

THE SYSTEMATICS AND BIOLOGY OF THE NEW
WORLD ANTS OF THE GENUS *PACHYCONDYLA*
(HYMENOPTERA: FORMICIDAE)

The Systematics and Biology of the New World Ants of the Genus *Pachycondyla* (Hymenoptera: Formicidae)

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FORWARD

The ant genus *Pachycondyla* is one of the most conspicuous of the Neotropical genera, a member of the subfamily Ponerinae and of the tribe Ponerini. It has had a long tradition in taxonomy, ecology and biology in general. It is a genus whose importance, unfortunately, is not proportional to the knowledge of its phylogeny and systematics. It is surprising that after about 150 years of its description we don't have a single monograph that covers the rich Neotropical fauna of the New World.

Fortunately myrmecologists in particular and biologists in general now have a revision for the genus *Pachycondyla* in the New World, a monograph that satisfactorily covers a group of ants so complex and rich in biology. As was explained by authors, *Pachycondyla* is probably not a natural genus and maybe paraphyletic or polyphyletic. The tribe Ponerini is probably a natural group, but the internal relations in the definition of genera is a theme that has been barely explored. There are no synapomorphies proposed for *Pachycondyla*, nor proposals for the clear separation between this genus and other closely related genera such as *Hypoponera*. The large numbers of names associated with *Pachycondyla* support the idea of previous authors to fragment the group into diverse genera, a proposition expressed by some modern investigators. The authors of this monograph correctly point out that there are no discrete morphological characters that clearly delimit the genera described in the past, for which the best option, at least for now, is to leave them as synonyms of *Pachycondyla*. This seems to me to be a good strategy as only future studies, using classical morphology, genes, biochemistry and other tools can evaluate the monophyly of the genus, the internal relations, and relationships with the other ponerines.

Independently of whether *Pachycondyla* is a natural grouping or not, it is certain that myrmecologists and biologists in general urgently need a revision that limits the species rationally and offers keys for identification. This is what we are offered in this work of Bill and Emma Mackay, who have spent many years doing field work, visiting collections and working in the laboratory to accomplish the difficult work of offering a synopsis of the fauna of these ants for the Americans. After studying the types and thousands of specimens of workers, females and males, Bill and Emma offer us in their revision the treatment of 92 species, of which 30 are new to science and 5 consist of new status.

The first pages offer a description of the genus based on the workers, females, males, and larvae, with appropriate illustrations, together with a glossary that appears at the end of the book, which provide a person with little familiarity with myrmecology the tools to interpret the keys and diagnoses. Another interesting part is the revision of the biology of the genus, which clearly shows that these ants have a large spectrum of strategies for life, a microcosm for ecologists and ethologists.

Following the introduction, the genus is divided into species complexes, and for each complex they offer diagnoses and comparative notes, followed by a complete key. The key is not only in English, but also Spanish and Portuguese, which will make this publication very welcomed by everyone in Latin America. Generally, keys for the identification of insect species and other groups can be the driest and sometimes most difficult part of a monograph or revision; it is not the case in this monograph: the keys offered by the authors are user friendly, well illustrated and in many cases offer alternative options to decide which route to follow. The bulk of this book is the synopsis of the 92 recognized species, with diagnoses, descriptions, illustrations, comparative notes, biology and distributions.

Is no doubt that this work will increment the study of the biology of the ponerine ants of the genus *Pachycondyla*. Equally, this book will stimulate the study of the taxonomy of the genus, now that we can correctly identify material in museums and in the field and possibly discover new species which will easily take the genus to more than 100 species in our hemisphere.

One of the most important aspects of Bill and Emma's publication, as they have done in previous publications, is the use user friendly language and understandable treatment for the reader, whether it is a myrmecologist, general entomologist, ecologist, ethologist, naturalist or only someone simply curious about the biology of these interesting hymenopterans. Thanks to both of these authors for creating in this book an eagerly awaited synthesis of the biology and systematics of *Pachycondyla*.

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PREFACE

Members of the ant genus *Pachycondyla* are among the most interesting and obvious ants, especially in the Neotropical regions of the New World. Unfortunately the genus has been in a state of taxonomic confusion, with many of the common species being unknown or unidentifiable. Hopefully this work will make the identification of these ants feasible.

We have tried to keep the terminology as simple as possible so that ecologists and behaviorists will be able to expand their work on this fascinating genus, without needing to be familiar with the details. We keep the technical details brief, and have included many of them as footnotes. Specific localities are listed to help researchers to collect the species. Countries are in capital letters, states, provinces, departments and similar political divisions are in italics. The range maps indicate the general distributions. Larger countries are hatched on the maps, smaller countries are filled to make them easier to see. The deposition of specimens in museums is listed when only a few specimens are known. Abbreviations for the museums can be found at the end of the book. We have checked the identities of species with type material whenever possible, but some types have been lost or destroyed during the last 100 - 150 years since they were described. We provide two sets of keys based as much as possible on separate characters. Specimens can be identified with the complete key, and the identification checked with the keys to species complexes. In addition, sections with the comparisons with other species will help to confirm the identities.

The book was carefully edited by Drs. John Longino, Alex Wild and Fernando Fernández, who checked the keys in English. Tania Arias checked the Spanish key and Ana Yoshi Harada checked the Portuguese key. We greatly appreciate these outstanding myrmecologists for improving this work.

We dedicate this book to our children, Mary Ana, Joseph Luis (deceased) and Linda Christina, who have not only tolerated their parents' unusual hobby, but have actively assisted in the collection of specimens. When Mary Ana was a small child, she asked one of her friends where her parents kept their ant collection, as she assumed that all grownups collected ants! Both daughters worked on various ant projects during their schooling and have coauthored papers and presentations with us. We were extremely lucky to have kids who participated under various trying field conditions without any time complaining about tedious jobs like collecting all of the ants in a log or in a bucket of soil. We will be forever grateful to them.

William and Emma Mackay, El Paso, TX, Wednesday, Friday, January 29, 2010.

ABSTRACT

The New World species of the ant genus *Pachycondyla* are revised. The species include *P. aenescens* Mayr, *P. agilis* (Forel) (= *P. goyana* **new synonymy**), *P. antecurvata* **new species**, *P. apicalis* (Latreille), *P. arhuaca* (Forel), *P. becculata* **new species**, *P. breviscapa* **new species**, *P. bucki* (Borgmeier), *P. bugabensis* Forel **new status**, *P. carbonaria* (F. Smith) (= *P. atrovirens*, = *P. atrovirens* race *splendida* **new synonymies**), *P. carinulata* (Roger) (= *P. carinulata* race *azteca*, = *P. carinulata gibbinota* **new synonymies**), *P. cavinodis* (Mann), *P. cernua* **new species**, *P. chinensis* (Emery), *P. chyzeri* (Forel), *P. cognata* (Emery), *P. commutata* Roger, *P. concava* **new species**, *P. conicula* **new species**, *P. constricta* (Mayr), *P. constricticeps* **new species**, *P. cooki* **new species**, *P. coveri* **new species**, *P. crassinoda* (Latreille), *P. crenata* (Roger), *P. curiosa* **new species**, *P. curvinodis* Forel **new status**, *P. dismarginata* **new species**, *P. donosoi* **new species**, *P. eleonorae* (Forel), *P. emiliae* (Forel), *P. fauveli* Emery, *P. ferruginea* (F. Smith) (= *P. ferruginea* variety *panamensis* **new synonymy**), *P. fiebrigi* (Forel) **new status**, *P. fisheri* **new species**, *P. foetida* (Linnaeus), *P. fusca* **new species**, *P. fuscoatra* (Roger), *P. gilberti* (Kempf), *P. gilloglyi* **new species**, *P. gilva* (Roger) (= *Ponera ochracea* race *guatemalensis* **new synonymy**), *P. globularia* **new species**, *P. goeldii* (Forel) (= *Neoponera lydiae* **new synonymy**), *P. guianensis* (Weber) (= *Wadeura haskinsi* **new synonymy**), *P. harpax* (Fabricius), *P. hispida* **new species**, *P. holcotyle* **new species**, *P. holmgreni* (Wheeler), *P. impressa* (Roger), *P. inca* Emery **new status** (= *P. fuscoatra* variety *cearensis*, **new synonymy**), *P. insignis* **new species**, *P. inversa* (F. Smith), *P. laevigata* (F. Smith), *P. latinoda* **new species**, *P. lattkei* **new species**, *P. lenis* Kempf, *P. lenkoi* Kempf, *P. leveillei* (Emery), *P. lineaticeps* Mayr, *P. longidentata* **new species**, *P. lunaris* (Emery), *P. luteola* (Roger), *P. magnifica* Borgmeier, *P. marginata* (Roger), *P. metanotalis* Luederwaldt, *P. minuta* **new species**, *P. mirabilis* **new species**, *P. moesta* Mayr **new status** (= *Neoponera stipitum*, = *Neoponera unidentata* stirps *sulcatula*, = *Neoponera crenata* stirps *confusa*, = *Neoponera mesonotalis* **new synonymies**), *P. oberthueri* Emery, *P. obscuricornis* Emery, *P. pergandei* (Forel), *P. procidua* Emery, *P. purpurascens* Forel, *P. recava* **new species**, *P. rostrata* Emery, *P. rugosula* Emery **new status**, *P. rupinicola* **new species**, *P. schoedli* Mackay and Mackay, *P. schultzi* **new species**, *P. solisi* **new species**, *P. stigma* (Fabricius) (= *Ponera stigma* var. *attrita*, = *Euponera stigma* variety *rufescens* **new synonymies**), *P. striata* F. Smith, *P. striatinodis* Emery (= *Neoponera rugosinodis* **provisional synonymy**), *P. succedanea* (Roger) (= *Euponera cauta*, = *Euponera stigma compressinodis* **new synonymies**), *P. tarsata* (Fabricius), *P. theresiae* Forel, *P. unidentata* Mayr, *P. venusta* (Forel), *P. verenae* (Forel), *P. vieirai* **new species**, *P.*

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villosa (Fabricius) and *P. zuparkoi* **new species**.

Species complexes are defined for the New World species. Identification keys, descriptions and distribution maps, together with notes on the habitats and biology of the species are included.

Introduction

Genus *Pachycondyla*

TAXONOMIC HISTORY OF THE GENUS

Formica (in part): Latreille, 1802:198

Ponera (in part): Illiger, 1807:194

Ponera (*Myrmecia*) (in part): Latreille, 1809:128

Pachycondyla F. Smith, 1858:105

Bothroponera Mayr, 1862:713 (synonymy by Wilson, 1958:361; Snelling, 1981:389; Bolton, 1995:40)

Megaponera Mayr, 1862:714 (synonymy by Bolton, 1995:40, 2003:166)

Paltothyreus Mayr, 1862:714 (synonymy by Bolton, 1995:41, 164)

Ectomyrmex Mayr, 1867:83 (synonymy by Brown, 1973:180; Snelling, 1981:389; Bolton, 1995:40)

Ophthalmopone Forel, 1890:cxii (synonymy by Bolton, 1995:41, 164)

Ponera (*Euponera*) Forel, 1891:126 (synonymy by Bolton, 1995:29, 41)

Cryptopone Emery, 1893:cclxxv **new synonymy**

Euponera (*Mesoponera*) Emery, 1900a:668 (synonymy by Brown, 1973:182; Bolton, 1995:41)

Pachycondyla (*Pseudoponera*) Emery, 1900b:314 (synonymy by Brown, 1973:184; Snelling, 1981:389; Bolton, 1995:41)

Euponera (*Brachyponera*) Emery, 1900b:315 (synonymy by Snelling, 1981:389)

Neoponera Emery, 1901a:43 (synonymy by Brown, 1973:183; Bolton, 1995:41)

Megaloponera (*Hagensia*) Forel, 1901b:333 (synonymy by Bolton, 1995:41, 164)

Eumecopone Forel, 1901b:335 (synonymy by Brown, 1973:180; Snelling, 1981:389; Bolton, 1995:40)

Euponera (*Trachymesopus*) Emery, 1911:84-85 (synonymy by Brown, 1973:185; Bolton, 1995:41)

Ponera (*Xiphopelta*) Forel, 1913:108 (synonymy by Brown, 1973:185; Snelling, 1981:389; Bolton, 1995:41)

Termitopone Wheeler, 1936:159 (synonymy by Brown, 1973:185)

Termitopone (*Syntermitopone*) Wheeler, 1936: 169 (synonymy by Borgmeier, 1959:312 ; Snelling, 1981:389; Brown, 1973:185)

Wadeura Weber, 1939:102 (synonymy by Brown, 1973:185)

Pseudoneoponera Donisthorpe, 1943:439 (synonymy by Wilson, 1958:361; Brown, 1973:184; Bolton, 1995:40)

Type of the genus: *Formica crassinoda* Latreille, 1802 (designated by Emery, 1901a:42)

BRIEF HISTORY OF THE GENUS

The genus *Pachycondyla* was described by Frederick Smith in 1858 and form a group of mostly medium to large ants belonging to subfamily Ponerinae. Later, Roger (1863a), Mayr (1863) and others considered this genus to be heterogeneous and broke out several new genera, including *Neoponera* Emery (1901a), *Mesoponera* Emery (1901) and *Termitopone* Wheeler (1936). Brown (1973) considered these genera to be synonyms of *Pachycondyla*. The genus will probably be broken into a number of genera, and *Cryptopone* will probably be recognized as a separate genus in the future (Schmidt, pers. comm.).

CHARACTERIZATION OF THE GENUS

Pachycondyla is a heterogeneous genus, but the morphological characters that have been used to separate constituent genera and subgenera are not consistent. For example, the malar carina may be absent, partially developed, or extend completely between the anterior edge of the head and the eye. Members of the *apicalis* species complex (previously considered to be members of *Neoponera*) have a well-developed malar carina, whereas members of the apparently closely related (based on the structure of the mesosoma and petiole) *fauveli* species complex (previously members of *Mesoponera*) do not. Members of the previous genus *Mesoponera* have the metanotal suture deeply depressed (*P. constricta*) to weakly depressed (*P. arhuaca*). Some of the members of the previous genus *Mesoponera* belong to the *crassinoda* species complex, others the *ferrugineus* species complex and others to the *fauveli* species complex. Members of the genus *Termitopone* are typical *Pachycondyla*, which were separated by being large and shiny black ants and are apparently related to the *apicalis* species complex. Wheeler and Wheeler (1952) reinforced the difficulty of separating this genus into taxa, as the larval morphology does not support the recognition of subgenera. Different larvae of species in the same subgenus may belong to different types, whereas larvae from species of different subgenera may belong to the same type.

The genus *Cryptopone* was described by Emery in 1893, and apparently separated from *Pachycondyla* approximately 75 million years ago (Moreau et al., 2006). It has been separated from *Pachycondyla* on the basis of coarse, conical setae on the extensor surface of the middle tibia, absence of eyes, by the presence

of a depression on the base of the mandible and by the two-segmented maxillary and labial palps. Later Weber (1939) described a new genus, *Wadeura*, based on the unusual form of the mandibles (elongated with a long slender apical tooth), which was later synonymized with *Pachycondyla* (Brown, 1973). *Wadeura guianensis* is basically a *Cryptopone* with unusual mandibles. Unfortunately the characteristics used to separate the three genera are poor. The coarse conical setae may be poorly developed in some *Cryptopone* (*P. gilva*), the eye may be present, but poorly defined and the impression at the base of the mandible may be so poorly developed that it is difficult to see (*P. gilva*), may be combined with a furrow (*P. holmgreni*), or may be completely absent (*P. mirabilis*). *Cryptopone* is closely related to the *stigma* complex of *Pachycondyla* and members are often nearly impossible to place in one complex or the other. Thus *Cryptopone* is synonymized with *Pachycondyla* based on morphology.

There does not appear to be a single, derived characteristic (synapomorphy) that can be used to define *Pachycondyla* and it could be paraphyletic or even polyphyletic. This has made the separation of *Pachycondyla* into several genera particularly attractive. Unfortunately, these genera apparently cannot be morphologically separated, making it an unattractive alternative. We have chosen to put all of the species into a single genus, following Brown (1973). Key characters, such as the shape of the propodeal spiracle, the degree of impression of the metanotal suture and the presence or absence of the stridulatory file appear to have little phylogenetic importance, as they appear or are lacking within members of different species complexes. Perhaps molecular techniques will allow us to understand the phylogeny of this genus. At the present time, there is no justification for the recognition of the subgenera.

RELATIONSHIPS OF THE NEW WORLD SPECIES TO OTHER GENERA

Pachycondyla is closely related to *Hypoconera* and it is difficult to distinguish the two genera, which apparently separated 100 million years ago (Moreau et al., 2006). Most species of *Pachycondyla* have two spurs on the middle and posterior tibia (all New World species except for *P. leveillei*, which is probably best considered to be a member of *Hypoconera*, Dash, in prep.). *Hypoconera* has a single, pectinate spur on the middle tibia and a pectinate or barbulate spur on the posterior tibia (Bolton, 2003). The spurs on *Pachycondyla* range from simple to pectinate (Bolton, 2003). The New World species of *Pachycondyla* that were examined had a palpal formula of 4-segmented maxillary palp and a 4-segmented labial palp, but note that Kempf (1958) reports that *P. guianensis* (as *P. haskinsi*) has a 4-segmented maxillary palp and a 3-segmented labial palp. Bolton (2003) lists 4,4; 4,3, 3,3 and 2,2 for *Pachycondyla*,

Hypoponera has papal formulae of 1,4; 1,3; 1,2; 1,1 (Bolton, 2003). The New World species of *Pachycondyla* have at least 5 well-developed teeth; the mandibles of all of nearly all of the New World species of *Hypoponera* we have seen have only tiny denticles (*H. iheringi* often has teeth developed apically), with only the apical tooth developed. *Pachycondyla leveillei* has a number of small mandibular teeth. Members of the *stigma* species complex appear nearly identical to those of *Hypoponera*, except for the characters listed above. The borders between *Hypoponera* and *Ponera* are poorly defined, especially in the species from Madagascar (Fisher, pers. comm.) and in the New World *Hypoponera perplexa*. This is also true of the Madagascar species of *Pachycondyla*. For example, *Pachycondyla ambigua* André (Madagascar, Sierra Leon) has the sharp posterior angles on the subpetiolar process very similar in structure to members of *Ponera*. Other species in the New World have a similar subpetiolar process, especially members of the *stigma* and *crenata* species complexes. It may be possible that species of the three genera will not be able to be separated when all of the species are examined. *Pachycondyla guianensis* has a 4 or 5-toothed mandible and based on its mandible, Weber (1939) suggested it might be related to the Old World *Pseudoponera* (now *Pachycondyla* with type species *P. stigma*, see Bolton, 1995:45) and *Promyopias* (now a synonym of *Centromyrmex*, see Brown, 1973:184; Bolton, 1994:164).

The genus is represented in the fossil record from the Dominican amber (Wilson, 1985), as well as from the Paleocene and Eocene (Rust and Møller Andersen, 1999) and the Oligocene Baltic amber and Miocene Chiapas amber (Helava et al., 1985).

THE WORKERS, FEMALES AND MALES

Worker

The worker (Fig. 1) is usually a medium to large ant (total length 1 cm or more), although smaller species are known (5 mm or less total length). Most species are black, a few are dark with yellowish appendages and a minority is yellow or orange. The mandible is well developed and the mandibular teeth range in number from 4 to more than 20 (Fig. 2). Most species have about a dozen teeth. The clypeus is divided transversely by a carina (called the midsagittal keel by Kempf, 1960a) into the anteclypeus and postclypeus, a carina which may be poorly developed and not obvious. The postclypeus usually projects medially over the anteclypeus. The frontal lobes are well developed and most or all of the attachment of the antenna is hidden with the head in frontal view. The eyes are nearly always developed and can be quite large, occupying $\frac{1}{3}$ of the side of the head. The antenna has 12 segments. The scape usually extends to the posterior lateral corner of the head and extends past the posterior lateral corner of the head

in many species. The pronotum is usually swollen at the shoulder and often forms a sharp carina. The mesonotum is usually relatively short and may be divided from the propodeum by well-developed metanotal suture. The propodeum never has spines or teeth, but may be angulate between the faces. The propodeal spiracle ranges in shape from circular to slit-shaped. The petiole varies greatly in shape, ranging from narrow, without a dorsal face, to broad, with a well-developed dorsal face. The postpetiole is fused to the remainder of the metasoma and the anterior face is often vertical and may form an angle with the dorsal face. A stridulatory file is often present on the second pretergite (fourth abdominal tergite). Arolia may be present between the tarsal claws and are apparently inflatable.

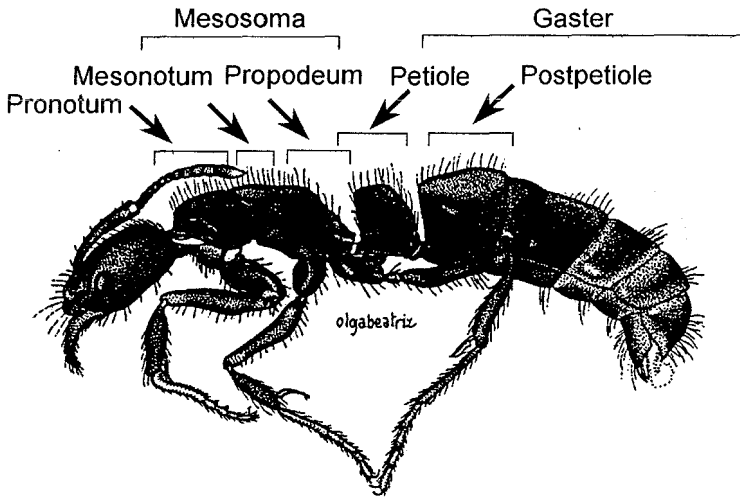


Fig. 1. Side view of a worker of the genus *Pachycondyla harpax* (from Serna, 1999, used with permission).

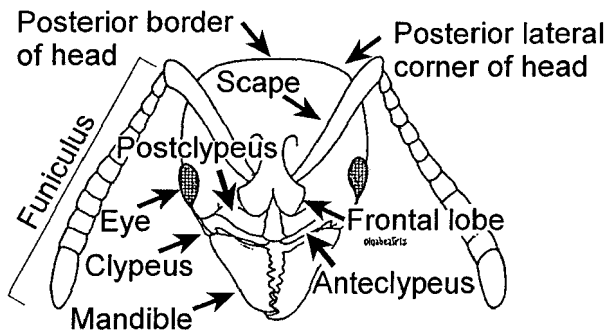


Fig. 2. Head of a worker of *Pachycondyla* sp. (modified from Serna, 1999, used with permission).

Bolton (2003) lists palpal formulae of 4,4; 4,3; 3,3 and 2,2 as possibilities for *Pachycondyla* (# of maxillary palp segments, # of labial palp segments). The New World species that were examined had 4-segmented maxillary palps and 4-segmented labial palps (Fig. 3). The females of *P. tarsata* (Old World species, possibly found in Brasil) have a formula of 4,4 or 5,4, the males 6,4. Most of those members that have been examined and that previously belonged to *Cryptopone* have 2,2 (Fig. 3).

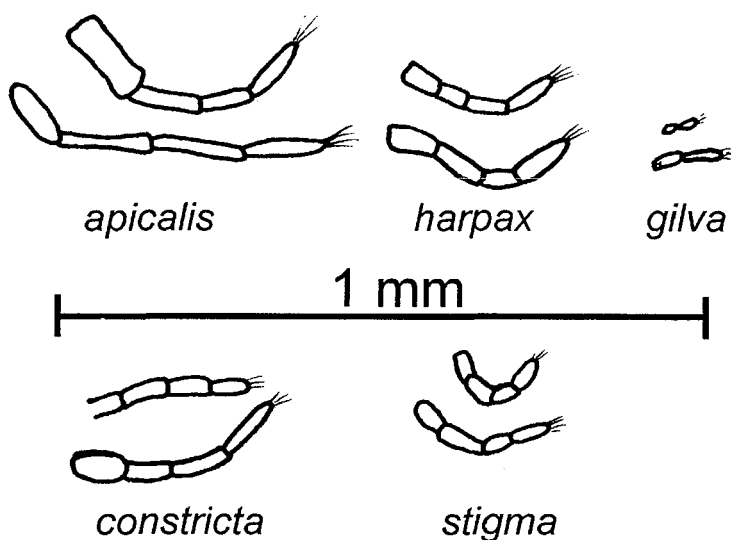


Fig. 3. Labial (top) and maxillary (bottom) palps of workers of *P. apicalis* (Granada, Nicaragua, CWEM), *P. harpax* (Petén, Guatemala, CWEM), *P. gilva* (Matagalpa, Nicaragua), *P. constricta* (San José, Costa Rica, CWEM) and *P. stigma* (Alta Vera Paz, Guatemala, CWEM)¹.

The coxal cavities are closed (completely surrounded by a raised ridge - 4).

¹ Simple technique for palp dissection: Remove the head. If the specimen has been dried, soak it in alcohol for a few minutes. Make a ball of Plasti-tak®, or similar, flexible material, flatten one side and make a depression in the other side with the handle of your forceps. Fill the depression with alcohol and place the head in the depression, upside down. Push an insect pin completely through the head, about in the middle of the underside, to anchor it. Insert a second pin between the mandibles to anchor them, use a third pin to open the labrum. The maxilla and labium will usually be packed in the buccal cavity and covered with the labrum. Bend the labrum back and insert a pin along the side of the buccal cavity. The maxilla and labium will be forced outwards. When you are sure the mouthparts are permanently extruded, remove the pins and glue the head upside down on a mounting triangle and place it on the pin below the specimen. Be sure the palps are in a position where they can be seen, before the head dries completely.

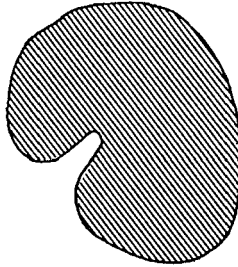


Fig. 4. Closed coxal cavity of the posterior left leg of a worker of *P. apicalis* (Granada, Nicaragua, CWEM).

The metasternal process, located between the two posterior coxae², is always well developed and the shape is somewhat characteristic for each of the species complexes (Fig. 5). The form ranges from well-formed, triangular lobes (*aenescens*, *apicalis*, *crassinoda*, *foetida* and *laevigata* species complexes), closely placed lobes (*crenata* and *ferruginea* species complexes) to fang-like (*constricta* and *stigma* species complexes) and finally to small, triangular processes (*ochracea* and *mirabilis* complexes). The last groups differ little from those of the ant genus *Hypoponera*. The shape is remarkably consistent within a species and in many cases they are distinct enough to be used for species recognition.

The form of the subpostpetiolar process is also important for defining species complexes (thanks to Shawn Dash for suggesting that this character could be useful), and will be discussed within each of the complexes. Basically there are four types: the first group consists of those that have no process, or the process consists of a slightly elevated triangle, and includes the complexes *arhuaca*, *ferruginea*, *ochracea* and *rubra*. The second group has a process which consists of a lobe which may be sharp, and includes the complexes *aenescens*, *apicalis*, *constricta*, *crassinoda*, *crenata emiliae*, *foetida*, and *laevigata*. The third group has a tooth similar to the second group, but the tooth is followed by a ventral longitudinal carina on the ventral surface of the postpetiole. This group includes *P. tarsata* and *P. lenkoi* (a species we have assigned to the *stigma* species complex, as it does not appear related to *P. tarsata*). The fourth group has a rounded collar-like flange which points somewhat anteriorly under the articulation with the petiole and has a slightly concave anterior face. This group includes only the *stigma* species complex. The form of the process in *P. curiosa* cannot be seen in the single holotype. In general, this structure is similar in the worker, female and male of these complexes, which may be useful for sorting males to a species complex.

² It is usually necessary to remove the left posterior leg to view the process, although it can often be seen well enough if the gaster is elevated and one looks ventrally between the two attached coxae.

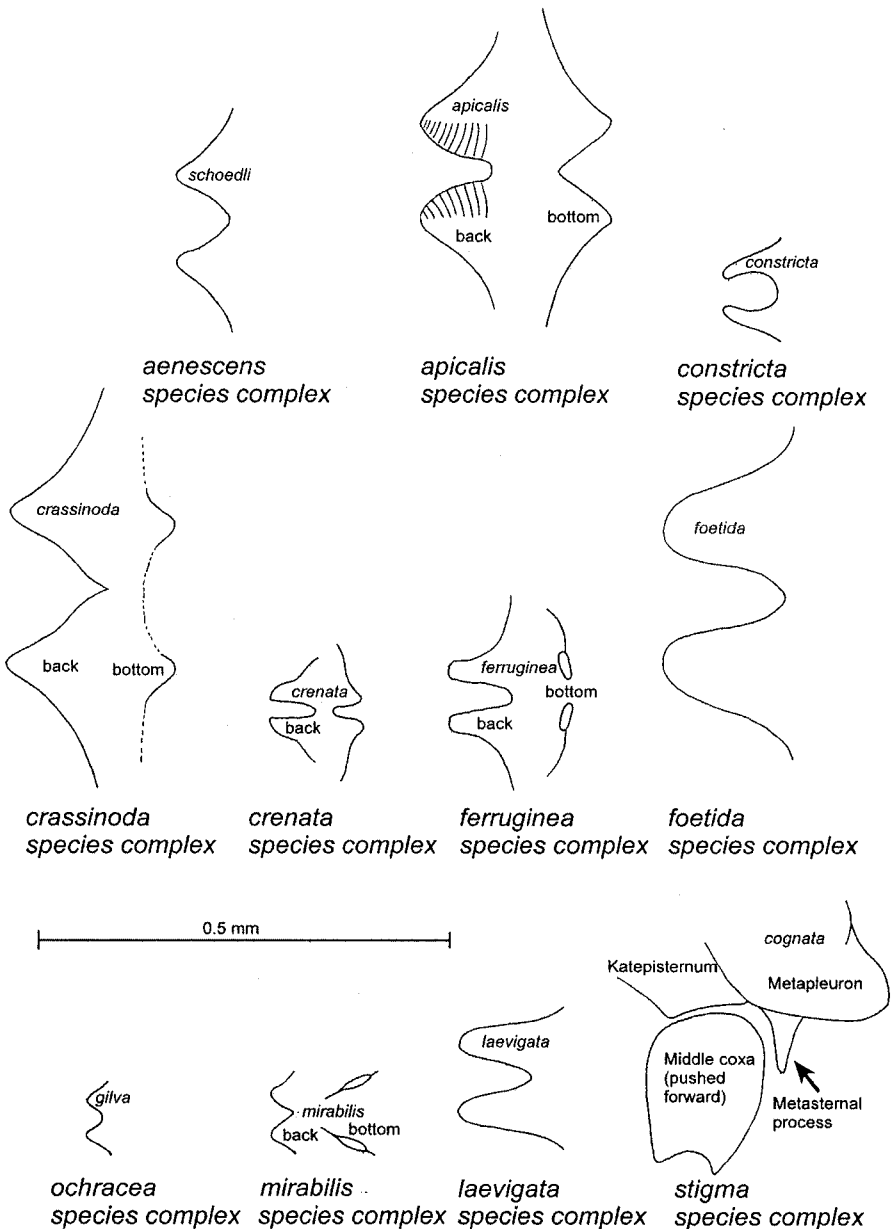


Fig. 5. Metasternal processes of *Pachycondyla* workers, including *P. schoedli* (paratype), *P. apicalis* (Granada, Nicaragua), *P. constricta* (Río San Juan, Nicaragua), *P. crassinoda* (Bolívar, Venezuela), *P. crenata* (Río San Juan, Nicaragua), *P. ferruginea* (Chiapas, México), *P. foetida* (Meta, Colombia), *P. gilva* (Matagalpa, Nicaragua), *P. mirabilis* (Rosario, Bolivia), *P. laevigata* (Panamá, Panamá) and *P. cognata* (Heredia, Costa Rica). (All specimens from CWEM).

Most species have fairly abundant erect hairs, especially on the clypeus, the mandibles, the mesosoma, the petiole and the gaster, these hairs may be nearly completely missing, or may also be very abundant on the surfaces mentioned above, as well as on the head and the legs. Appressed pubescence is often present and may be sparse to dense and range in color from white to golden.

The workers vary in sculpturing, but most surfaces are usually punctate and opaque. Striae may be present on many surfaces and the worker may even be nearly completely smooth and glossy.

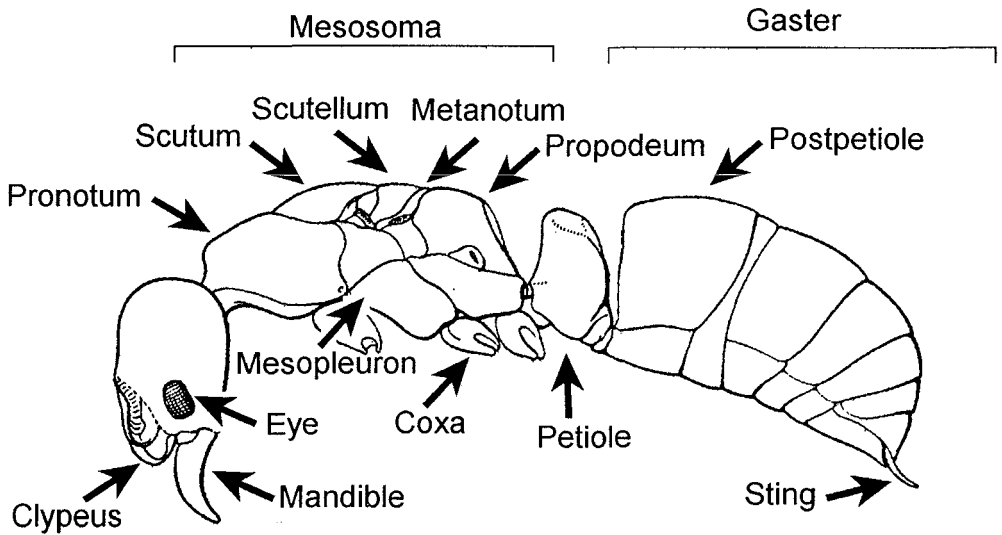


Fig. 6. Side view of a female of *Pachycondyla harpax* (modified from Creighton, 1950).

Female

The female is similar to the corresponding worker (Fig. 6). Most specimens are large (total length over 1 cm), but small species are also common. The mandibles are well developed, with several well-formed teeth (usually at least 10). The eye is large, with many ommatidia. The antenna has 12 segments; the scape usually extends at least to the posterior lateral corner of the head. The pronotum is often swollen at the shoulder and a sharp carina may be present. The mesosoma is thickened and adapted for flight and all of the known species in the New World have wings. The mesopleuron is clearly divided into an upper anepisternum and a lower katepisternum by the mesopleural oblique suture. The metanotum is always well developed, with well-developed scutellar metanotal and metanotal propodeal sutures, even in species in which the workers lack the

metanotal suture. Unfortunately the suture is not more depressed in species in which the worker has a deeply depressed metanotal suture. The petiole and postpetiole are similar in form to the corresponding worker, as is the subpetiolar process. These characteristics make it possible to identify many females not associated with workers. The file on the second pretergite may be present, as well as the arolia on the tarsi. All of the tibiae have two spurs (possible exception: unknown female of *P. leveillei*).

The venation of the wing (Figs. 7 & 8) is typical for members of the tribe Ponerini, as well as most of the other tribes of the poneromorph ants. The costal, median and submedian cells are always well developed, as are the first cubital, marginal, the first and third discoidal cells and the second discoidal cell. We had hoped that the shapes and sizes of the cells, especially the first and third discoidal cells, would help define the species complexes and perhaps show the relationships between them. Unfortunately this does not appear to be the case, as there is much variability within a species complex, minor differences between the males and females and even differences between the two wings of a single specimen. Additionally, the males and/or females of many of the species are unknown.

Erect hairs are usually abundant on most surfaces, but are relatively sparse in many of the species. Appressed pubescence is similar to that of the corresponding worker.

Most surfaces are punctate and dull, although some may be covered with striate and some species are even predominately smooth and glossy.

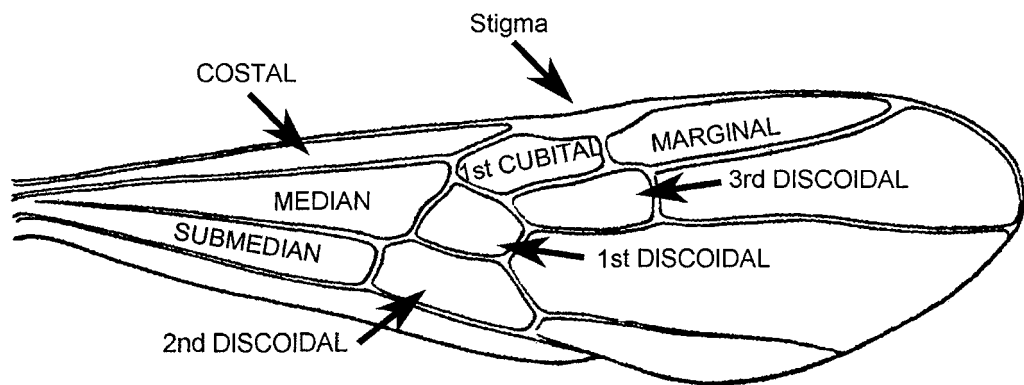


Fig. 7. Forewing of a female of *P. harpax* (modified from Creighton, 1950), showing the cells of the wing.

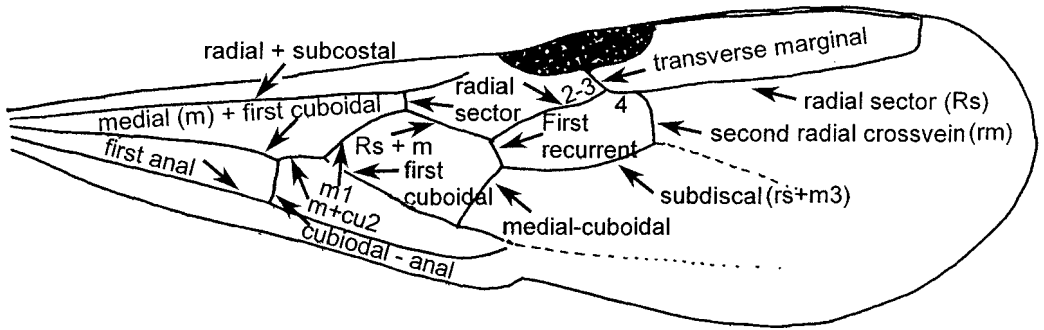


Fig. 8. Left forewing of a female of *P. gilva* (Matagalpa, Nicaragua, CWEM), showing the wing venation.

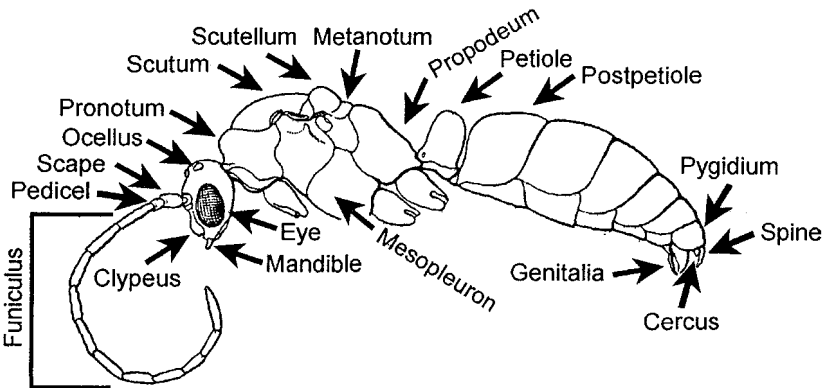


Fig. 9. Side view of a male of *Pachycondyla harpax* (from Creighton, 1950).

Male

The male (Fig. 9) is usually small (total length less than 10 mm), although larger males are found. Most males are dark or black; a few are yellow or orange. The mandibles are tiny and do not meet medially (Fig. 10). The palpal formula is normally 6,4 (Fig. 11), but some species, for example *P. striata*, have a palpal formula of 5,4 (Kempf, 1961). The clypeus is small and poorly defined and is often swollen medially. The eyes are well developed and usually occupy most of the side of the head. Three ocelli are present and range in diameter in different

species. The frontal lobes and frontal carina are poorly developed, exposing the insertions of the scapes. The antenna has 13 segments. The scape is short (shorter than the funicular segments) and the pedicel is even shorter, the remaining segments are elongated. The pronotum may be swollen at the shoulder, but a distinct margin is absent. The scutum usually has parapsidal sutures; Mayrian sutures are usually present. The scutellum is often bulging above of the remainder of the mesosoma. The shape of the petiole varies among species and is often similar to that of the worker. The postpetiole is fused to the gaster, as in the worker. The stridulatory file is present on the second pretergite of species in which the workers and females have stridulatory files. The arolia are also developed in those species in which the arolia are developed in the workers and females. The down-turned pygidial spine is always well developed, as are the cerci. Males are relatively rare and the genitalia (Fig. 12) of only three common species were dissected (*P. cognata*, *P. aenescens* and *P. villosa*). They are of the generalized formicid type, with well-developed parameres, a well-developed bilobed aedeagus, but having tiny ventral teeth and poorly developed, knob-shaped volsellae.

Erect hairs are usually less dense than those of the corresponding worker, although some species have abundant erect hair. Appressed pubescence may also be present.

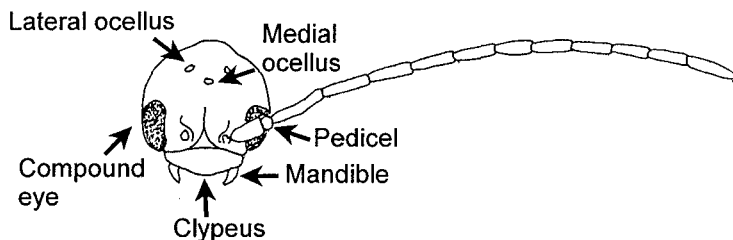


Fig. 10. Head of a male of *P. marginata* (from Wheeler, 1936).

Most species are opaque and dull, but in a few species in which the workers are smooth and shiny the males are also mostly smooth and shiny.

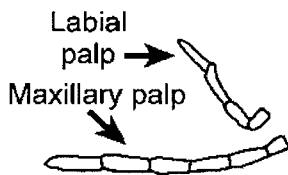


Fig. 11. Labial and maxillary palps of a male of *P. crenata* (Costa Rica).

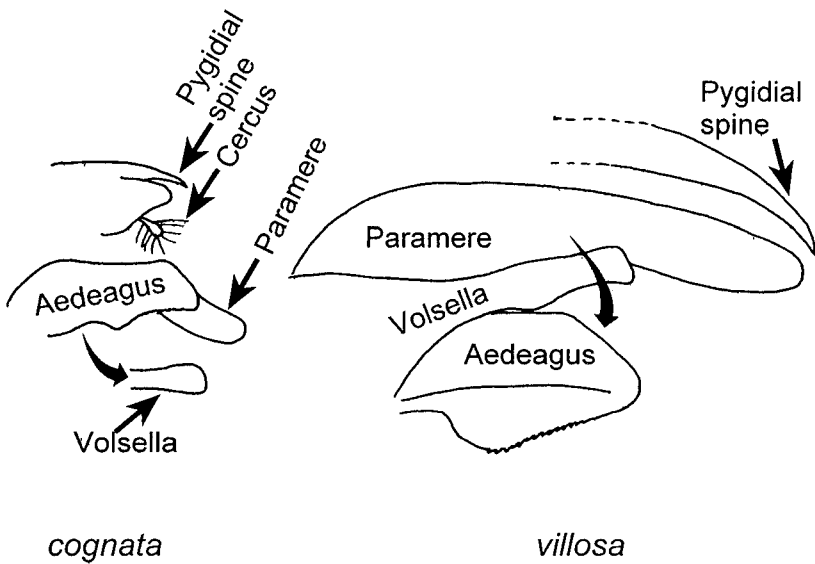


Fig. 12. Genitalia of males of *P. cognata* (Heredia, Costa Rica) and *P. villosa* (yellow gaster form, Canal zone, Panamá, CWEM).

DEVELOPMENT

The first developmental stage is the egg, which is normally laid by the queen, but eggs laid by workers of *Pachycondyla stigma* may become males or serve as a food source, especially for the queen (Camargo Mathias and Caetano, 1995a; Oliveira et al., 1998). The egg hatches into a first instar larva (Fig. 13) and within a few days, passes through several instars (developmental stages) and finally becomes a pupa. The pupa makes a tough, dark brown bag of silk, in which it develops. This is often considered a “resting” stage, but metabolically it is a very active stage in ants (Mackay and Sassaman, 1984). It later “hatches” (ecloses) to become an adult worker. *Pachycondyla gilva* remains as an egg for 30 - 31 days, as a larva 22 - 35 days and as a pupa for 31 - 33 days (Haskins, 1931). Development from egg to adult in *P. caffraria* requires about 60 days in laboratory colonies (Villet, 1990). The callow (immature adult) is usually somewhat pale in comparison to the adults and the integument is very soft. Within a few days the integument darkens and hardens and the ant begins life as an adult. In most ants, the workers first toil within the nest, caring for the brood and the gyne, nest excavation etc. and only become foragers late in their lives. This phenomenon is referred to as age polyethism and was described in *Pachycondyla* by Fresneau and Dupuy (1988).

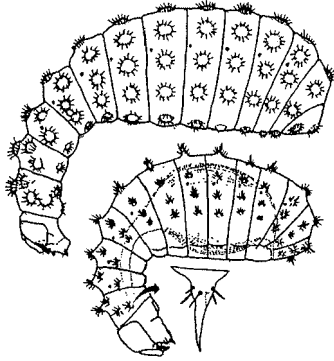


Fig. 13. Late instar larva and young larva of workers of *P. harpax* (From Wheeler, 1900). The inset shows an enlargement of the tubercles of the young larva.

Wheeler and Wheeler (1952) characterize the larvae of the tribe Ponerini as having the body covered with tubercles (Fig. 14). The tubercles in many species of *Pachycondyla* are not smoothly rounded bosses, but actual projections that extend from the surface. The body hairs are usually few and small and mostly associated with the tubercles. The tubercles are often covered with tiny spinulae or minute spines. The tubercles may defend the larvae from each other (Wheeler, 1910), or may simply allow them to be more easily picked up and moved by the workers. The larva of *Pachycondyla* is shaped like a crook-necked squash, with the thorax and first two abdominal somites forming a stout, moderately long neck, which is strongly bent ventrally (Wheeler and Wheeler, 1952). The remainder of the body is broadened and swollen. The anus is terminal and is surrounded by small tubercles.

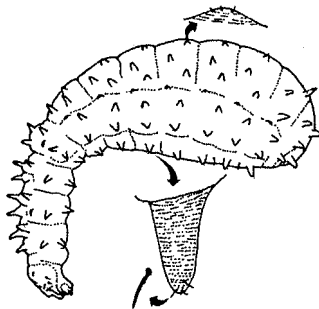


Fig. 14. Larva of a worker of *P. constricta* (from Wheeler and Wheeler, 1952). The insets show enlargements of the tubercles and an enlargement of a hair.

The head (Fig. 15) is well developed and is equipped with sharp-tipped mandibles (heavily sclerotized and adapted for eating solid food), antennae, labrum, maxillae and labium. The head generally has a single pair of ocelli, a well-developed antenna and well-developed labial and maxillary palps.

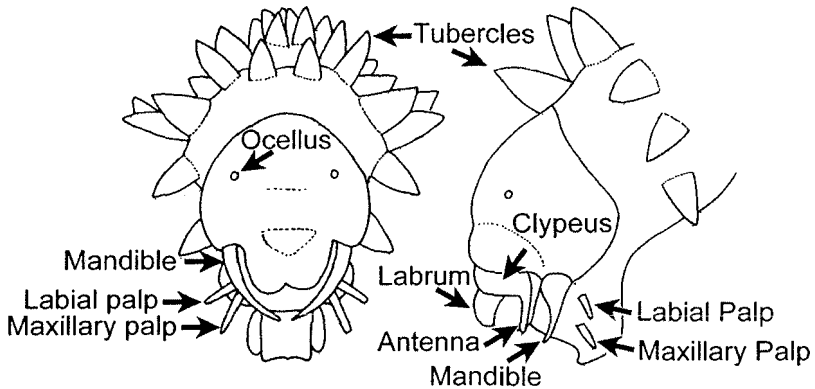


Fig. 15. Head of a worker larva of *P. stigma* (unknown locality, MCZC), as seen from the front and from the side.

The larvae have been studied for only a few species but appear to be useful for defining the species complexes and may be useful for resolving the phylogeny of the genus. The form of the tubercles appears to be especially important in recognizing broad groups within *Pachycondyla*. Probably the most basal larval form is that of the *crassinoda* complex (Group 1), which are simply covered by bumps surrounded by hairs. This condition is similar to that found in *Dinoponera*, *Myopias* (= *Trapeziopelta*) and *Diacamma* (Wheeler and Wheeler, 1952). Species with this form of larvae include *P. harpax*, *P. impressa* and *P. striata*. Members of a group of complexes, including the *apicalis* complex (*P. apicalis*), the *constricta* complex (*P. constricta*), the *crenata* complex (*P. crenata*, *P. donosoi*), the *foetida* complex (*P. villosa*) and the *stigma* complex (*P. cernua*, *P. stigma*), form a second Group and have at least the anterior half of the larva covered with elongated, slender, finger-like tubercles. The similarities of the larvae of this morphologically diverse group suggest that they are not as different as the worker morphology would suggest. The larva of the ant genus *Myopias* is especially interesting as it seems to show a combination of the swellings and the elongate tubercles (Wheeler and Wheeler, 1952) that are found in these two groups (Group 1 and Group 2) of *Pachycondyla*. The larvae of the *ochracea* complex (*P. gilva*, *P. mayri*), *rubra* complex (*P. chinensis*) as well as the *leveillei* complex (*P. leveillei*) form Group 3, which have similar tubercles, but those on the dorsum of the posterior part of the larva are doorknob-shaped. Interestingly, similar tubercles

are also found in the larva of *Ponera pennsylvanica* (Fig. 16) and *Hypoponera*, which suggests that these two genera were derived from a *Pachycondyla* ancestor.

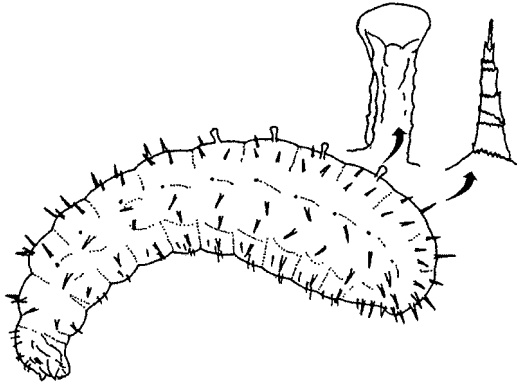


Fig. 16. Larva of a worker of *Ponera pennsylvanica* (from Wheeler and Wheeler, 1952). The insets show enlargements of the two types of tubercles.

These tubercles are used by *Hypoponera eduardi* to attach the larvae to the walls and ceilings of the nests (Escoubas et al., 1987). Finally, a fourth Group of larvae have the slender tubercles (but the region around the base is swollen) and are called mammiform by Wheeler and Wheeler (1952). This group includes *P. fisheri* and possibly the remainder of the members of the *aenescens* as well as the ventral tubercles of *P. striata*. The *ferruginea* species complex may form a fifth Group, unfortunately the larvae are known only from *P. rupinicola* at this time. These larvae have modified, elongate tubercles, but also have some button like structures on the dorsum of the posterior half, which may be homologous with the doorknob-like tubercles in Group 3 larvae.

Odontomachus and *Anochetus* have tubercles (Wheeler and Wheeler, 1952) similar to those of *Ponera*, suggesting a possible close relationship. The tubercles of these two genera also resemble the tubercles of the young larva of *P. harpax*. The larvae should be very useful in working out the phylogeny of the Ponerini.

Wheeler (1900) described the feeding behavior of the larvae of *P. harpax*. They lie on their backs and eat pieces of insects, or insert their entire heads into the bodies of the prey and eat the softer tissue. The larvae cover the prey with salivary gland secretions, which partially digest the prey, after which it is eaten by the larvae, as well as surrounding workers (Wheeler, 1918a). After the workers extracted the liquids from carpenter ant larvae (*Camponotus sansabeanus*), they placed the crumpled and pulpy remains into the trough-like ventral surface of the larvae. The *Pachycondyla* larvae eagerly ate the entire remains of the *Camponotus*

larvae. Apparently workers of *P. lutea* are fed only liquid food (Wheeler, 1933; Haskins and Haskins, 1950).

The behavior of the larvae of *P. gilva* was described by Haskins (1931). They are separated from the eggs and fed bits of solid food. When food is introduced, the larvae stretched their necks to search for it. Workers spend much time licking exudates and saliva from the larvae. Such liquids may be the entire diet of callow (immature) workers. The workers pinch the neck of the larvae, apparently to hasten the flow of exudates. When they are mature, the workers cover the mature larvae with soil and allow them to spin cocoons. The soil is removed after the first sheet of silk is completed and the cocoon is cleaned.

NESTING SITES AND POPULATIONS

Most of the New World species of *Pachycondyla* nest in dead wood or in hollow twigs (Byrne, 1994). Occasionally nests are found under stones and in the soil. Most colonies are small, usually with fewer than 200 workers (Fresneau, 1985; Goss et al., 1989; Dietemann and Peeters, 2000) to 500 workers (Beckers et al., 1989) and usually monogynous (Dietemann and Peeters, 2000). Reproductives and brood can be found in nests essentially any time of the year. *Pachycondyla* range from having a single queen (monogynous), including the Australian *P. australis* and South African *P. wroughtonii*, to having an ergatoid female (*P. analis* from Guinea) to having gamergates (*P. kruegeri* from South Africa) (Peeters and Crewe, 1986; Peeters, 1987).

The presence or absence of the arolium (adhesive pad) between the tarsal claws and the configuration of the claws is correlated with the nesting site (Orivel et al., 2001). One group of species, including all of the arboreal and three of the ground nesting species, have well developed arolia and the tarsal claws are spread and horn-shaped. The remainder of the species lacks the arolium and the tarsal claws are relatively closely spaced. The ability to walk upside down is strictly correlated to the presence of the adhesive pad.

ANTS AND PLANTS

Foragers of most of the species of *Pachycondyla* can be collected in vegetation and some, such as an unidentified species (listed as *Neoponera* sp.), visits the extrafloral nectaries of *Bixa orellana* (Bixaceae) (Bentley, 1977).

Several species nest in living plants, especially epiphytes, including *P. goeldii* (Orivel, et al., 1998). Beattie (1989) reports *Pachycondyla* occurring in domatia of myrmecotrophic plants, but does not specify the species or the specific plants. Fisher and Zimmerman (1988) found an unidentified species of *Pachycondyla* nesting in the orchid *Aspasia principissa*. Several species have

been collected in orchids that were imported into the United States from Latin America (see index). Several other species of *Pachycondyla* have been reported from epiphytes (*Tillandsia streptophylla* and *T. bulbosa* [Bromeliaceae]), including *P. crenata*, *P. unidentata* and *P. villosa* at La Selva Biological Station in Costa Rica (Olson, 1991).

Many species nest in plants of the genus *Cecropia*. *Pachycondyla villosa* nests in a variety of places, including inside the stems of *Cecropia hispidissima*. Some of the species, including *P. crenata* and *P. striatinodis*, nest opportunistically, as their entrance holes are irregularly shaped and are often through wounds in the plant, rather than through the prostoma (Longino, website). Others, such as *P. insignis*, *P. luteola* and *P. fisheri* are apparently obligatory nesters in *Cecropia*, especially *Cecropia insignis* (and to a lesser extent *C. obtusifolia*). These species are only found in *Cecropia* and at least *P. insignis* harvest Müllerian bodies and use the prostoma to gain entrance to the internodes (Longino, website). One of these species, *P. luteola*, is highly aggressive and swarms when the plant is disturbed, attacking the enemy (Longino, website). These associations appear to be the result of multiple independent colonizations of a plant lineage by diverse ant lineages (Longino, website). Other ant genera involved with *Cecropia* include *Azteca* and *Crematogaster*.

Some species nest in several genera of plants, such as *P. crenata* and *P. unidentata*, which nest in a diverse group of plants including bamboo, guava, *Cordia nodosa*, *C. gerascanthus*, *C. alliodora*, *Tococa formicaria*, *Cecropia insignis*, *C. membranacea*, *C. polystachya*, *C. sciadophylla*, *Cattleya* spp. [Orchidaceae], *Costus laevis* [Costaceae], *Calathea ovandensis*, *Clibadium microcephalum*, *Byttneria aculeata* [Sterculiaceae], *Bromelia fastuosa*, *B. epiphytica*, *Triplaris paniculata* and *Tillandsia bulbosa* [Bromeliaceae].

Pachycondyla striata can have an important impact on rain forest trees, apparently due to the greater concentration of nutrients near the nest (Passos and Oliveira, 2002). The soil from nests of *P. harpax* are significantly enriched in nutrients as compared with surrounding soils, but do not significantly improve seedling growth of the myrmecochore *Calathea ovandensis* [Marantaceae] (Horvitz and Schemske, 1986a, 1986b).

FORAGING

These ants are generalist predators (Dejean et al., 1999) and scavengers, collecting fruit debris and vertebrate and invertebrate carcasses, especially Lepidoptera and Coleoptera larvae. Foragers generally orient themselves visually, forage independently of each other (Agbogba, 1984) and are thus individual foragers. *Pachycondyla apicalis* are individual foragers and apparently are not optimal foragers (Goss et al., 1989), but have regional specialization (Fresneau, 1985).

Several species prey predominantly on termites (Mill, 1983). *Pachycondyla*

harpax specializes in termite workers (García-Pérez et al., 1997). *Pachycondyla analis* (= *Megaponera foetens*) and *Pachycondyla* sp. are important termite predators in Kenya (Abe and Darlington, 1985). *P. harpax* feeds on termites of the genus *Nasutitermes* (Overal, 1987). *Pachycondyla marginata* conducts well-organized predatory raids on the termite *Neocapritermes opacus* (Hölldobler et al., 1996a).

Foragers may recruit workers to a food source using tandem running (Agbogba, 1984) and a chemical pheromone (Jessen and Maschwitz, 1985), but also use tandem running when a nest is moving to a new site (Traniello and Hölldobler, 1984; Jessen and Maschwitz, 1986; Wild, 2005). *Pachycondyla caffraria* in Senegal raid termite nests (*Microcerotermes*), using tandem running (Agbogba, 1992). The only time tandem running is used by *P. apicalis* is during the natural translocation of a colony (Fresneau, 1985). Other species such as *P. verenae* and *P. tesseronoda* use tandem running and chemical orientation (Maschwitz et al., 1974; Traniello and Hölldobler, 1984; Jessen and Maschwitz, 1986). *Pachycondyla laevigata* use a recruitment trail pheromone, which originates from the pygidial gland (Hölldobler and Traniello, 1980) and not the hindgut (Blum, 1966). Workers have individual specific trails (Jessen and Maschwitz, 1985). The trail pheromone of *P. marginata* originates from the pygidial gland and citronellal is the only effective trail pheromone (Hölldobler et al., 1996a). Isopulegol elicited an increase in locomotory activity and the chemical signal is enhanced by a shaking display performed by the recruiting ant (Hölldobler et al., 1996a). The secretions of the mandibular gland of three species were reported by Morgan et al. (1999).

Transportation of the food back to the nest may involve various mechanisms. Workers of *P. villosa* carry droplets of glucidic food between their mandibles, which are shared with other members of the nest (Dejean and Corbara, 1990a). Foragers of *P. harpax* and *P. apicalis* are important dispersers of the seeds of *Calathea ovandensis* (Marantaceae) (Horvitz and Schemske, 1986a, 1986b). *Pachycondyla caffraria* has two distinct types of foragers, one that specializes in hunting and the other in collecting liquids (Agbogba and Howse, 1992). Among the hunters, the “stingers” attack and paralyze the prey (termites); the “transporters” move the prey to the nest.

NEST FOUNDATION

New nests are generally formed by a single female (called haplometrosis), which breaks off the wings after mating and establishes a colony in a small preformed cavity. New nests of *P. caffraria* are formed by single females, which raise the first brood on their own (Villet, 1990). New nests can form with more than a single female (called pleometrosis), with 2 (24 % of the nests) or 3 (16%) females occurring in founding nests of *P. villosa* (Trunzer et al., 1998). Eighty-

two percent of the new nests are founded by between 2 and 7 females in *P. marginata* and the survival of incipient colonies was positively correlated with the number of females (Leal and Oliveira, 1995). The egg-laying rate of laboratory nests of single females does not differ from that in two female groups, but three-group females individually laid significantly fewer eggs (Trunzer, et al. 1998). After twenty-one weeks, multiple female nests had significantly more workers than single female nests (haplometrosis).

Intercastes (members intermediate between workers and females) are found in *P. verenae*, which are able to mate and lay eggs (Düssmann et al., 1996). They differ from ergatoid females (permanently wingless caste) and gamergates (mated workers). A single gamergate is found in the nest of *Pachycondyla sublaevis* (Ito and Higashi, 1991; Dahbi and Jaisson, 1995). Ergatogynes (intermediates between workers and queens) are found in the Old World *Pachycondyla analis* (= *Megaponera foetens*) (Peters, 1991), *P. verenae* (listed as *P. obscuricornis*) and *P. latinoda* (see description). Closely related species may have ordinary gynomorphic females (*P. wroughtonii*) or gamergates (*P. kruegeri*) (Peeters and Crewe, 1986).

REPRODUCTIVE BEHAVIOR

The behavior of *Pachycondyla* can be regulated by a diversity of mechanisms. In most species, the colony is relatively small (< 100) and worker/queen dimorphism is relatively slight. In some species, the workers are capable of mating and laying fertilized eggs (Peeters, 1993, 1997; Heinze et al., 1994). The males in the nest attempted to mate with the workers, but workers only accepted alien males (Ito, 1999).

Colony odor is spread through the colony by nestmate grooming and not by trophallaxis (Soroker et al., 1998). In *Pachycondyla stigma*, the social organization and reproductive activity is linked with mutual antennal rubbings between nestmates (Oliveira et al., 1998). The ants specifically rub their antennae over the openings of the right tibial gland of the encountered nestmate. Inseminated queens engage in this activity at a higher rate than do virgin queens and workers. The reproductive dominance of the nest queen is enhanced by the extremely aggressive behavior of the workers towards other egg-laying queens. The workers always destroy the few eggs laid by these individuals. The nest queen, on the other hand, receives more food in the form of trophic eggs, has her eggs safely deposited on the egg pile and rarely participates in activities other than egg laying. When Oliveira et al. (1998) removed the queen from a colony, mutual antennal rubbings among virgin queens and aggressive behavior increased. Apparently, the tibial glands of the front legs of the queens produce either an inhibitory chemical signal, or more likely, the secretion signals the reproductive state to nestmates that respond by refraining from reproduction (Oliveira et al.,

1998). Such multiple female nests may continue to be polygynous (have multiple females), without antagonistic behavior between the multiple females, even when workers are present (Trunzer et al., 1998). When intercastes of *P. verenae* were removed, dominance interactions occurred between the workers and reproductive eggs were then laid (Düssmann et al., 1996), suggesting they were functioning as nest females.

In some species such as the Malaysian *P. tridentata* more than 80% of the workers are inseminated, whether or not a queen is present (Sommer et al., 1994) and these workers compete directly for reproduction. The non-reproductive ants are much more aggressive than those with reproductive ability. A dominance hierarchy forms and the queen is not always at the top. Removal of the dominant workers results in a new hierarchy, with the callows (immature workers) being the most aggressive (Sommer and Hölldobler, 1992; Sommer et al., 1994). Queenless colonies of *P. villosa* establish linear or near-linear rank orders by antennation bouts and overt aggression (Trunzer et al., 1999). The top ranking workers laid the most eggs, but even low ranking workers laid numerous eggs. The eggs of low ranking workers were eaten, but at least some hatched into males (Trunzer et al., 1999). The behavior of *P. apicalis* is similar. There is one dominant worker and several subordinates in the nest (Oliveira and Hölldobler, 1990). This worker maintains her position by antagonistic interactions involving physical attack or the destruction of eggs laid by nestmates. Dominant workers usually have more developed ovaries, lay more eggs and spend more time attending the eggs than do the subordinate workers. Thus workers lay eggs in the presence of the nest female and it is possible that these haploid eggs may develop into workers (Oliveira and Hölldobler, 1990). Workers of the African *P. caffraria* and *P. analis* (= *Megaponera foetens*) lay eggs when the nest queen is not present, but only those of *P. caffraria* hatched (Villet and Duncan, 1992). Queenless groups of workers of *P. harpax* set up dominance hierarchies, using “boxing” and biting (Heinze et al., 1996). The dominant workers lay eggs and eat the eggs of other workers. The presence of larvae reduces the numbers of eggs, by feeding on the eggs and fewer eggs are laid when larvae are present (Heinze et al., 1996). The Old World workers of *P. berthoudi* also form dominance interactions (Sledge et al., 2001).

Pachycondyla sublaevis (and other members of the *rufipes* species complex from Australia) apparently has the smallest nest population (9 workers per colony) and completely lacks queens; inseminated workers of *P. sublaevis* are responsible for reproduction, one per colony (Peeters et al., 1991). Colonies of an unidentified *Pachycondyla* from Indonesia has some mated workers in the nest, but a single gamergate laid eggs (Ito, 1999). *Pachycondyla kruegeri* from South Africa is queenless, with a number of gamergates present in the nest (Wildman and Crewe, 1988).

No other ant genus has such an enormous diversity of social organization as is found in *Pachycondyla* (Hölldobler and Wilson, 2009).

STRIDULATION

Some of the species of *Pachycondyla* can stridulate by scraping a file on the second pretergite with the posterior edge of the first tergite (postpetiole) (Giovannotti, 1966; Pavan et al., 1997). Stridulation in *P. commutata* may serve to attract other foragers to a termite colony (Mill, 1982a), or may be an alarm signal, which causes the workers to scatter into the surrounding litter (Hermann, 1968; Mill, 1984).

VENOM AND STING

Ants of the genus *Pachycondyla* are well known for their painful sting. The sting induced pain in humans considered to be a 2 on a scale of 1 - 4 (Schmidt et al., 1984). *Pachycondyla* uses the sting to subdue living prey and in defense the nest. Termites stung by *P. commutata* instantly become immobile (Mill, 1984). The bitter taste and burning sensation of the venom of *P. apicalis* is due to cyclic dipeptides and suggest that the venom serves both offensive and defensive functions (López and Morgan, 1997). The venoms of 12 species have paralytic and lethal effects on the cricket, *Acheta domesticus* (Orivel and Dejean, 2001). Although the species are closely related, there is a wide range of effects. The venoms cause a rapid, dose-related and reversible paralysis, followed by a second, slow-acting permanent paralysis and death within four days. Arboreal species have more efficacious venoms than ground nesting species, with higher potency and a faster-acting effect. This is presumably due to the greater possibility of escape in arboreal prey as compared to prey on the surface (Orivel and Dejean, 2001).

Workers of the Malaysian *P. tridentata* and the New World *P. harpax* and *P. striata* produce foam or a stream of viscous secretions at the tip of the gaster as a defense measure (Maschwitz et al., 1981; Overall, 1987, pers. obs.). Members of the *rufipes* complex display the same behavior (Peeters et al., 1991).

ASSOCIATES

Pachycondyla goeldii shares its bromeliad nesting sites with hesperiid caterpillars (Orivel and Dejean, 2000). *Pachycondyla goeldii* nests with the ponerine ant *Odontomachus mayi* (Corbara et al., 1999) and others (*P. crassinoda*, *P. gilberti*, *P. globularia* and *P. villosa*) have an association with army ants of the genus *Eciton*, the nature of which is unknown.

Wheeler (1901) described the behavior of a commensal phorid fly larva, which raps itself around the neck of the *Pachycondyla* larva (phorid identified by Brues [1903, 1946] as *Cataclinusa pachycondylae*). The fly larva also participates with the feeding of the *Pachycondyla* larva on insect remains and may even feed

on the food supply of an adjacent larva. The workers lick and clean the commensals at the same time they care for their own larvae.

These ants are parasitized by eucharitid wasps (Heraty, 1998) and phorid flies in the genus *Apocephalus* (Brown and Feener, 1991, 1998). They are the hosts of histerid beetles of the subfamily Hetaeriinae (Helava et al., 1985). *Pachycondyla sennaarensis* is an intermediate host for the poultry cestode *Raillietina tetragona* in the Sudan (Mohammed et al., 1988). They are apparently eaten by the ant *Blepharidatta conops* (Brandão et al., 2001).

A number of Batesian mimics of *Pachycondyla* are found. *Pachycondyla apicalis* is mimicked by the spider *Castianeira memnonia* ([Clubionidae] Reiskind, 1977; Wild, 2005). *Pachycondyla carinulata* and *P. striatinodis* are mimicked by the salticid spider *Myrmarachne parallela*; *P. villosa* by the salticid *Zuniga magna* (Reiskind, 1977).

ANATOMY AND GENETICS

Little is known of the anatomy of members of this genus. Hölldobler and Engel-Siegel (1984) discussed the presence and absence of the metapleural gland in ants and demonstrated its presence in *P. crassa* and *P. verenae* (= *P. obscuricornis*). The digestive and excretory systems of *P. villosa* and *P. verenae* were described by Caetano (1988). Some of the members of *Pachycondyla* have a metatibial gland, a major synapomorphic character of the doryline section (Hölldobler et al., 1996b). Ortiz and Camargo-Mathias (2003) discuss the anatomy of the venom gland in *P. striata* and *P. villosa*. Hölldobler and Engel-Siegel (1982) describe the abdominal glands (tergal and sternal) of the males of *P. apicalis* and *P. verenae*. The report of 28 abdominal dermal complex glands in *P. tridentata* (Jessen and Maschwitz, 1983) suggests much work remains to be done on the glandular communication in *Pachycondyla*.

Little is known of the genetics of this genus. *Pachycondyla rubra* from Sarawak has 20 chromosomes (Nio Tjan et al., 1986). The karyotypes of some of the groups, including *Bothroponera* and *Cryptopone* have been studied by Imai et al. (1977). Microsatellite loci have been studied in *P. inversa* (Trindl et al., 2004) and *P. luteipes* (Takahashi et al., 2005). GenBank has 55 DNA sequence records for *Pachycondyla* and 7 for *Cryptopone* and gene sequences were used by Moreau et al. (2006).

MISCELLANEOUS

The Tupí-Guaraní language family associates *Pachycondyla commutata* with menarche and female initiation rites (Balée, 2000).

SPECIES COMPLEXES

The New World species can be separated into 18 species complexes, based on morphological characteristics. Most of these complexes are also found in the Old World and the names of the complexes may change when the Old World fauna is carefully examined. A common complex in the Old World, characterized by a con-

cave posterior face of the petiole, the dorsum posterior edge of the petiole often has denticles or teeth on the apex of the petiole and the postpetiole and first tergum are longitudinal striate or rugose, is not found in the New World.

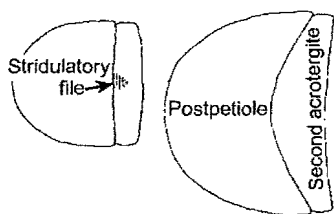
The species complexes can be separated with the following key.

Key to the species complexes, based on workers:

1. Stridulatory file developed on second pretergite of gaster³ (Fig. 17, left) 2

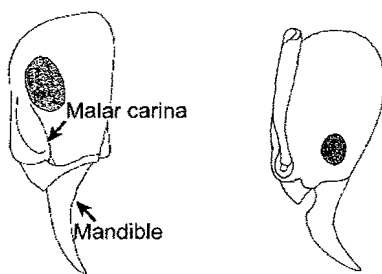
second pretergite (Fig. 17, right) .. 11

2(1). Malar (preocular) carina present (Fig. 18, left) 3



obscuricornis *lattkei*

Fig. 17. Dorsal views of the pretergites of workers of *P. obscuricornis* (Sucumbíos, Ecuador, CWEM) and *P. lattkei* (paratype).



apicalis *harpax*

Fig. 18. Heads of workers of *P. apicalis* (Petén, Guatemala, CWEM) and *P. harpax* (modified from Creighton, 1950) as seen from the side.

- Stridulatory file absent on

- Malar carina absent (Fig. 18, right) or very poorly developed 8

³ The stridulatory file is easily seen if the gaster is extended and the second pretergite is exposed. It may be necessary to remove the posterior medial part of the tergum of the postpetiole to see the file.

3(2). Most surfaces smooth and glossy, some with striae

..... ***laevigata* species complex**

- Most surfaces dull and punctate, rarely with striae present .. 4

4(3). Metanotal suture poorly developed, not notably depressed and not breaking sculpture on dorsum of mesosoma (Fig. 19, left)

..... ***crenata* species complex**

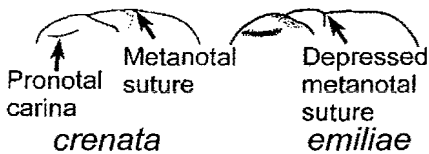


Fig. 19. Outlines of the mesosomata of workers of *P. crenata* and *P. emiliae*.

- Metanotal suture and furrow well developed, depressed below level of mesosoma, breaking sculpture on dorsum of mesosoma (Fig. 19, right)

5(4). Petiole relatively narrow when viewed in profile, height nearly twice width (Fig. 20, left)



constricta apicalis

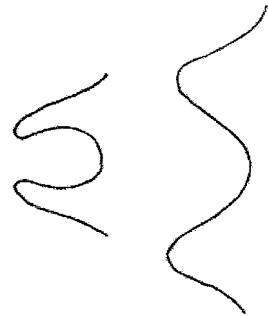
Fig. 20. Petioles of workers of *P. constricta* and *P. apicalis* as seen from the side.

- Petiole relatively broad, height approximately equal to width

(Fig. 20, right), at least less than twice height

6(5). Metanotal suture deeply depressed (Fig. 204); metasternal process consisting of two narrow, fang-like appendages (Fig. 21, left) ...

..... ***constricta* species complex**



constricta emiliae

Fig. 21. Metasternal processes of workers of *P. constricta* and *P. emiliae* as seen from the side.

- Metanotal suture moderately depressed (Fig. 19, right); metasternal process consisting of two triangular-shaped lobes (Fig. 21, right)

7(5). Eyes located on anterior half of head (Fig. 18, right), relatively small (occupying less than 1/4 of the length of the side of the head); dorsum of mesosoma with abundant erect hairs

..... ***foetida* species complex**
 - Eyes located in middle of head (Fig. 18, left), large (about 1/3 length of side of head); mesosoma lacking or nearly lacking erect hairs .
 ***apicalis* species complex**

8(2). Mandibles greatly elongated (Fig. 209), length about as long as length of head; rarely collected ...
 ***rostrata* species complex**
 - Mandibles not greatly elongated, length notably less than length of head (Fig. 18) **9**

9(8). Propodeal spiracle large, elongated to slit-shaped (Fig. 22, left); relatively common **10**

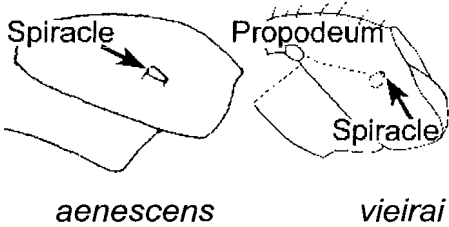


Fig. 22. Propodea of workers of *P. aenescens* and *P. vieirai* as seen from the side.

- Propodeal spiracle tiny, circular shaped (Fig. 22, right); known only from central Ecuador
 ***vieirai* species complex**

10(9). Most surfaces covered with costulae; rarely collected
 ***curiosa* species complex**
 . Most surfaces covered with punctures; commonly collected
 ***aenescens* species complex**

11(1). Anterior face of postpetiole with two lateral swellings near apex (Fig. 23, left); known only from single specimen from São Paulo, Brasil ..
 ***tarsata* species complex**

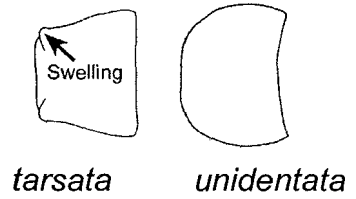


Fig. 23. Postpetioles of workers of *P. tarsata* and *P. unidentata* as seen from above.

- Without swellings on anterior face of postpetiole (Fig. 23, right); very common **12**

12(11). Mostly larger species (total length > 7 mm); black; propodeal spiracle elongated or slit-shaped (Fig. 22, left)
 ***crassinoda* species complex**

- Mostly smaller species (total length < 7 mm); often brown, reddish or yellow; propodeal spiracle nearly always circular (Fig. 22, right)
 **13**

13(12). Middle tibia with conical setae (Fig. 24, left); rarely collected ...
 ***ochracea* species complex**

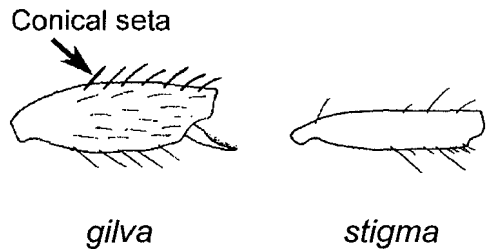


Fig. 24. Tibiae of workers of *P. gilva* (cotype of *P. obsoleta*) and *P. stigma* (Petén, Guatemala, CWEM) as seen from the side.

- Middle tibia with normal erect and suberect hairs (Fig. 24, right), or without hairs 14

14(13). Mandible with 8 or fewer teeth (Fig. 25, left); side of propodeum depressed *stigma* species complex



Fig. 25. Mandibles of workers of *P. stigma* and *P. ferruginea*.

- Mandible usually with 8 or more teeth (Fig. 25, right); side of propodeum usually not notably depressed 15

15(14). Middle and posterior tibiae with single spines (Fig. 26, left) *leveillei* species complex

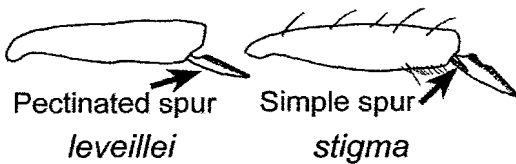


Fig. 26. Posterior tibiae of *P. leveillei* and *P. stigma*

- Middle and posterior tibiae each with two spines (Fig. 26, right) 16

16(15). Subpetiolar process with posteriorly directed, sharp angle or

tooth (Fig. 27, left) 17
 - Metanotal suture not depressed (Fig. 28, right); Latin America *ferruginea* species complex

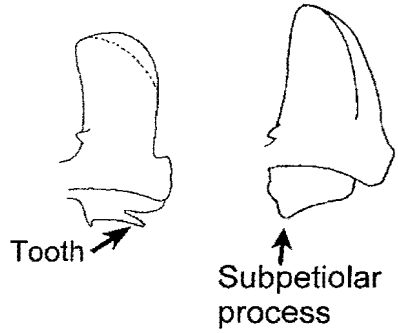


Fig. 27. Petioles of workers of *P. ferruginea* and *P. becculata*.

17(16). Metanotal suture deeply depressed (Fig. 28, left); USA *rubra* species complex

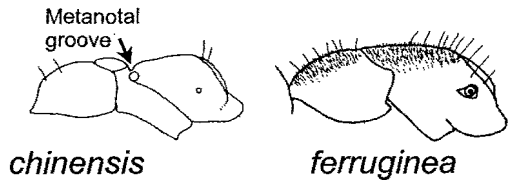


Fig. 28. Mesosomata of workers of *P. chinensis* and *P. ferruginea*.

- Subpetiolar process without posteriorly directed angle (Fig. 27, right), lobe or tooth (process may be directed downwards posteriorly) *arhuaca* species complex

LIST OF THE SPECIES COMPLEXES

aenescens species complex

DESCRIPTION

Worker

The mandibles are moderately elongated with more than ten teeth. The *medial anterior border of the clypeus is notably concave* in most species. The head is elongated and somewhat narrowed, especially posteriorly. The *eye is relatively small*, located more than one diameter from the anterior margin of the head. The *malar carina is absent* or barely evident (*P. aenescens*) to weakly developed (*P. fisheri*).

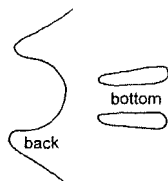


Fig. 29. Metasternal process of a worker of *P. aenescens* (Puntarenas, Costa Rica, CWEM), as seen from the back and from below.

The scape is long and extends about $\frac{1}{3}$ length past the posterior lateral corner of the head (does not reach the posterior border of the head

of *P. fisheri*). The pronotal shoulder is generally slightly swollen, but is not formed into a distinct carina. The mesosoma is depressed at the metanotal suture and the suture breaks the sculpture on the dorsum. The dorsal face of the propodeum is at least twice as long as the posterior face; the propodeal spiracle is elongated. The anterior and posterior faces of the petiole are nearly parallel and form the highest point near the central - posterior part of the node.

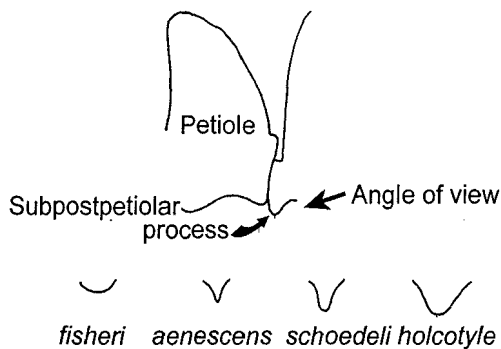


Fig. 30. Subpostpetiolar process in four species of the *aenescens* species complex, as seen from below and behind. The upper inset shows the petiole and anterior part of the postpetiole of *P. aenescens*, the arrow indicates the angle of view used to see the processes below.

The stridulatory file is present on the second pretergite. The metasternal process consists of two widely spaced, longitudinally positioned lobes (Fig. 29) in *P. aenescens*, *P. fauveli* and *P. schoedli*, similar to those of *P. holcotyle*.

These lobes are widely spaced, but poorly developed in *P. carbonaria* and are closely spaced in *P. fisheri* and *P. fusca*, similar to the condition in the *crenata* species complex. The subpostpetiolar process consists of a single lobe which points ventrally and somewhat anteriorly, as seen from below (Fig. 30). A longitudinal carina is never developed on the ventral surface of the postpetiole. The lobe may be poorly developed (*P. fisheri*) or well developed and sharply angulate apically (*P. aenescens*, *P. fusca*), weakly angulate (*P. carbonaria*, *P. chyzeri*, *P. fauveli*, *P. schoedli*) or rounded and blunt (*P. eleonorae*, *P. hispida*, *P. holcotyle*).

The scape has few or no erect hairs in most species (exceptions: *P. fauveli*, *P. fisheri*, *P. hispida* and *P. holcotyle*). Erect and suberect hairs are usually abundant on other surfaces in most species.

Most surfaces are dull and sculptured, but some surfaces, especially the gaster, may be smooth and glossy and have bluish or greenish reflections.

Female

The *females* that are known are usually *large* (total length 12 - 18 mm) dark ants. They are similar to the workers in most characteristics. The

eyes are larger with the diameter being approximately equal to the distance between the anterior border of the eye and the anterior margin of the head. The *ocelli are tiny* with the diameter being approximately $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the distance between them. The medial ocellus of *P. fauveli* is larger, about twice the size of the lateral ocellus and located slightly more than 1 diameter from the lateral ocellus. The shape of the petiole is similar to that of the worker and the *stridulatory file is well developed*.

Male

The male is smaller than the worker, with the *surface of the clypeus swollen* (side view) and with the *anterior half slightly overhanging the remainder* of the clypeus. The *eyes are large*, located about $\frac{1}{2}$ diameter from the lateral ocellus. The eye is

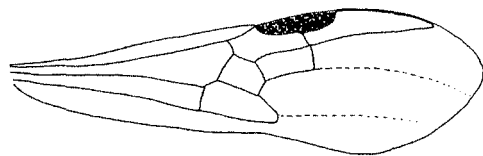


Fig. 31. Wing of a male of *P. aenescens* (Monson Valley, Perú, CWEM).

smaller in *P. fisheri* and is separated by approximately 1 diameter from the lateral ocellus. The ocelli are large, separated by approximately one diameter (smaller and separated by more than one diameter in *P. fisheri*). The pronotum is swollen at the

shoulder. The petiole is vaguely similar to that of the corresponding worker, but the apex tends to be more rounded. The stridulatory file is well developed. The wing venation is basically the same as most members of *Pachycondyla*, except that the third discoidal cell is rectangular shaped, at least in *P. aenescens* (Fig. 31).

Of the members of this complex, only the larva of *P. fisheri* is known to us and it may not represent the true form of the larvae of the *aenescens* group, as the worker and female of *P. fisheri* are somewhat unusual. It has a somewhat more swollen abdomen (Fig. 32), as compared to the larvae of the other members of the genus. Many of the tubercles are mammiform, as in *P. striata* and suggest a relationship between the two complexes.

The larva of *P. fauveli* has been described (Wheeler and Wheeler, 1971), but unfortunately only a tubercle was illustrated. The brief description suggests it is similar to *P. fisheri*.

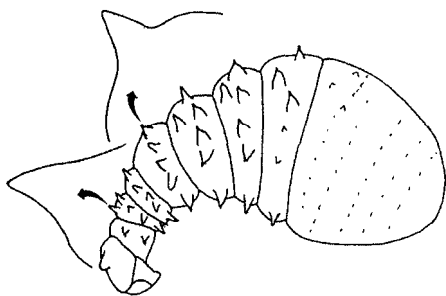


Fig. 32. Larva of a worker of *P. fisheri* (from the type series). The insets show enlargements of the tubercles.

COMPARISON

Members of the *aenescens* species complex include *P. aenescens*, *P. carbonaria*, *P. chyzeri*, *P. eleonora*, *P. fauveli*, *P. fisheri*, *P. fusca*, *P. hispida*, *P. holcotyle* and *P. schoedli*.

Workers of *P. eleonora*, *P. fusca* and *P. holcotyle* can be separated from the workers of the other species by the apex of the petioles, which forms a nearly horizontal surface, with the highest point being near the posterior edge of the node. *Pachycondyla eleonora* can be separated from the other two as it has a golden color, due to the abundant appressed pubescence. *Pachycondyla holcotyle* can be separated by the horizontal striae on the side of the petiole, which are lacking in *P. fusca*. The petioles of these three species are the most similar in shape to members of the *apicalis* species complex. *Pachycondyla aenescens* could be confused with this group of three species, as the apex of the petiole may be somewhat flattened dorsally, but the highest point is near the anterior of the node.

The apex of the petiole of the remainder of the workers is broadly rounded, with the highest point being near the middle of the apex, or near the anterior edge. Two of the species, *P. chyzeri* and *P. fisheri* are relatively large (total length 12 mm or more) and have several long erect hairs on the shaft of the scape, as well as on all surfaces of the posterior tibia. The scapes of *P. chyzeri* are very long, extending well beyond the posterior lateral corner of the head; the scape of *P. fisheri* is remarkably short and does not reach the posterior lateral corner.

The other species are smaller (TL 12 mm or less) and generally have no hairs or only tiny erect hairs on the shaft of the scape and few or no erect or suberect hairs on the posterior tibia. The anterior face of the petiole is broadly rounded into the dorsal face in two of the remaining species. Of these, *P. hispida* has numerous tiny, erect hairs on the scape and the mandibles are shiny. *Pachycondyla fauveli* nearly lacks erect hairs on the scape. The ventral surface of the petiole is concave in *P. hispida* and convex in *P. fauveli*.

The anterior face of the petiole of workers of the other three species (*P. aenescens*, *P. carbonaria* and *P. schoedli*) is nearly straight (or slightly concave) and meets the broadly rounded posterior face near the anterior edge of the petiole, thus the highest point on the apex is near the front. The surfaces of the mandibles of all three of these species are striate and dull. The dorsum of the postpetiole of *P. aenescens* is covered with definite punctures, but is moderately shining with bronze or reddish reflections. The dorsum of the postpetiole of the other two species is smooth and polished, with indistinct punctures. The reflections on the postpetiole of *P. carbonaria* are bluish and greenish; those on *P. schoedli* are not.

This species complex is similar to the *apicalis* species complex, differing in lacking a carina anterior to the eye. Most of the species of the *P. apicalis* species complex lack erect hairs on the mesosoma (exceptions: *P. cooki*

and rare samples of *P. apicalis*). *Pachycondyla fisheri* is somewhat intermediate between this complex and the *crenata* and *foetida* species complexes, with the moderately well developed malar carina. It seems to be especially similar to the *foetida* species complex, based on the depressed metanotal suture and short scapes.

KEY

The following key will separate the workers of the *aenescens* species complex.

- 1. Petiole narrowed toward apex, posterior face broadly curving and meeting anterior face at highest point near anterior edge of petiole (Fig. 33, left)
- 2

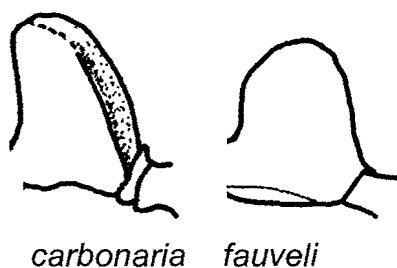


Fig. 33. Petioles of workers of *P. carbonaria* and *P. fauveli*.

- Petiole not as above, anterior and posterior faces nearly parallel, highest point not at anterior edge (Fig. 33, right)
- 5

2(1). Antennal scape with several erect hairs (Fig. 34, left); scape fails to reach posterior lateral corner of head; Panamá *fisheri* Mackay and Mackay

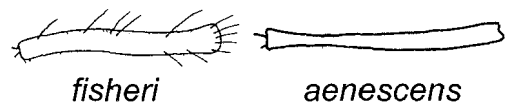


Fig. 34. Antennal scapes of workers of *P. fisheri* and *P. aenescens*.

- Antennal scape without (or with possibly fewer than 4) erect hairs (Fig. 34, right); if more hairs present, scape extends past posterior border of head; widely distributed 3

3(2). Mesopleuron and side of propodeum nearly completely smooth and glossy (Fig. 35, left); Ecuador *schoedli* Mackay and Mackay

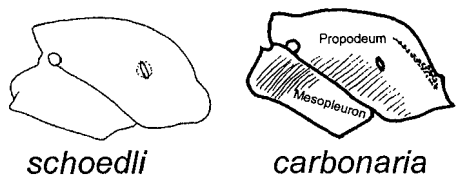


Fig. 35. Mesopleura and propodea of workers of *P. schoedli* and *P. carbonaria*.

- Mesopleuron and especially side of propodeum mostly or completely covered with striae (Fig. 35, right) 4

4(3). Head, mesosoma and gaster with obvious bluish or greenish reflections, most surfaces smooth and

glossy; Nicaragua south to Ecuador and Venezuela ... *carbonaria* Smith
 - Without bluish or greenish reflections, at most with bronze reflections, mostly dull; Nicaragua south to Bolivia *aenescens* Mayr

5(1). Highest point on petiole near midpoint (Fig. 36, left) 6

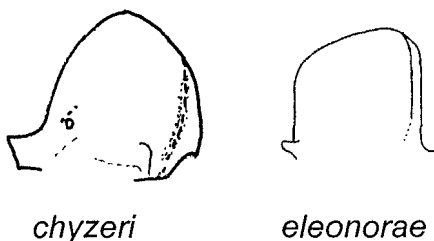


Fig. 36. Petioles of workers of *P. cooki* (Amazonas, Brasil) and *P. eleonora* (Tungurahua, Ecuador).

- Highest point on petiole near posterior edge (Fig. 36, right) 8

6(5). Shaft of scape with 6 or more erect or suberect, relatively long (> 0.1 mm) hairs (Fig. 37, left); relatively large (total length > 12 mm); Colombia, Ecuador and Perú *chyzeri* (Forel)

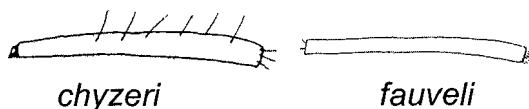
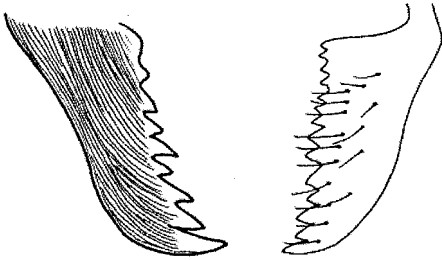


Fig. 37. Antennal scapes of workers of *P. chyzeri* and *P. fauveli*.

- Shaft of scape (Fig. 37, right) without (or with fewer than 6, or with many short [< 0.1 mm]), bristly erect and suberect hairs (except at apex); smaller (TL < 12 mm) 7

7(6). Dorsal surface of mandibles completely striate (Fig. 38, left), shaft of scape nearly always without erect or suberect hairs (except near apex); Colombia south to Bolivia *fauveli* Emery

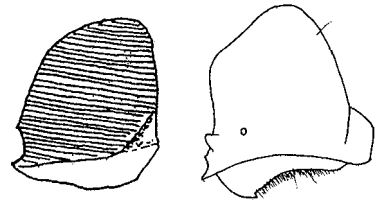


fauveli *hispidia*

Fig. 38. Mandibles of workers of *P. fauveli* and *P. hispidia*.

- Dorsal surface of mandible smooth and shiny, with scattered punctures (Fig. 38, right); scape with short, bristly hairs along entire length; Colombia and Ecuador *hispidia* Mackay and Mackay

8(5). Side of petiole with horizontal striae (Fig. 39, left); Costa Rica and Colombia *holcotyle* Mackay and Mackay

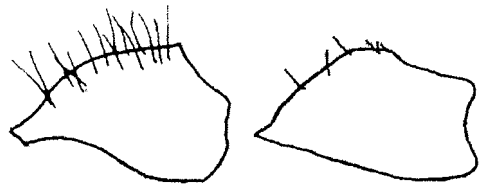


holcotyle *fusca*

Fig. 39. Petioles of workers of *P. holcotyle* and *P. fusca*.

- Side of petiole without horizontal striae (Fig. 39, right) 9

9(8). Most surfaces covered with dense conspicuous golden appressed pubescence, giving ant reddish bronze appearance; appendages reddish brown; disc of pronotum with more than 10 erect hairs (Fig. 40, left); known only from region of Baños, Ecuador *eleonorae* (Forel)



eleonorae *fusca*

Fig. 40. Pronota of workers of *P. eleonorae* and *P. fusca*.

- Surfaces with moderate yellow appressed pubescence, not obscuring black color; appendages black; disc of pronotum with fewer than 10 erect hairs (Fig. 40, right); known only from state of Cundinamarca, Colombia *fusca* Mackay and Mackay

apicalis species complex

DESCRIPTION

Worker

Workers of this species complex are large (total length 9 – 12 mm) and have large *elongated mandibles* with more than 10 teeth. The anterior border of the clypeus is broadly convex and the medial area of the clypeus usually has several fine longitudinal striae. The eyes are large, located approximately in the middle of the head and the maximum diameter is about $\frac{1}{3}$ the length of the head. The *malar carina is well developed and sharp*. The usually has several fine longitudinal striae. The *eyes are large*, located approximately in the scape extends about $\frac{1}{3}$ length past the posterior lateral corner of the head. The mesosoma is elongated and strongly depressed at the metanotal suture. The pronotal shoulder is swollen, but does not form a carina. The region between the faces of the propodeum is broadly rounded and the propodeal spiracle is slit-shaped. The petiole is broad when viewed in profile, with convex, rounded anterior and posterior faces (posterior lateral edges may be sharp), which meet at about the midpoint of the dorsal surface of the petiole. The *dorsum of the mesosoma is normally without erect hairs*. The second pretergite of

the gaster has a well-developed stridulatory file. The metasternal process consisted of two relatively widely spaced lobes (Fig. 41), which often have striae on the posterior surface (*P. apicalis* and *P. verenae*).

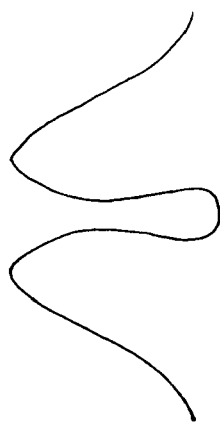


Fig. 41. Metasternal process of a worker of *P. obscuricornis* (Sucumbíos, Ecuador, CWEM), as seen from behind.

The subpostpetiolar process of all four species in the *apicalis* species complex is nearly identical to that of the *aenescens* species complex, in those species in which the process is sharp apically (Fig. 30, *aenescens*).

Female

The female is *slightly larger than the worker* (total length 12 - 13 mm), black with either a brown tip of the funiculus (*P. verenae*) or a yellow tip (*P. apicalis*). The females of *P. obscuricornis* and *P. cooki* are unknown. The *mandibles are long* and have more than 12 teeth. The *eyes are large* (maximal diameter 0.85 - 0.95 mm) and located at approximately the middle of the side of the head. The *malar carina is well developed*. The *ocelli are small* (0.07 - 0.12 mm diameter) and the medial ocellus is located more than 2 diameters from the lateral ocelli. The mesosoma is massive and winged; the *propodeal spiracle is slit-shaped*. The petiole is similar to that of the worker. The wing venation appears to be somewhat unusual in the males and females of *P. apicalis* and *P. verenae* in that the first discoidal cell is narrowed posteriorly (Fig. 42).

Male

The male is slightly smaller (in *P. apicalis*), to slightly larger than the worker (in *P. verenae*), with a total length of 10 - 12 mm. The mandibles are tiny with a well-developed basal cavity that extends more than half the length in *P. verenae*, to possibly a small cavity (or the cavity may even be absent) in males of *P. apicalis* (all specimens of *P. apicalis* seen have the mandibles closed). The *head and mesosoma are covered with erect hairs*, contrasting strongly to the condition of the worker and female. The side of the petiole is either

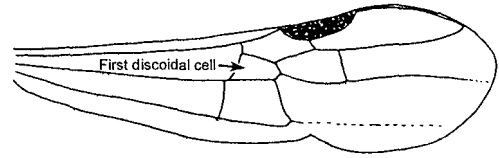


Fig. 42. Forewing of a male of *P. apicalis* (Veracruz, México, CWEM).

punctate (*P. verenae*) to covered with rugae (*P. apicalis*) and is broadly rounded dorsally as in the worker and female. The forewing is similar to that of the female (Fig. 42).

Larva

Wheeler and Wheeler (1952) characterized the larva of *P. apicalis* as having several hairs on the tubercles (Fig. 43), which are flat apically and bearing a sensillum (simple sense organ) with a minute hair. The cranium has a broad, low rounded, longitudinal ridge extending from the middle of the occipital border to the level of the antennae. The vertex, genae and gula are spinulate (with small spines), with the spinulae being minute and isolated, or in short rows, but variable in size and arrangement. The maxillary spinulae on the anterior surface are mostly isolated, but those on the posterior surface are in short, transverse, arcuate (arched) rows. They also provide two photographs of *P. verenae* (as *P. obscuricornis*).

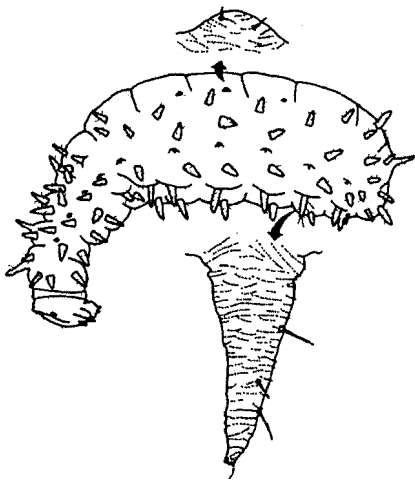


Fig. 43. Larva of a worker of *P. apicalis* (From Wheeler and Wheeler, 1952). The insets show enlargements of the tubercles.

COMPARISON

Members of the *apicalis* species complex include *P. apicalis*, *P. cooki*, *P. obscuricornis* and *P. verenae*.

The workers are usually easily separated, as *P. cooki* has abundant erect hairs on the dorsum of the mesosoma. The other three have few or no erect hairs on the dorsum of the mesosoma. Much of the funiculus of *P. apicalis* (and *P. cooki*) is yellow,

whereas it is brown or reddish brown in *P. verenae* and *P. obscuricornis*. Additionally the posterior lateral edges of the petiole are rounded in *P. apicalis* and *P. obscuricornis*, but usually have sharp edges in *P. verenae*. *Pachycondyla obscuricornis* is most closely related to *P. apicalis*. It can be separated by the lack of a yellow tipped funiculus (usually brown) and by more abundant appressed hairs on the surface of the hypopygium.

Members of this species complex appear to be related to the South African, Rhodesian and Sudan *Pachycondyla* (*Ophthalmopone*) *berthoudi*. All of these species have long mandibles, elongated heads (especially elongated in *P. berthoudi*), an impression at the metanotal suture, a slit-shaped spiracle, a wide petiole and a stridulatory file on the second pretergite. The only significant difference is that *P. berthoudi* lacks the malar carina. The worker and female of *P. berthoudi* have three angles on the posterior face of the petiole, reminiscent of the spines in *P. tridentata* and its allies. The mandible of the male of *P. berthoudi* is more developed than in the males of the *apicalis* species complex. This complex may have an Old World origin.

arhuaca species complex

DESCRIPTION

Worker

Workers of the *arhuaca* species complex are mostly *small* (total length less than 7 mm), *dark reddish brown to black* ants. The *mandibles are elongated*, with *many teeth* (usually approximately 12), and are *covered with striae*. The *malar carina is not developed*. The *metanotal suture is depressed*, but not to a great extent. The *petiole is narrow in profile*, with a nearly vertical anterior face and a broadly rounded posterior face, which meets the anterior face near the anterior edge. Thus the dorsal face is short. The subpetiolar process is thick and lobe-like, usually without a posteriorly directed lobe. A ventrally directed angular posterior lobe is present in *P. cernua*. The *stridulatory file is absent* on the dorsum of the second pretergite of the gaster. The metasternal process consists of two triangular well-developed lobes (Fig. 44). The subpostpetiolar process is poorly developed, and at most consists of a small raised triangular area.

Female

The females are poorly known, but based on the available material, they are *small and similar to the worker*. The *mandibles are elongate*, with about 12 teeth. The metanotal suture is not more strongly depressed than in females of most other species. The *propodeal spiracle is circular*.

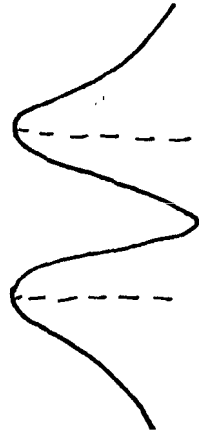


Fig. 44. Metasternal process of a worker of *P. arhuaca* (Huila, Colombia, CWEM), as seen from behind.

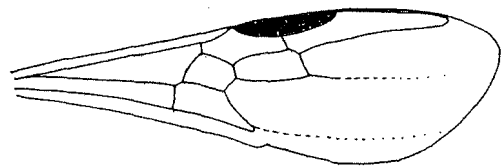


Fig. 45. Left forewing of a female of *P. arhuaca* (Parque Nacional Soberanía, Panamá, CWEM).

The *petiole is narrow* in profile, similar in form to that of the worker and the subpetiolar process is thick and lobe-like, as in the worker. The *stridulatory file is absent*.

The wing venation is similar to that of the *ochracea* and *stigma* species complexes (Fig. 45), with an elongated third discoidal cell.

Male

The males are known from most of the species. They are usually *small* (total length 4 - 8 mm) and *usually dark brown* (the pronota and scuta of *P. pergandei* and *P. conicula* are reddish brown). The Mayrian furrows are either absent (*P. arhuaca*), weakly developed (*P. cernua*) to strongly developed and deep (*P. pergandei* and *P. conicula*). The metanotal suture is not more deeply depressed than in other species. The *petiole is somewhat triangular-shaped*, distinctly different in shape from the workers. The subpetiolar process is usually different from that of the worker, with an anterior swelling or even a ventrally directed angle, followed by a concave region. It resembles the subpetiolar process of males of the *crenata* species complex. The *stridulatory file is absent* on the second pretergite.

Larva

The larva of this complex, represented only by *P. cernua*, is of the generalized form, with well-developed, elongated tubercles covering nearly the entire surface (Fig. 46). It is similar to that of members of the *crenata* species complex, as well as *P. constricta* and the *P. foetida* complexes. It suggests a close relationship between these four species complexes, which is not apparent when only the workers are examined. This appears to be an early

instar larva and a later instar larva may be different in form.

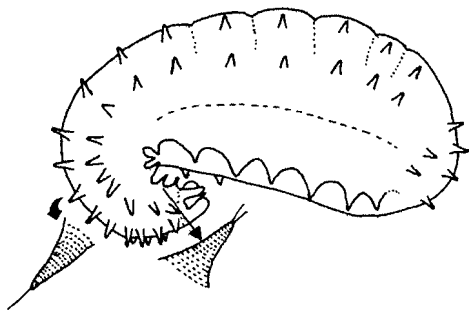


Fig. 46. Young larva of a worker of *P. cernua* (from the type series). The inserts show enlargements of two of the tubercles.

COMPARISON

Members of the *arhuaca* species complex include *P. arhuaca*, *P. becculata*, *P. cernua*, *P. conicula*, *P. longidentata* and *P. pergandei*.

Pachycondyla longidentata is unusual in that the mandible has only about 7 teeth and the mesosoma is only weakly depressed at the metanotal suture (similar to those of the *ferruginea* species complex). Workers of one of the other five species, *P. conicula*, have the entire dorsal medial area of the clypeus completely convex. The other four species have a narrow elongate medial depression down the middle of the clypeus. *Pachycondyla conicula* is also slightly larger than the other species (total length 8 mm versus 4 - 7 mm in the other species).

Pachycondyla cernua is unusual in that there is a downward directed angle on the posterior edge of the subpetiolar process. *Pachycondyla becculata* is easily separated from the others by the presence of a sharp spine on the anterior medial border of the clypeus. Finally, the petiole of *P. pergandei* has a definite dorsal horizontal face, whereas the apex of the petiole of *P. arhuaca* is narrowed dorsally with a relatively sharp apex.

Workers would most likely be confused with *P. constricta* of the *constricta* complex. The petioles are similar in shape in both complexes, but *P. constricta* has a well-developed stridulatory file on the second pretergite. The mandible is not as elongate and has fewer than 12 teeth, as compared to *P. constricta*, which usually has more than 12 teeth (many may be poorly defined). The metanotal suture is depressed in the worker and thus they differ from those of the *ferruginea* complex, in which the metanotal suture is poorly developed or absent.

The females and males would be difficult to distinguish from other groups, as they lack many of the defining characteristics of the workers.

This may be an Old World group that became established in the New World. It is closely related to some of the Old World species, particularly *P. ambigua* from Madagascar.

KEY

Workers of the *arhuaca* species complex can be separated with the following key.

- 1. Medial clypeal border ending in a sharp spine or tooth (Fig. 47, left); Panamá south to Perú *becculata* Mackay and Mackay

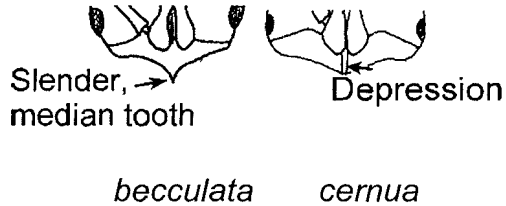


Fig. 47. Clypeuses of workers of *P. becculata* and *P. cernua*.

- Anterior border of clypeus broadly rounded (Fig. 47, right), possibly angulate, never terminating in elongated sharp spine 2

- 2(1). Posterior edge of subpetiolar process terminating in downwardly directed angle (Fig. 48, left); state of Napo, Ecuador *cernua* Mackay and Mackay

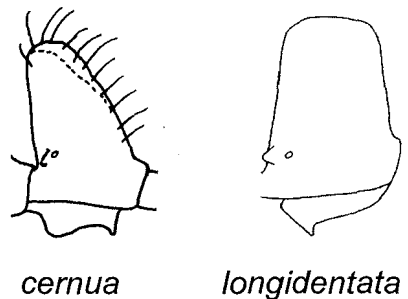


Fig. 48. Petioles of workers of *P. cernua* and *P. longidentata*.

- Posterior edge of subpetiolar process rounded, without angle (Fig. 48, right) 3

3(2). Subpetiolar process with well-developed anterior ventrally directed spine (Fig. 48, right); apicalmost tooth approximately 3 times longer than subapical tooth (Fig. 49, left); ferruginous red ***longidentata* Mackay and Mackay**

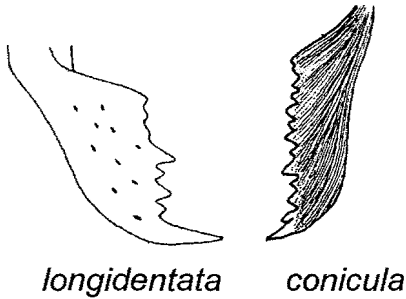


Fig. 49. Mandibles of workers of *P. longidentata* and *P. conicula*.

- Subpetiolar process without well-developed anterior spine (Fig. 51); apical mandibular tooth only slightly larger than subapical tooth (Fig. 49, right); usually dark reddish brown **4**

4(3). Middle part of clypeus with elongate depression (Fig. 47, right); scape extending well past posterior lateral corner of head (scape length/head length ranges between 0.79 - 0.84 - Fig. 198) **5**

- Middle part of clypeus without elongate depression, nearly forming carina (Fig. 50); scape barely reaching posterior lateral corner of head (scape length/head length ranges between 0.75 and 0.76 - Fig. 50); Perú and Venezuela ***conicula* Mackay and Mackay**

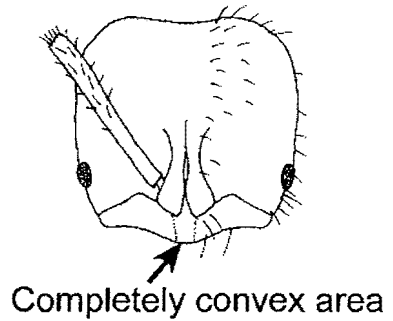


Fig. 50. Head of a worker of *P. conicula*.

5(4). Posterior edge of subpetiolar process abruptly truncate (Fig. 51, left); dark ferruginous red; Costa Rica south to central Brasil ***arhuaca* (Forel)**

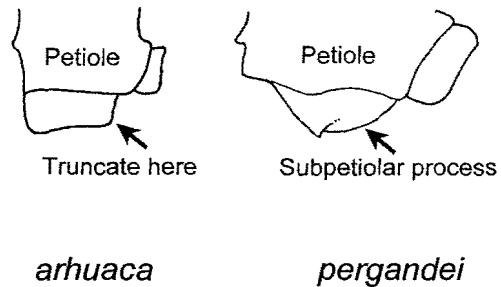


Fig. 51. Subpetiolar processes of *P. arhuaca* and *P. pergandei*.

- Posterior section of subpetiolar process rounded (Fig. 51, right); very dark brown to black; Guatemala south to Perú ***pergandei* (Forel)**

constricta species complex

DESCRIPTION

Worker

The workers of this species complex are *mostly small* (up to 7 mm total length) ants. The *anterior border of the clypeus is broadly convex* and a lobe does not overhang the anteclypeus. There is *no malar carina* anterior to the eye. The eye is moderate in size (maximum length 0.3 - 0.4 mm, about $\frac{1}{5}$ - $\frac{1}{4}$ of the head length). The pronotal shoulder does not form a carina. The mesosoma has a *well-developed metanotal suture* on the dorsum, which is deeply depressed below the remainder of the mesosoma. The *propodeal spiracle is round*. The *petiole is relatively narrow* as seen in profile, with the anterior face being nearly vertical and straight, the posterior face curves broadly and meets the anterior face near the anterior border. The posterior lateral margins of the petiole as well as the apex, are moderately sharp. There is no posteriorly directed spine on the subpetiolar process. The subpostpetiolar process consists of a small, apically rounded process, being similar to that of the *aenescens* species complex (Fig. 328). The *stridulatory file is well developed*.

Erect hairs are abundant on most surfaces.

Female

The female is *similar to the worker*, differing in not having the mesosoma strongly constricted at the metanotal suture. Unfortunately we do not have a winged specimen from this species complex, but would expect the venation to be similar to that of *P. gilva*, which has a relatively long first discoidal cell.

Male

The male is a *small, dark brown* specimen that would be difficult to place in a species complex. The presence of the *stridulatory file* on the second pretergite would be useful for species complex placement and would separate it from similar males in the *stigma* species complex.

Larva

The larva is of the generalized *Pachycondyla* form, with all surfaces covered by tubercles. It is similar to the larvae of the *crenata*, *foetida* and especially to members of the *arhuaca* species complex, which suggests a close relationship, especially with the latter group. The larva of *P. caffraria* (South Africa) resembles that of *P. constricta* and suggests they are closely related and possibly both belong in the same species complex.

COMPARISON

Pachycondyla constricta is phylogenetically important, as it shares characters with several species complexes, as well as with a number of Old World species. The presence of the stridulatory file on the second pretergite suggests it is near the base of the radiation of *Pachycondyla*. The metasternal process of *P. constricta* is similar to that of members of the *rubra* and *stigma* species complexes, with elongate, slender appendages, which are curved inwards. It lacks the posteriorly directed lobe on the subpetiolar process, a key characteristic of the *rubra* complex (Fig. 52). Workers can be separated from the *stigma* species complex by the deeply depressed mesosoma (at the metanotal suture). The mandibles of *P. constricta* are also elongated with numerous teeth, similar to those of the *rubra* species complex (Fig. 53). It may actually form a transition between the *arhuaca* species complex

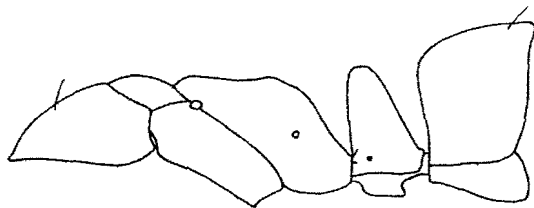


Fig. 52. Mesosoma, petiole and postpetiole of a worker of *P. rubra* (Tjibodas, Java, MCZC).

and the *emiliae* species complex. It shows similarities to *P. rubra* and may

be a member of this Old World species complex.

The larvae are similar to those of *P. stigma* (Wheeler and Wheeler, 1952), as well as to those of several other species complexes.

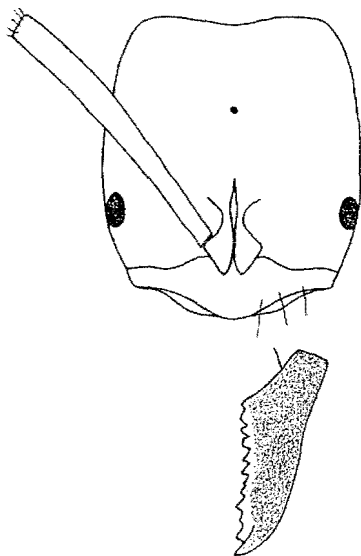


Fig. 53. Head a worker of *P. rubra* (Tjibodas, Java, MCZC). The inset shows the mandible as seen in frontal view.

It will be necessary to study the Old World fauna related to *P. constricta* to understand the evolution of *Pachycondyla*. *Pachycondyla constricta* is very similar to some of the members of the *rubra* species complex of the Old World, such as *P. ambigua* André from Sierra Leone and Madagascar, *P. australis* Forel from Australia, the New Zealand *P. castanea* (Mayr), the Chinese and Japanese *P. chinensis* (Emery) (which

has been introduced into the eastern United States), *P. luteipes* (Mayr) from Nicobar Islands and Japan, *P. manni* Viehmeyer from Malaysia, Java, the Solomon Islands and New Guinea and the Sri Lankan *P. melanaria* (Emery), *P. papuana* (Viehmeyer) from New Guinea and *P. pulchella* Donisthorpe from Dutch New Guinea and West Malaysia, all of which have elongated, generally striate mandibles, relatively small eyes (as in Fig. 53), a deep depression at the metanotal suture (as in Fig. 52), the stridulatory file and lack the posteriorly directed lobe on the posterior part of the subpetiolar process (present, but poorly developed in some species). It also may be related to species that have more robust mandibles, but a similarly depressed mesosoma, but lack the stridulatory file. Such species include the Indonesian *P. atrata* (Karavaiev), the New Guinean *P. croceicornis*, the Australian *P. lutea* (Mayr) and the Arabian *P. sennaarensis*. It differs from all of these species in having the subpetiolar process gradually narrow-

ed posteriorly, not forming a posteriorly directed process as in the Old World species. All of these mentioned Old World species have circular propodeal spiracles (or at most oval-shaped, but not slit-shaped). The Old World species suggest that this complex is closely related to the *ferruginea* species complex, due to the presence of the posteriorly directed lobe on the subpetiolar process, but many can be separated as the stridulatory file is absent in the *ferruginea* group and the metanotal suture is poorly marked or absent in the latter species complex and link other complexes to these groups.

Only a single New World species belongs to this complex: *P. constricta*. It may actually be an Old World species that was introduced into the New World. It will probably be considered a member of an Old World species complex in the future, possibly the *castanea* or *rubra* complex, but will be left in its own species complex for now, simply because it lacks the posteriorly directed lobe on the subpetiolar process.

crassinoda species complex

DESCRIPTION

Worker

The workers of this species complex *lack a carina* anterior to the eye (may be slightly developed near the anterior border of the head in occasional workers), and usually have relatively small eyes (about $\frac{1}{5}$ the length of the side of the head). The *antennal scapes are short* and rarely extend past the posterior lateral corner of the head. Workers have a *swollen region on the pronotal shoulder*, which is usually developed into a carina, usually have a *poorly developed metanotal suture* on the dorsum of the mesosoma, the *propodeal spiracle is slit-shaped*, the *petiole is thick* (wide) when viewed in profile and rectangular shaped in most of the species. The subpetiolar process is laterally thickened and has a downward directed angle on the anterior edge. The anterior face of the postpetiole meets the broadly rounded posterior face at a right angle. The metasternal process consists of two broad, triangular lobes (Fig. 54). The subpostpetiolar process is similar to that of the *aenescens* species complex. Although there is never a posteriorly directed carina from the edge of the process, the area is slightly swollen, especially in *P. striata*. The *stridulatory file is absent* in the New

World species, but present in the Old World species of this complex.

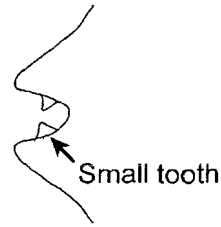


Fig. 54. Metasternal process of a worker of *P. harpax* (Petén, Guatemala, CWEM), as seen from behind.

Female

The *female is larger* than the corresponding worker. It is mostly similar in habitus to the corresponding worker, *lacking a malar carina*, having a *carina on the pronotal shoulder*, a *slit-shaped propodeal spiracle* and the shape of the petiole is similar to that of the worker. The pilosity, sculpture and color are similar to that of the worker.

Male

The male is smaller than, or approximately equal in size to the corresponding worker (*P. harpax*) or larger (i.e. *P. impressa*). They are usually *abundantly hairy* and the *subpetiolar process is poorly developed*. The *pronotal shoulder is*

swollen, but does not form a carina. The stridulatory file is *absent* on the second pretergite in the New World species. The wing (Fig. 55) is similar to that of other species in the genus.

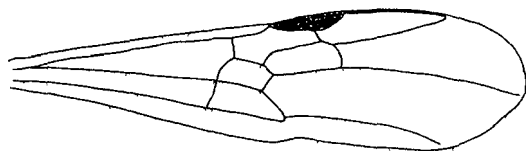


Fig. 55. Forewing of a male of *P. impressa* (Tungurahua, Ecuador, CASC).

The wing venation is typical of that of the genus *Pachycondyla*. *Pachycondyla impressa* and *harpax* both have a relatively long third discoidal cell, similar to that of the *arhuaca*, *ochracea* and *stigma* species complexes.

Larva

The larvae of the *crassinoda* complex are remarkably homogeneous (based on four species), in that the tubercles are simply raised areas, surrounded by hairs (Fig. 56). Those of *P. impressa* are essentially round, with a slightly raised area in the center of the circle. Each tubercle has a surrounding circlet of 8 - 10 hairs (Fig. 56). Those on the ventral areas of the larvae have fewer hairs, usually 2 - 4 (Fig. 56).

Wheeler and Wheeler (1952) characterized the larva of *P. striata* (Fig. 57). The abdomen is voluminous

and sub ellipsoidal, with the ventral profile being nearly straight (Fig. 57).

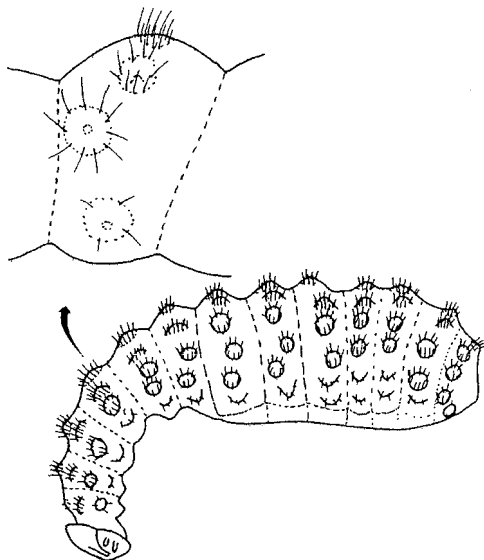


Fig. 56. Larva of a worker of *P. impressa* (Heredia, Costa Rica, CWEM). The inset shows an enlargement of a segment.

The ventral surface is separated from the dorsal surface by a rounded, ventral-dorsal, longitudinal welt. The body is covered with mammiform tubercles (rounded enlargements with "nipples"), arranged in 10 longitudinal rows. Each tubercle is surrounded by 5 - 10 hairs 0.04 - 0.23 mm in length. There are few body hairs not associated with the tubercles. Each tubercle of young larvae (2.5 - 6 mm long) is surmounted by a subconical spine about 0.12 mm long.

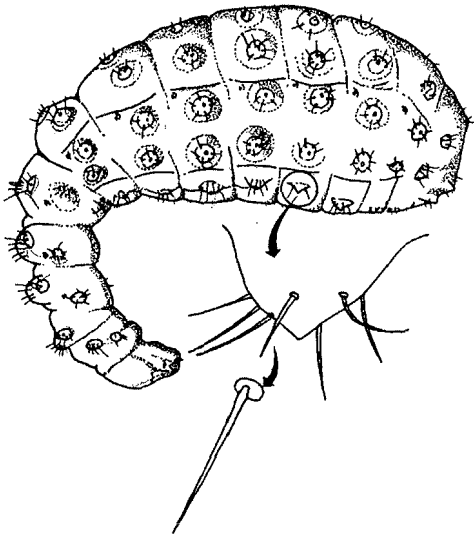


Fig. 57. Larva of a worker of *P. striata* (from Wheeler and Wheeler, 1952). The insets show an enlargement of the mammiform tubercle and of a hair on the tubercle.

The larvae of two other species have been described. Wheeler and Wheeler (1952) mention that the larva of *P. crassinoda* is similar to that of *P. striata*, except the tuberculate hairs are curved and are mostly longer and more numerous. The hairs on the head are coarser and constricted at the base. The larvae of *P. harpax* are similar to those of *P. striata* (Wheeler and Wheeler, 1952), except the tuberculate hairs are shorter and there are some differences in the mouthparts. Wheeler (1900) notes there are striking differences between the tubercles of the youngest and oldest larvae. The tubercles are longer, more pointed and nearly straight and lack the terminal

bristle. Those of older larvae are reduced, but with large, flattened bosses (swellings), with a row of elongated bristles.

COMPARISON

New World members of the *crassinoda* species complex include *P. constricticeps*, *P. crassinoda*, *P. fuscoatra*, *P. harpax*, *P. impressa*, *P. inca*, *P. lattkei*, *P. lenis*, *P. procidua*, *P. purpurascens* and *P. striata*.

Some of the species in this complex are distinct and easily recognized. For example *P. crassinoda* has a thickened petiole, with a horizontal apex and three large teeth on the apex of the pygidium. Another species, *P. constricticeps* has the head strongly narrowed posterior to the eyes. The remaining nine species are difficult to separate. *Pachycondyla fuscoatra* can be separated by the coarse striae, which cover the entire dorsum of the head. The head of *P. striata* is covered with fine striae, as is the dorsum of the mesosoma, which separates it from the others. *Pachycondyla fuscoatra* lacks the sharp pronotal carina that is present in *P. striata*. One of the species, *P. procidua*, has a strongly concave anterior face of the postpetiole (first segment of the gaster). It could only be confused with *P. harpax*, in which the anterior face of the postpetiole forms only a perpendicular angle with the dorsal face. Two of the species, *P. harpax* and *P. lenis* are relatively small, with a total length of about 8 mm. The other species have a total length greater than

8 mm, usually greater than 12 mm. The rarely collected southern Brazilian *P. lenis* differs from the widely distributed *P. harpax* as the clypeus has a medial, longitudinal carina and the shoulder of the pronotum lacks a carina. The clypeus of *P. harpax* lacks the carina and the pronotal shoulder nearly always has a shiny carina that is slightly raised from the surface, contrasting with the surrounding sculpture. *Pachycondyla harpax* is the most common and widely distributed species of *Pachycondyla* in the New World.

The workers of several species are relatively large (total length > 12 mm) and are not commonly collected. The pygidium of four of these species (*P. impressa*, *P. inca*, *P. purpurascens* and *P. striata*) is distinctly concave, with the lateral edges marked by coarse, short (0.08 mm) fused hairs or spines. The pygidium of the Venezuelan *P. latkei* is not depressed and the gaster is smooth and glossy, a condition rarely found in the other four species. The dorsum of the pronotum of *P. striata* is covered with longitudinal striae and the margin on the pronotal shoulder is sharp. The striae are absent or poorly developed in the other two species and the pronotal shoulder is rounded. The common *P. impressa* can be separated from the other two as the medial anterior border of the clypeus is strongly concave, the clypeus is short and the anterior edges of the frontal lobes nearly reach the anterior margin of the clypeus. The clypeuses of the remaining two species are long and less strongly concave. *Pachycondyla*

purpurascens is widely distributed (from Costa Rica to Bolivia) and the dorsal surface of the mandible is nearly smooth. The less common species, *P. inca*, is found in Perú and Bolivia and the surface of the mandible is mostly or completely striate. The dorsum of the petiole of *P. striata* is covered with transverse striae, which are lacking or very fine and poorly defined in the other four species. These four species are obviously closely related and difficult to separate.

This species complex is related to the *foetida* species complex, but can be distinguished by the lack of the carina anterior to the eye (which is present in most species in the *foetida* species complex) and the lack of a stridulatory file on the second pretergite. The rectangular-shaped petiole of members of the *crassinoda* species complex is distinct from members of the *P. foetida* species complex, in which the posterior face of the petiole is usually broadly rounded. It is also related to the *aenescens* species complex, from which it can be separated as members of the *aenescens* complex have a petiole narrowed towards the apex. It could be confused with the *ferruginea* species complex. It differs in being larger (total length > 8 mm, usually much larger than 10 mm, versus total length < 8 mm in members of the *ferruginea* species complex). The metanotal suture is well developed on the side of the mesosoma (often poorly developed or even absent in members of the *ferruginea* species complex, especially the Old World

species). The propodeal spiracle is slit-shaped, not circular as in most of the New World species (not necessarily true in the Old World species).

Old World species that are apparently members of this species complex include *P. cavernosa*, *P. comorensis*, *P. crassa*, *P. granosa*, *P. henryi*, *P. kruegeri*, *P. leeuwenhoekii*, *P. pachyderma*, *P. perroti*, *P. sculpturata*, *P. soror* (intermediate with the *ferruginea* species complex?), *P. talpa* (shows some affinities to the *ferruginea* species complex), *P. tesseronoda* and *P. wasmannii*. Most of these lack the stridulatory file on the second pretergite, two (*P. granosa* and *P. pumicosa*) have a u-shaped file and others (*P. sculpturata*, *P. henryi*, *P. pachyderma*, *P. perroti* and *P. talpa*) have the common v-shaped file. *Pachycondyla granosa* and *P. sculpturata* from South Africa appear to be members of the *crassinoda* species complex and also have well developed stridulatory files. The file may have been secondarily derived in *P. granosa*, as it is u-shaped and the ridges on the file are very fine. Many of these species are roughly sculptured, especially with foveolae and may form a separate species complex allied to the *crassinoda* species complex. *Pachycondyla perroti* is not roughly sculptured like most of the others, looks like a bona fide member of the *crassinoda* group and has a poorly defined stridulatory file. Its sculpture shows a faint indication of foveolae, but is relatively smooth and shining.

KEY

The workers of the *crassinoda* species complex can be separated with the following key.

- 1. Pronotal shoulder with carina, which varies from a shiny raised area (Fig. 58, left), which is slightly elevated from surface, to carina which slightly overhangs side of pronotum (Fig. 59) 2

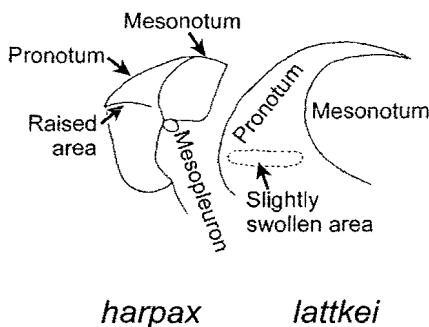


Fig. 58. Pronotal shoulders of workers of *P. harpax* (Petén, Guatemala, CWEM) and *P. lattkei* (paratype, CWEM) as seen obliquely from behind and from the side.

- Pronotal shoulder slightly swollen, but not forming edge above surrounding surface (Fig. 58, right) 7
- 2(1). Relatively large, total length greater than 1 cm 3
- Relatively small, total length less than 1 cm 5
- 3(2). Top of pronotum with predominantly longitudinal striae (Fig. 59, left); Brasil south to Uruguay and central Argentina 4

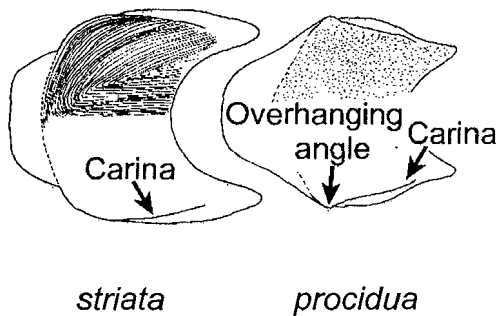


Fig. 59. Pronota of workers of *P. striata* (São Paulo, Brasil, CWEM) and *P. procidua* (10 k W Sinnamary, French Guiana, CWEM), as seen from above.

- Top of pronotum smooth and glossy with scattered punctures (Fig. 59, right); Guianas and Brasil ...
 *procidua* (Emery)

4(3). Region posterior to eyes broadly convex (Fig. 60, left); common and widely distributed in southern South America
 *striata* F. Smith

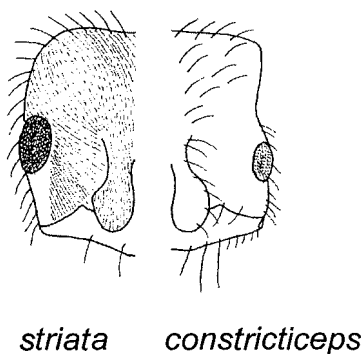


Fig. 60. Heads of workers of *P. striata* (left) and of *P. constricticeps* (right) as seen in full face view.

- Region posterior to eyes strongly constricted (Fig. 60, right); known only from Misiones, Argentina
 ..*constricticeps* Mackay and Mackay

5(2). Mandible with 7 teeth (Fig. 61, left); central Brasil *lenkoi* Kempf (*stigma* species complex)

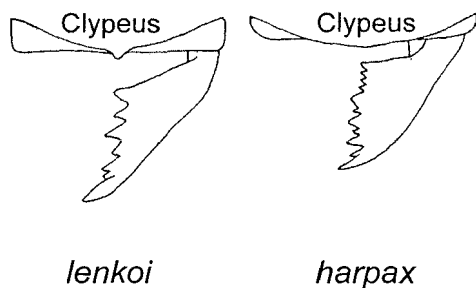


Fig. 61. Mandibles of workers of *P. lenkoi* (Brasilia, Brasil, MCZC) and *P. harpax* (Alta Verapaz, Guatemala, CWEM).

- Mandible with more than 7 teeth (Fig. 61, right) 6

6(5). Medial, longitudinal carina present on clypeus (Fig. 243); rarely collected; southern Brasil
 *lenis* Kempf

- Clypeus without longitudinal carina (Fig. 504); common, southern US south to southern Brasil . *harpax* (Fabricius)

7(1). Pygidium terminating in 2 upturned lateral spines or processes (Fig. 62); Colombia south to Paraguay
 *crassinoda* (Latreille)

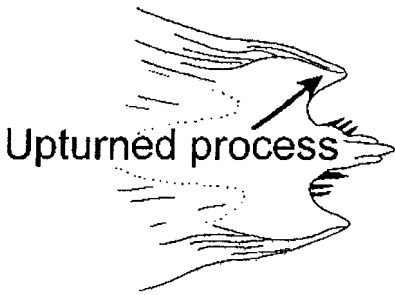


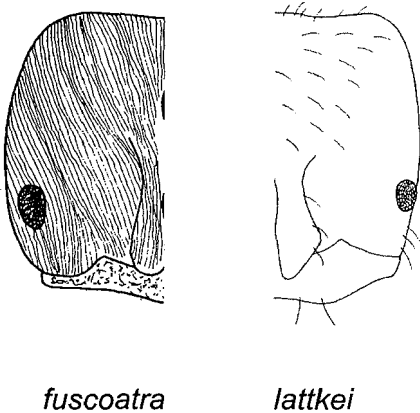
Fig. 62. Pygidium of a worker of *P. crassinoda*.

- Pygidium not forming 2 spines 8

8(7). Dorsum of head completely covered with coarse, diverging striae (Fig. 63, left); Colombia, Venezuela? *fuscoatra* (Roger)

- Dorsum of head without striae (Fig. 63, right) or with poorly defined striae; widely distributed 9

9(8). Dorsum of pygidium not concave; gaster occasionally smooth and glossy (Fig. 251) 10



fuscoatra

lattkei

Fig. 63. Heads of workers of *P. fuscoatra* and *P. lattkei*.

- Dorsum of pygidium strongly concave (Fig. 64); gaster nearly always dull; widely distributed from México south to Bolivia 11

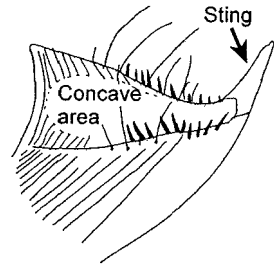
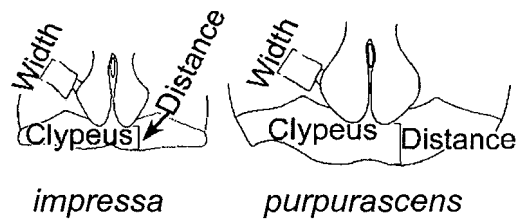


Fig. 64. Pygidium of a worker of *P. impressa*.

10(9). Relatively small, total length up to 1 cm; mostly restricted to Costa Rica and Venezuela occasional samples of *harpax* (Fabricius)

- Relatively large, total length greater than 1 cm; Venezuela *lattkei* Mackay and Mackay

11(9). Distance between frontal lobes and anterior edge of clypeus short (0.14 - 0.25 mm), about equal to width of base of scape (Fig. 65, left); common and widely distributed (México to southern Brasil) *impressa* (Roger)



impressa

purpurascens

Fig. 65. Clypeuses of workers of *P. impressa* and *P. purpurascens*

(both from Guanacaste, Costa Rica, CWEM).

- Distance between frontal lobes and anterior edge of clypeus longer (0.35 - 0.50 mm), greater than diameter of scape at base (Fig. 65, right); rarely collected, but widely distributed 12

12(11). Dorsal surface of mandible smooth, with little or no evidence of striae (Fig. 252, left); Costa Rica to Bolivia

..... *purpurascens* Forel

- Dorsal surface of mandible with distinct striae covering at least 1/2 of the surface (Fig. 252, right); Perú and Bolivia *inca* Emery

crenata species complex

DESCRIPTION

Worker

This is the most difficult of the species complexes for three reasons: first, it is a large group with seventeen species; second, the species are so variable that definition is nearly impossible; and third, there are only subtle differences between workers of some of the species, which have very different males.

Workers of this species complex are small (total length < 10 mm), to moderate sized ants (TL 12 mm). The *anterior margin of the clypeus is convex* and usually forms a medial lobe or angle or even a spine, which overhangs the remainder of the clypeus (Fig. 66, exception: *P. luteola*). This medial process is

distinctly flattened (Fig. 67), or even concave and is usually covered with longitudinal striae (Fig. 67). The *malar carinae (preocular carinae)* are *nearly always well developed* and are

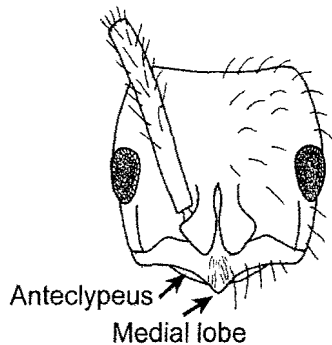


Fig. 66. Head of a worker of *P. rugosula*, showing the medial lobe of the clypeus overhanging the anteclypeus.

very sharp and well marked in some of the species. The scapes extend about $\frac{1}{3}$ length past the posterior lateral corner of the head and are covered with *numerous, erect or nearly erect hairs*. The eye is large (Fig. 55), covering about $\frac{1}{3}$ of the side of the head. The *pronotal shoulder* is nearly always strongly developed into a *sharp carina* (weakly developed in *P. crenata* and *P. moesta*) which overhangs the side of the pronotum. The *metanotal suture* is poorly marked

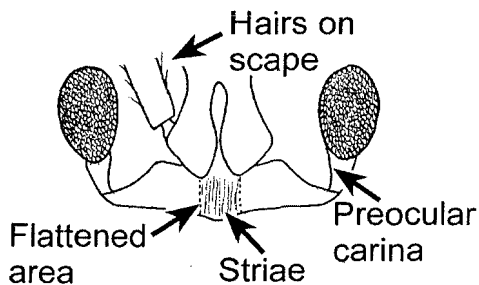


Fig. 67. Anterior part of the head of a worker of *P. crenata* (20 k S Sinnamary, French Guiana, CWEM).

and barely breaks the cuticle on the dorsum of the mesosoma. The *propodeal spiracle* is slit-shaped and elongate. The *petiole* is thick when viewed in profile, usually somewhat cuboidal-shaped, although the posterior face may curve anteriorly and meet the vertical anterior face near the anterior border of the top of the petiole, or may curve posteriorly and form a concave posterior face. The *stridulatory file* on the second pretergite is *well developed*.

The metasternal process has parallel and closely spaced inner margins and convex exterior margins (Fig. 68).



Fig. 68. Metasternal process of a worker of *P. oberthueri* (Pará, Brasil, CWEM), as seen from behind.

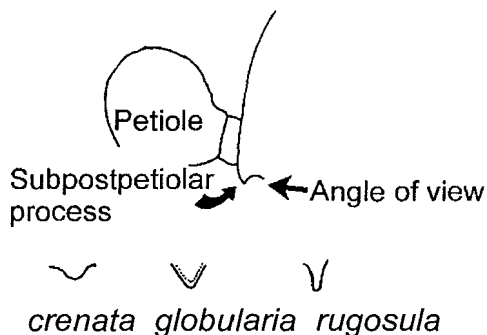


Fig. 69. Subpostpetiolar process in three species of the *crenata* species complex, as seen from below and behind. The upper inset shows the petiole and anterior part of the postpetiole of *P. crenata*, the arrow indicates the angle of view used to see the processes below.

The subpostpetiolar process (Fig. 69) is basically the same as that found in the *aenescens* species complex (Fig. 30). Development ranges from a broadly rounded, poorly developed lobe (*P. carinulata*, *P. cavinodis*, *P. crenata*, *P. goeldii*, *P. latinoda*, *P.*

luteola, *P. moesta*, *P. oberthueri*), poorly developed and weakly angulate (*P. coveri*, *P. fiebrigi*, *P. globularia*), to a relatively sharp tooth-like structure (*P. antecurvata*, *P. donosoi*, *P. rugosula*, *P. striatinodis*, *P. unidentata*).

Erect hairs are present on most surfaces, including the mandibles, dorsum and ventral surfaces of the head, scapes, posterior margin, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, the hairs on the tibiae are mostly suberect and bristly.

These ants are reddish brown or dark brown to nearly black, the appendages are often lighter brown or even yellowish.

Female

The females are similar to the workers, with the *convex anterior margin of the clypeus*, the *well-developed carina* anterior to the eye, the *large eyes*, the *well-developed carina on the pronotal shoulder* (lacking in *P. moesta*) and the *thick petiole*. Erect hairs are present on most surfaces.

Male

The males are *relatively small*, approximately as large as the worker, or slightly smaller. The eyes are relatively large (Fig. 71). The *surface of the clypeus is swollen* and usually forms a small bump (best seen in profile). The pronotal shoulder is swollen, but does not form a distinct carina. The *petiole is usually somewhat triangular shaped*, with a

relatively sharp apex. The subpetiolar process is somewhat characteristic for this group, in general having a *broadly rounded anterior lobe* and a *smaller, sharper posterior lobe, separated by a distinctly concave region* (the posterior lobe is absent in *P. moesta* and poorly developed in *P. unidentata* and *P. crenata*).

The wing venation is similar to that in other species of *Pachycondyla*, except that the third discoidal cell is often shorter than normal, at least in *P. goeldii* (Fig. 70) and *P. crenata*.

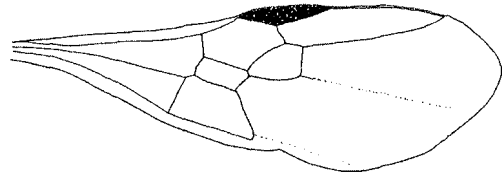


Fig. 70. Left forewing of a male of a species near *P. goeldii* (Amazonas, Colombia, CASC).

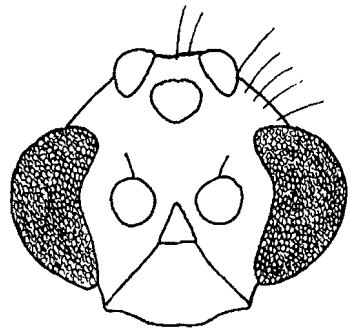


Fig. 71. Head of a male of a species near *P. goeldii* (Amazonas, Colombia) (CASC).

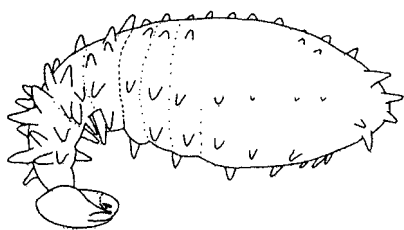


Fig. 72. Larva of a worker of *P. crenata* (Heredia, Costa Rica, CWEM).

Larva

The larvae of *P. crenata* and *P. donosoi* are known. Most of the surfaces are covered with slender, finger-like tubercles, especially the anterior half of the larvae (Fig. 72). These tubercles are similar to those found in many other species complexes, including the *apicalis*, *constricta*, *foetida* and *stigma* species complexes.

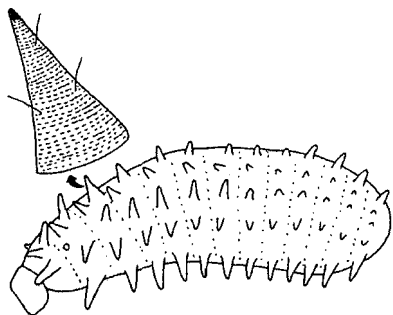


Fig. 73. Larva of a worker of *P. donosoi* (from type series, CWEM). The inset shows an enlargement of a tubercle.

The larva of *P. moesta* is similar (Wheeler and Wheeler, 1971, Fig. 12f) to that of *P. crenata* (Fig. 72) and *P.*

donosoi (Fig. 73), but with fewer and less well-developed tubercles. The similarity of the larvae in several complexes, suggests a phylogenetically close relationship between them, which is not evident using the morphology of the workers.

COMPARISON

Members of the *crenata* species complex include *P. antecurvata*, *P. carinulata*, *P. cavinodis*, *P. coveri*, *P. crenata*, *P. donosoi*, *P. fiebrigi*, *P. globularia*, *P. goeldii*, *P. latinoda*, *P. luteola*, *P. moesta*, *P. oberthueri*, *P. recava*, *P. rugosula*, *P. striatinodis* and *P. unidentata*.

This is the most difficult complex in the genus, consisting of a baffling array of closely related species, which are separated on the basis of subtle differences in the workers that are usually supported by more substantial differences in the males.

The form of the petiole can most easily separate the workers of these species. The petiole of three species is strongly concave (or at least flat) posteriorly. In all of the other species in this complex, the posterior face of the petiole is predominantly convex. Among these three species, the highest point of the petiole is near the anterior edge in *P. recava* and near the posterior edge in *P. cavinodis*. *Pachycondyla recava* differs in that the petiole is smooth and glossy (especially the posterior face) and is sculptured (specifically the posterior face) in *P. rugosula*.

The highest point is at the anterior edge, and the anterior face of the petiole is vertical and straight and

meets the broadly rounded dorsal and posterior faces in three of the species. The sides of the petioles of *P. striatinodis* and *P. rugosula* are partially or mostly covered with horizontal striae, which separates them from similar species. The posterior face of the petiole of *P. striatinodis* also has horizontal striae, which are lacking in *P. rugosula*. *Pachycondyla unidentata* lacks the horizontal striae on all surfaces of the petiole.

Another group of species has the highest point near the middle of the petiole. At least part of the anterior face is usually vertical and the dorsal face is developed to one extent or the other. The dorsal face is angulate at the apex of three species: *P. carinulata*, *P. coveri* and *P. goeldii*. *Pachycondyla goeldii* is easily recognized, as the erect and suberect hairs on the scapes and tibiae are mostly greater in length than the diameter of the appendages from which they arise. They are mostly shorter in *P. carinulata* and *P. coveri*. These two species are very similar, but *P. carinulata* can be separated as the punctures on the dorsum of the pronotum are coarse and form transverse striae and are only weak and poorly defined on the dorsum of the pronotum of *P. coveri*.

The apex of the petiole of several other species is only broadly rounded with the highest point being in the mid region. Of these, three species (*P. crenata*, *P. luteola* and *P. moesta*) have poorly developed carinae on the pronotal shoulder and are usually ferruginous red (generally at least the head and mesosoma). Most of the

hairs on the posterior tibia of *P. luteola* are longer than the diameter of the tibia, but are shorter than the tibia in the other two species. Separation of the workers of *P. crenata* and *P. moesta* is difficult. Workers of *P. crenata* are often slightly smaller (total length < 7 mm), than are workers of *P. moesta* (TL > 7 mm) and are more commonly collected. If males are available in a series, identification is much easier. The male of *P. crenata* is smaller (TL < 5 mm) and the dorsal surface of the clypeus is only slightly swollen. The male of *P. moesta* is larger (TL > 5 mm) and the medial section of the clypeus is raised into a swollen region. The remainder of the species have a well developed, sharp pronotal carinae and are mostly dark reddish brown (of if they are ferruginous red, they are larger than the workers of *P. luteola*, *P. crenata* and *P. moesta*). *Pachycondyla fiebrigi*, *globularia* and *P. latinoda* form a clade of closely related, larger (total length > 8 mm) workers, which are difficult to separate. Most workers of *P. globularia* have a nearly circular petiolar node (seen from above), or at most it is slightly oval-shaped. The petioles of the other two species (seen from above) are not circular. The petiole of *P. latinoda* is slightly longer (side view) than is that of *P. fiebrigi*.

The two remaining species are very similar to *P. crenata*, differing in having the highest point on the petiole being posterior to the anterior face, on the anterior half of the petiole, but near the middle. One of these, *P. donosoi*, has a small medial angle on the clypeus which overhangs the

clypeus. The other species, *P. antecurvata*, lacks this angle. Otherwise these two species are very similar.

Finally, three species have the highest point of the petiole near the posterior edge. One of these, *P. cavinodis*, has an obvious concave posterior petiolar face. *Pachycondyla latinoda*, discussed above, may have the highest point near the posterior edge, but the dorsal face is broadly rounded, not angulate as in these other two species. The third species, *P. oberthueri* is similar to *P. cavinodis*, but the posterior face of the petiole is mostly convex.

This species complex is very closely related to the *foetida* species complex. The *crenata* species complex can be separated from the *foetida* species complex by the poorly developed metanotal suture, especially on the dorsum of the mesosoma, which is depressed in members of the *foetida* species complex. In addition, they are mostly smaller (total length up to 8 mm), whereas those of the *foetida* species complex are usually larger (> 10 mm TL).

This complex is also very similar to members of the *emiliae* species complex, especially *P. venusta*, *P. emiliae*, *P. schultzi* and *P. magnifica*. *Pachycondyla schultzi* lacks the overhanging process on the clypeus, but the middle of the clypeus has longitudinal striae, similar to those found in some of members of the *crenata* species complex. Most of the species in the *emiliae* species complex have the metanotal suture marked on the dorsum of the mesosoma, to deeply depressed. The propodeal

spiracle of members of the *crenata* species complex is elongated, not circular as in many members of the *emiliae* species complex. All of the species of the *crenata* group have a similar subpetiolar process with a ventrally directed anterior angle followed by a concave region. This characteristic is even found in the males. The subpetiolar processes of members of the *emiliae* complex have a thickened lobe without any sharp angles (except for *P. magnifica*, which has a small, posteriorly directed lobe).

KEY

The following key may be useful for separating the workers of the *crenata* species complex.

1. Petiole with vertical anterior face and broadly rounded dorsal-posterior face, highest point near anterior edge (Fig. 74) 2
 - Petiole not as above, highest point near midpoint or at posterior face (Figs. 77 & 78) 5
- 2(1). Side of petiole with horizontal striae (Fig. 74) at least on lower half; Guatemala south to Bolivia 3

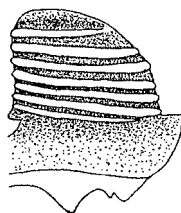


Fig. 74. Petiole of a worker of *P. striatinodis* (Frijolito, Panamá, CWEM).

- Side of petiole very finely punctate, without any evidence of striae 4

3(2). Posterior face of petiole with striae (Fig. 75); Guatemala south to Bolivia *striatinodis* Emery

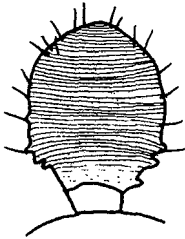
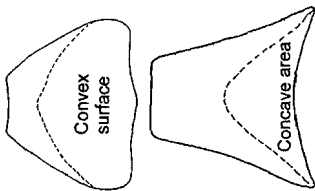


Fig. 75. Posterior face of the petiole of a worker of *P. striatinodis*.

- Posterior face of petiole punctate, partially smooth and shining; Costa Rica south to Bolivia *rugosula* Emery

4(2). Posterior face of petiole convex (Fig. 76, left) or at least flat, weakly sculptured and moderately shining; common, México south to Brasil and Bolivia *.unidentata* (Mayr)



unidentata recava

Fig. 76. Petioles of workers of *P. unidentata* and *P. recava* (holotype), as seen from above.

- Posterior face of petiole strongly concave (Fig. 76, right) and glossy; rare, known only from state of Valle del Cauca, Colombia *recava* Mackay and Mackay

5(1). Dorsum of petiole angulate, forming relatively sharp point (Fig. 77, left) or rounded angle (Fig. 787) 6

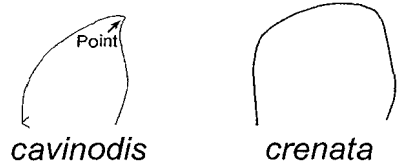


Fig. 77. Petioles of workers of *P. cavinodis* (Madre de Dios, Perú, CWEM) and *P. crenata* (20 k Sinnamary, French Guiana, CWEM), as seen from the side.

- Dorsum of petiole at most convex, not forming sharp point (Fig. 77, right) 12

6(5). Highest point near midpoint of petiole (Fig. 78) 7

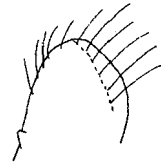


Fig. 78. Petiole of a female of *P. goeldii* (holotype female of *P. lydiae*), as seen from the side.

- Highest point near posterior edge of petiole (Fig. 77) 10

7(6). Erect and suberect hairs on posterior tibia very long, some hairs on extensor surface about as long or longer than tibial diameter (Fig. 79)

..... 8

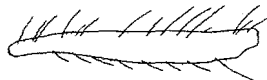


Fig. 79. Posterior left tibia of a worker of *P. goeldii* (Pichincha, Ecuador, CWEM).

- Erect and suberect hairs on tibiae shorter than diameter of tibiae (Fig. 80); México south to Bolivia and Brasil 9

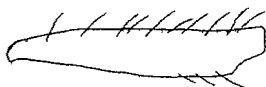
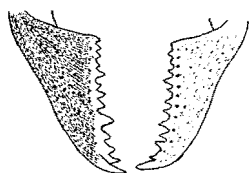


Fig. 80. Posterior left tibia of a worker of *P. carinulata* (Tabasco, México, CWEM).

8(7). Dorsal surface of mandible completely striate (Fig. 81, left); Ecuador east to Trinidad, south to Brasil *goeldii* (Forel)

- Dorsal surface of mandible nearly smooth, with weak, coriaceous sculpture (Fig. 81, right); Pichincha, Ecuador *donosoi* Mackay and Mackay



goeldii *donosoi*

Fig. 81. Mandibles of workers of

P. goeldii (Pichincha, Ecuador, CWEM) and *P. donosoi* (paratype, CWEM).

9(7). Highest point on apex of petiole closer to posterior edge (Fig. 234); relatively smaller (Total Length < 6 mm); México to Bolivia

..... *carinulata* (Roger)

- Highest point on petiole closer to anterior edge (Fig. 331); relatively larger (TL > 6 mm); Costa Rica to Perú and Brasil

... *antecurvata* Mackay and Mackay

10(6). Entire posterior face of petiole convex, highest point not at posterior edge of petiole (Fig. 82, left); Perú

..... *coveri* Mackay and Mackay



coveri *oberthueri*

Fig. 82. Petioles of workers of *P. coveri* (holotype, MCZC) and *P. oberthueri* (Pará, Brasil, CWEM), as seen from the side.

- Posterior face of petiole at least slightly concave near apex, highest point at posterior edge (Fig. 82, right)

..... 11

11(10). Small, total length < 5 mm; Perú south to Bolivia to eastern Brasil

..... *oberthueri* Emery

- Moderate in size, TL > 7 mm; Panamá south to Brasil, east to Guyana *cavinodis* (Mann)

- 12(5).** Relatively small, total length < 7 mm; commonly collected **13**
 - Relatively large, total length > 8 mm; rarely collected **14**

- 13(12).** Petiole usually narrower (length in profile < 0.66 mm); males tiny (total length < 5 mm); common and widely distributed, México south to Argentina ***crenata* (Roger)**
 - Petiole usually wider (length > 0.7 mm); males larger (TL > 5 mm); rarely collected, but widely distributed, Guatemala to Brasil ***moesta* Mayr**

- 14(12).** Dorsal surface of mandible nearly smooth and glossy (Fig. 83, left); ferruginous red without medial lobe which overhangs remainder of clypeus; Perú, Bolivia and Brasil ***luteola* (Roger)**
 - Dorsal surface of mandible finely striate, dull (Fig. 83, right); usually reddish brown to brown; medial lobe overhangs remainder of clypeus **15**

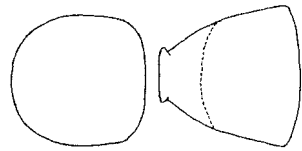


luteola globularia

Fig. 83. Mandibles of workers of *P. luteola* (Madre de Dios, Perú, CWEM) and *P. globularia* (holotype).

- 15(14).** Petiole circular or slightly oval shaped when viewed from above (Fig. 84, left); Colombia east to Venezuela, south to Paraguay

... ***globularia* Mackay and Mackay**

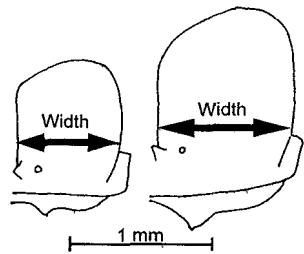


globularia latinoda

Fig. 84. Petioles of workers of *P. globularia* (Saint Augustine, Trinidad, MCZC) and *P. latinoda* (holotype, MCZC), as seen from above.

- Petiole not circular when viewed from above, anterior half definitely narrowed (Fig. 84, right) **16**

- 16(15).** Petiole narrow in profile, width < 0.8 mm (Fig. 85, left); Paraguay ***fiebrigi* (Forel)**
 - Petiole (in profile) wide, width > 1 mm (Fig. 85, right); southern Brasil, Guyana? ***latinoda* Mackay and Mackay**



fiebrigi

latinoda

Fig. 85. Petioles of workers of *P. fiebrigi* (paralectotype) and *P. latinoda* (holotype), as seen from the side.

curiosa species complex

DESCRIPTION

Worker and male

Unknown.

Female

This complex is known from a female of a single species, *P. curiosa*. It is an oddball in the genus, as it *lacks the malar and pronotal carinae*, but has a *stridulatory file on the second pretergite*. The subpostpetiolar process cannot clearly be seen due to glue on the single holotype of this species.

The worker, larva and male of this complex are unknown.

COMPARISON

The *short antennal scape* and the robust mandibles suggest a relationship with *P. mirabilis* or *P. luteola*, but the lack of conical setae on the middle tibiae places it outside the *ochracea* species complex and the lack of the carina anterior to the eye and on the pronotum suggests it is not a member of the *crenata* species complex. As these two carinae are not well developed in some of the members of the *crenata* species complex, it may be related and may even be a member of the *crenata* complex. It is easily separated from all of the others in the genus by the *presence of costulae on all of the bodily surfaces*, except the mandibles, the appendages and the gaster.

emiliae species complex

DESCRIPTION

Worker

The workers of this species complex are *mostly small* (up to 8 mm total length) ants. *The anterior border of the clypeus is often broadly convex* and may even overhang the remainder of the clypeus. The region posterior to the medial point may be slightly depressed or flattened and may have longitudinal striae. There is a weakly developed (*P. emiliae*, *P. magnifica*, *P. metanotalis*) to a well-developed malar carina (*P. concava*, *P. schultzi*, *P. venusta*). *The eye is relatively small* (maximum length 0.3 - 0.4 mm, about $\frac{1}{5}$ - $\frac{1}{4}$ of the head length). *The pronotal shoulder is developed into a carina*. The mesosoma has a *well-developed metanotal suture* on the dorsum, which is depressed below the remainder of the mesosoma. The propodeal spiracle is round (*P. concava*, *P. emiliae*, *P. schultzi*, *P. venusta*), oval-shaped (*P. metanotalis*) to slit-shaped (*P. magnifica*). *The petiole is relatively narrow* as seen in profile, with the anterior face being nearly vertical (straight or slightly concave), the posterior face curves broadly and meets the anterior face near the anterior border. The posterior lateral margins of the petiole as well as the apex, are moderately sharp. The posteriorly directed spine on the subpetiolar process is only poorly developed in *P. magnifica* and absent in the other species. The subpostpetiolar process varies from being

poorly developed, essentially consisting of a low rounded lobe (*P. concava*, *P. schultzi* and *P. venusta*) to a relatively large process which appears somewhat toothlike when seen from behind (*P. emiliae*, *P. magnifica*, *P. metanotalis*). *The stridulatory file is well developed* on the second pretergite. *Erect hairs are abundant* on most surfaces.

Female, Male and Larva

Unknown.

COMPARISON

The species in the *emiliae* species complex include *P. concava*, *P. emiliae*, *P. magnifica*, *P. metanotalis*, *P. schultzi* and *P. venusta*. It is likely that this is not a monophyletic group, but final resolution of the group must await the discovery of additional specimens, especially sexuals.

Pachycondyla concava can be separated from the others by the concave posterior face of the petiole (convex in the other species). *Pachycondyla magnifica* has coarse striae on the dorsum of the pronotum (not present in the other species). *Pachycondyla emiliae* and *P. metanotalis* are larger (total length greater than 7 mm) than the other two remaining species (*P. schultzi* and *P. venusta*, which are less than 7 mm in total length). The slightly smaller (8 mm total length) *P. emiliae* from northern South American can be recognized by the finely striate and dull mandibles, whereas the mandibles

are nearly smooth with scattered punctures in the larger (9 mm total length) Brazilian *P. metanotalis*. Finally, *P. schultzi* can be separated as it lacks the projecting medial lobe on the clypeus, which is present in *P. venusta*.

Workers of this species complex would most likely be confused with members of the *crenata* species complex, but differ in having the mesosoma deeply depressed at the metanotal suture. It may not be a natural grouping and some of the species may actually be members of the *crenata* species complex, especially *P. venusta*, *P. concava* and *P. schultzi*. Members can be separated from the apparently related *P. constricta*, as the metanotal suture is not as deeply depressed and by the presence of a carina on the pronotal shoulder.

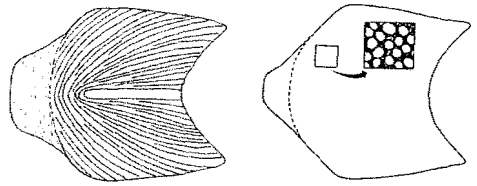
Interestingly, the structure of the mesosoma is similar to that of some of the Old World species, which appear to be related to *P. constricta*, especially the Indonesian *P. atrata* Karavaiev. It is probably the result of convergence, as the latter species lacks the malar carina and has a posteriorly directed lobe on the subpetiolar process. Of the New World species, only *P. magnifica* has a poorly developed posteriorly directed angle.

KEY

Workers of the *emiliae* species complex can be identified with the following key.

1. Dorsum of pronotum covered with coarse mostly longitudinal

striae (Fig. 86, left); states of Goiás and São Paulo, Brasil
 *magnifica* Borgmeier



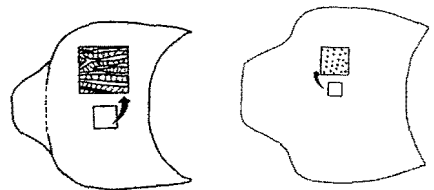
magnifica

schultzi

Fig. 86. Pronota of workers of *P. magnifica* (Goiás, Brasil, USNM) and *P. schultzi* (holotype), as seen from above.

- Dorsum of pronotum punctate (Fig. 86, right), striae, if present, poorly developed and not coarse (Fig. 87) 2

2(1). Side of pronotum and mesopleuron very smooth and glossy; dorsum of pronotum punctate, but with punctures forming poorly defined, longitudinal striae (Fig. 87, left); southeastern Brasil 3



concava

metanotalis

Fig. 87. Pronota of workers of *P. concava* (holotype) and *P. metanotalis* (São Paulo, Brasil, USNM), as seen from above.

- Side of pronotum and mesopleuron completely sculptured, possibly moderately shining; dorsum of pronotum may be punctate, but not forming striae (Fig. 87, right) 4

3(2). Anterior face of postpetiole broadly rounded into dorsal face (Fig. 88, left) ***venusta* Forel**

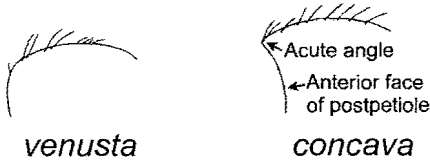


Fig. 88. Anterior face of postpetioles (first gastral terga) of workers of *P. venusta* (Espírito Santo, Brasil, MCZC) and *P. concava* (holotype), as seen from the side.

- Anterior face of postpetiole strongly concave, forming acute angle with dorsal face of postpetiole (Fig. 88, right)
 ***concava* Mackay and Mackay**

4(2). Apex of petiole forming distinct, obliquely sloping (higher posteriorly), dorsal face (Fig. 89, left); southeastern Brasil
 ***schantzi* Mackay and Mackay**



Fig. 89. Petioles of workers of *P. schultzi* (holotype) and *P. metanotalis* (São Paulo, Brasil, USNM), as seen from the side.

- Apex of petiole not forming dorsal face, convex posterior face meeting concave anterior face near anterior edge of apex (Fig. 89, right); northern South America to Brasil ... 5

5(4). Anterior medial border of clypeus angulate, slightly overhanging remainder of clypeus, with longitudinal striae (Fig. 90, left); dorsum of pronotum densely and evenly punctate, each puncture nearly touching adjacent punctures; northern South America ***emiliae* (Forel)**

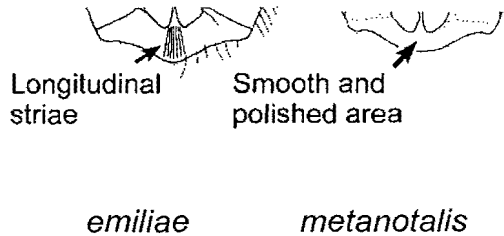


Fig. 90. Clypeuses of workers of *P. emiliae* (Aragua, Venezuela, CWEM) and *P. metanotalis* (based on Kempf, 1961).

- Anterior medial border of clypeus depressed, medial region of clypeus concave, smooth and shining (Fig. 90, right); punctures on dorsum of pronotum sparse (fewer than 10 / 0.1 mm²), area between punctures smooth and glossy; southern Brasil .
 ***metanotalis* Luederwaldt**

ferruginea species complex

DESCRIPTION

Worker

Workers of this species complex are a homogenous group of *relatively small* (total length up to 8 mm) ants, with *small eyes* (maximum diameter 0.25 mm). The mandible has approximately 10 teeth in most species (seven teeth on the mandibles of *P. minuta* and *P. longidentata*). The *clypeus has a transverse carina* (Fig. 92). There is *no carina anterior to the eye*. The *pronotal shoulder is slightly swollen*, but does not form a carina (Fig. 91). The *mesosoma is only slightly depressed* at the metanotal suture, which is barely indicated on the dorsum. The *propodeal spiracle is*

directed angle or lobe on the subpetiolar process.

round. The metasternal process consists of two blunt, finger-like processes (Figs. 5, 93). The posterior face of the petiole is broadly rounded and meets the anterior vertical face near the anterior point of the apex of the petiole, or is rectangular-shaped. The *subpetiolar process has a posteriorly directed angle or lobe* (Fig. 91). The subpostpetiolar process is not developed in the New World species of the *ferruginea* species complex, although it is developed in at least some of the Old World species that we consider to be members of the complex (*P. aciculata*, *P. crassa* and *P. soror*).

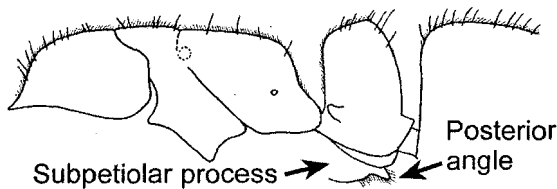


Fig. 91. Mesosoma and petiole of a possible worker of *P. minuta* (Suchitepéquez, Guatemala, CWEM), showing the posteriorly

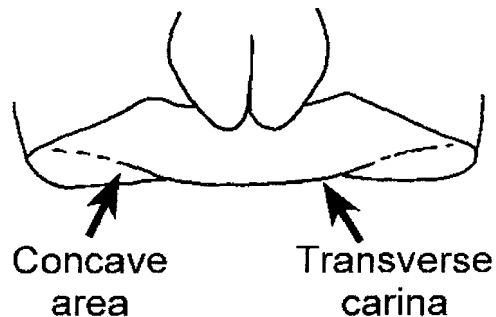


Fig. 92. Clypeus of a worker of *P. lunaris* (Puntarenas, Costa Rica).

Erect hairs are relatively sparse and short (most hairs < 0.25 mm), but present on the dorsum of the head, the scape, the ventral surface of the head, the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster, the hairs on the tibiae are very short (0.1 mm) and nearly erect.

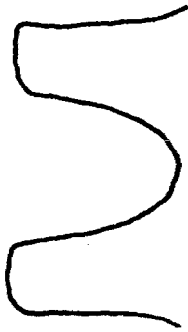


Fig. 93. Metasternal process of a worker of *P. lunaris* (Puntarenas, Costa Rica, CWEM) as seen from behind.

These ants range in color from ferruginous red, with slightly lighter appendages, to black with lighter brown appendages.

Female

The female is relatively small, approximately the same size as the corresponding worker. It is similar to the worker in most of the other traits, including the form of the mandible, shape of the clypeus, the relative length scape, the *pronotal shoulder lacks a carina*, the *propodeal spiracle*

is nearly always circular and the petiole is similar in shape to that of the worker. The sculpture, pilosity and color are similar to those of the corresponding worker. They are unknown in many of the species, but are undoubtedly all winged.

Male

The male is unknown except for that of *P. rupinicola*. It is relatively small (total length 7 mm), somewhat smaller than the worker. It is similar to those of the stigma species complex, but could be recognized by the well-developed posteriorly directed tooth on the subpetiolar process.

The wing venation is similar to that of members of the ochracea species complex and related groups, with an elongated third discoidal cell.

Larva

Wheeler and Wheeler (1974) characterized the larva of *P. rupinicola* (= n. sp. in paper), as being shaped like a crookneck squash, with a large slender neck and a large head (Fig. 94). The abdomen is subovoidal, but nearly straight ventrally. The anus is ventral with two small lips. There are total of 134 tubercles. The typical tubercle is conical, about 0.2 mm tall, with numerous minute spinules in short encircling rows and with three or four simple hairs about 0.2 mm long mounted near its base. The spiracles are mounted on minute papillae. The integument is covered with large spinules in arcuate rows, which frequently form a reticulate pattern. The few body hairs are about 0.13 mm long, simple and slightly curved.

Those on the head are shorter, 0.06 - 0.12 mm long and similar. The labrum is large, deeply bilobed, with the lateral margins sinuate and with the anterior surface of each lobe bearing a ventral boss with about 10 sensilla on and near its ventral border. The posterior surface is deeply spinulose, with long medial spinules in numerous long transverse parallel rows that are so close together that the spinules overlap. The mandibles are heavily sclerotized, narrowly subtriangular in anterior view, with the apical tooth curved medially and with two small subapical teeth. The anterior and medial surface of the basal half of the mandible has minute denticles which are either isolated or in short rows.

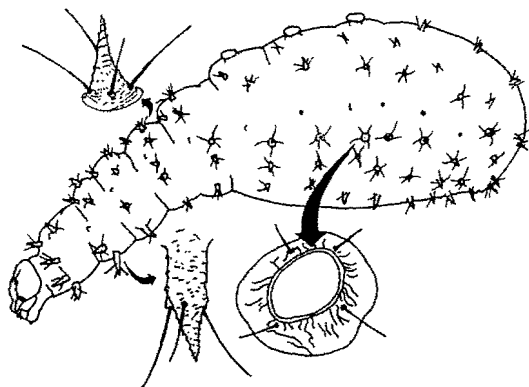


Fig. 94. Larva of a worker of *P. rupinicola* (From Wheeler and Wheeler, 1974). The insets show enlargements of the various tubercles.

The maxilla has a conoidal apex and is densely spinulose, with the spinules

longer and in short rows apically and shorter basally and isolated laterally. The anterior surface of the labium is densely spinulose, with the spinules in numerous short rows medially, becoming longer and isolated ventrally and laterally with a basal densely spinulose transverse welt.

COMPARISON

Members of the *ferruginea* species complex in the New World include *P. breviscapa*, *P. ferruginea*, *P. lunaris*, *P. minuta* and *P. rupinicola*. There could be additional species, as John Longino has six subtly different morphospecies in Costa Rica (pers. comm.).

The petioles of two of these species have a vertical anterior face and a broadly rounded posterior face, which meets the anterior face near the anterior edge of the petiole, forming at most a short horizontal surface at the apex. One of these species, *P. minuta*, has only seven mandibular teeth; the other, *P. ferruginea* has approximately ten. *Pachycondyla ferruginea* is larger (total length > 5 mm). The other species, *P. minuta*, is smaller (total length < 5 mm).

The structure of the petiole of the three remaining species is different, in that the anterior and posterior faces are essentially parallel and the apex forms a distinct horizontal surface (the petiole of *P. longidentata* is similar, see below). One of these species, *P. lunaris*, is relatively small (total length < 5.5 mm) and has a relatively small eye (maximum diameter 0.12 mm). It is common in Costa Rica and occurs as far south as Bolivia. The second

species, *P. rupinicola* and third species, *P. breviscapa*, are relatively large (total length > 7 mm), with a relatively large eye (maximum diameter > 0.2 mm). The first (*P. rupinicola*) has been found only in Panamá and Colombia, the second only in Bolivia. The two species can be easily separated, as the scape of the female of *P. rupinicola* extends well past the posterior lateral corner of the head and that of the female of *P. breviscapa* barely reaches the posterior lateral corner of the head. The worker and male of *P. breviscapa* are unknown.

Pachycondyla longidentata (*arhuaca* species complex) resembles members of the *ferruginea* species complex, but has an elongated apical tooth, about three times as long as any of the other teeth. The form of the clypeus is very different from those of the *ferruginea* species complex, lacking the transverse carina. It also lacks the posterior pointed spine or lobe on the subpetiolar process. Otherwise it is similar to members of the *ferruginea* species complex and is included in the key.

This species complex could be confused with the *constricta* species complex, but can be easily separated as the metanotal suture is only slightly depressed below the level of the remainder of the mesosoma (may not be true in the Old World members of this complex). This complex is very similar to the *crassinoda* species complex, especially when the Old World species (listed below) are considered. It differs in consisting of smaller species (total length < 8 mm,

versus most species > 8 mm in the *crassinoda* group). It can be separated by the lack of a marginate pronotal shoulder (nearly always formed into a sharp carina in the *crassinoda* group) and by often having a poorly developed metanotal suture on the side of the mesosoma (well developed in the *crassinoda* group, absent on the dorsum of the mesosoma of both groups). The propodeal spiracle of members of the *ferruginea* species complex is usually circular (at least in the New World species), not slit-shaped as in members of the *crassinoda* species complex.

This is primarily an Old World group with closely related species which lack the posteriorly directed spine on the subpetiolar process and often have slit-shaped propodeal spiracles. Old World species include *P. aciculata* Emery and *P. acuta* Emery from New Guinea, the Australian *P. astuta* Smith, *P. crassa* (Emery) from Ethiopia, *P. pachynoda* (Clark) (an Australian species similar to *P. lunaris*), *P. rubiginosa* Emery) from Burma, *P. striatula* Karavaiev (New Guinea, which is very similar to *P. arhuaca*), the Philippine *P. claudata* (Menozzi), *P. insulana* (Mayr) from Samoa Island, the Ghanan *P. silvestrii* Santschi and the African *P. soror* (Emery). Several Old World species have a posteriorly directed spine on the subpetiolar process, similar to that of *P. ferruginea*. Some of these are similar to *P. constricta*, with a strongly depressed metanotal suture, including widely distributed species such as *P. atrata* (Karavaiev) (Indonesia), *P.*

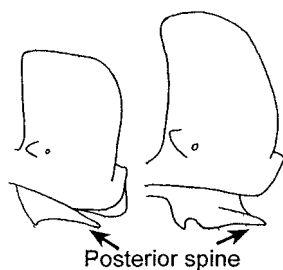
sennaarensis (Mayr) (Sudan, Iran), *P. lutea* (Mayr) (Australia), *P. castanea* (Mayr) (New Zealand) and *P. croceicornis* (Emery) (New Guinea) (all of these except *P. castanea*, were members of *Brachyponera* in the past). These species suggest that *P. constricta* and the related species may actually belong to the *ferruginea* species complex. *Pachycondyla minuta* is an especially interesting species as it bridges the gap between the *ferruginea* species complex and the *stigma* species complex. It has mandibles and a petiole similar to members of the *stigma* complex and the remainder similar to the *ferruginea* species complex. *Pachycondyla fugax*, a species from Angola, appears very similar to *P. ferruginea*, but has a well-developed stridulatory file on the second pretergite. It lacks the malar carina, the margin at the shoulder of the pronotum, but does have a slit-shaped propodeal spiracle.

The worker of *P. brunoi* Forel (Zimbabwe), apparently a member of the *ferruginea* species complex and similar to *P. arhuaca*, has what appears to be a stridulatory file crossing the entire second pretergite of the gaster.

KEY

The following key would separate the species of the *ferruginea* species complex.

1. Petiole rectangular in shape, with the anterior and posterior faces being nearly parallel and with a definite dorsal face (Fig. 95, left) . 2



lunaris *ferruginea*

Fig. 95. Petioles of workers of *P. lunaris* (Valle del Cauca, Colombia, CWEM) and *P. ferruginea* (Chiapas, México, CWEM) as seen from the side.

- Posterior face of petiole rounded and meeting anterior face near anterior edge of apex, without definite dorsal face (Fig. 95, right) 6

2(1). Eye large, as seen with head in lateral view, maximum diameter greater than diameter of scape (Fig. 96), with about 100 ommatidia; Panamá and Colombia 3

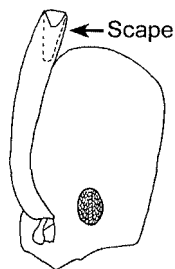


Fig. 96. Side of the head of a paratype worker of *P. rupinicola* (CWEM), showing the relative sizes of the eye and the side of the scape.

- Eye small, again with head seen from side view, maximum diameter of eye less than maximum diameter of scape (Fig. 97), with fewer than 60 ommatidia; Costa Rica south to Bolivia 4

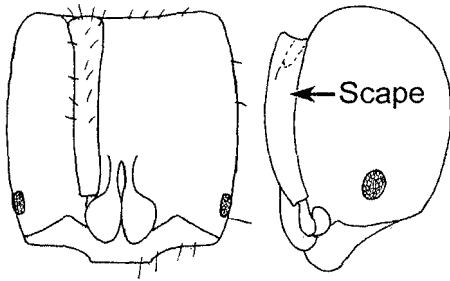


Fig. 97. Front and side of the head of a possible worker of *P. minuta* (CWEM), showing the relative sizes of the eye and the side of the scape.

3(2). Antennal scape relatively long, extending past posterior lateral corner of head (Fig. 96); Panamá and Colombia

... *rupinicola* Mackay and Mackay

- Antennal scape relatively short, not reaching or barely reaching posterior lateral corner of head (Fig. 348); Bolivia

... *breviscapa* Mackay and Mackay

4(2). Mandible with 7 teeth (Fig. 181)

5
- Mandible with more than 7 teeth (Fig. 564, left); Guatemala south to Paraguay and Brasil

..... *lunaris* (Emery)

5(4). Eye small, with about 20 poorly developed ommatidia (Fig. 98); subpetiolar process with spine or angle (Fig. 91); México and Guatemala ...

..... possible worker of *P. minuta* Mackay and Mackay

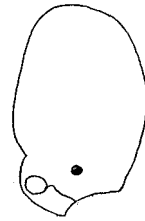


Fig. 98. Side of the head of the holotype worker of *P. longidentata*.

- Eye tiny, with about 10 poorly developed ommatidia (Fig. 98); posterior edge of subpetiolar process without spine (Fig. 99); Colombia

..... *longidentata* Mackay and Mackay (*arhuaca* species complex)

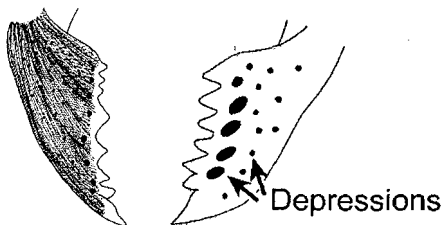


Fig. 99. Petiole of the holotype worker of *P. longidentata*, showing the subpetiolar process.

6(1). Mandible with 8 or more teeth of various sizes, some poorly defined (Fig. 100, left); dorsal surface of mandible completely striate, with scattered punctures; common and widely distributed from México south to Brasil

..... *ferruginea* (F. Smith)

- Mandible with 7 teeth that are similar in size (Fig. 100, right), dorsal surface smooth and glossy with scattered punctures; known only from state of Chiapas, México (and possibly Guatemala)
 *minuta* Mackay and Mackay



ferruginea *minuta*

Fig. 100. Mandibles of a worker of *P. ferruginea* (Chiriquí, Panamá, CWEM) and of a possible worker of *P. minuta* (Suchitépéquez, Guatemala, CWEM).

foetida species complex

DESCRIPTION

Worker

The workers of this species complex have a *well-developed malar carina* (which extends at least $\frac{1}{2}$ the length from the anterior edge of the head to the eye) and have *relatively large eyes* (maximum diameter is at least $\frac{1}{4}$ the length of the side of the head) (Fig. 102). The worker has a *well-developed sharp carina on the pronotal shoulder* (except for *P. zuparkoi*), the *metanotal suture is well marked on the dorsum of the mesosoma* and depressed below the adjacent levels of the mesosoma, and there is a *slit-shaped propodeal spiracle* (Fig. 101). They have a *thick*

petiole as seen in profile and the

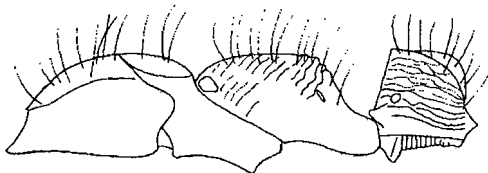


Fig. 101. Mesosoma and petiole of a worker of *P. foetida* (Canal Zone, Panamá, MCZC).

anterior face of the postpetiole is vertical and forms a nearly right angle with the dorsal face. The posterior face of the petiole is convex and broadly rounded and meets the anterior face near the anterior border

of the apex. The subpostpetiolar process is poorly developed (*P. solisi*) or consists of either a relatively blunt simple processes (*P. bugabensis*, *P. dismarginata*, *P. foetida*, *P. insignis*, most specimens of *P. inversa*, *P. lineaticeps*, *P. theresiae*, *P. villosa* and *P. zuparkoi*), or a blunt process with a swollen region or carina extending posteriorly from the process (*P. curvinodis*, some specimens of *P. inversa*).

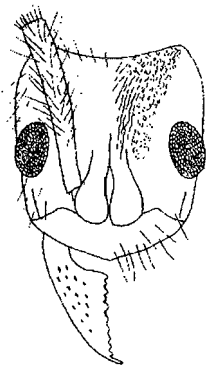


Fig. 102. Head of a worker of *P. foetida* (Canal Zone, Panamá, MCZC). Only part of the sculpture is shown.

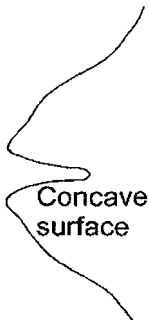


Fig. 103. Metasternal process of a worker of *P. villosa* (Nayarit, México, CWEM), as seen from behind.

The *stridulatory file* is well marked on the second pretergite of the gaster.

The metasternal process consists of two broad lobes that are concave posteriorly (Fig. 103).

Female

The female is large (~ 15 mm) and is very similar to the corresponding worker, with well-developed mandibles, a sharp malar carina and a well-developed pronotal carina. The anterior face of the petiole is vertical (straight or concave) and meets the broadly rounded posterior face near the anterior edge of the apex. The *stridulatory file* is well developed on the second pretergite.

Male

The male is generally large (~ 9 - 14 mm). The males of most species are probably dark (unknown in several species), but are orange in *P. lineaticeps*. The malar carina and pronotal carina are absent. The petiolar node is more rounded than that of the worker. The *stridulatory file* is present on the second pretergite.

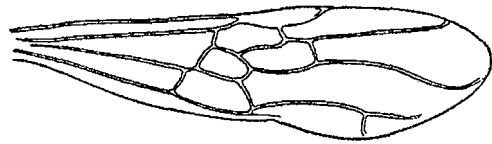


Fig. 104. Forewing of a female of *P. villosa* (from Creighton, 1950).

The wing of the female (Fig. 104) and male are typical of the genus, with

an elongated third discoidal cell. The veins extend to near the edges of the wing, presumably to support the heavier masses of the large specimens.

Larva

The larva is similar to those of many of the other species complexes, including the *apicalis*, *crenata*, *constricta* and *stigma* species complexes. Most of the elongate, finger-like tubercles are found on the anterior half of the larvae (Fig. 105).

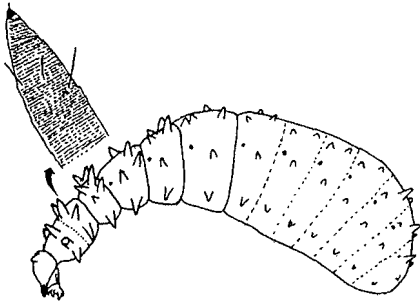


Fig. 105. Larva of a worker of *P. villosa* (Ecuador, CWEM). The inset shows an enlargement of a tubercle.

Wheeler and Wheeler (1952) further characterize the larva of *P. villosa* as being similar to that of *P. apicalis* (as *P. latreillei*), except that the tubercles are shorter (0.11 - 0.28 mm), with those on the thorax being predominantly long, with the basal half cylindrical and the apical half conical. Those on the abdomen are predominantly short and conical, terminating in a short apical spine. The body hairs are 0.027 - 0.072 mm in length. The integument of the posterior margin of the head is

spinulose (with tiny spines) with those near the middle being in short transverse rows, the lateral spinulae are isolated.

The similarities of the larvae in several species complexes suggest a closer relationship than that evident from examining the workers.

COMPARISON

Members of the *foetida* species complex include *P. bugabensis*, *P. curvinodis*, *P. dismarginata*, *P. foetida*, *P. insignis*, *P. inversa*, *P. lineaticeps*, *P. solisi*, *P. theresiae*, *P. villosa* and *P. zuparkoi*. This species complex composes much of the previous genus *Neoponera*.

One of the species in this complex, *P. zuparkoi*, differs from all of the others in lacking the pronotal carina. Four of the remaining species (*P. bugabensis*, *P. dismarginata*, *P. insignis* and *P. solisi*) can be separated as the malar carina extends only about $\frac{1}{2}$ - $\frac{2}{3}$ of the length to the eye. *Pachycondyla bugabensis* is a relatively small (total length < 10 mm) member of the *foetida* species complex and is black with orange or reddish brown legs. The scape has fewer than 20 erect hairs. The middle of the clypeus is without horizontal or longitudinal striae. The other three species are similar, but are larger (total length > 10 mm) and black, with black legs, with more than 20 erect hairs on the scapes and the middle of the clypeus has several horizontal striae (*P. insignis*) or longitudinal striae (*P. dismarginata* and *P. solisi*). The posterior lateral edges of the petiole are sharp in *P. solisi* and completely

rounded in *P. dismarginata*.

The other members of the *foetida* species complex have a well-developed malar carina, which extends completely to the eye. Two of these (*P. foetida* and *P. theresiae*) have horizontal striae on the side of the petiole. The posterior face of the petiole of *P. foetida* is covered with horizontal, coarse striae; it is weakly sculptured and mostly punctate in *P. theresiae*. *Pachycondyla holcotyle* (*apicalis* species complex) has striae on the side of the petiole, but the anterior and posterior faces of the petiole are nearly parallel, with the apex forming a relatively flat surface. In *P. foetida* and *P. theresiae* the anterior face of the petiole is vertical and meets the broadly rounded posterior face near the anterior part of the petiole.

Four species can be characterized by having the malar carina extending completely to the eye and having the side of the petiole punctate (*P. curvinodis*, *P. inversa*, *P. lineaticeps* and *P. villosa*). *Pachycondyla lineaticeps* is easily recognized by the striae present from the frontal carinae to the posterior border of the head. The striae diverge between the eyes and somewhat converge on the posterior part of the head. The other three species lack these striae. The anterior face of the petiole is nearly straight in *P. villosa* and is concave in the remaining two species: *Pachycondyla inversa* and *P. curvinodis*. They are relatively large (total length 13 mm) and the surface of the mandibles is dull and finely striate. They (*P. inversa* and *P. curvinodis*)

are difficult to separate, but *P. curvinodis* has a wider petiole.

This species complex is closely related to the *crassinoda* species complex, but differs in having a carina anterior to the eye (in most species except *P. zuparkoi*) and in having very sharp carina on the pronotum shoulder. The New World members of the *crassinoda* complex lack the stridulatory file, which is present in members of the *foetida* species complex. The metanotal suture of the worker is depressed (as seen in profile); it is not depressed in members of the *crassinoda* species complex.

This complex is very similar to the *crenata* species complex, differing only in having the metanotal suture depressed below the remainder of the mesosoma (poorly marked on the dorsum in the *crenata* species complex). Workers and females are also somewhat larger (total length usually greater than 10 mm) than are those of members of the *crenata* species complex (total length usually less than 8 mm).

Jack Longino pointed out to us that all species in the complex have the anterior median margin of the clypeus folded over the anteclypeus, forming a groove into which the mandibles fit when closed. The lobe is less developed in *P. dismarginata* (and to a even lesser extent in *P. lineaticeps*), projecting and forming an angular process in side view, forming more of a shelf, similar to members of the *crenata* complex. Most other species complexes have this same groove.

KEY

The workers of the *foetida* species complex can be separated with the following key.

1. Side of petiole with horizontal striae (Fig. 106) 2

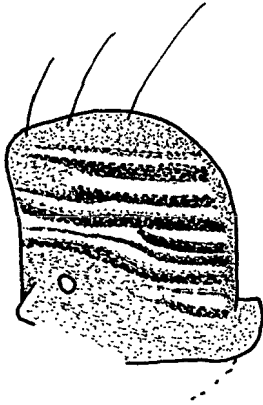


Fig. 106. Petiole of a worker of *P. lineaticeps* (Querétaro, México, JONES), showing the horizontal striae.

- Side of petiole without horizontal striae (Fig. 109), or with a single horizontal stria 4

2(1). Dorsum of head with coarse striae, much different than surrounding sculpture (Fig. 107); Querétaro, México
 *lineaticeps* Mayr⁴

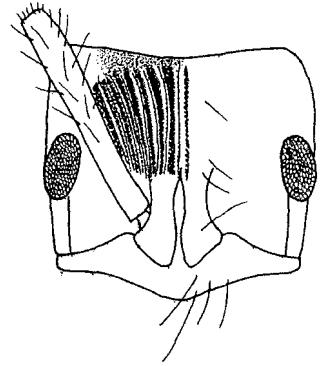
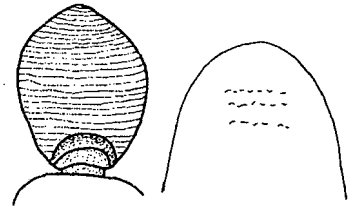


Fig. 107. Head of a worker of *P. lineaticeps* (Querétaro, México, JONES), showing the longitudinal striae. Only a portion of the sculpturing is shown.

- Dorsum of head without coarse striae, if striae are present, sculpture similar across entire dorsum of head 3

3(2). Posterior face of petiole completely covered with coarse, transverse striae (Fig. 108, left); México south to Bolivia
 *foetida* (Linnaeus)



foetida *theresiaie*

Fig. 108. Posterior faces of petioles of workers of *P. foetida* (Paracou Experimental Forest, French Guiana, CWEM) and *P. thesiaie* (Puntarenas, Costa Rica, MCZC).

⁴ A single worker from México is identical to *P. lineaticeps*, but has horizontal striae on the side of the petiole. It may be a new species, but will not be described at this time.

- Posterior face of petiole without striae, or with poorly defined striae (Fig. 108, right); Costa Rica south to Brasil *theresia* Forel

4(1). Anterior face of petiole strongly concave, meeting dorsal face at angle less than 90° (Fig. 110) 5

- Anterior face of petiole straight, vertical, meeting dorsal face at nearly right angle (Fig. 109) 6

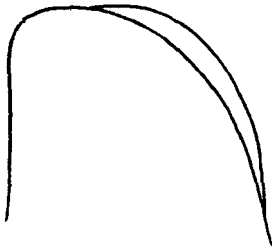
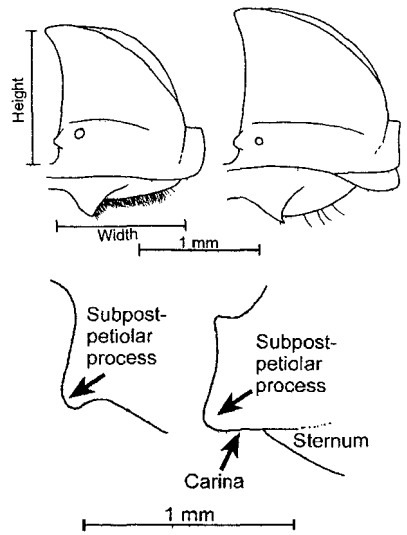


Fig. 109. Petiole of a worker of *P. villosa* (Veracruz, México), as seen from the side.

5(4). Subpostpetiolar process consisting of blunt projection, usually separated from remainder of post-petiole by deep depression (Fig. 110, left), rarely followed posteriorly with elongated longitudinal swollen region or carina; width of petiole < 1.3 mm (Fig. 110, left); anterior face of petiole usually strongly concave; México south to southern Brasil *inversa* (Smith)



inversa *curvinodis*

Fig. 110. Petioles of workers of *P. inversa* and *P. curvinodis*, showing the measurements (CWEM). The erect hairs on the dorsum of the petioles are not shown. The hairs on the ventral surface are not consistently different in the two species. The lower insets show the subpetiolar processes of *P. inversa* (female, Tiputini Biodiversity Station, Ecuador CWEM) and of *P. curvinodis* (Rio San Juan, Nicaragua CWEM).

- Subpostpetiolar process consisting of blunt projection, not separated from remainder of post-petiole by deep depression, connected posteriorly with elongated longitudinal swollen region or carina (Fig. 110, right); width of petiole > 1.3 mm (Fig. 110, right); anterior face of petiole usually only moderately concave; Nicaragua south to Perú *curvinodis* Forel

6(4). Anterior medial margin of clypeus extending over remainder of clypeus (Fig. 111) as an angular projection as seen in side view; erect hairs on scapes mostly longer than diameter of scape (Fig. 257); Costa Rica
dismarginata Mackay and Mackay

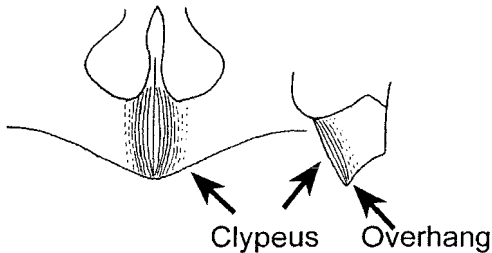


Fig. 111. Clypeus of a paratype worker of *P. dismarginata* (CWEM), as seen from the front and from the side.

- Anterior medial margin of clypeus usually rounded or concave (Fig. 112), very weakly overhanging remainder of clypeus; erect hairs on scape mostly shorter than diameter of scape 7

7(6). Middle of dorsum of head with coarse striae, greatly differing from the surrounding punctate sculpture (Fig. 107); México south to Panamá *lineaticeps* Mayr

- Sculpture of head consisting of punctures or poorly defined striae, sculpture similar across entire dorsum of head; if head is weakly striate, then posterior face of petiole smooth and shiny, not rugulose 8

8(7). Anterior medial area of clypeus with transverse striae (Fig. 112); Costa Rica
 *insignis* Mackay and Mackay

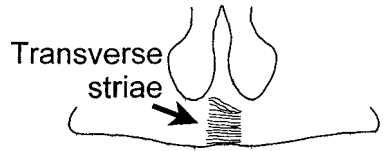


Fig. 112. Clypeus of a paratype worker of *P. insignis* (CWEM).

- Anterior medial area of clypeus without transverse striae, with longitudinal striae or with fine striae that are obliquely angled 9

9(8). Medial part of clypeus with longitudinal "ditch" or furrow (Fig. 113), surrounded by longitudinal striae; region between anterior and dorsal face of petiole broadly rounded (Fig. 635); known only from state of Heredia, Costa Rica
 *solisi* Mackay and Mackay

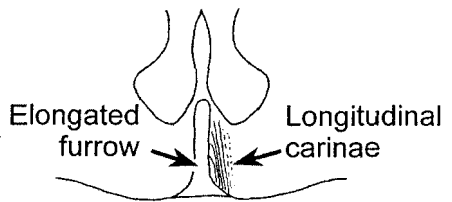


Fig. 113. Clypeus of a paratype worker of *P. solisi* (CWEM).

- Medial part of clypeus without longitudinal ditch or depression; region at anterior apex of petiole forming sharp angle (Fig. 685) 10

10(9). Pronotum without sharp carina (Fig. 114, left); known only from state of Huánuco, Perú
 *zuparkoi* Mackay and Mackay

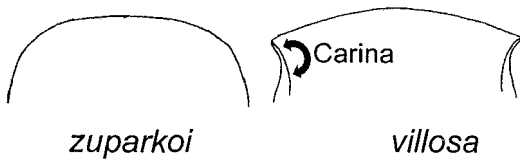


Fig. 114. Pronotal shoulders of the holotype worker of *P. zuparkoi* and a worker of *P. villosa* (CWEM), as seen obliquely from behind and above.

- Pronotum with sharp carina (Fig. 114, right) **11**

11(10). Relatively large, total length > 1.1 mm; common and widely distributed, southern USA south to Paraguay

..... *villosa* (Fabricius)

- Relatively small, total length < 1.1 mm; rarely collected, Nicaragua south to Ecuador

..... *bugabensis* Forel

laevigata species complex

DESCRIPTION

Worker

These ants were previously considered to be members of the genus *Termitopone*. Workers range from small (total length 5 mm), moderate sized (total length 10 mm) to large (total length 17 mm). They can be distinguished from most of the other species in *Pachycondyla* as being shiny black with at least some striae usually present on the dorsum of the head and on the side of the propodeum. The malar carina is generally absent anterior to the eye,

but a swollen region may be present. The anterior border of the clypeus is convex and may be slightly angulate medially, the eyes are moderately large, covering about $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the side of the head. The pronotal shoulder is swollen, but does not form a carina; the metanotal suture breaks the sculpture and is slightly depressed on the dorsum of the mesosoma. The petiole is thick when viewed in profile; the anterior and posterior faces are nearly parallel. The stridulatory file is present on the second pretergite. The metasternal process consists of two

slender lobes, which may be short (*P. laevigata* and *P. marginata*) or greatly elongated (*P. commutata*).

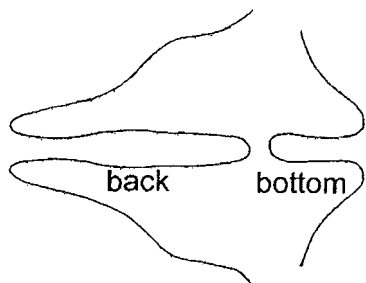


Fig. 115. Metasternal process of a worker of *P. commutata* (Bolívar, Venezuela, CWEM), as seen from behind and from below.

The subpostpetiolar process consists of a small blunt process (*P. laevigata* and *P. marginata*) to a large blunt process (*P. commutata*).

Erect hairs are moderately abundant on most surfaces, including the dorsum and ventral surfaces of the head, scapes, the dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster. The tibiae are covered with suberect hairs.

Most surfaces, except possibly parts of the dorsum of the head and the side of the propodeum, are smooth and glossy.

These ants are generally black, with lighter brown appendages.

Female

The female is similar to the worker and can be easily recognized as most surfaces are smooth and glossy.

Male

The male can also be easily recognized, as most surfaces are smooth and glossy as in the worker.

Larva

Unknown.

COMPARISON

Members of the *laevigata* species complex include *P. commutata*, *P. laevigata* and *P. marginata*.

Pachycondyla commutata, ranging from Costa Rica to Paraguay, can be separated from the other two in being much larger, with the total length of the worker being greater than 15 mm. The other two species (total length of the worker < 12 mm) can be easily separated, as the dorsal face of the mandible of the worker and female of *P. marginata*, which is found from Trinidad to Argentina, has a carina that extends nearly the entire length, which is not present in *P. laevigata*, distributed from Costa Rica south to Brasil. The carina is rarely poorly developed.

These shiny, glossy ants are not likely to be confused with any of the other New World *Pachycondyla* species, except possibly *P. carbonaria* (*aenescens* species complex), in which the surface is moderately shining. This latter species can be separated from members of the *laevigata* species complex as the anterior medial border of the clypeus is notched and depressed. In addition, the dorsum of the head of *P. carbonaria* lacks longitudinal striae.

leveillei species complex

DESCRIPTION

Worker

The mandible usually has more than 10 teeth, but most are poorly defined. The transverse carina is poorly developed on the clypeus and the longitudinal carina is absent. The *scape is relatively short* and does not extend to the posterior lateral corner of the head, or extends only slightly past. The *mesosoma is depressed* at the metanotal suture, but not strongly and the propodeum is at a lower level than the mesonotum. The *propodeal spiracle is elongated*. The *petiole is narrowed* when viewed in profile. The *subpetiolar process is well developed*, but lacks the posteriorly directed lobe or angle. The second pretergite cannot be seen on any of the specimens, but workers of a closely related, possibly new species, have a stridulatory file.

Pachycondyla leveillei is different from most of the other small species of *Pachycondyla* in having *few erect hairs*, more shining surfaces and in being medium brown. It apparently deserves its own species complex, although it could be included in the *stigma* complex. The *doorknob-like tubercles* on the dorsum of the

posterior half of the larvae suggest it is closely related to the *rubra* species complex, as well as possibly the *ochracea* species complex. The presence of *single tibial spurs on the middle and posterior legs* suggests a possible relationship with *Ponera* and *Hypoponera*. It could be considered to be a member of *Hypoponera*, except the numerous mandibular teeth and the well-developed metasternal process unites it with *Pachycondyla*.

Female and male

Unknown.

Larva

Eidmann (1936) concluded the larvae of *P. leveillei* are especially interesting. They are characterized as having the entire body, with the exception of the head, covered with blunt protuberances, which are covered with tiny spines. The spines show a uniform, ring-like arrangement on the distal part of the protuberance (Fig. 116). The tip usually has a thicker spine. There is a pair of thicker, knob-like processes on the dorsum of abdominal segments 4 and 5, similar to what Wheeler (1910:75) found in the larvae of *Ponera*

pennsylvanica. Furthermore the larvae have 2 knob-like protuberances on the prothorax immediately behind the mouthparts on each side of the head and 2 rows of similar structures on the ventral sides of abdominal segments 2 - 6. The position and arrangement of the latter structures are similar to abdominal appendages. He continues with a comparison of the larvae with those of the ants *Crematogaster scutellaris* and *Tetraoponera* (= *Pachysima*) *latifrons*.

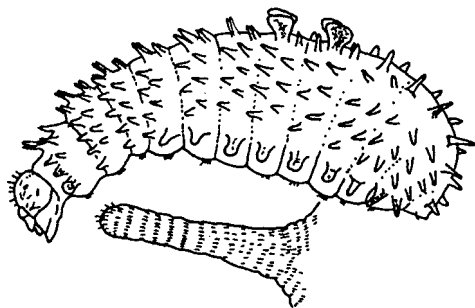


Fig. 116. Larva of a worker of *P. leveillei* (from Eidmann, 1936). The inset shows an enlargement of one of the normal tubercles. Two worker specimens of probably the same series collected by Eidmann are in the USNM.

Wheeler and Wheeler (1952) include *Cryptopone mayri*, *P. gilva* and *Ponera* [several species] in the same area of the key to the larvae, united by having tubercles of two types, which are mostly finger-like, with a few pairs of doorknob-shaped tubercles on the dorsal surface. The larvae of *P. leveillei* are similar to those of *P. gilva* and to those of the ant genus *Ponera* (Wheeler and Wheeler, 1952). *Euponera*, *Trachymesopus* and *Mesoponera* separate in another section of the key, based on a lack of the type of tubercles found in the species above. This suggests that *P. leveillei* may belong to the *ochracea* species complex, but the lack of coarse setae on the middle tibia suggests it does not belong there.

COMPARISON

Pachycondyla leveillei is the only species in this complex and may be the only species of *Pachycondyla* with single tibial spurs on the middle and posterior legs. We have two or possibly three similar species in our collection, which are closely related to *P. leveillei*. They will not be described at this time as they may have already been described in the genus *Hypoponera*.

ochracea species complex

DESCRIPTION

Worker

This complex was previously composed of the genera *Wadeura* and *Cryptopone*, as well as *Euponera* and *Trachymesopus*. The workers, females and males of the four genera are similar (differ significantly only in the form of the mandibles) and there is no justification for the recognition of the genus *Wadeura*. Brown (1973) considered *Wadeura* to be a synonym of *Pachycondyla*. The other species of *Cryptopone* are similar to *Wadeura* and apparently closely related to members of the *Pachycondyla stigma* species complex and thus *Cryptopone* is considered to be a synonym of *Pachycondyla*. Two of the species (*P. guianensis* and *P. mirabilis*) are both so distinct from the remainder of the *ochracea* species complex (including the Old World species), that each could probably be justified to belong to its own species complex, but this will not be done to keep the total number of species complexes at a manageable number.

Three worker characteristics define this complex: the *extensor surface of the middle tibia is covered with a series of conical setae*, which are usually much coarser than the surrounding hairs (rarely poorly developed), the *posterior part of the mesopleuron and anterior half of the*

propodeum is depressed laterally, for the reception of the middle femur. It appears that the femur is braced in this depression and the conical setae anchor the ant and allow it to push during excavation of soil. Finally a *mandibular pit is located at the base of the mandible* in the worker, female and male of most of the species. This pit tends to be moderately to well-developed in Old World species, but poorly developed and difficult to see (*P. gilva*) or absent (*P. guianensis*), or apparently developed into a furrow (*P. mirabilis*) or formed into a combined pit-furrow (*P. holmgreni*) in the New World species. This pit or furrow is probably homologous to the mandibular furrow, which is obvious in the workers and females of the *stigma* and *tarsata* species complexes, although Brown (1963) states that it is probably not homologous. The males of at least the New World species have a large pit at the base of the mandibles, which is probably the same mandibular furrow that is found in some of the workers.

The subpostpetiolar process is absent (*P. guianensis*, *P. mirabilis*) or consists of a poorly developed bump (*P. gilva*, *P. holmgreni*).

Female

The females of *P. gilva* and *P. guianensis* are very similar to the workers, differing only in having

ocelli, large eyes and massive mesosomata, with wings. The female of *P. holmgreni* and *P. mirabilis* are unknown, but that of *P. holmgreni* would be expected to be similar to that of *P. gilva* and that of *P. mirabilis* would be expected to be yellow, smooth and glossy and have well-developed conical setae on the middle tibia.

The wing venation is typical of the genus *Pachycondyla*, except that the third discoidal cell is elongate, similar to that of the *arhuaca* and *stigma* species complexes.

Male

Of the New World species, only the males of *P. gilva* and *P. guianensis* are known. Based on the major differences of the workers and females of the other two species from *P. gilva*, the unknown males of *P. mirabilis* may be distinct from those of *P. gilva*. The male of *P. holmgreni* (unknown) would be expected to be similar to that of *P. gilva*, given the similarity of the workers. The males of *P. gilva* and *P. guianensis* are tiny (total length 4 - 5 mm), with relatively small eyes, which are located near the base of the mandibles. The mandibles have a depression at the base, as in the males of most of the other species of *Pachycondyla*. The parapsidal sutures are present, but the Mayrian furrows are absent (as they are in all of the Old World species of the *ochracea* species complex examined). The node of the petiole is thick and broadly rounded at the apex and the subpetiolar process is nearly absent, characteristics that are unlike most of

the remainder of the species in the genus.

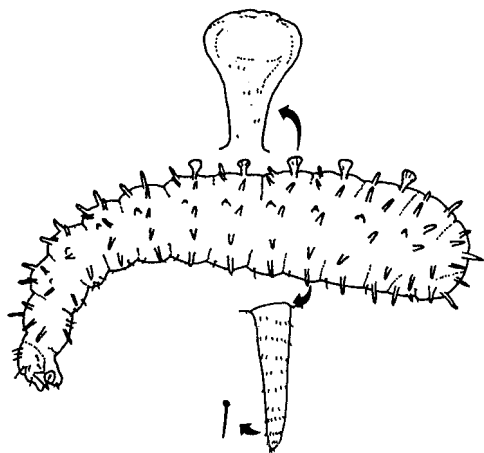


Fig. 117. Larva of a worker of *P. gilva* (From Wheeler and Wheeler, 1952). The insets show enlargements of the "door knob" and the normal tubercles and the hairs on the tubercle.

Larva

Wheeler and Wheeler (1952) described the larva of *P. gilva*. There is no defined neck, as in most of the other species (Fig. 117). The body has numerous (156) long (0.035 - 0.120 mm) slender, finger-like, nearly straight tubercles. Each tubercle is surrounded by several rows of minute spicules. The dorsum of abdominal segments 4 to 7 has pairs of door knob-shaped tubercles, which have a stout stalk and an enlarged distal bulb. The ventral surface of the body has a few short (~0.03 mm), simple hairs. The mouthparts are large and conspicuous.

Wheeler and Wheeler (1952) described the larva of *P. mayri* from

the Solomon Islands. They also have tubercles that are enlarged at the apex (Fig. 118).

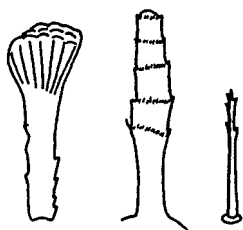


Fig. 118. Tubercles (left and middle) and hair (right) of a larva of a worker of *P. mayri* (From Wheeler and Wheeler, 1952).

The larvae of *P. leveillei* (*stigma* species complex) have similar knob-shaped tubercles, which suggest they may be related to members of the *ochracea* species complex.

The larvae of this complex show close similarities to members of the genera *Ponera* and *Hypoponera*, possessing similar knob-like tubercles (Escoubas et al., 1987). The similarity of these structures suggests that all three taxa evolved from a *Pachycondyla*-like ancestor.

Escoubas et al. (1987) suggest that the tubercles ensure that the larvae are always in the correct position for feeding (ventral surface away from the substrate), elevate the larvae from the substrate (reducing contamination by microorganisms), conserve space in the nest, keep the larvae from attacking each other and prevent the larvae from wandering into a hostile environment (in the cases studied, the inside of a termite nest).

COMPARISON

Members of the *ochracea* species complex include *P. gilva* (USA south to Panamá), *P. guianensis* (México south to Brasil), *P. holmgreni* (Perú, Trinidad and Guianas south to Brasil) and *P. mirabilis* (Bolivia).

The workers and females of these four species are easily separated. Workers and females of *Pachycondyla guianensis* have remarkable mandibles (Figs. 493, 496), in which three teeth are well developed and the remaining two teeth (located between each of the three teeth) are poorly developed, the second tooth, counting from the apex, may be nearly absent. The mandibles of the other three species have more than 5 teeth, which are approximately equal in size. The worker and female of the relatively common *P. gilva* and *P. holmgreni* have 7 mandibular teeth (may be 6 + a small basal denticle, or 7 plus the small denticle); the worker of the rare *P. mirabilis* has about 15 small denticles. The conical setae on the middle tibiae of *P. guianensis*, *P. mirabilis* and *P. holmgreni* are abundant and well developed; those of workers and females of *P. gilva* are poorly developed and barely noticeable. *Pachycondyla holmgreni* is very similar to *P. gilva* and can be separated from all of the others by the sharp tooth on the anterior medial border of the clypeus.

The males of *P. gilva* are tiny (~4 mm total length), pale brown specimens as compared with the larger (~5 mm TL), orange males of *P. guianensis*. The ocelli of the males of *P. gilva* are tiny (diameter of median

ocellus 0.06 mm) as compared to the larger ocelli of *P. guianensis* (diameter of median ocellus 0.12 mm).

The males of *P. guianensis* and *P. oberthueri* are very similar in size, color, wing venation and the lack of the Mayrian furrows, possibly suggesting a relationship between the two species complexes (*ochracea* and *crenata* complexes). The shape of the propodeal spiracle can separate them: that of workers, females and males of *P. guianensis* is circular (or nearly so) and those of the worker, female and male of *P. oberthueri* is elongate. The subpetiolar processes of the worker, female and male of *P. guianensis* are poorly developed, those of *P. oberthueri* are well developed, as in the other members of the *crenata* species complex. The workers and females of the two complexes are very different and suggest that the similarities in the males are due to convergence.

It is possible that *P. mirabilis* independently evolved characteristics similar to members of the *gilva* species complex and belongs in its separate complex. Final evaluation of its relationships will have to await the discovery of the male and female.

The *ochracea* complex could be confused with the *stigma* species complex, which has a similar depression on the side of the mesosoma. Members can be easily separated by the conical setae on the middle tibia, which are lacking in the *stigma* complex. The many similarities suggest that the complexes are closely related and that *P. stigma* and *P. gilva* are somewhat intermediate between

the two species complexes. One apparent structural difference between the two complexes is that the depressed area on the side of the mesosoma of the *ochracea* species complex appears designed predominantly for the reception of the middle femur, whereas in the *stigma* species complex it may be designed for the reception of the posterior femur.

This is a predominantly Old World species complex. *Pachycondyla gilva* and *P. holmgreni* are very similar to the Old World species, especially larger species with 7 or 8 mandibular teeth, including *P. ochracea* (Mayr) (Europe), *P. sauteri* Wheeler (Japan) and especially *P. crassicornis* (Emery) (New Guinea), with which they are nearly identical. Other species are mostly smaller and have fewer than 7 mandibular teeth, including *P. butteli* (Forel) (Sumatra), *P. testacea* (Emery) (Sri Lanka), *P. fusciceps* (Emery) (New Guinea), *P. hartwigi* (Arnold) (South Africa) and *P. motschulskyi* (Donisthorpe) (New Guinea). *Pachycondyla gilva* (and many others to varying degrees) may serve as a link between the *ochracea* species complex and the *stigma* species complex, as the conical setae are poorly developed. Unidentified specimens from Africa also nearly lack the coarse setae on the middle tibia (Fisher, pers. comm.). The larvae of *P. gilva* are similar to those of the ant genus *Ponera* and to *P. leveillei* (Wheeler and Wheeler, 1952). Based on very limited material, Wheeler and Wheeler, (1952) include *Cryptopone [mayri]*, *P. gilva* and several species of *Ponera* together in the key to the

larvae. They share the characteristics of having the tubercles of two distinct types. *Pachycondyla guianensis* and *P. mirabilis* are morphologically separated from the Old World species, differing in a number of characteristics, especially the modified mandibles in *P. guianensis*. We have a considerable amount of work to be done before we understand the phylogeny and relationships of the taxa in the Ponerini.

The known males appear to be essentially identical for both the New World and Old World species, except for the male of *P. guianensis* which differs as outlined above. The male of *P. mirabilis* would be expected to be different than those of the other species.

Members of this species complex are rarely collected, but in at least *P. ochracea* in the Mediterranean region, this may be due insufficient sampling in adequate microhabitats (Espadaler and López-Soria, 1991).

rostrata species complex

DESCRIPTION

Worker

Workers of this species complex have *greatly elongated mandibles, with about 20 teeth*, in addition to many small denticles between the teeth. The *malar carina is poorly developed*, but extends about $\frac{1}{2}$ the distance to the anterior edge of the eye. The eyes are located at about the middle of the side of the head. The head is narrowed anteriorly and nearly straight at the posterior margin (Fig. 119). The *carina at the pronotal shoulder is either poorly developed or*

absent. The *mesosoma is deeply depressed at the metanotal suture*. The *propodeal spiracle is slit-shaped*. The anterior face of the petiole is concave, straight or convex, but slopes posteriorly to meet the straight posterior face at the posterior edge of the apex. The subpetiolar process is poorly developed and consists of a ventrally directed angle or process, followed by a posterior section that gradually diminishes in width. The subpostpetiolar process of *P. rostrata* is a simple, blunt collar-like process. The *stridulatory file is well developed*, as are the arolia between the tarsal

claws.

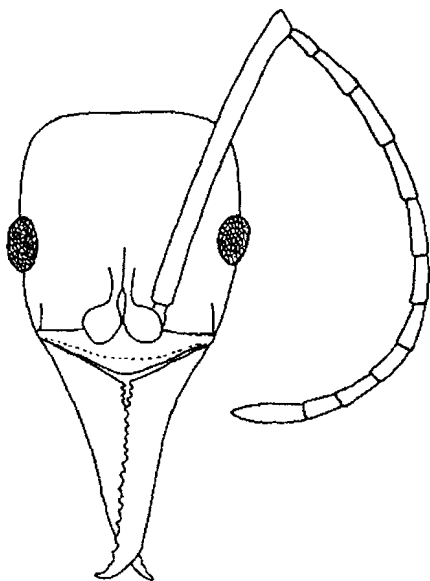


Fig. 119. Head of the holotype worker of *P. agilis* (from Borgmeier, 1937).

The worker is dark reddish brown.

The *surface of the mandible is finely striate and dull*; the remainder of the ant is punctate and dull.

Female and male

The female was not seen, but is apparently similar to the worker. The male is unknown.

Larva

The larva is unknown. It would undoubtedly provide information as to the relationships of this complex to the other complexes.

COMPARISON

Members of the *rostrata* species complex include *P. agilis* and *P. rostrata*.

Pachycondyla agilis, a more southern distributed species from Brasil, Argentina and Paraguay, can be separated from the generally more northern distributed *P. rostrata*, found in Colombia, Venezuela to southern Brasil, by the lack of a pronotal carina, which is more developed in *P. rostrata*. The anterior face of the petiole is convex in *P. rostrata*, but is straight or slightly concave in *P. agilis*. The differences between the two species are subtle and it would not be surprising to find that there is a single species, when more material becomes available.

This complex can be easily separated from all of the other complexes by the elongated mandibles. The shape of the mesosoma and especially the shape of the petiole would suggest that this complex is not closely related to any of the others.

rubra species complex

DESCRIPTION

Worker

Workers of this species complex can be recognized by the *constriction at the metanotal suture, the dorsal face of the propodeum being at a lower level than the mesonotum* (at approximately the same level in *P. lutea*) and the *posteriorly directed pointed spine or lobe on the subpetiolar process* (Figs. 52, 120). They are predominantly *small* (total length less than 4 mm) *dark brown* ants. The *petiole is narrow* when viewed in profile (Fig. 120). The *mandibular teeth are mostly small, irregular in size and poorly defined* and there are generally fewer than ten present. The *transverse horizontal*

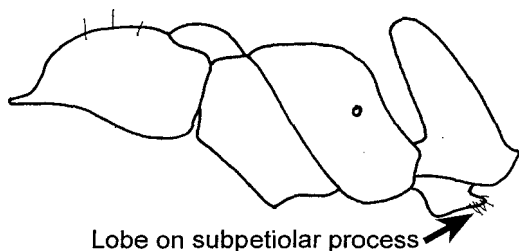


Fig. 120. Mesosoma and petiole of a worker of *P. luteipes* (Okinawa, Japan, CWEM).

carina on the clypeus is poorly developed (Figs. 53, 121). The *stridulatory file is absent on the*

second pretergite. The *metasternal process consists of a pair of slender, fang-like appendages* (Fig. 122), similar to that of members of the *stigma* species complex. The subpostpetiolar process of *P. chinensis* is not developed.

Erect hairs are sparse, a few may be present on the mandibles, clypeus, mesosoma, petiole and gaster. Erect hairs are absent on the scape (except at the apex) and essentially absent on the legs. *Appressed pubescence is very fine* and sparse on all surfaces except the gaster, where it is abundant.

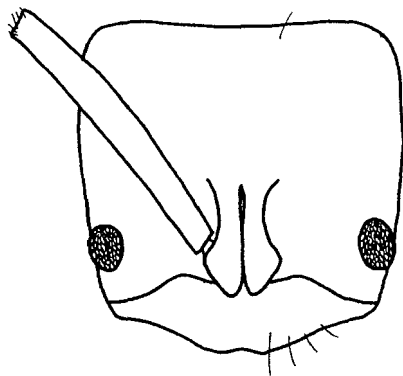


Fig. 121. Head of a worker of *P. luteipes* (Okinawa, Japan, CWEM).

All surfaces are dull and punctate, except for the mandibles (but are punctate) and side of the mesosoma (especially the pronotum, mesopleuron and metapleuron).

Female

The female is a *small* (TL less than 5 mm) *dark brown* specimen. The mandibles are similar to those of the

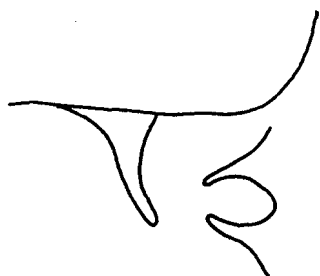


Fig. 122. Metasternal process of a worker of *P. luteipes* (Okinawa, Japan, CWEM) as seen from the side and from behind.

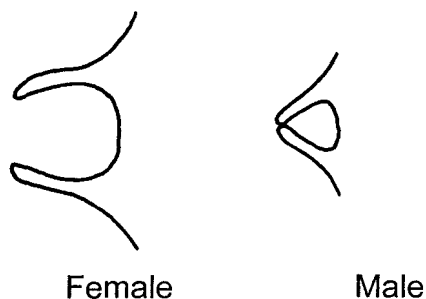


Fig. 123. Metasternal process of a female and male of *P. luteipes* (Okinawa, Japan, CWEM), as seen from behind.

metasternal worker; the *ocelli* are *small* but well developed (Fig. 125). The process is similar to that of the worker (Fig. 123). The petiole and subpetiolar process are similar to those of the worker with a *well-developed posteriorly directed lobe on the subpetiolar process* (Fig. 124). The

venation on the forewing is similar to that of the *ochracea* species complex.

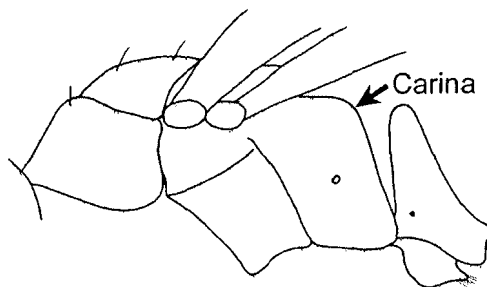


Fig. 124. Mesosoma and petiole of a female of *P. luteipes* (Okinawa, Japan, CWEM).

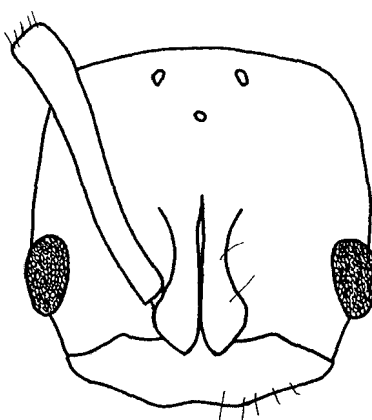


Fig. 125. Head of a female of *P. luteipes* (Okinawa, Japan, CWEM).

Hairs and appressed pubescence are similar to those of the worker.

Most surfaces are dull and punctate, except for the mandibles, which are shiny, but punctate, the side of the mesosoma is partially smooth and glossy.

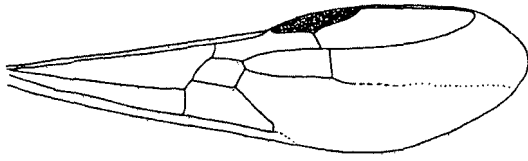


Fig. 126. Left forewing of a female of *P. luteipes* (Okinawa, Japan, CWEM).

Male

The male is a *tiny* (TL less than 4 mm) specimen with tiny mandibles, but with elongated tips. The cavity is present at the base of the mandibles as in other species in the genus. The metasternal process is similar to that of the worker (Fig. 123), except the two appendages curve inwards. The *petiole is slender, with a relatively sharp apex* (Fig. 127). The *subpetiolar process has a well-developed, posteriorly directed lobe*, similar to that of the worker. The eyes are relatively small (Fig. 128).

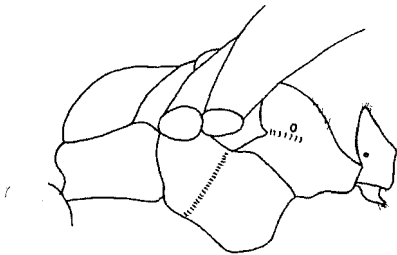


Fig. 127. Mesosoma and petiole of a male of *P. luteipes* (Okinawa, Japan, CWEM).

Erect hairs are nearly absent on all surfaces. The appressed pubes-

cence is very sparse and mostly limited to the dorsum of the mesosoma and gaster.

The sculpture is very weak and most surfaces are smooth and glossy.

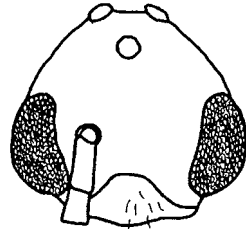


Fig. 128. Head of a male of *P. luteipes* (Okinawa, Japan, CWEM).

Larva

Wheeler and Wheeler (1952) provide a translation of Teranishi's (1927) description of the larva of *P. sauteri*. It has a pair of glutinous tubercles on each of the abdominal somites 2 - 4. The other somites have a pair of bristle-capped tubercles on the dorsal surface and five on each lateral surface. The glutinous dorsal tubercles on the second abdominal somite disappear when the larva is in approximately the third instar, those on the third and fourth somites move posteriorly and assume a different position. Those on the third somite are larger than those on the fourth. The neck and mouthparts are well developed and allow the larvae to reach for their own food, which is placed near them by the workers. The function of the glutinous dorsal tubercles is to attach the larvae to the walls or ceiling of the nest. Teranishi believed that the bristle-capped

tubercles protected them from predation by other larvae. Wheeler and Wheeler (1952) state that *P. chinensis* (as *Euponera solitaria*) are similar to those of *P. sauteri* and *P. leveillei*, also with the doorknob like tubercles on the dorsal surface.

COMPARISON

In the New World, only a single introduced species of the *rubra* species complex occurs: *P. chinensis*. Many Old World species are probably members of this complex, including *P. luteipes* (Mayr) from the Nicobar Islands (near Sumatra) and Japan, the New Zealand *P. castanea* (Mayr), *P. obscurans* (Walker) from China and Indonesia, the African and Iranian *P. sennaarensis* (Mayr) and the New Guinean *P. croceicornis* (Emery). These species are similar to members of the *constricta* species complex. *Pachycondyla weberi* (Bernard) (Ivory Coast) has the elongated mandibles and small eyes of the *rubra* complex with the posteriorly directed spine on the subpetiolar process and lacks the stridulatory file on the second pretergite. It is possible that the *constricta* species complex and the *rubra* species complex form a single taxon.

Pachycondyla caffraria (F. Smith) is apparently related to this species complex. The workers have small stout mandibles and the eyes are relatively large. The mesosoma is little depressed at the metanotal suture, which barely breaks the sculpture on

the dorsum. The subpetiolar process lacks the posteriorly directed lobe and in some specimens is relatively large and triangular shaped, somewhat similar to the process in *P. tarsata*. The stridulatory file is lacking on the second pretergite.

Pachycondyla chinensis (workers, females and males) can be separated from all of the others in the New World by a combination of the posteriorly pointed lobe on the subpetiolar process and the constriction at the metanotal suture (in the worker only). Others with a similar subpetiolar process (*ferruginea* species complex) have the metanotal suture weakly depressed. *Pachycondyla magnifica*, a Brazilian species with a similar process, is a large species with numerous coarse, longitudinal striae on the pronotum, which are lacking in *P. chinensis*. The other members of the *constricta* and *arhuaca* species complexes lack the posteriorly directed spine or lobe on the subpetiolar process. As *P. chinensis* is found only in the US, there is little chance it would be confused with any species of *Pachycondyla*, but could be confused with *Ponera pennsylvanica*. It can be easily separated as it lacks the fenestra, or oval-shaped thin area found on the subpetiolar process of *Ponera pennsylvanica*. Similar species of *Hypoconera* lack a similar lobe on the subpetiolar process and have a single spur on the middle and posterior tibiae.

stigma species complex

DESCRIPTION

Worker and female

Workers and females of this species complex are easily recognized by the *small size* (total length < 6 mm) and by the 5 - 7, *often poorly developed, mandibular teeth* (Fig. 134). The *clypeus is separated by a horizontal carina into an anterior 1/3 and a posterior 2/3 section*, which is developed to a greater or lesser extent in the different species. The *eyes are tiny* (maximum diameter < 1/8 the length of the side of the head). The *malar carina is never present*. The *pronotal shoulder lacks a carina* (except for *P. lenkoi*), but may be swollen; the *mesosoma is slightly depressed at the metanotal suture*, the *side of the propodeum is depressed*, apparently as an area to brace the femur of the posterior leg, the *propodeal spiracle is nearly circular* (except for *P. lenkoi*, in which the spiracle is slit-shaped), the region between the side and the posterior face of the propodeum is angulate and nearly forms a vertical carina with the posterior face. The *metasternal processes* of the worker, female and male consist of two, *narrow, elongated fingers* (Figs. 129, 130, 135). The *petiole is relatively narrow* as seen in profile and narrowed toward the apex and the anterior face of the

postpetiole is rounded with the dorsal face. The *stridulatory file on the pretergite is always absent* as are the arolia between the tarsal claws.

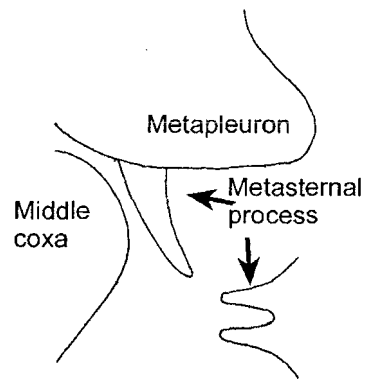


Fig. 129. Metasternal process of a worker of *P. stigma* (Alta Vera Paz, Guatemala, CWEM). The posterior coxa has been removed.



Fig. 130. Metasternal process of a female of *P. succedanea* (Aragua, Venezuela, CWEM), as seen from behind.

The subpostpetiolar process consists of a collar-like flange (Fig. 131). It is somewhat narrower in *P. gill-oglyi*, *P. cognata* and *P. succedanea*,

than it is in *P. stigma*. The subpostpetiolar process of *P. bucki* was not seen. *Pachycondyla lenkoi* has a subpostpetiolar process unlike the other members of the complex (Fig. 132), similar to that of *P. tarsata*, which suggests it is not actually a member of the *stigma* species complex. Old World species that appear to be members of the *stigma* species complex do not always have a well-developed process.

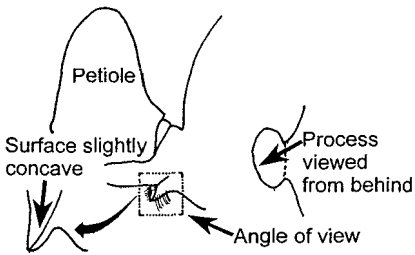


Fig. 131. Subpostpetiolar process of a worker of *P. stigma* (Esmeraldas, Ecuador, CWEM). The left inset shows an enlargement of the process as seen obliquely from the front and side. The right inset shows the process as viewed from behind and below (as in angle of view arrow).

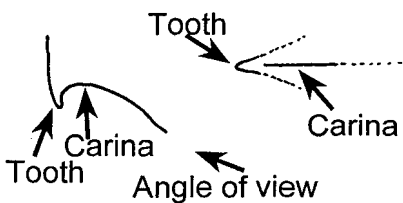


Fig. 132. Subpostpetiolar process of a worker of *P. lenkoi* (Distrito Federal, Brasil, MCZC).

Erect hairs are generally abundant on most surfaces (Fig. 133), including the antennal scapes and the tibiae. Golden pubescence is present on the head, mesosoma (at least the dorsum) and all surfaces of the gaster (Fig. 133).

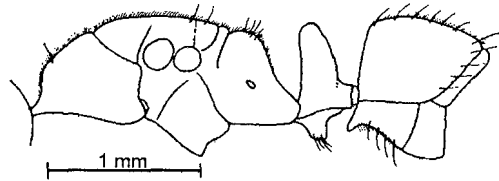


Fig. 133. Mesosoma, petiole and postpetiole of a female of *P. succedanea* (Aragua, Venezuela, CWEM).

Most surfaces are dull and punctate, except the mandibles, which may be smooth or striate and the gaster, which may be weakly shining.

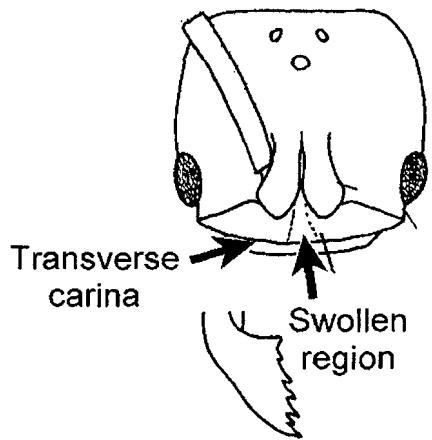


Fig. 134. Head of a female of *P. succedanea* (Aragua, Venezuela, CWEM). The inset shows the mandible.

Most species are dark brown.

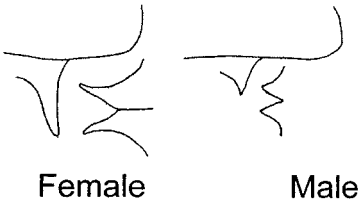


Fig. 135. Metasternal processes of a female and a male of *P. stigma* (Orange Walk, Belize, CWEM), as seen from the side and from behind.

The wing venation is similar to that of the *ochracea* species complex, with an elongated third discoidal cell.

Male

The males are *tiny to small* (up to 5 mm in total length). The *cavity at the base of the mandible is well developed* and extends from 1/2 to nearly the complete length of the mandible. The *eyes are relatively small* (maximum diameter less than or about equal to the distance from the posterior margin of the eye to the lateral ocellus). The *ocelli are mostly small*, usually separated by a distance greater than their diameter. The *Mayrian furrows are well developed*, but usually do not meet medially. The *propodeal spiracle is circular or oval-shaped*. The *petiole is triangular-shaped* with a rounded apex. The *anterior part of the subpetiolar process is well developed*, the posterior half poorly developed. The *stridulatory file is absent* on the second pretergite.

Larva

Wheeler and Wheeler (1952) characterized the larva of *P. stigma* (Fig. 136), as being similar to that of *P. constricta*. They have about the same number of tubercles, but are arranged differently with 12 on each thoracic somite, 14 on abdominal somites 1 and 2, 12 on somites 3 and 4 and 10 on somites 5 - 8, 6 on somite 9 and 2 on somite 10. Integumentary spinulae are found only on the ventral surface.

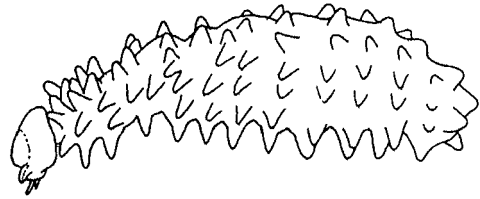


Fig. 136. Larva of a worker of *P. stigma* (Izabal, Guatemala, CWEM).

The larva of *P. gilberti* appears to be similar (Wheeler and Wheeler, 1971, Fig. 16a), but with less developed and fewer denticles. The larvae of *P. stigma* are similar to those of several other species complexes, including the *apicalis*, *constricta*, *crenata* and *foetida* species complexes, suggesting a close relationship between these complexes, which is not evident from an examination of the workers.

COMPARISON

New World species that belong to the *stigma* species complex include: *P. bucki*, *P. cognata*, *P. gilberti*, *P. gilloglyi*, *P. lenkoi*, *P. stigma* and *P. succedanea*.

The workers of three of these species (*P. gilberti*, *P. stigma* and *P. succedanea*) have six mandibular teeth and are widely distributed from the United States to Argentina. The workers of the other four species (*P. cognata*, *P. succedanea*, *P. gilloglyi* and *P. lenkoi*) have seven mandibular teeth and are mostly restricted to Costa Rica (although *P. gilloglyi* occurs in México, *P. succedanea* occurs as far south as Perú and *P. lenkoi* is from Brasil). Two of these species (*P. gilloglyi* and *P. lenkoi*) have slit-shaped or elongated propodeal spiracles; the other two species (*P. cognata*, *P. succedanea*) have circular spiracles. *Pachycondyla gilloglyi* can be recognized as being smaller (total length 5 mm) and having the dorsal face of the propodeum at a lower level than the mesonotum (the metanotal suture is slightly depressed). *Pachycondyla lenkoi* is larger (total length at least 6.5 mm) and the dorsal face of the propodeum is at the same level as the mesonotum (metanotal suture not depressed). The two remaining species with seven mandibular teeth can be separated in that the frontal carinae are either closely spaced, separated by 0.07 mm or less (*P. cognata*) or by a distance greater than 0.13 mm (*P. succedanea*).

Of the other 3 species, *P. succedanea* has a longitudinal carina

in the middle of the clypeus, which is especially sharp in the section anterior to the transverse carina (Figs. 134, 658). The section anterior to the transverse carina is noticeably concave. The workers and females of this species nearly always have a well-developed mandibular furrow (Fig. 658). *Pachycondyla gilberti* and *P. stigma* lack the longitudinal carina (or it is barely developed), as well as the mandibular furrow. *Pachycondyla stigma* has the clypeus separated into an anterior (anteclypeus) and posterior section (postclypeus) by an indistinct, horizontal ridge and the head width is approximately 1 mm. The subpetiolar process consists of a rounded lobe (specifically rounded posteriorly). Of the other two species, *Pachycondyla succedanea* is similar, but slightly smaller (head width about 0.8 mm) and the clypeus is separated by a sharp, horizontal carina. The subpetiolar process is angulate posteriorly. *Pachycondyla gilberti*, from the Guianas and Brasil, is intermediate between the two, with the transverse ridge sharp, but with the subpetiolar process rounded posteriorly.

Jack Longino uses the shape of the subpetiolar process to separate the workers and females of the common species (pers. comm.). The subpetiolar process of *P. stigma* is convex, smoothly rounded and the posterior margin has a shallow slope with the anterior margin being much steeper. *Pachycondyla gilloglyi* has a convex and smoothly rounded process, but the posterior margin is steeper and looks similar to that of the anterior margin. The subpetiolar process of *P.*

gilberti is similar to that of *P. gilloglyi*, but the posterior margin has a pair of lamellae, so that the posterior margin in profile becomes flat, not evenly rounded. Both *P. succedanea* and *P. cognata* have a subquadrate to rectangular process, with the posterior margin square-cut and with a pair of lamellae. The posterior margin may actually be concave and even bidentate where the posterior and ventral margins meet, especially in specimens from Costa Rica.

This species complex could be confused with the *ochracea* species complex, based on the reduced number of mandibular teeth, the relatively small eyes, the rounded pronotal shoulder, the depressed area on the side of the propodeum and the shape of the petiole, which is narrowed toward the apex. It can be easily separated, as members lack the conical setae on the middle tibia (relatively long, coarse setae, up to 0.15 mm in length are present). The similarities of the two species complexes suggest a close relationship and that *P. stigma* appears to be somewhat intermediate between the *ochracea* species complex and the remainder of the genus. This group is also similar to members of the genus *Hypoponera* and can be separated by the presence of a pair of spurs on the posterior tibia, which are represented by a single spur in *Hypoponera*. The larvae of *P. constricta* are similar to those of *P. stigma* (Wheeler and Wheeler, 1952).

This species complex is easily confused with the *ferruginea* species complex, especially with *P. arhuaca*.

They can be separated as the mandibles have 7 or fewer teeth, not more than 12 teeth as in *P. arhuaca*. It can be separated from *P. leveillei* by the presence of two tibial spines on the middle and posterior legs.

These ants may belong to the *stigma* complex, or may be considered to be members of the *rufipes* species complex (mentioned by Brown, unpublished, reported in Peters et al., 1991), when the entire world fauna is analyzed.

The larvae of *P. stigma* differ from those of other members of *Pachycondyla* [sensu stricto, including *P. striata*, *P. crassinoda* and *P. harpax*] in lacking the mammiform (broadened with a constricted area apically) tubercles, which are present in many other *Pachycondyla* (Wheeler and Wheeler, 1952).

The morphology of workers and females of the *stigma* species complex suggests a close relationship with the genus *Hypoponera*. The doorknob shaped tubercles on the larvae also suggest a close relationship with members of the *ochracea* species complex, or possibly with *Ponera*. *Pachycondyla rufonigra* (Australia) is apparently a member of the *stigma* complex. It is interesting that the apical mandibular tooth is well developed, but the other teeth are poorly developed as in most members of *Hypoponera*. The second tibial spur is present on middle and posterior legs, (although miniscule), as in most other members of *Pachycondyla*. This species thus shows affinities to *Hypoponera*, but surprisingly the subpetiolar process is like that of

ferruginea group, with a posteriorly projecting spine.

This complex includes species that were originally in genera (or sometimes subgenera), including *Euponera*, *Trachymesopus*, *Pseudoponera*, *Ectomomyrmex* and *Bothroponera*. Members of *Ectomomyrmex* and *Bothroponera* are especially similar to members of the *stigma* complex, differing in having horizontal striae on the posterior face of the petiole and having an angulate corner between the anterior and dorsal faces of the postpetiole.

Old World species, which probably belong to the *stigma* species complex, include *P. annamita* (André) (Vietnam), *P. claudata* (Menozzi) (Philippines), *P. melancholica* F. Smith (Indonesia), *P. pilosior* (Wheeler) (Japan), *P. ruficornis* (Clark) (Australia), *P. sharpi* (Forel) (although the mandible has 8 - 9 mandibular teeth) (Singapore) and *P. simillima* (Donisthorpe) (New Guinea).

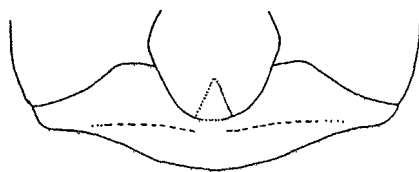


Fig. 137. Clypeus of a worker of *P. stigma* (Orange Walk, Belize).

- Clypeus usually with longitudinal carina (Fig. 138), forming broad lobe near anterior ends of frontal lobes, which progressively becomes sharper anteriorly, where it is elevated above surface of clypeus (Fig. 138), at least anterior to transverse carina; transverse carina usually well developed (Fig. 138) 4

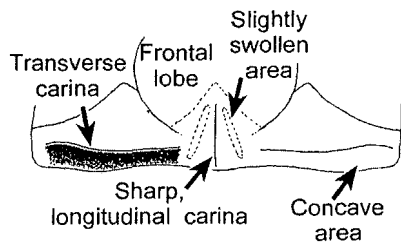


Fig. 138. Clypeus of the lectotype worker of *P. cognata*.

KEY

The following key will separate the workers of the New World species of the *stigma* species complex.

1. Clypeus without longitudinal carina (Fig. 137, possibly slightly developed near anterior margin of clypeus); transverse carina usually poorly developed (Fig. 137) 2

2(1). Middle and posterior tibia each with single spur (Fig. 139, left); very rarely collected, but widely distributed (Panamá to Bolivia) (*leveillei* species complex) *leveillei* (Emery)

- Middle and posterior tibiae each with double spurs (Fig. 139, right), one pectinated, second simple and sometimes difficult to see; very common and widely distributed ... 3

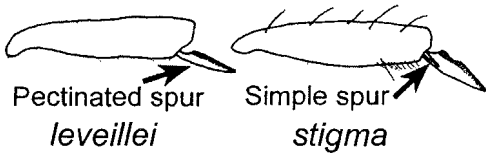


Fig. 139. Posterior left tibiae of workers of *P. leveillei* (Cochabamba, Bolivia, CWEM) and *P. stigma* (near Tela, Honduras, MCZC).

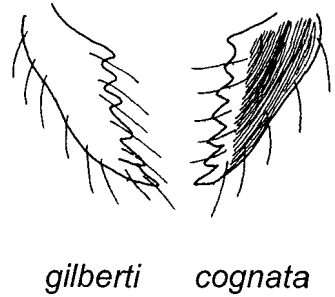


Fig. 141. Mandibles of workers of *P. gilberti* (near Tela, Honduras) and *P. cognata* (lectotype).

3(2). Relatively small (total length < 6 mm); mandible with 5 - 6 teeth (Fig. 140, left); common and widely distributed *stigma* (Fabricius)

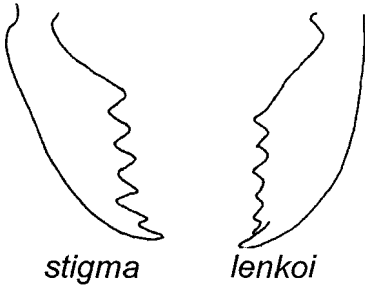


Fig. 140. Mandibles of workers of *P. stigma* (near Tela, Honduras) and *P. lenkoi* (from Kempf, 1962).

- Relatively large (TL > 6 mm); mandible with 7 teeth (Fig. 140, right); known only from Bolivia ..
..... *lenkoi* Kempf

4(1). Dorsal surface of mandible smooth and glossy, with scattered punctures (Fig. 141, left), or possibly with poorly defined striae 5

- Dorsal surface of mandible mostly covered by longitudinal striae (Fig. 141, right) 7

5(4). Posterior face of petiole distinctly concave (Fig. 168); erect hairs absent on dorsum of mesosoma; mandible with approximately 12 teeth; transverse carina on clypeus poorly defined (Fig. 167); northern Venezuela, central and southeastern Brasil *bucki* (Borgmeier)

- Posterior face of petiole not concave (Fig. 464) or very weakly concave; dorsum of mesosoma with at least one erect hair; transverse clypeal carina well defined (Fig. 142); mandible with 6 - 7 teeth 6

6(5). Mandible with 6 teeth, approximately equal in size and length (Fig. 141, left) (tiny denticle may be present between two basalmost teeth); Panamá to southern Brasil
..... *gilberti* Kempf

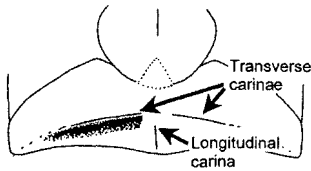


Fig. 142. Clypeus of a worker of *P. gilberti* (Mato Grosso, Brasil, USNM).

- Mandible with 7 teeth (Fig. 141, right), two basalmost teeth usually noticeably smaller than remaining teeth; Honduras south to southern Brasil; Caribbean region ...
 *succedanea* (Roger)

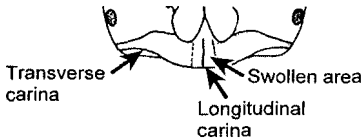
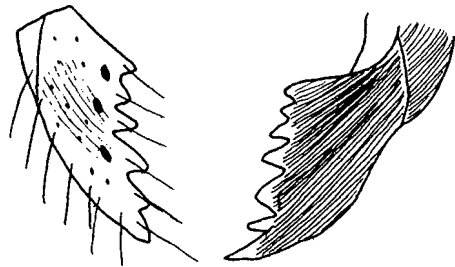


Fig. 143. Clypeus of a worker of *P. succedanea* (Tingo Maria, Perú, CWEM).

7(4). Mandible with 6 teeth (Fig. 144, left); Honduras south to Bolivia; Caribbean region
 *succedanea* (Roger)

- Mandible with 7 teeth (Fig. 144, right) 8



succedanea

gilloglyi

Fig. 144. Mandibles of workers of *P. succedanea* (near Tela, Honduras) and *P. gilloglyi* (holotype).

8(7). Striae on mandible not covering entire surface (Fig. 141, right), at least region near base smooth and glossy; frontal carinae closely spaced (minimum space between them < 0.07 mm); Costa Rica and Panamá
 *cognata* Emery

- Striae on mandible covering entire surface (Fig. 144, right, except for teeth); frontal carinae widely spaced (minimum space between them > 0.13 mm; México south to Ecuador
 *gilloglyi* Mackay and Mackay

tarsata species complex

DESCRIPTION

Worker

The worker in this species complex is easily recognized by a number of excellent characters. It is a *large specimen* about 15 mm in total length. The mandible has *approximately 20 teeth* (Fig. 147). The *mandibular furrow is well developed and deep*, extending nearly the entire length of lateral edge the mandible. The *medial process of the clypeus is elongated and blunt-ended and extends a considerable distance over the remainder of the clypeus*. The *malar carina is absent*. The *eye is relatively small*, located on the anterior half of the head. The *scape extends about 1/4 of its length past the posterior lateral border*. The *pronotum is not swollen* at the shoulder and the *carina is absent*, with the shoulder being completely rounded. The *metanotal suture is weakly developed and nearly absent* on the dorsum of the mesosoma (Fig. 145). The *propodeal spiracle is oval-shaped*. The *meta-sternal process is poorly developed*. (Fig. 149) The *petiole is narrow when viewed in profile*, often with a concave anterior face, a convex posterior face and a moderately defined dorsal face. The *subpetiolar process is well developed*. The *tarsi have the normal claw, plus a smaller additional inner claw* on each side (Fig. 148). The *front edge of the*

gaster has a pair of anterior lateral knobs (Fig. 145). The *stridulatory file is absent* on the second pretergite and the *arolia are absent* between the tarsal claws (Fig. 148).

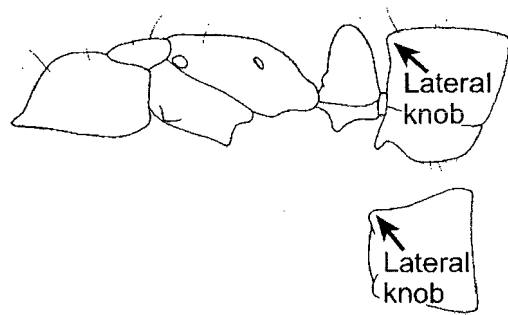


Fig. 145. Mesosoma, petiole and postpetiole of a worker of *P. tarsata* (Lukolela, Congo, AMNH). The inset shows the postpetiole as seen from above.

The subpetiolar process of *P. tarsata* consists of a blunt tooth, followed by a longitudinal carina (Fig. 146).

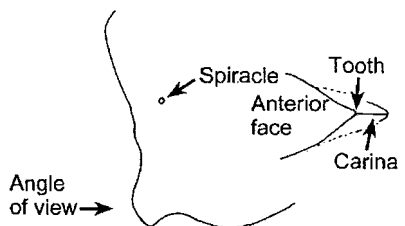


Fig. 146. Subpostpetiolar process of a worker of *P. tarsata* (Mozam-

bique, CWEM). The inset shows the process and bottom of the postpetiole as seen from the front (direction of arrow).

Erect and suberect hairs are abundant on all surfaces, including the antennal scape and the tibiae.

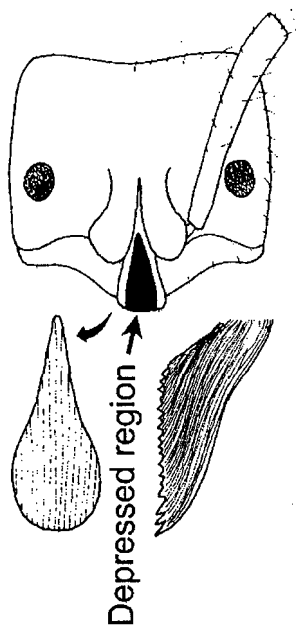


Fig. 147. Head of a worker of *P. tarsata* (Lukolela, Congo, AMNH). The dark area indicates a depressed region. The insets show the medial clypeal process (enlarged) and the mandible (same scale as head).

The mandible is smooth and glossy (New World only), the head and most of the mesosoma are striate, the lower mesopleuron (katepisternum) is smooth and glossy, the

petiole and gaster are mostly smooth and glossy.



Fig. 148. Posterior right tarsal claws of a worker of *P. tarsata* (Lukolela, Congo, AMNH), showing the inner tooth.

The worker is reddish black.



Fig. 149. Metasternal process of a worker of *P. tarsata* (Mozambique, CWEM), as seen from behind.

Female

These are *large* (total length 20 mm), *black* specimens. The *mandibles have approximately 20 teeth* and denticles, many poorly defined. The *mandibular furrow* extends from the base of the mandible to the tip. The labial palp (Fig. 152) has 4 segments, the maxillary palp 5 (the last two segments are fused in many specimens). The anterior border of the clypeus is broadly convex, but with a large, *elongated lobe*, which over-

hangs the remainder of the clypeus.

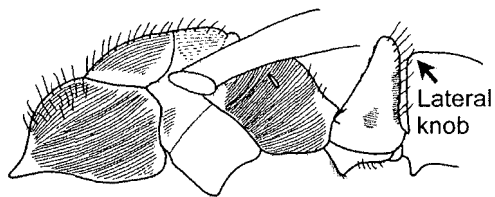


Fig. 150. Mesosoma, petiole and postpetiole of a female of *P. tarsata* (Kisangani, Zaire, MCZC).

The center of the region between the frontal lobes forms a long raised area, which is completely surrounded by a depressed area and again with a raised area along the lateral edges. The head length (including the lobe of the clypeus) is 4 millimeters; the head width is 4.5 mm. The sides of the head are nearly straight and slightly narrowed anteriorly; the posterior margin is broadly concave (Fig. 151). The eyes (0.8 mm in greatest diameter) are located slightly more than one diameter from the anterior margin of the head and are located away from sides of the head, as compared to other species of *Pachycondyla*. The ocelli (diameter of the median and lateral ocelli approximately 0.2 mm) are small and closely spaced (separated by approximately one ocellar diameter). The scape (3.5 mm) extends slightly past the posterior lateral corner of the head. The pronotal shoulder is swollen, but does not form a distinct carina. The propodeal spiracle is slit-shaped. The petiole is narrow when viewed in profile (Fig. 150), with a distinctly

concave anterior border and a nearly straight posterior border. The subpetiolar process consists of a broad triangle. The lateral knobs are well formed on the anterior face of the postpetiole (Fig. 150) and the subpostpetiolar process consists of a ventrally directed angle.

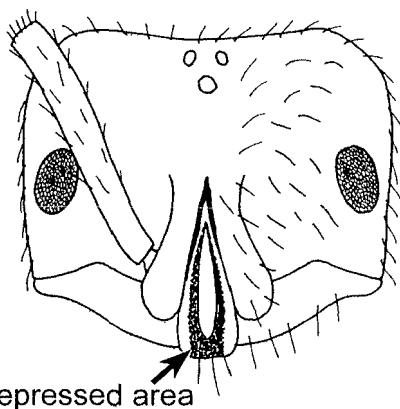


Fig. 151. Head of a female of *P. tarsata* (Kisangani, Zaire, MCZC).

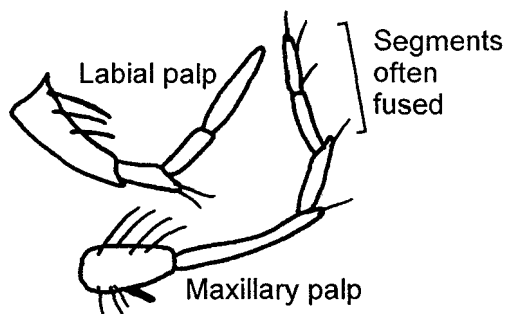


Fig. 152. Palps of a female of *P. tarsata* (Kisangani, Zaire, MCZC).

Most surfaces, including the mandibles, clypeus, sides of the head, dorsal and ventral surfaces of the head and scapes, are covered with erect and suberect hairs. Most of the mesosoma

especially the dorsum, is covered with similar hairs as is the petiole, especially the posterior face. Hairs on the gaster are mostly erect and present on all surfaces. Most hairs on the legs are suberect and moderately abundant. A golden appressed pubescence is present on nearly all surfaces, especially the sides of the head, dorsum of the mesosoma, all surfaces of the gaster and the legs, especially the coxae and tibiae.

The forewing is of the generalized *Pachycondyla* form (Fig. 153).

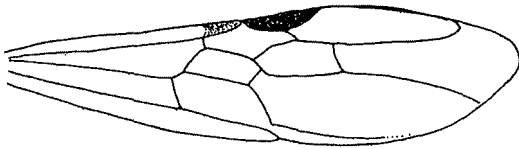


Fig. 153. Forewing of a female of *P. tarsata* (Tanga, Tanzania, Congo, MCZC).

The mandibles are densely covered with fine striae (possibly smooth in the New World); the dorsum of the head is covered with coarse striae, which diverge posteriorly. The dorsum and sides of the pronotum are covered with coarse striae, as are the scutum and scutellum; the dorsum of the propodeum is covered with transverse striae. The anepisternum has several horizontal striae, as does the side of the propodeum. The side of the petiole and the posterior face have fine striae. Most of the gaster is covered with punctures and weakly to moderately shining and glossy. The stridulatory file on the second tergum and the

arolia on the tibial claws (Fig. 154) are both absent.

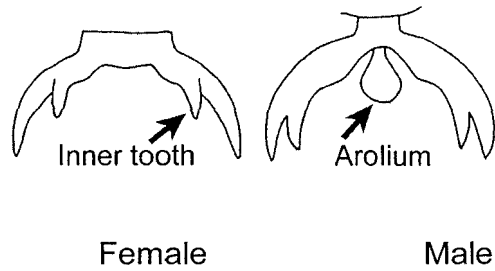


Fig. 154. Posterior left tarsal claws of a female and a male of *P. tarsata* (Kisangani, Zaire, MCZC) showing the inner tooth and the arolium of the male.

Male

The male is a *large* (total length 18 mm), *black* specimen. The *mandibles are tiny*, but with well-developed depressions at the base (Fig. 156). The labial palp has four segments, the maxillary palp six. (Fig. 156). The anterior margin of the clypeus is straight or convex. The clypeus is slightly swollen when viewed in profile. The head length is 1.8 mm; the head width is 1.65 mm. The eyes (maximum diameter 1 mm) are located approximately $\frac{1}{2}$ diameter from the lateral ocellus. The scape and first funicular segments are short as in the other species of *Pachycondyla*. The *pronotal shoulder is completely rounded*; the *propodeal spiracle is slit-shaped*. The petiole is wider than in the female and worker, with slightly convex anterior and posterior faces (Fig. 155). The subpetiolar process is triangular-shaped as in the female and worker. The subpostpetiolar process is

large and forms a sharp, ventrally directed spine-like lobe. The *knobs are not developed* on the anterior lateral faces of the postpetiole. The *stridulatory file is absent*, but the arolia are well developed between the tarsal claws (Fig. 154).

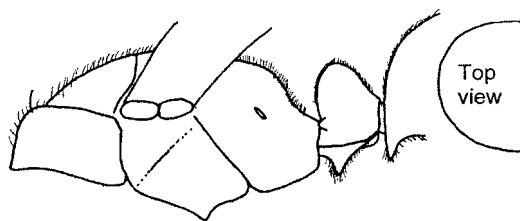


Fig. 155. Mesosoma, petiole and postpetiole of a male of *P. tarsata* (Kisangani, Zaire, MCZC). The inset shows the anterior half of the postpetiole as seen from above.

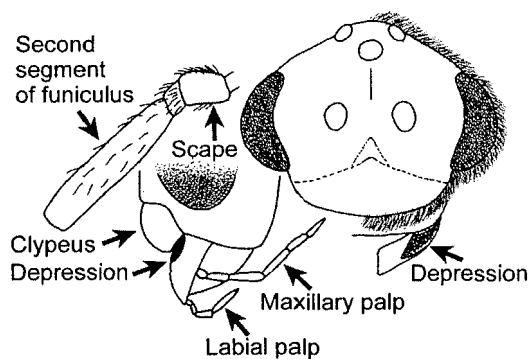


Fig. 156. Head of a male of *P. tarsata* (Kisangani, Zaire, MCZC). The inserts show the first three segments of the antenna, the head and palps as seen from the side and the mandible as seen in frontal view.

Erect hairs are very abundant on all surfaces of the head and clypeus;

the hairs on the scape and antenna are mostly suberect to appressed. All surfaces of the mesosoma are covered with erect and suberect hairs, as are the petiole and all surfaces of the gaster. The hairs on the legs are mostly appressed, although some are raised from the surface. The suberect hairs form a gradient to appressed hairs and are abundant on all surfaces.

Most surfaces are finely punctate and striae are completely absent. The side of the petiole and the gaster are moderately shining.

The parameres are large and well developed (Fig. 157), although there are other species in the genus with equally large parameres, especially in the members of the *aenescens* species complex.

Larva

Unknown.

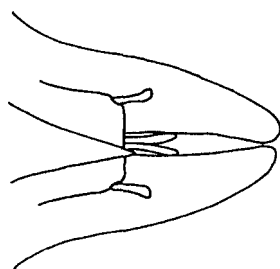


Fig. 157. Genitalia of a male of *P. tarsata* (Kisangani, Zaire, MCZC) as seen from above.

COMPARISON

Pachycondyla tarsata (Fabricius) is an African species, which was previously in the genus *Paltothyreus*. This complex is possibly represented

in the New World by *P. tarsata*, from Brasil.

The worker and female would not be confused with any others in the New World, by the excellent characters listed above, none of which is

possessed by any other New World species. The males can be separated from those of other species by the presence of the inner teeth on the tarsal claws.

vieirai species complex

DESCRIPTION

Worker

This complex is known only from the worker. It is unusual by the unique group of characters, including the *absence of the malar carina*, the *well-developed nuchal collar*, the *elongated antennal scape*, the *rounded pronotal shoulder*, the *depressed metanotal suture*, the *circular propodeal spiracle* and the *broad petiolar node*.

Erect hairs and appressed yellowish hairs are present on most surfaces.

All surfaces are roughly sculptured.

Female and male

Unknown.

Larva

Unknown.

COMPARISON

The circular propodeal spiracle could result in confusion with members of the *emiliae*, *ferruginea* and *stigma* species complexes. It can be easily separated by the wide petiole. Superficially it appears to be a member of the *crenata* species complexes, but can be easily recognized by the lack of the carinae anterior to the eye and on the pronotal shoulder.

There is a single species in the complex: *P. vieirai*.

Key to New World *Pachycondyla*, based on workers⁵

1. Extensor surface of middle tibiae with stiff, conical setae over at least $\frac{1}{2}$ of their length (Fig. 158, look carefully, difficult to see in *P. gilva*), worker yellowish or orange in color; eyes absent or very tiny and indistinct in worker (formerly *Wadeura* and *Cryptopone*) 2

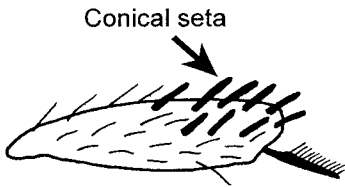


Fig. 160. Middle tibia of a worker of *P. guianensis*, showing the conical setae (Costa Rica).

- Extensor surfaces of middle tibiae without stiff conical setae, except possibly for few at apex, though long fine erect setae may occur (Fig. 80); mature workers nearly always reddish to black in color, with eyes large or small, but always distinct and multifaceted 5

2(1). Mandibles nearly straight, oblique masticatory border nearly continuous with basal border (Fig. 159), with 4 - 5 teeth; tooth at mid length of mandible noticeably longer than others (Fig. 159); petiolar node as seen from side subtriangular, tapered markedly to narrowly rounded apex (Fig. 160); México (Veracruz), Central America to southeastern Brasil (São Paulo) *guianensis* (Weber)

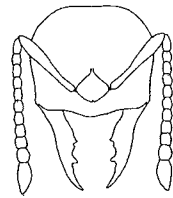


Fig. 158. Head of a worker of *P. guianensis* (from Weber, 1939).

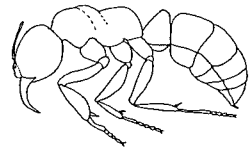
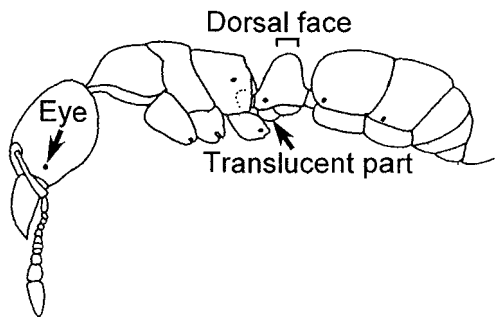


Fig. 159. Side view of a worker of *P. guianensis* (from Weber, 1939).

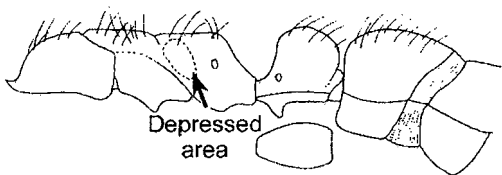
⁵ Based in part on a partial unpublished key by W. Brown. Females differ from workers in having larger eyes, three ocelli, a more robust mesosoma, wings (or at least stubs) and shorter, broader petiolar nodes, but can usually be identified using this key.

- Mandibles triangular, basal and masticatory borders meeting at distinct angle, at least 6 mandibular teeth, approximately equal in length (Fig. 173); petiole as seen from side nearly cuboidal, feebly tapered dorsally 3



3(2). Dorsal face of petiole broadly convex, nearly equal in length to posterior face (Fig. 161); anterior half of subpetiolar process not translucent; Perú east to the Guianas, south to Bolivia 4

Fig. 162. Side view of a worker of *P. gilva* (modified from (Creighton and Tulloch, 1930). The erect hairs are not shown.



4(3). Mesosoma completely dull; Perú east to Trinidad, south to Brasil (Bahía) *holmgreni* (Wheeler)

- Mesosoma completely smooth and glossy; Bolivia (El Bení) and Brasil (Mato Grosso)
..... *mirabilis* Mackay & Mackay

Fig. 161. Mesosoma, petiole and first gastral tergite of a worker of *P. mirabilis* (Rosario, Bolivia, LACM). The inset shows the petiole as seen from above.

5(1). Dorsal surface of mesosoma (Fig. 163) and petiolar node without erect hairs 6

- Dorsal face of petiole narrowly convex, shorter than posterior face (Fig. 162); anterior half of subpetiolar process translucent (Fig. 162); United States (Tennessee south to Florida, west to Louisiana), México, Central America at least as far south as Panamá *gilva* (Roger)

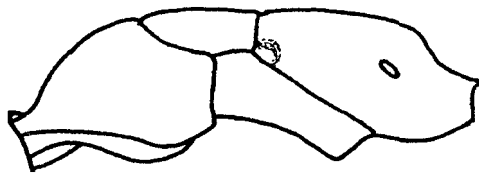


Fig. 163. Mesosoma of a worker of *P. verenae* (Tingo Maria, Perú), showing the lack of erect hairs on the dorsum.

- Dorsal surface of mesosoma (Fig. 164) and usually also of petiolar node with erect hairs 10

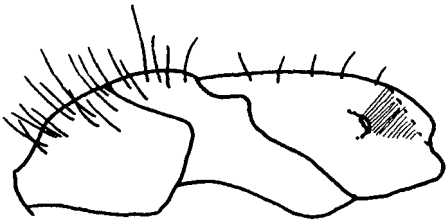


Fig. 164. Mesosoma of a paratype worker of *P. cooki*, showing the erect hairs on the dorsum.

6(5). Dorsum of pronotum strongly and regularly striate (Fig. 573); dorsal surface of head posterior to eye often with large oval patch of appressed golden pubescence on each side of vertex, in clean specimens resembling pair of huge eyes (Fig. 165); Goiás and São Paulo states of Brasil *magnifica* Borgmeier

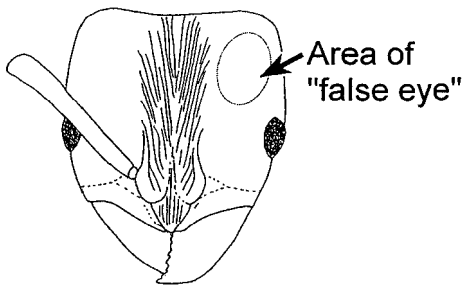


Fig. 165. Head of a worker of *P. magnifica* (from Kempf, 1961).

- Pronotum without coarse striae; without "false eye" pubescence patches on head 7

7(6). Eyes very large and convex (Fig. 166), longer than apical antennomere; apex of petiole curving gradually into posterior face 8

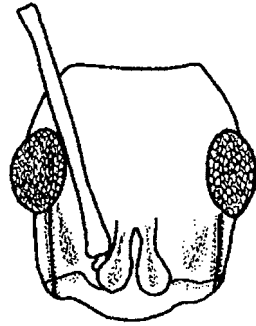


Fig. 166. Head of a worker of *P. apicalis* (Sarapiquí River, Costa Rica).

- Eyes shorter than first antennomere (Fig. 167); apex of petiole meeting its vertical posterior face at abrupt angle (Fig. 168); northern Venezuela (Distrito Federal), central and southeastern Brasil (south to Rio Grande do Sul) *bucki* (Borgmeier)

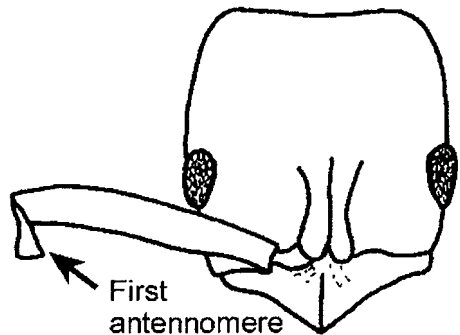


Fig. 167. Head of a cotype worker of *P. bucki* (São Paulo, MCZC).

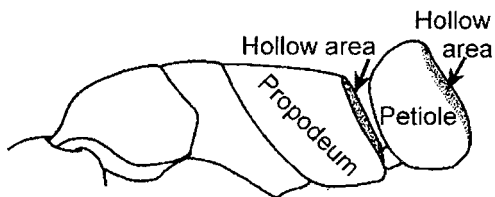


Fig. 168. Mesosoma and petiole of a cotype worker of *P. bucki* (São Paulo, MCZC).

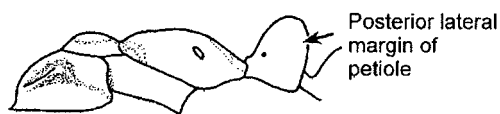


Fig. 170. Mesosoma and petiole of a worker of *P. apicalis* as seen from the side (Sarapiquí River, Costa Rica, MCZC).

8(7). Posterior lateral edges of petiole with sharp margins (Fig. 169), concave anteriorly and posteriorly to margin (look from above); hypopygium with sparse, appressed pubescence in area adjacent to sting (Fig. 171, left); tip of antennal funiculus brown to rarely orange; very common; México (Veracruz) south to Paraguay (Canindeyú) *verenae* (Forel)

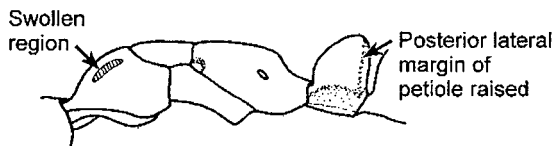
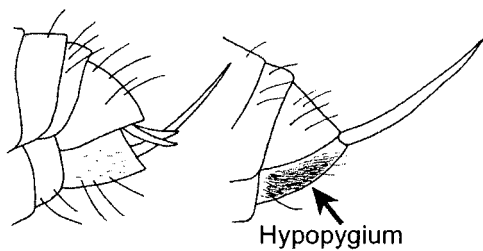


Fig. 169. Mesosoma and petiole of a worker of *P. verenae* as seen from the side (43 mi E Tingo Maria, Perú, MCZC).

- Posterior lateral edges of petiole rounded (Fig. 170); convex on all sides at bend; hypopygium with moderate (Fig. 171, left) to dense appressed pubescence (Fig. 171, right); tip of funiculus (last antennomeres) normally bright yellow; México (Veracruz, Chiapas, Yucatán Peninsula) south to Brasil (Rio de Janeiro) and Argentina **9**

9(8). Apical 3 - 6 antennomeres conspicuously bright yellow; antennal scape relatively long (greater than 2.3 mm), longer than head length; hypopygidium with sparse pubescence (Fig. 171, left); very common; northern México to southern Brasil and Bolivia *apicalis* (Latreille)

- Apical antennomeres light brown to dark brown, never bright yellow; antennal scape relatively short (usually less than 2.3 mm), shorter than head length; hypopygidium with dense pubescence (Fig. 171, right); very rarely collected; Ecuador to eastern Brasil, south to Paraguay and northern Argentina *obscuricornis* Emery



verenae *obscuricornis*

Fig. 171. Tips of the gaster of workers of *P. verenae* (Río San Juan, Nicaragua, CWEM) and of

P. obscuricornis (Madre de Dios, Peru, CASC) as seen from the side, showing the dense appressed pubescence on the hypopygium of *P. obscuricornis*.

10(5). Dorsum of pygidium (gastral apex) on each side of sting with stout, triangular upturned processes or teeth (Fig. 172); large black species with cuboidal-shaped petiole; widespread from Colombia east to the Guianas, south to Paraguay; British West Indies
 *crassinoda* (Latreille)

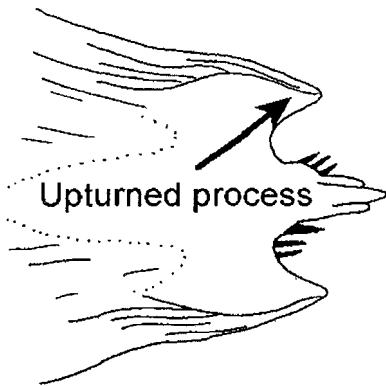


Fig. 172. Pygidium (dorsum of gastral apex) of a worker of *P. crassinoda* showing the two upturned processes (modified from Kempf, 1961).

- Gastral apex not produced as pair of stout processes or teeth, although in few species, some setae bordering gastral apex may be spine-like and resemble teeth **11**

11(10). Mandible (Fig. 173) with 5 - 7 teeth (if 8, basalmost teeth consist of smaller denticles); dorsum of pronotum without distinct lateral margins and densely and finely punctulate; relatively small (usually < 5 mm total length); Florida to northern Argentina, common in rotten wood **12**

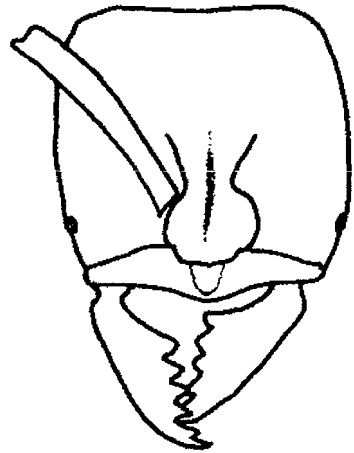


Fig. 173. Head of a worker of *P. stigma* (near Telas, Honduras).

- Mandibles usually with more than 8 teeth and/or denticles (Fig. 240); either pronotal margins distinct, pronotal dorsum smooth and shining, or size larger (usually greater than 7 mm total length) **21**

12(11). Mandible with 5 - 6 teeth (Fig. 173); USA (Florida) south to northern Argentina **13**

- Mandible with 7 teeth (including small basalmost tooth, see Fig 178); México south to Bolivia **16**

13(12). Subpetiolar process blunt and rounded posteriorly (Fig. 174); clypeus divided by indistinct (usually), horizontal carina (Fig. 177) 14

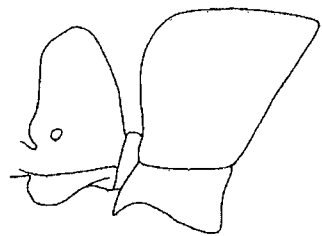


Fig. 174. Petiole and postpetiole (first gastral segment) of a worker of *P. stigma* (Pichilingue, Ecuador, MCZC).

- Subpetiolar process angulate posteriorly (Fig. 175), nearly rounded in female, see Fig. 133); clypeus divided by sharp, transverse carina (Fig. 176); head width ~ 0.8 mm; Honduras south to southern Brasil and Bolivia; Caribbean area ...
..... ***succedanea* (Roger)**

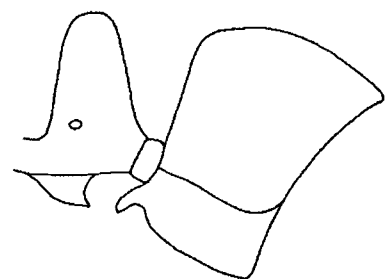


Fig. 175. Petiole and postpetiole (first gastral segment) of a worker of *P. succedanea* (3 - 5 k E Turrialba, Costa Rica, MCZC).

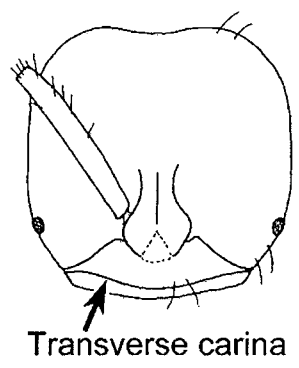


Fig. 176. Head of a worker of *P. succedanea* (Puntarenas, Costa Rica, MCZC).

14(13). Horizontal carina on clypeus incomplete, but well developed, sharp (Fig. 177); not common, Panamá to southern Brasil; Haiti
..... ***gilberti* (Kempf)**

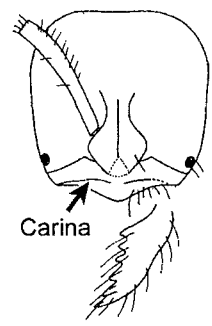


Fig. 177. Head of a worker of *P. gilberti* (identified by Kempf, USNM) (Mato Grosso, Brasil). The inset shows the mandible.

- Horizontal carina on clypeus poorly developed (Fig. 173), consisting of merely a fold; widely distributed throughout Americas, very common 15

15(14). Head width ~ 1 mm; clypeus without longitudinal carina or raised area (Fig. 173); subpetiolar process thickened (Fig. 174); common and widely distributed from USA (Florida), Bahamas, México south to Argentina, Caribbean

..... ***stigma* (Fabricius)**

- Head width ~ 0.6 mm; clypeus with blunt, longitudinal carina or raised area (Fig. 178); anterior half of subpetiolar process thin and translucent (Fig. 162); USA (Tennessee south to Florida, west to Louisiana), México south to Panamá (Chiriquí)

..... ***gilva* (Roger)**

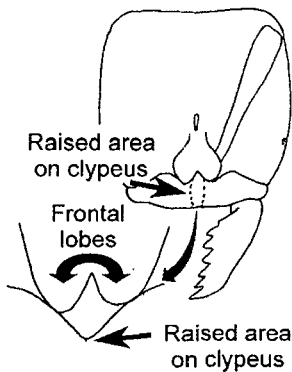


Fig. 178. Head of a worker of *P. gilva* (cotype worker of *P. obsoleta*). The inset shows an enlargement of the medial part of the clypeus, as seen obliquely from above.

16(12). Frontal carinae closely spaced (separated by 0.07 mm or less) posteriorly (Fig. 179); subpetiolar process angulate posteriorly (Fig. 175); mandible with well developed, longitudinal striae (Fig. 185), moderately shining; Costa Rica south

to Colombia (Valle del Cauca)
 ***cognata* (Emery)**

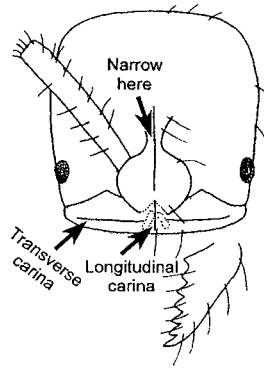


Fig. 179. Head of the lectotype worker of *P. cognata*. The longitudinal striae are not shown on the inset of the mandible.

- Frontal carinae more widely spaced (separated by 0.13 mm or more) posteriorly (Fig. 180); subpetiolar process usually rounded posteriorly (Fig. 174); mandibles nearly always without striae (Fig. 180), usually smooth and polished; México south to Venezuela and Bolivia

..... **17**

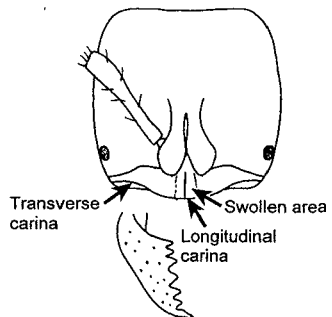


Fig. 180. Head of a worker of *P. succedanea*, with the right mandible (Tingo Maria, Perú).

17(16). Middle and posterior tibia each with single, pectinated spine (Fig. 139, left); very rarely collected; Panamá (Veraguas), Venezuela (Mérida) south to Bolivia (Cochabamba) *leveillei* (Emery)
 - Middle and posterior tibia each with two spines (Fig. 139, right), one large, pectinate, other spine simple and sometimes difficult to see; relatively common **18**

18(17). Propodeal spiracle nearly circular (Fig. 182); worker relatively small (total length < 5 mm); clypeus without longitudinal carina, longitudinally depressed, anterior medial border concave, with two lateral angles (Fig. 181); southern México (Chiapas) and Guatemala? (Suchitpequez)
 *minuta* Mackay and Mackay

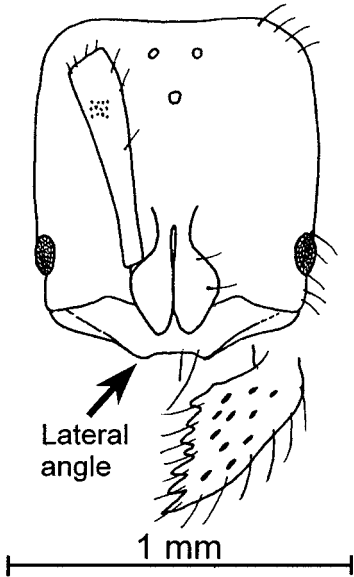


Fig. 181. Head of the holotype female of *P. minuta*. The inset

shows the mandible. Part of the sculpture of the scape is shown.

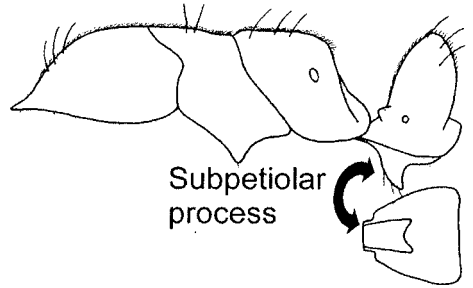


Fig. 182. Mesosoma and petiole of a worker of *P. succedanea* (Tingo Maria, Perú). The inset shows the petiole and subpetiolar process as seen from below.

- Propodeal spiracle oblong or slit-shaped (Fig. 183); clypeus not as above (Fig. 184); Costa Rica south to Perú and Venezuela **19**

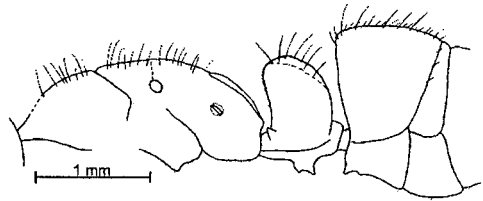


Fig. 183. Mesosoma, petiole and first gastral tergite of a worker of *P. lenkoi* (Tumupasa, Bolivia, USNM).

19(18). Clypeus with longitudinal carina (Fig. 180), without medial angle on anterior margin; metanotal suture slightly depressed (Fig. 182); worker relatively small (total length 4 - 6 mm) **20**

- Clypeus without longitude-
 inal carina (Fig. 184), but with well
 developed transverse carina, with
 medial angle which overhangs ante-
 clypeus (Fig. 184); metanotal suture
 not depressed, barely indicated on
 dorsum of mesosoma, not interrupting
 surface (Fig. 183); worker relatively
 large (TL > 6 mm); Brasil (Mato
 Grosso, Distrito Federal), Bolivia (La
 Paz) *lenkoi* Kempf

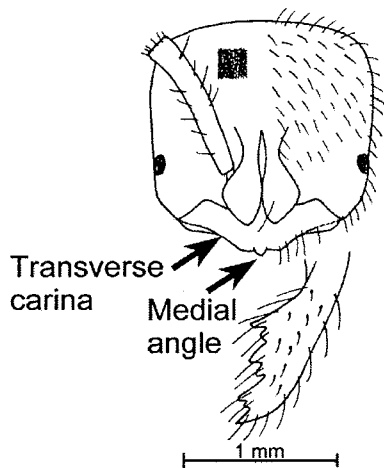


Fig. 184. Head of a worker of *P. lenkoi* (Tumupasa, Bolivia, USNM). The inset shows the mandible.

20(19). Dorsal surface of mandible
 smooth, glossy with scattered pun-
 ctures (Fig. 180); Honduras south to
 Perú east to Venezuela, south to Brasil
 (Goiás, São Paulo) and Bolivia
 (Cochabamba), Caribbean
 *succedanea* (Roger)

- Dorsal surface of mandible
 completely covered with coarse striae
 (Fig. 185); México (Chiapas) south to
 Ecuador (Pichincha)
 *gilloglyi* Mackay and Mackay

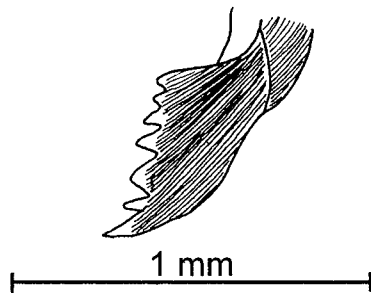


Fig. 185. Mandible of the holotype worker of *P. gilloglyi*.

21(11). Opening of propodeal
 spiracle viewed from side, small round
 or elliptical (Fig. 186, left), usually
 little more elongate in females than in
 workers of same species; small and
 medium size species 22

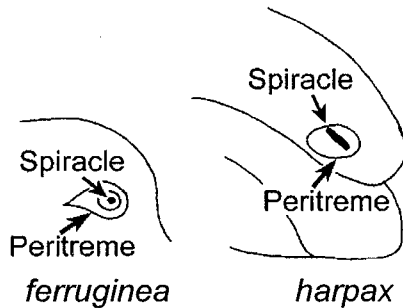


Fig. 186. Round spiracle (*P. ferruginea*, Guanacaste, Costa Rica, CWEM) and elongate spiracle (*P. harpax*, CWEM).

- Opening of propodeal
 spiracle viewed from side slit-shaped
 (Fig. 186, right), or elongated, usually
 more than twice as long as wide;
 mostly medium and large size species
 40

22(21). Pronotal shoulder with lateral margin or carina (Fig. 187) ...
 23

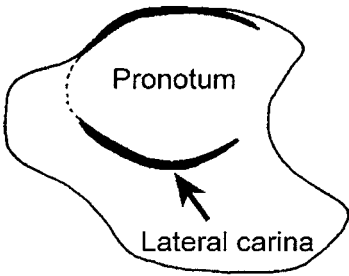


Fig. 187. Pronotum of a worker of *P. arhuaca*, as seen in an oblique side view (Huila, Colombia, CWEM).

- Pronotal dorsum rounded into sides, without distinct margins (Fig. 188) 28

23(22). Petiole as seen from side less strongly tapered, dorsal face broadly rounded or obliquely truncate (Fig. 188), forming dorsal face more or less separate from posterior face (Fig. 188); states of Espírito Santo and Bahia, Brasil 24

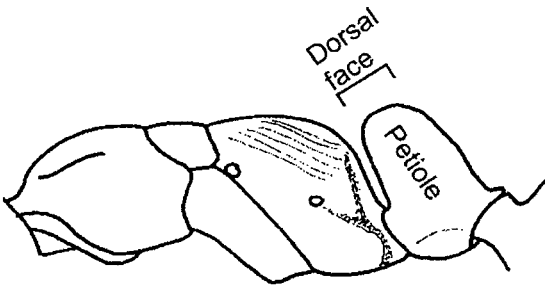
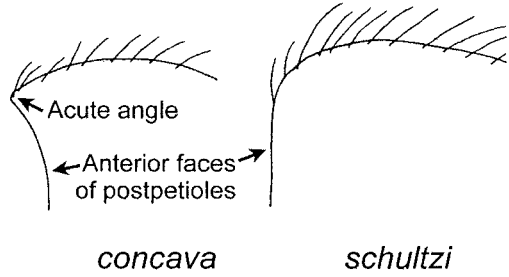


Fig. 188. Mesosoma and petiole of a worker of *P. venusta* (Espírito Santo, Brasil, MCZC).

- Petiole as seen from side acutely tapered to narrowly rounded apex (Fig. 191) 26

24(23). Anterior face of postpetiole (first segment of gaster) strongly concave, apex forming acute angle which overhangs remainder of face (Fig. 189, left); known only from state of Bahia, Brasil
 *concava* Mackay and Mackay



concava *schultzi*

Fig. 189. Anterior faces of postpetioles of a paratype worker of *P. concava* and the holotype worker of *P. schultzi*, both as seen from the side.

- Anterior face of postpetiole broadly rounded into dorsal face (Fig. 189, right); known only from states of Espírito Santo and Bahia, Brasil . 25

25(24). Side of pronotum and mesopleuron smooth and glossy; petiole with poorly defined dorsal face (Fig. 190, left); southeastern Brasil (states of Espírito Santo and Bahia)
 *venusta* (Forel)

- Side of pronotum and mesopleuron with coarse irregular striae; petiole with well defined dorsal face (Fig. 190, right); eastern Brasil (state of Espírito Santo)
 *schultzi* Mackay and Mackay

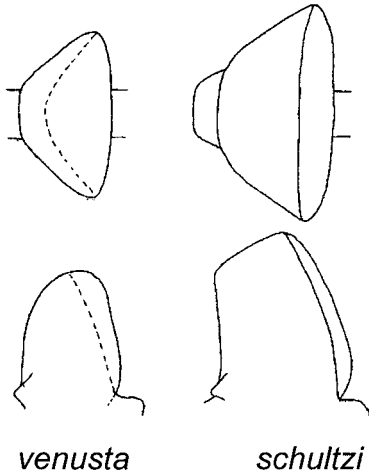


Fig. 190. Petioles of the lectotype worker of *P. venusta* and the holotype worker of *P. schultzi* as seen from above and from the side (drawn to the same scale).

26(23). Smaller species (Fig. 191), maximum width of worker head 1.1 mm, of female head about 1.25 mm; stridulatory file absent on middle of second pretergite; eye of worker not longer than about 0.2 mm (Fig. 336); rain forest litter and rotten wood; common and widely distributed from Costa Rica (Heredia) south to southern Brasil *arhuaca* (Forel)

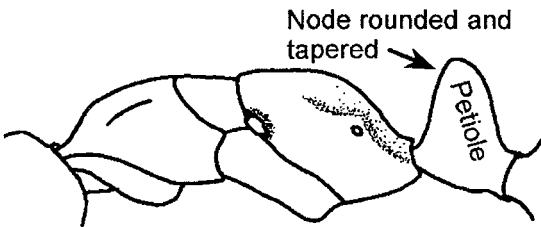


Fig. 191. Mesosoma and petiole of a worker of *P. arhuaca* (Antioquia, Colombia, MCZC).

- Larger species, head width of worker > 1.4 mm; stridulatory file present in middle of second pretergite (Fig. 192); diameter of eye of worker > 0.28 mm 27

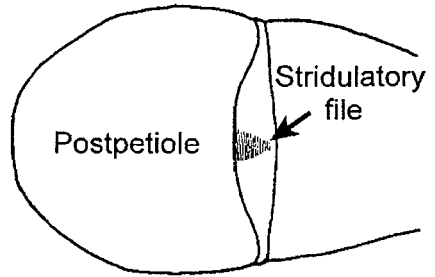


Fig. 192. Dorsum of the anterior part of the gaster of a worker of *P. emiliae* showing the stridulatory file (Aragua, Venezuela, CWEM).

27(26). Medial section of clypeus smooth glossy; posterior face of petiole very smooth and shining with few scattered punctures and extremely sparse appressed pubescence (Fig. 193); pronotal carina well developed, overhanging side of pronotum (Fig. 193); southern Brasil *metanotalis* Luederwaldt

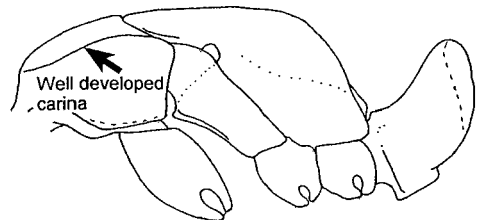


Fig. 193. Mesosoma and petiole of a worker of *P. metanotalis* (from Kempf, 1961).

- Medial section of clypeus with longitudinal striae, dull; posterior face of petiole punctulate or irregularly striate, weakly shining and with appressed, golden pubescence; pronotal carina poorly developed (Fig. 194); central Colombia (Boyacá, Meta), Perú and northern Venezuela (Aragua, Carabobo) *emiliae* (Forel)

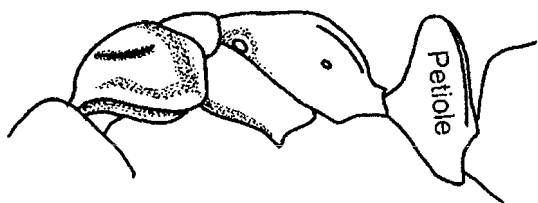
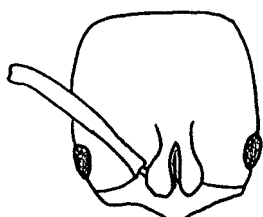


Fig. 194. Mesosoma and petiole of a worker of *P. emiliae* (Rancho Grande, Venezuela, MCZC).

28(22). Clypeus armed with conspicuous slender sharp median tooth that projects well beyond free margin (Fig. 195); Panamá to Perú (Huánuco, Pasco), Venezuela (Aragua) *becculata* Mackay and Mackay



Slender, median tooth

Fig. 195. Head of the holotype worker of *P. becculata* (Pichincha, Ecuador).

- Clypeus unarmed or with small angle (Fig. 199), middle of its free border straight, convex, or emarginate 29

29(28). Tibia of middle leg of worker shorter than maximum width of pronotum (seen from above) 30

- Tibia of middle leg of worker longer than maximum width of pronotum 36

30(29). Petiole as seen from side narrowly subtriangular with anterior and posterior slopes about equal in length and feebly convex or straight (Fig. 196); worker metanotal groove impressed and interrupting dorsal profile; worker nearly always dark brown with lighter colored legs (may be pale brown) 31

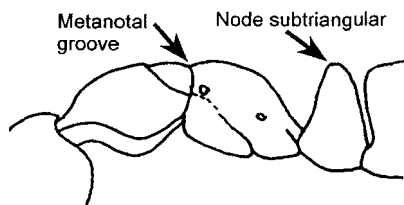


Fig. 196. Mesosoma and petiole of a worker of *P. conicula* (Aragua, Venezuela, MCZC).

- Petiole as seen from side nearly rectangular in shape, possibly slightly narrowed at apex (Fig. 197); worker metanotal groove fine and shallow, barely breaking convex dorsal profile of mesosoma in side view (Fig. 197); worker nearly always ferruginous red (may be dark to black); S Mexico to SE Brasil 34

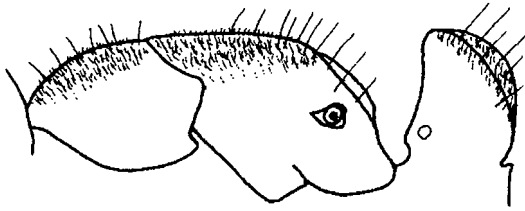


Fig. 197. Mesosoma and petiole of a worker of *P. ferruginea* (Guanacaste, Costa Rica, CWEM).

31(30). Middle and posterior tibiae each with two spurs (Fig. 139, right), simple spur may be difficult to see; fully pigmented worker black with brown or black appendages; common, Central America to Bolivia **32**

- Middle and posterior tibiae each with single spur (Fig. 139, left); medium brown; rarely collected; Panamá, Venezuela (Mérida), Brasil (Rio de Janeiro, São Paulo), Bolivia (Cochabamba) ... *leveillei* (Emery)

32(31). Antennal scape extends past posterior lateral corner (Fig. 198); clypeus with longitudinal, medial depressed area (Fig. 198); mesonotum relatively short (~ 0.18 mm in length, seen from above); anterior and posterior faces of petiole nearly parallel, forming short dorsal face (Fig. 203); common and widely distributed (Guatemala south to Perú) **33**

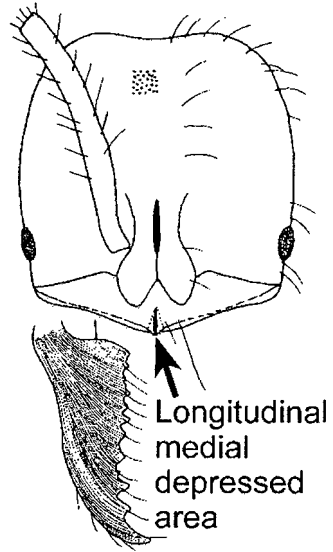


Fig. 198. Head and mandible of the lectotype worker of *P. pergamdei*. Only a small portion of the sculpturing is shown.

- Antennal scape fails to reach or barely reaches posterior lateral corner of head (Fig. 199); longitudinal medial clypeal carina or raised area present; mesonotum relatively long (> 0.24 mm); faces of petiole converging dorsally, forming broadly rounded surface (Fig. 196); rarely collected, Colombia (Huila), Perú (Huánuco) and Venezuela (Aragua) *conicula* Mackay and Mackay

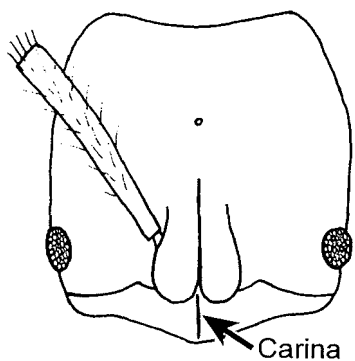


Fig. 199. Head of a worker of *P. conicula* (Aragua, Venezuela, MCZC).

33(32). Posterior edge of subpetiolar process with ventrally bent tooth or angle (Fig. 200); Ecuador (Napó)
 *cernua* Mackay and Mackay

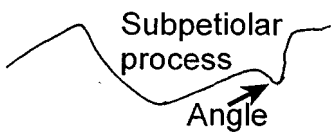


Fig. 200. Subpetiolar process of the holotype worker of *P. cernua*.

- Posterior edge of subpetiolar process completely rounded (Figs. 51, 201); Guatemala south to Perú *pergandei* (Forel)

34(30). Subpetiolar process lacking posteriorly directed tooth or lobe near posterior edge of petiole, anterior angle present (Fig. 201, right); apical tooth of mandible about 3 times length of any other tooth (Fig. 201, left); Colombia (Meta)
 .. *longidentata* Mackay and Mackay

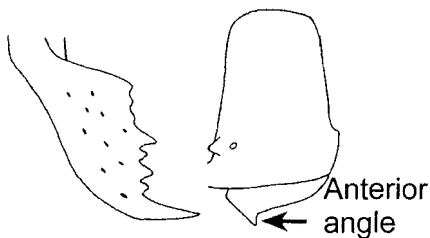


Fig. 201. Mandible and petiole of the holotype worker of *P. longidentata*.

- Subpetiolar process with sharp, well developed, posteriorly directed tooth or lobe near posterior edge (Fig. 202, right) in addition to anterior angle; apical tooth slightly larger than subapical tooth (Fig. 202, left) 35

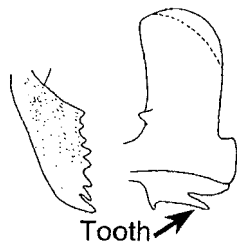


Fig. 202. Mandible (Chiriquí, Panamá) and petiole (Chiapas, México) of workers of *P. ferruginea*.

35(34). Petiole with straight or feebly concave anterior face and rounded summit merging into convex posterior slope (Fig. 202); apex much broader than long (> 2.5X) as seen from above; northeastern México (Tamaulipas) to southern Brasil (São Paulo), Trinidad
 *ferruginea* (F. Smith)

- Petiole nearly rectangular-shaped (seen from side, Fig. 203), sometimes slightly wider near apex, apex not as wide (< 2.0 X) as seen from above (Fig. 203); Guatemala (Suchitepéquez) south to Paraguay (Canindeyú), Trinidad *lunaris* (Emery)

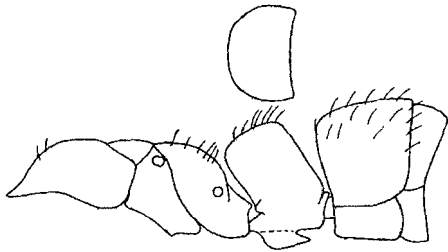


Fig. 203. Mesosoma, petiole and postpetiole of a worker of *P. lunaris* (Puntarenas, Costa Rica, CWEM). The inset show the petiole as seen from above.

36(29). Petiole as seen from side narrowly subtriangular with feebly convex to slightly concave anterior and posterior slopes (anterior slope straight to weakly concave in female) meeting at narrowly rounded apex (Fig. 204); worker metanotal groove set in deep impression separating mesonotal and propodeal convexities (Fig. 204) **37**

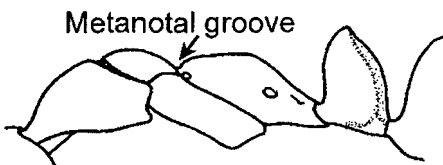


Fig. 204. Mesosoma and petiole of a worker of *P. constricta* (Atlántida, Honduras, MCZC).

- Petiole thick, subtruncate above, with nearly vertical anterior and posterior faces (Fig. 205); metanotal suture not as deeply depressed (Fig. 205) **38**

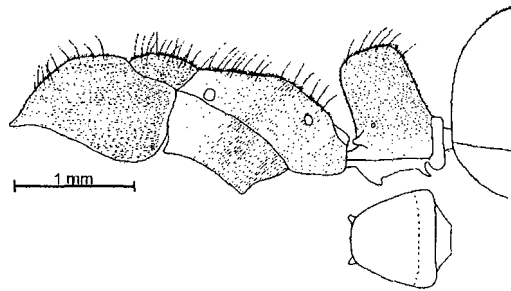


Fig. 205. Mesosoma, petiole and first gastral tergite of the holotype worker of *P. rupinicola*. The inset shows the petiole as seen from above.

37(36). Relatively larger (total length > 5 mm); mandibles finely striolate, opaque, with only apical third smooth; common, Honduras to southern Brasil and Bolivia ...
..... *constricta* (Mayr)

- Relatively smaller (TL < 5 mm); mandibles smooth with scattered punctures (Fig. 378); introduced into USA (Virginia, North Carolina, Georgia); rarely collected, but may be locally abundant
..... *chinensis* (Emery)

38(36). Metanotal groove very shallow, separating convex mesonotum from nearly straight propodeal dorsum, which lies at slightly lower level (Fig. 205) **39**

- Metanotal suture deeper, separating flattened and relatively short mesonotum from convex propodeal dorsum (Fig. 206); mandibles mostly striate and dull; Ecuador (Los Rios) ***vieirai* Mackay and Mackay**

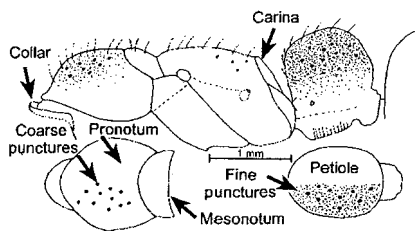


Fig. 206. Mesosoma and petiole of the holotype worker of *P. vieirai*. The insets show the pronotum and mesonotum, as well as the petiole, as seen from above.

39(38). Mandibles smooth and shining, with spaced punctures (Fig. 627); Panamá, western Colombia ***rupinicola* Mackay and Mackay**
 - Mandibles completely striated (Fig. 185); Bolivia ***breviscapa* Mackay and Mackay**

40(21). Anterior lateral edge of postpetiole (first gastral tergum) with pair of bumps or angles (Fig. 207); tarsal claws with small, internal teeth (Fig. 208); known only from São Paulo, Brasil ***tarsata* (Fabricius)**

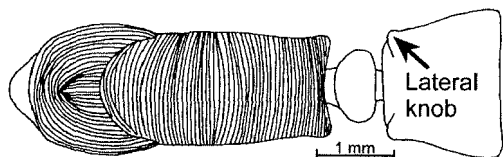


Fig. 207. Mesosoma, petiole and

postpetiole of a worker of *P. tarsata* (São Paulo, Brasil), as seen from above.

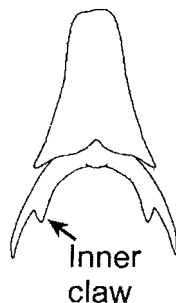


Fig. 208. Tarsal claws of the middle right leg of a worker of *P. tarsata* (São Paulo, Brasil).

- Postpetiole without angles; tarsal claws without internal teeth . **41 41(40).** Mandibles exceptionally long and slender, about as long as head (Fig. 209); petiole longer than high, rising and thickening gradually to rounded petiole posteriorly (Fig. 210); widespread, but rare and local in tropical S. America **42**

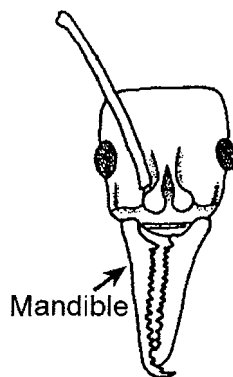


Fig. 209. Head of a worker of *P. rostrata* (Leticia, Colombia, MCZC).

- Mandibles shorter than head (Fig. 198); petiole not longer than high and with steeply rising anterior face; common and widely distributed ... 43

42(41). Anterior face of petiole convex (Fig. 210); carina on pronotal shoulder moderately developed; most common in northern South America (Colombia [Amazonas], Ecuador [Sucumbíos], Venezuela [Carabobo] to southern Brasil and Argentina [Salta]) *rostrata* Emery



Fig. 210. Mesosoma and petiole of a worker of *P. rostrata* (Leticia, Colombia, MCZC).

- Anterior face of petiole straight or slightly concave (Fig. 211); carina on pronotal shoulder weakly developed (Fig. 211); southern South America (southern Brasil [Goiás, Mato Grosso, São Paulo, Rio de Janeiro], Paraguay and Argentina [Misiones]) *agilis* (Forel)

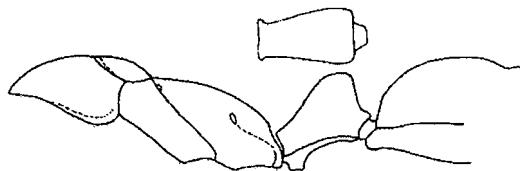


Fig. 211. Mesosoma, petiole and postpetiole of a worker of *P. agilis* (holotype of *P. goyana*, from

Borgmeier, 1937). The inset shows the petiole as seen from above.

43(41). Postpetiole (first gastral segment) with anterior face concave and pointed, so that it forms overhanging acute angle with dorsal face (Fig. 212); eyes small (Fig. 606); rare and local, Perú east to Guianas, western Brasil *procidua* Emery

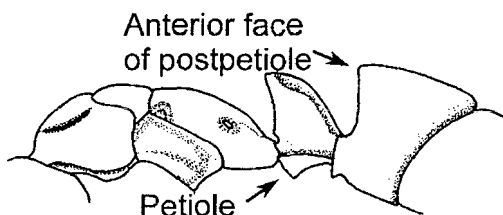


Fig. 212. Mesosoma, petiole and postpetiole (first gastral tergite) of a worker of *P. procidua* as seen from the side (King Frederic William IV Falls, Suriname, MCZC).

- First gastral segment with sloping anterior face that rounds into dorsal face (Fig. 211) or meets it at approximate right angle, possibly slightly overhanging anterior face (Fig. 241) 44

44(43). Black, most surfaces very smooth and glossy with striate areas on sides of mesosoma (Fig. 213) and sometimes on head; pronotal shoulders without carinae or with weak margins and with only few scattered punctures; petiole sub-rectangular when viewed from side (Fig. 213) 45

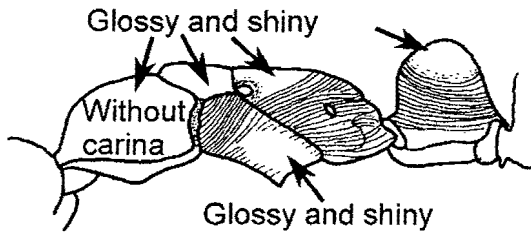


Fig. 213. Mesosoma and petiole of a worker of *P. laevigata* (Ecuador).

- Sculpture more extensive, if smooth and shiny, head without longitudinal striae; pronotal dorsum striate or densely and finely punctulate; pronotal shoulders often with carina; petiole rarely rectangular-shaped, as seen from side (Fig. 384) 47

45(44). Very large species, total length > 15 mm, head width > 3 mm; head behind eyes mostly distinctly striate (Fig. 214); Costa Rica south to Paraguay, east to eastern Brasil *commutata* (Roger)

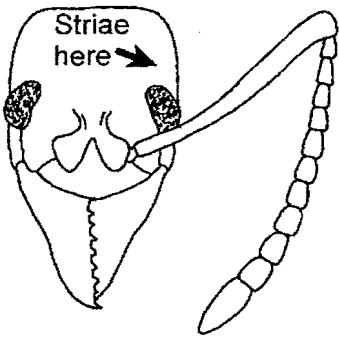


Fig. 214. Head of a worker of *P. commutata* (modified from Wheeler, 1936).

- Smaller species, total length < 15 mm, head width < 2.5 mm; head behind eyes usually mostly smooth and shining (Fig. 215) 46

46(45). Dorsal surface of mandible divided by longitudinal ridge into convex lateral part and a concave inner part that extends to dental margin (Fig. 215); Trinidad, Brasil, Bolivia, Paraguay to northern Argentina (Salta, Misiones, Chaco) *marginata* (Roger)

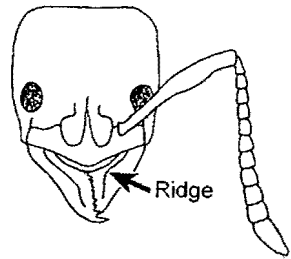


Fig. 215. Head of a worker of *P. marginata* (MCZC).

- Each mandible with single convex dorsal surface (Fig. 216) with series of coarse punctures along dental margin; Costa Rica south to south-eastern Brasil (São Paulo) *laevigata* (F. Smith)

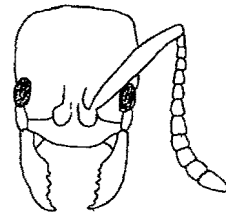


Fig. 216. Head of a worker of *P. laevigata* (MCZC).

47(44). Female (and undoubtedly undescribed worker) with all of following characteristics: antennal scape short, not reaching posterior lateral corner of head (Fig. 424); preocular (Fig. 424) and pronotal carinae absent (Fig. 423); petiole cuboidal, anterior and posterior faces vertical straight and parallel; head, mesosoma and petiole covered with longitudinal rugae or carinae (Fig. 423 & 424); known only from the state of Amazonas, Brasil *curiosa* Mackay and Mackay

- Without all of above mentioned characters; common and widely distributed 48

48(47). In side view, dorsal outline of mesosoma forms continuous (slightly sinuous in *P. goeldii* - Fig. 233) convexity including mesonotum and propodeal dorsum (Fig. 217); metanotal groove obsolete or nearly so and not strongly impressed; pronotal shoulder usually with well developed carina (Fig. 217) 49

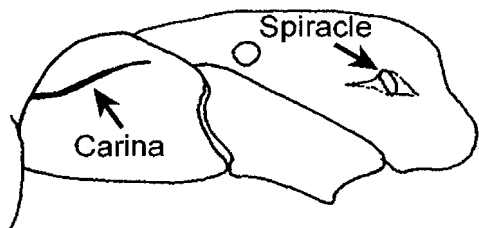


Fig. 217. Mesosoma of a worker of *P. striata* (Minas Gerais, Brasil, MCZC).

- Dorsal outline of mesosoma interrupted by distinct, impressed metanotal suture, so that mesonotum forms convexity separate from more or less convex propodeal dorsum (Fig. 218); pronotal margin formed into distinct carina (Fig. 218), indistinct, or absent 75

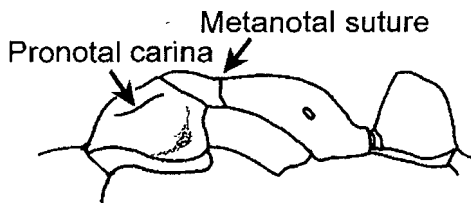


Fig. 218. Mesosoma and petiole of a worker of *P. lineaticeps* (near Guápiles, Costa Rica, MCZC).

49(48). Distinct malar carina (Fig. 219) extends from lateral edge of clypeus near mandibular insertion to or nearly to anterior medial quarter of margin around eye (malar carina); pretergite of second gastral tergum with distinctly differentiated median stridulatory file with bands of rainbow colors (Fig. 220); arolia present (Fig. 221, left) 50

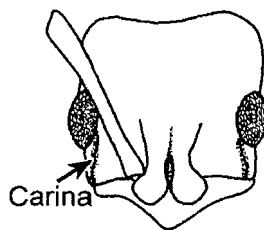


Fig. 219. Head of a worker of *P. crenata*, showing the malar carina anterior to the eye (Chiapas, México, MCZC).

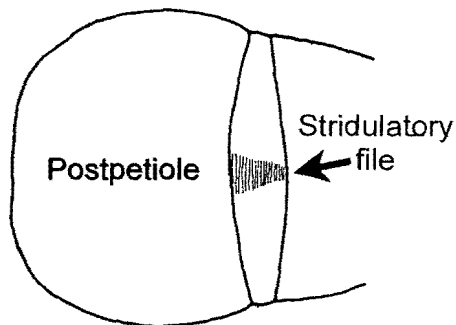
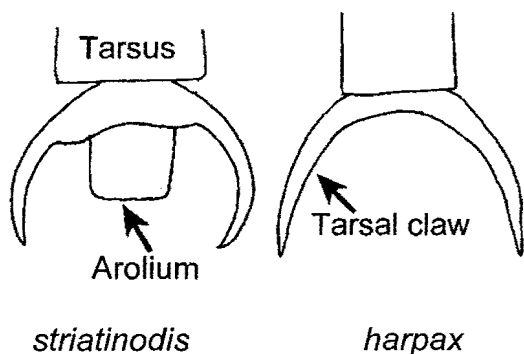


Fig. 220. Dorsum of the gaster of a worker of *P. unidentata* (Chiapas, México, CWEM), showing the postpetiole and the stridulatory file on the second pretergite.

- Cheeks without distinct carina (Fig. 243) reaching more than halfway from clypeal wing to eye margin (carina indistinct from background sculpture may sometimes occur); stridulatory file absent; arolia absent (Fig. 221, right) 66



striatinodis

harpax

Fig. 221. Middle tarsal claws of a worker of *P. striatinodis* (left, Frijolito, Panamá, CWEM), showing the arolium and of a worker of *P. harpax* (right, Nayarit, México,

CWEM) lacking the arolium.

50(49). Petiole as seen from side with front face rising abruptly to angular summit at or near front, descending behind through broad curve (Figs. 233) 51

- Petiole as seen from side with horizontal or strongly rounded summit with highest point near or posterior to mid-length; (Figs. 228) 55

51(50). Side and posterior face of petiole completely and coarsely horizontally striate (Fig. 222; widely distributed from Guatemala (Escuintla) south to Bolivia (El Beni) *striatinodis* Emery

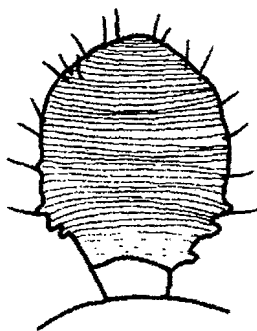


Fig. 222. Posterior face of the petiole of a worker of *P. striatinodis* (Barro Colorado, Panamá, MCZC).

- Posterior face of petiole without transverse striae, finely sculptured (Fig. 223) 52

collected 54

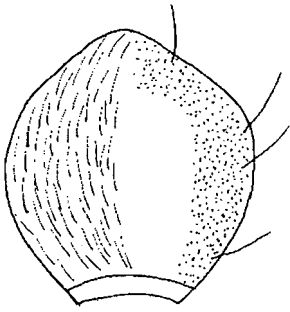


Fig. 223. Posterior face of the petiole of a worker of *P. unidentata* as seen from behind. The pubescence is shown on the left, the punctures on the right.

52(51). Posterior face of petiole convex (Fig. 224), moderately shiny; complete side of propodeum rarely with horizontal striae; common and widely distributed from northern México to Bolivia and southern Brasil 53

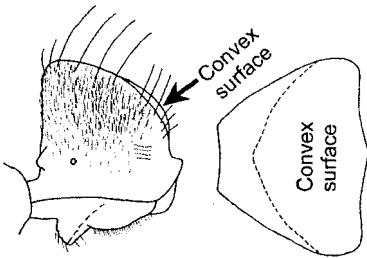


Fig. 224. Petiole of a worker of *P. unidentata* as seen from the side and from above (Granada, Nicaragua, CWEM).

- Posterior face of petiole strongly concave (Fig. 225) to flat; complete side of propodeum with horizontal striae (Fig. 620); rarely

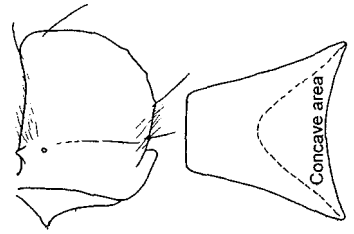


Fig. 225. Petiole of the holotype worker of *P. recava*, as seen from the side and from above.

53(52). Dorsum of pronotum with fine, isolated punctures (Fig. 226, left); sides of propodeum and petiole without striae (Fig. 666) or with poorly defined striae; common, distributed from México (San Luis Potosí) south to Bolivia and southeastern Brasil *unidentata* Mayr

- Dorsum of pronotum with coarse punctures, which are somewhat aligned in rows, forming carinae (Fig. 226, right); sides of propodeum with well defined, obliquely oriented striae, petiole with horizontal striae (Fig. 620); uncommon, but widely distributed, Costa Rica south to Bolivia (El Bení) *rugosula* Emery

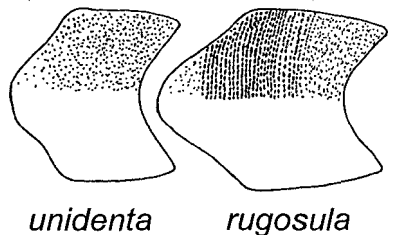


Fig. 226. Pronota of workers of *P. unidentata* (Grenada, Nicaragua,

CWEM) and *P. rugosula* (Rio Madeira, Brasil, LACM), as seen from above.

54(52). Sides and especially posterior face of petiole smooth and glossy (Fig. 225); known only from western Colombia

..... ***recava* Mackay and Mackay**
 - Sides and posterior face of petiole completely, but finely punctate and possibly with poorly defined striae on lower half of side (Fig. 620), weakly shining; Venezuela
 ... rare samples of ***rugosula* Emery**

55(50). Petiole as seen from side more or less subquadrate, with vertical anterior and posterior faces and horizontal, but convex dorsal face (Fig. 227)

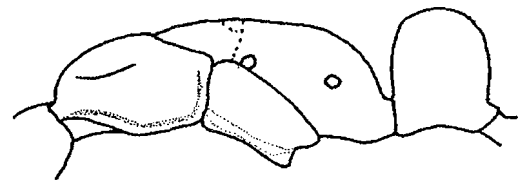


Fig. 227. Mesosoma and petiole of a worker of *P. crenata* (Oaxaca, México, CWEM).

- Petiole as seen from side with anterior or anterodorsal and posterior faces strongly converging above to form sharply rounded or even angular summit near or behind mid length (Fig. 228)

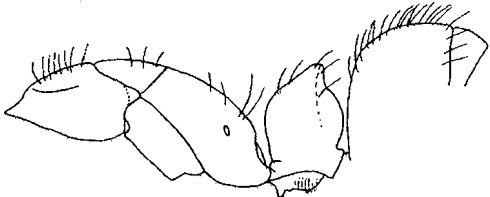


Fig. 228. Mesosoma, petiole and postpetiole of a worker of *C. oberthueri* (Pará, Brasil, CWEM).

56(55). Posterior and usually anterior face of petiole convex, dorsal face of petiole convex, with highest point posterior to midpoint (Fig. 232); common from southern Mexico to northern Argentina

57
 - Anterior and posterior faces of petiole nearly straight, nearly parallel, dorsal face of petiole weakly convex, with highest point near midpoint (Fig. 589); rarely collected, but widely distributed, from México (Veracruz, Oaxaca) south to northern Argentina

..... ***moesta* Mayr**⁶

57(56). Petiole (seen from above) with node nearly circular, often slightly broader than long (Fig. 229) (may be slightly longer than broad);

Colombia (Amazonas, Putumayo) south to Paraguay, east to Venezuela and central Brasil

..... ***globularia* Mackay and Mackay**

⁶ Listed as JTL-013 at John Longino's website www.evergreen.edu/ants/genera/Pachycondyla/SPE/CIES/JTL-013/JTL-013.html

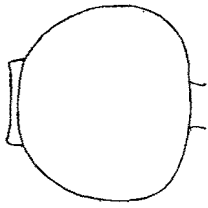


Fig. 229. Petiole of the holotype worker of *P. globularia*, as seen from above.

- Petiole not as above, usually wider than long, but may be longer than wide (Fig. 230); with sides converging anteriorly **58**

58(57). Relatively small (Total length nearly always < 7 mm, but larger specimens are occasionally found); petiolar node about as long as broad as viewed from above (Fig. 230, left); common and widely distributed from northern México south to Paraguay, east to Venezuela and eastern Brasil and Argentina (Formosa, Misiones) *crenata* (Roger)

- Moderately large (TL > 8 mm); petiolar node broader than long (Fig. 230, right); rarely collected **59**

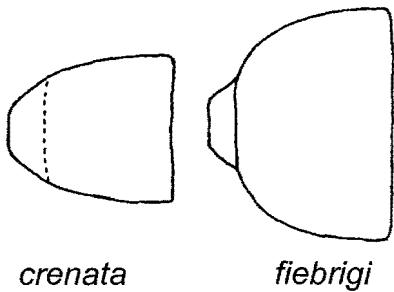


Fig. 230. Petioles of workers of *P. crenata* (Gamboa, Panamá,

CWEM) and the paralectotype of *P. fiebrigi* as seen from above.

59(58). Petiole (Fig. 231, left) relatively narrow when viewed in profile (worker: 0.64 - 0.70 mm; female: 0.76); known only from Paraguay (Central, Guairá) *fiebrigi* (Forel)

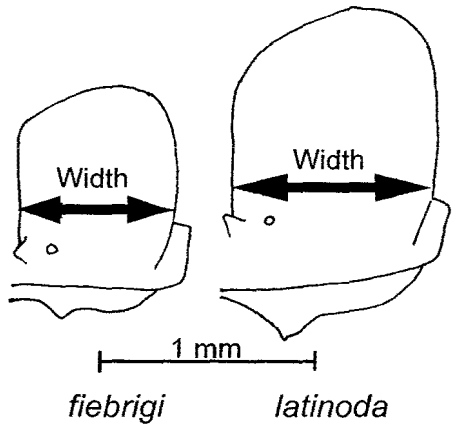


Fig. 231. Petioles of workers of *P. fiebrigi* (paralectotype) and *P. latinoda* (holotype), as seen from the side.

- Petiole (Fig. 231, right) relatively thick when viewed in profile (worker: 0.88 - 1.04 mm; female: 1.00 - 1.20 mm); Brasil (Mato Grosso, Espírito Santo, São Paulo), Guyana? *latinoda* Mackay and Mackay

60(55). Anterior and dorsal surfaces of petiole as seen from side forming even rising curve to narrowly rounded almost pointed apex, overhanging posterior face at rear (Fig. 232); Panamá, Perú east to eastern Brasil (Bahia) *cavinodis* (Mann)

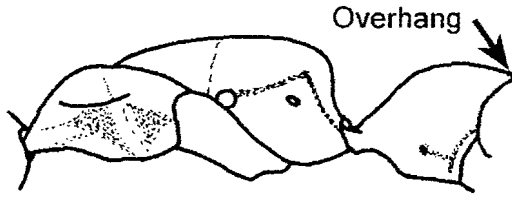


Fig. 232. Mesosoma and petiole of the holotype worker of *P. cavinodis* (MCZC).

- Posterior face of petiole as seen from side convex (Fig. 233) or flat, only rarely with feeble tendency towards concavity in upper half, but then this surface slopes forward to apex (Fig. 234) 61

61(60). Petiole as seen from side with broadly rounded anterior face, posterior face sloping anteriorly from near nodal mid-length (Fig. 233); northern half of South America 62

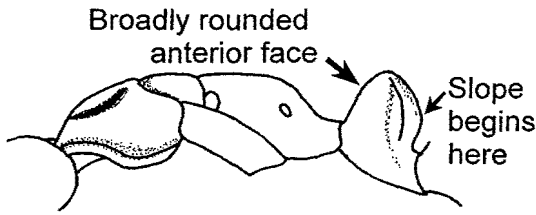


Fig. 233. Mesosoma and petiole of a worker of *P. goeldii* (Trinidad, MCZC).

- Petiole as seen from side with distinct anterior (nearly vertical) and sloping anterodorsal faces; anterodorsal face meets posterior face at sub-angular summit (Fig. 234) 63

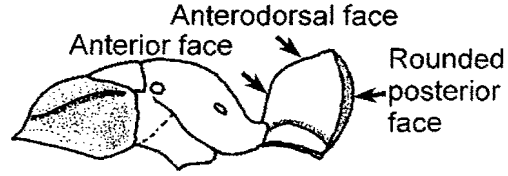


Fig. 234. Mesosoma and petiole of a worker of *P. carinulata* (Cuzco Amazónico, Perú, MCZC).

62(61). Dorsal surface of mandible completely striate (Fig. 198); erect hairs on posterior tibia mostly longer than diameter of tibia (Fig. 235); northern half of South America (Ecuador, Perú, Trinidad, Guianas, Brasil) *goeldii* (Forel)

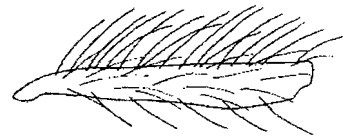


Fig. 235. Posterior left tibia of a female of *P. goeldii* (holotype female of *P. lydiae*).

- Dorsal surface of mandible nearly smooth and shining (Fig. 240, left); erect hairs on posterior tibia mostly shorter than diameter of tibia (Fig. 236); Pichincha, Ecuador *donosoi* Mackay and Mackay

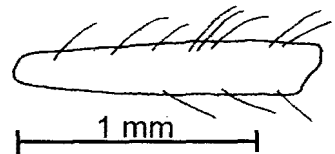


Fig. 236. Posterior left tibia of the holotype worker of *P. donosoi*.

63(61). Head in full face view rectangular-shaped posteriorly, with angulate posterior lateral corners and nearly straight (or concave) posterior border (Fig. 237); punctures of vertex and pronotum dense, feebly shining to opaque, spaces between punctures of pronotum often so narrow as to form tiny, mostly transverse striolae (Fig. 238, bottom); southern México south through Amazonian region to Bolivia **64**

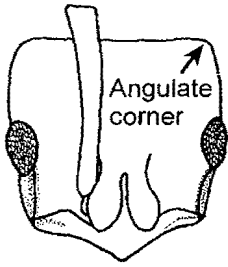


Fig. 237. Head of a worker of *P. carinulata* (Cuzco Amazónico, Perú, MCZC).

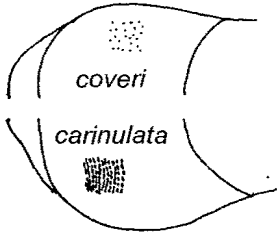


Fig. 238. Pronota of workers of *P. coveri* (holotype) and *P. carinulata* (Tabasco, México, CWEM), showing part of the sculpturing.

- Head with broadly rounded posterior corners (Fig. 239), or if angulate, posterior border convex; punctures near posterior border widely

spaced, surface moderately shining, punctures on dorsum of pronotum widely spaced (Fig. 238, top), fine, surface strongly shining and usually showing bluish iridescence; Amazonian region to Bolivia, Guyana .. **65**

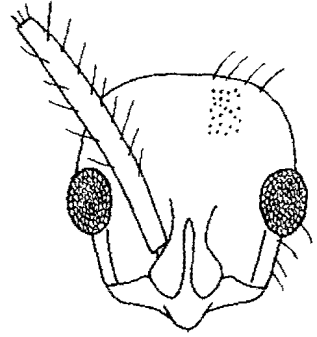


Fig. 239. Head of a worker of *P. oberthueri* (Pará, Brasil, CWEM). Only a small portion of the sculpturing is shown.

64(63). Apex of petiole angulate posterior to midpoint (Fig. 234); common and widely distributed from México south to Bolivia

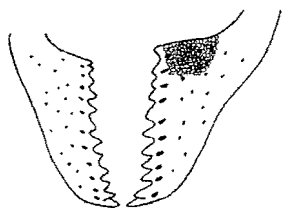
..... ***carinulata* (Roger)**

- Apex of petiole angulate anterior to midpoint (Fig. 233); rarely collected, Costa Rica (Heredia) south to Brasil (Amazonas)

.. ***antecurvata* Mackay and Mackay**

65(63). Mandibles moderately smooth and glossy (Fig. 240, left); posterior edge of apex of petiole terminating as an angle, with region below angle slightly concave (Fig. 228); Perú (Loreto, Madre de Dios) south to Bolivia and east to state of Pará, Brasil

..... ***oberthueri* Emery**



oberthueri coveri

Fig. 240. Mandibles of workers of *P. oberthueri* (Pará, Brasil, CWEM) and *P. coveri* (holotype). Only a small portion of the sculpturing on the mandible of *P. coveri* is shown.

- Mandibles dull, coriaceous with scattered punctures (Fig. 240, right); apex of petiole rounded posteriorly (Fig. 405); southern Perú *coveri* Mackay and Mackay

66(49). Petiole as seen from side with vertical, subparallel front and rear faces and more or less well differentiated dorsal face (Fig. 241); sculpture of dorsa of head and mesosoma usually fine and dense, prevailingy opaque; mandible with more than 7 teeth (Fig. 61, right) **67**

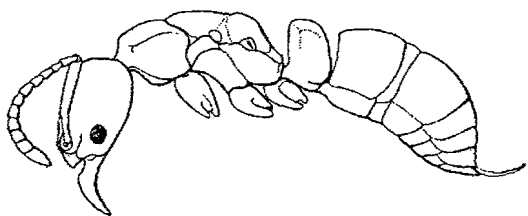


Fig. 241. Side view of a worker of *P. harpax* (from Creighton, 1950).

- Petiole with posterior face curving evenly into narrowly rounded apex (Fig. 242); sculpture of head and

mesosoma consisting mainly of fine, separated punctures, surface prevailingly shining; mandible with 7 teeth (Fig. 61, left); rarely collected, Brasil (Mato Grosso and Distrito Federal), Bolivia (La Paz) *lenkoi* Kempf

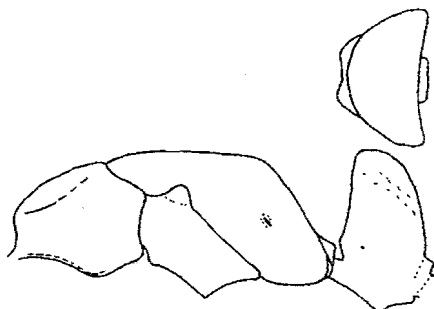


Fig. 242. Mesosoma and petiole of the holotype worker of *P. lenkoi* (from Kempf, 1962). The inset shows the petiole as seen from above.

67(66). Size smaller, mesosoma < 3.6 mm long; petiole relatively slender (Fig. 241) in side view, < 1.0 mm wide just above spiracle; Texas and Louisiana to northern Argentina ... **68**
 - Size larger, mesosoma > 3.6 mm long; petiole in side view 1.0 mm or more wide just above spiracle (Fig. 255) **69**

68(67). Clypeus without longitudinal carina (Fig. 504); pronotal shoulder nearly always with well marked carina (Fig. 241); common and widely distributed from United States (Louisiana, Texas), through México and Central America south to Paraguay and southern Brasil, Caribbean *harpax* (Fabricius)

- Clypeus with longitudinal carina (Fig. 243); pronotal shoulder without carina (or poorly developed - Fig. 244, right); known only from southern Brasil (Distrito Federal, Rio de Janeiro, São Paulo, Paraná) *lenis* Kempf

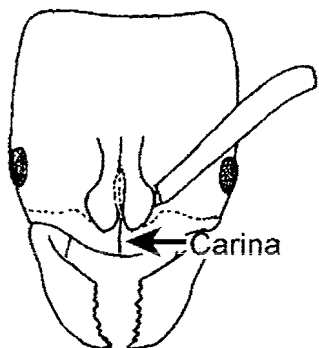


Fig. 243. Head of a worker of *P. lenis*, showing the clypeal carina (From Kempf, 1961).

69(67). Pronotal shoulder with sharp, shining, carinate lateral margins (Fig. 244, left), striae on pronotum predominantly longitudinal (Fig. 59, left); anterior clypeal border rounded or straight in middle; pygidium punctate on sides and smooth or nearly so on dorsum (Fig. 245); Brasil, Bolivia, Paraguay, Uruguay, Argentina **70**

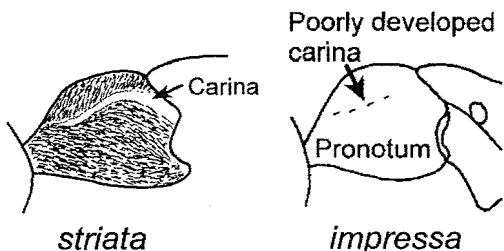


Fig. 244. Pronota of workers of *P.*

striata (left, Minas Gerais, Brasil) and *P. impressa* (right, Guanacaste, Costa Rica), showing the well developed and poorly developed pronotal carinae.

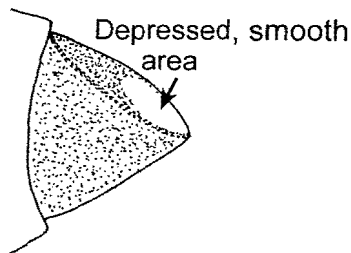


Fig. 245. Pygidium of a worker of *P. striata* (Minas Gerais, Brasil, MCZC), as seen from the side.

- Pronotal shoulder with indistinct or blunt margins, not carinate (Fig. 244, right), striae on dorsum of pronotum, if present, predominantly transverse or in semicircular whorls; anterior clypeal border slightly convex (Fig. 249) to emarginate in middle (Fig. 250); sculpture of pygidium varies (Fig. 246); southern Mexico to mountains of Peru and northeastern Brasil, (rare in southeastern Brasil), Bolivia **71**

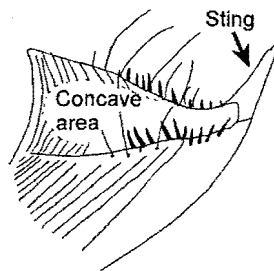
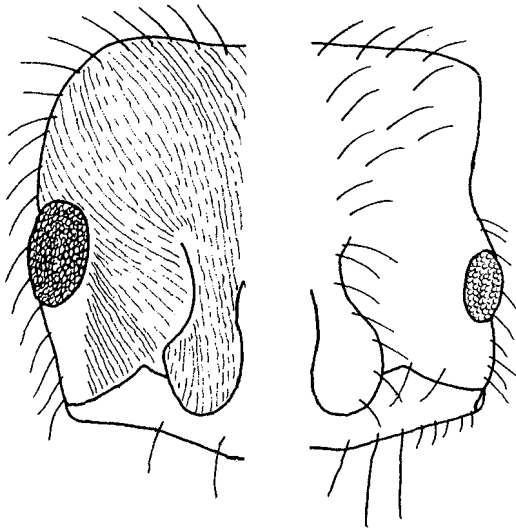


Fig. 246. Pygidium of a worker of *P. impressa* as seen from the side (modified from Kempf, 1961).

70(69). Side of head posterior to eye convex (full face view), not strongly constricted (Fig. 247, left); commonly collected in southern South America *striata* F. Smith
 - Side of head posterior to eye strongly constricted (Fig. 247, right); known only from Misiones region of Argentina *constricticeps* Mackay and Mackay



striata *constricticeps*

Fig. 247. Heads of workers of *P. striata* (left) and of *P. constricticeps* (right) as seen in full face view.

71(69). Mandible with 8 - 9 teeth, as well as smaller denticles (Fig. 248); pygidium always with rugae or striae on side (Fig. 246), which often extend over dorsum of basal part of tergum, apical part slightly concave; widely distributed and common **72**



Fig. 248. Mandible of a worker of *P. impressa* (Puntarenas, Costa Rica, CWEM).

- Mandible with 5 - 6 teeth plus 3 - 5 smaller denticles (Fig. 249); pygidium without rugae or striae on side, without smooth, central region; central western Colombia; northern Venezuela *fuscoatra* (Roger)

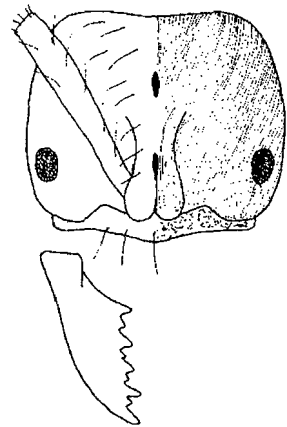


Fig. 249. Head and mandible of a worker of *P. fuscoatra* (Valle del Cauca, Colombia, IAVH).

72(71). Distance between anterior edge of frontal lobe and anterior edge of clypeus ranging from 0.14 - 0.25 mm, a distance less than or about equal to diameter of scape at base

(Fig. 250, left); common and widely distributed 73

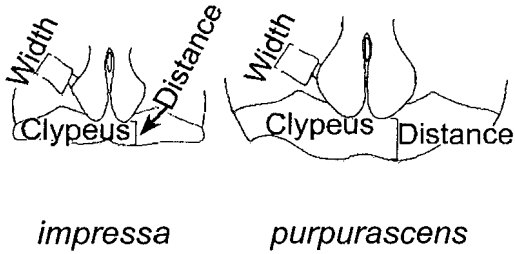


Fig. 250. Clypeuses of workers of *P. impressa* and *P. purpurascens* (both from Guanacaste, Costa Rica, CWEM).

- Distance between anterior edge of frontal lobe and anterior edge of clypeus ranging from 0.35 - 0.50 mm, a distance greater than diameter of scape at base (Fig. 250, right); rarely collected, Costa Rica south to Bolivia 74

73(72). Dorsum of gaster sculptured, weakly shining (very rarely strongly shining); dorsum of pronotum with poorly defined, predominantly transverse striae; pygidium distinctly concave (Fig. 246); common and widely distributed from southern México (Veracruz, Tabasco, Chiapas) south to southern Brasil (São Paulo) and Bolivia (El Bení, Cochabamba, La Paz)
..... *impressa* (Roger)

- Dorsum of gaster smooth and glossy; dorsum of pronotum with well defined, longitudinal striae; dorsum of pygidium convex (Fig. 251)

or very weakly concave; Venezuela (Aragua, Distrito Federal)
..... *lattkei* Mackay and Mackay

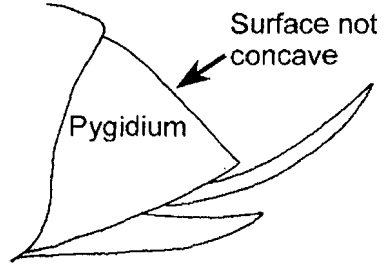


Fig. 251. Pygidium of a paratype worker of *P. lattkei*, as seen from the side.

74(72). Dorsal surface of mandible smooth, with little or no evidence of striae (Fig. 252, left); Costa Rica to Bolivia *purpurascens* Forel

- Dorsal surface of mandible with distinct striae covering at least 1/2 of surface (Fig. 252, right); Perú and Bolivia *inca* Emery

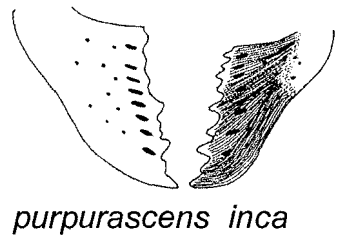


Fig. 252. Mandibles of the lectotype workers of *P. purpurascens* and *P. inca*.

75(48). In full face view, line drawn horizontally through centers of eyes falls at or behind mid head length (Fig. 253) 76

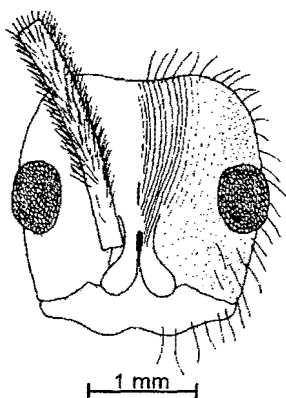


Fig. 253. Head of the holotype worker of *P. solisi*.

- Eyes situated more anteriorly on head (Fig. 254) 88

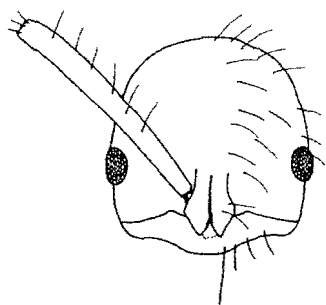


Fig. 254. Head of a worker of *P. chyzeri* (Valle del Cauca, Colombia, CWEM).

76(75). Petiole in side view with steep anterior face, apex angular or sharply rounded and situated at or near front of petiole, followed behind by broad, descending curve of posterior dorsal face (Fig. 255), dorsal lateral margins, when present, reaching to or nearly to anterior apex (Figs. 255 & 256); antennomeres never yellow (at most brown or reddish brown) 77

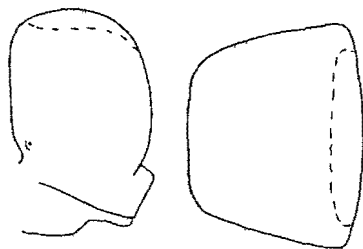


Fig. 255. Side view and top view of a petiole of a female of *P. impressa* (from Kempf, 1961).

- Petiole in side view with anterior face rounding into dorsal face, which rises posteriorly to narrowly rounded posterior summit (Fig. 272); posterior lateral margins nearly vertical, separating lateral from posterior faces of petiole; 4 - 5 apical antennomeres largely or entirely contrasting yellow 87

77(76). Apex of petiole narrowly rounded (Fig. 256) and dorsal lateral margins absent; slender species with posterior margin of head straight (Fig. 257) or even feebly convex in full face view; antennal scapes long, SI > 120 (Fig. 257); Costa Rica *dismarginata* Mackay and Mackay

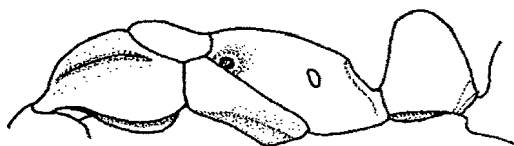


Fig. 256. Mesosoma and petiole of the holotype worker of *C. dismarginata*.

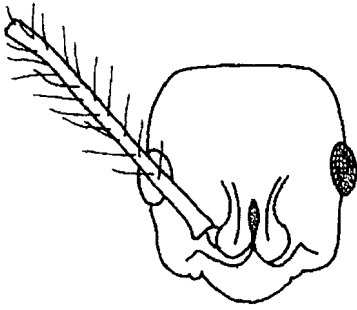


Fig. 257. Head of the holotype worker of *P. dismarginata*.

- Apex of petiole broadly rounded with dorsal lateral margins well marked and complete to apex (Fig. 258); scape usually shorter, extending slightly past posterior lateral margin (Fig. 259) 78

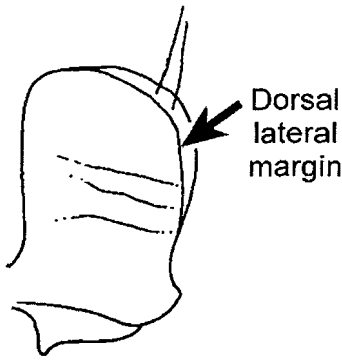


Fig. 258. Petiole of the lectotype worker of *C. lineaticeps*.

78(77). At least middle of dorsum of head covered with very coarse, diverging longitudinal striation (Fig. 259), free of pubescence, shining and contrasting strongly with surrounding areas of fine sculpture and pubescence on sides of head; posterior face of petiole usually with vertical rugae or

striae (Fig. 260), may be smooth and glossy 79

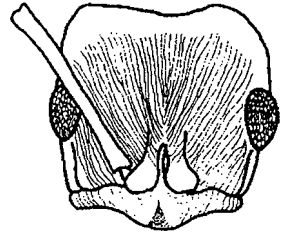


Fig. 259. Head of a worker of *P. lineaticeps* (Ocosingo, México, MCZC).

- Middle of head with sculpture and pubescence like most of remaining dorsum of head, punctulate or finely striate; posterior face of petiole sculptured differently (transversely striate or with indefinitely oriented rugulae or punctures) 80

79(78). Center of posterior face of petiole (Fig. 260) usually coarsely vertically rugose (rarely not); moderate in size (total length < 1 cm); central and eastern Mexico to Panamá *lineaticeps* Mayr

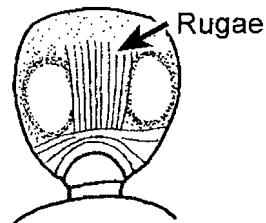


Fig. 260. Posterior face of the petiole of a worker of *P. lineaticeps* (Ocosingo, México, MCZC).

- Posterior face of petiole smooth and glossy; relatively large (TL > 1.2 cm); known only from the state of Heredia, Costa Rica
 ***solisi* Mackay and Mackay**

80(78). Side and posterior face of petiole coarsely, horizontally striate to apex (Fig. 261); clypeus broadly rounded in middle and unarmed (Fig. 262); legs black to dark brown; southern México (Guerrero) south to northern Bolivia (El Bení)
 ***foetida* (Linnaeus)**

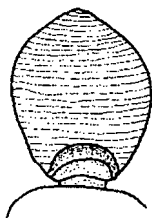


Fig. 261. Posterior face of the petiole of a worker of *P. foetida* (Paracou Experimental Forest, French Guiana, MCZC).

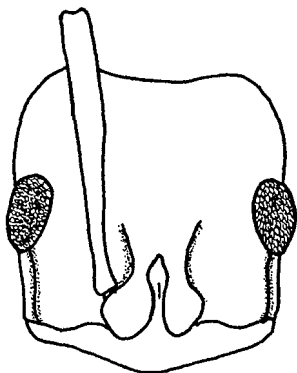


Fig. 262. Head of a worker of *P. foetida* (Paracou Experimental Forest, French Guiana, MCZC).

- Upper third of posterior face of petiole finely punctulate or otherwise sculptured (Fig. 108, right), not transversely striate (caution: hairs may lie transversely and appear as striae), side of petiole may be striate (Fig. 263) **81**

81(80). Sides of petiole horizontally striate or rugulose on lower half or more (Fig. 263); often irregularly striate or rugulose on lower part of posterior face as well; Costa Rica (Puntarenas) to Perú and Brasil (Amazonas) ***theresiae* Forel**

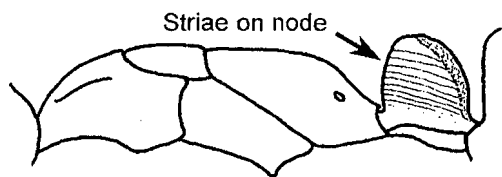


Fig. 263. Mesosoma and petiole of a worker of *P. theresiae* (syntype).

- Sides of petiole finely punctulate (Fig. 265), surface weakly shining **82**

82(81). Larger, more robust species, head width usually > 2 mm (Fig. 264), width of pronotum > 1.55 mm; legs red to black, but if red, then parts of propodeum, base of petiole and base of gaster also suffused with red; southern Texas to northern Argentina **83**

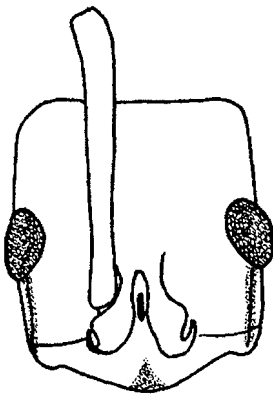


Fig. 264. Head of a worker of *P. villosa* (Madre de Dios, Perú, MCZC).

- Smaller and more slender species (Fig. 265), width of worker head < 2.2 mm; width of pronotum < 1.55 mm; Central America to Ecuador 86

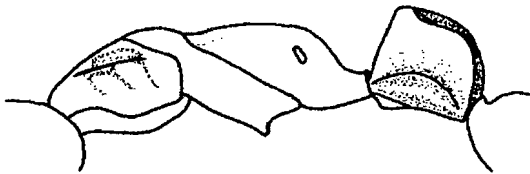


Fig. 265. Mesosoma and petiole of a worker of *P. bugabensis* (Alajuela, Costa Rica, MCZC).

83(82). Anterior face of petiole (in profile) forming vertical straight anterior face, meeting posterior, broadly rounded face at approximately right angle (Fig. 265); common; USA south to Argentina 84

- Anterior face of petiole concave, meeting posterior, broadly rounded face at less than right angle (Fig. 266) forming concave anterior

face; rarely collected; México south to Brasil 85

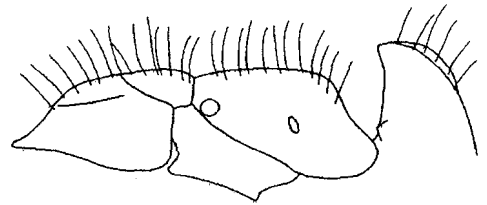


Fig. 266. Mesosoma and petiole of a worker of *P. inversa* (Pará, Brasil, MCZC).

84(83). Pronotal shoulder with sharp well-developed carina (Fig. 267, left); mesonotum relatively short (seen from above, Fig. 267, left), with posterior margin concave; common and widely distributed from United States (Texas), south to northern Argentina (Misiones, Salta) *villosa* (Fabricius)

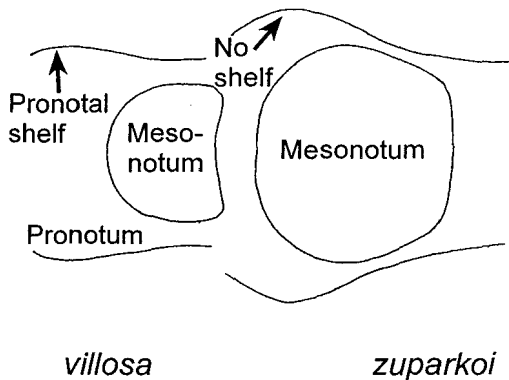


Fig. 267. Mesonota of a worker of *P. villosa* (Boyacá, Colombia, CWEM) and the holotype worker of *P. zuparkoi*, as seen from above.

- Pronotal shoulder lacking carina, completely rounded (Fig. 267, right); mesonotum relatively long, posterior margin weakly convex (Fig. 267, right); known only from Huánuco state of Perú
 ***zuparkoi* Mackay and Mackay**

85(83). Subpostpetiolar process consisting of blunt projection, separated from remainder of postpetiole by deep depression (Fig. 268, left), rarely followed posteriorly with elongated longitudinal swollen region or carina; width of worker petiole < 1.3 mm (Fig. 268, left), female petiole < 1.5 mm; anterior face of petiole strongly concave, making apex appear distinctly pointed (Fig. 268, left); southern México (Yucatán) south to southern Brasil (Santa Catarina) ***inversa* (F. Smith)**

- Subpostpetiolar process consisting of blunt projection which is not separated from remainder of postpetiole, connected posteriorly by elongated longitudinal swollen region or carina (Fig. 268, right); width of worker petiole > 1.3 mm (Fig. 268, right), female petiole > 1.5 mm; anterior face usually only moderately concave, making apex appear slightly rounded (Fig. 268, right); Nicaragua (Río San Juan) south to southern Perú (Madre de Dios), east to Venezuela (Delta) ***curvinodis* Forel**

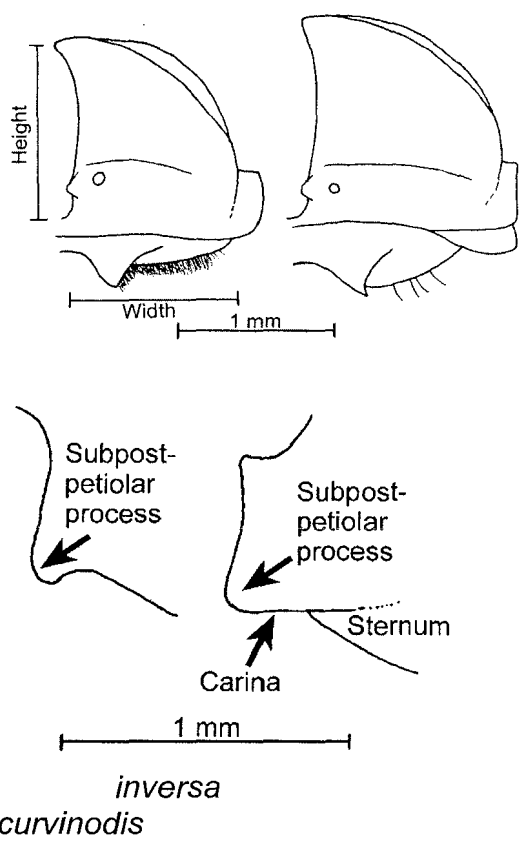


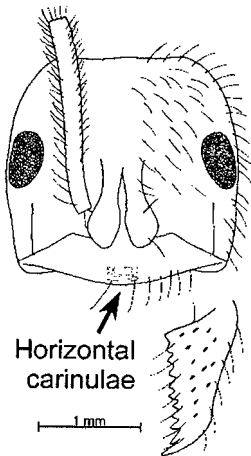
Fig. 268. Petioles of workers of *P. inversa* and *P. curvinodis* (CWEM), showing the measurements. The erect hairs on the top of the petiole are not shown. The hairs on the ventral surface are not consistently different. The lower insets show the subpetiolar processes of *P. inversa* (female, Tiputini Biodiversity Station, Ecuador CWEM) and of *P. curvinodis* (Rio San Juan, Nicaragua CWEM).

86(82). Carinae or carinulae on medial portion of clypeus absent (Fig. 351) or predominantly longitudinal; body nearly black, legs usually clear bright reddish brown to concolorous brown; Nicaragua (Matagalpa) south to Perú (Madre de Dios)

..... *bugabensis* Forel

- Carinulae on medial portion of clypeus horizontal (Fig. 269); legs nearly concolorous with dark brown body; Costa Rica

..... *insignis* Mackay and Mackay



Horizontal
carinulae

1mm

Fig. 269. Head and mandible of the holotype worker of *P. insignis*.

87(76). Head finely but distinctly longitudinally striate (Fig. 270); mesosoma and petiole with extensive striolate areas (Fig. 271); standing hairs abundant and generally distributed on all dorsal surfaces of head and body (Fig. 271) and all surfaces of scapes and legs; Colombia (Meta), south to Ecuador (Napó), east to Brasil (Amazonas)

..... *cooki* Mackay and Mackay

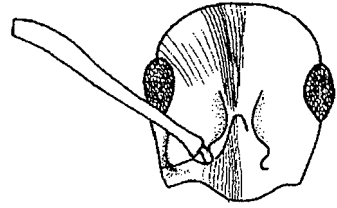


Fig. 270. Head of the holotype worker of *P. cooki*.

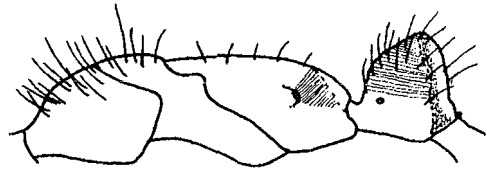


Fig. 271. Mesosoma and petiole of the paratype worker of *P. cooki*.

- Sculpture overall prevalingly opaque, densely punctulate; standing hairs rare (0 - 10 or so) on promesonotum, usually fewer than 15 on petiole; very few on femora and tibiae, where they are usually restricted to flexor surfaces; central and SW Amazonian region

..... rare samples of *apicalis* (Latreille)

88(75). Sides of petiole covered with coarse horizontal striation (Fig. 272); as seen in side view, dorsal outline of petiole evenly convex and rising only gently posteriorly (Fig. 272); Costa Rica (Guanacaste) south to Colombia (Valle del Cauca, Meta) ..

..... *holcotyle* Mackay and Mackay

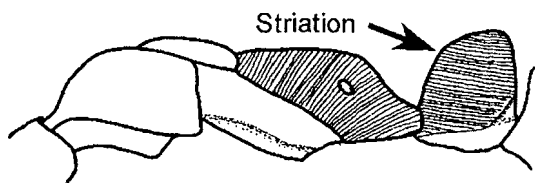


Fig. 272. Mesosoma and petiole of the holotype worker of *P. holcotyle*.

- Sides of petiole finely punctulate or nearly smooth (Fig. 274), striation, if broad present, fine and largely restricted to lower half **89**

89(88). Worker petiole as seen from directly above (Fig. 273, left) nearly as long as broad to distinctly longer than broad (but petiole in female usually shorter and broader than in corresponding worker) **90**

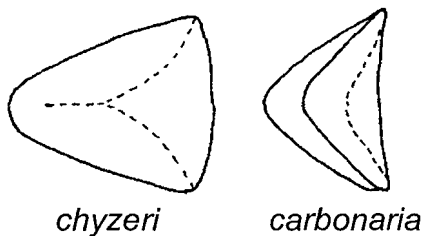


Fig. 273. Petioles of workers of *P. chyzeri* (left, Valle de Cauca, Colombia) and *P. carbonaria* (right, Tolima, Colombia, CWEM) as seen from above.

- Petiole as seen from above distinctly broader than long (Fig. 273, right) **94**

90(89). Size larger (Fig. 274), maximum worker head width excluding eyes > 2.4 mm; body and legs black, pubescence bright golden yellow; Mts. of SW Colombia to Bolivia *chyzeri* (Forel)

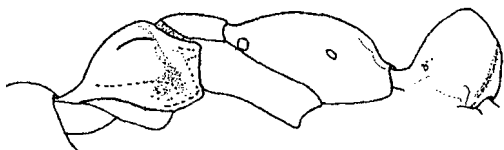


Fig. 274. Mesosoma and petiole of a worker of *P. chyzeri* (Valle, Colombia, MCZC).

- Size smaller, maximum worker and female head width excluding eyes < 2.4 mm *tarsata* species complex **91**

91(90). Posterior lateral margins of petiolar node sharply margined (Fig. 277); black, often with brownish legs and abundant golden pubescence **92**

- Posterior lateral margins of petiolar node broadly rounded (Fig. 275); color black, often with blue reflections on clean specimens, legs and antennae black or dark brown (antennae with yellow apices, as in *P. apicalis* in some samples of *P. fauveli* from southwestern Colombian and specimens from Napo, Ecuador); pubescence abundant, but short, not especially conspicuous, yellowish gray to dark reddish in color; Mts. of Colombia to Bolivia **93**

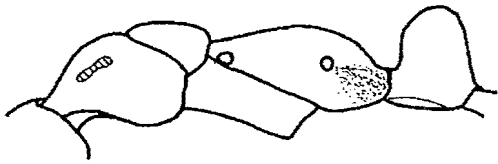


Fig. 275. Mesosoma and petiole of a worker of *P. fauveli* (Machu Picchu, Perú, MCZC).

92(91). Color black with bronze reflections, legs and antennae bright brownish red; pubescence abundant, long and conspicuous, bright reddish golden; hairs on posterior tibia relatively long, length of longest hairs approximately $\frac{1}{2}$ diameter of tibia, more than 10 erect hairs on disc of pronotum (Fig. 276); dorsal face of petiole noticeably convex (Fig. 276); Mts. of Ecuador near Baños *eleonorae* (Forel)

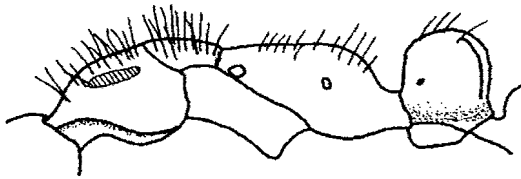


Fig. 276. Mesosoma and petiole of a worker of *P. eleonorae* (2 mi W Baños, Ecuador, CASC). The hatched area on the pronotum indicates a swollen region.

- Concolorous black, appendages dark reddish brown; pubescence sparse; hairs on posterior tibia short (less than $\frac{1}{3}$ diameter of tibia), fewer than 10 mostly inconspicuous, erect hairs on disc of pronotum (Fig. 277); dorsal face of petiole slightly concave (Fig. 277) to weakly convex; Colom-

bia (Cundinamarca)
..... *fusca* Mackay and Mackay

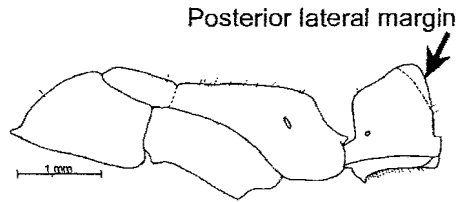


Fig. 277. Mesosoma and petiole of the paratype worker of *P. fusca*.

93(91). Mandibles completely striate (Fig. 38, left); antennal scape (Fig. 37, right) usually lacking erect hairs (except at or near apex); Colombia to Bolivia (La Paz) *fauveli* Emery - Mandibles smooth and glossy (Fig. 38, right); antennal scape (Fig. 510) with scattered short (mostly shorter than diameter of scape), erect hairs along shaft of scape; western Colombia (Valle del Cauca, Nariño) and northwestern Ecuador (Cotopaxi) *hispida* Mackay and Mackay

94(89). Petiole as seen from side cuboidal (Fig. 278), only weakly tapered anteriorly; apex tending to be horizontal and only gently convex; rarely collected, Panamá and Perú (nesting in *Cecropia* trees) **95**

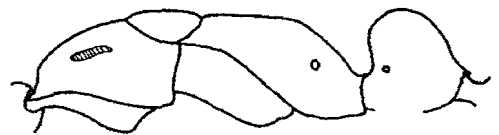


Fig. 278. Mesosoma and petiole of a paratype worker of *P. fisheri*. The hatched area is a swollen region.

- Petiole as seen from side higher, strongly tapered anteriorly with acute or narrowly rounded apex (Fig. 281); black, often with colored metallic tints; commonly collected, Nicaragua south to Bolivia (not commonly nesting in *Cecropia*) ... 96

95(94). Anterior clypeal border (Fig. 279) indented and depressed in middle; size larger (head width of worker > 0.80, of female > 1.05 mm); petiolar node broader (width of worker > 0.50, of female > 0.65 mm); worker black; Panamá (Colón, San Blas) *fisheri* Mackay and Mackay

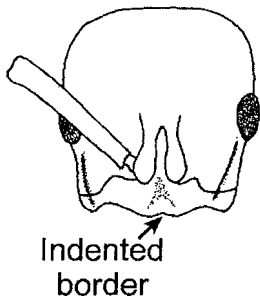


Fig. 279. Head of the holotype worker of *P. fisheri*. The stippling indicates a depressed area.

- Anterior clypeal border straight to weakly convex (Fig. 280); size smaller (HW worker < 0.70, female < 1.05 mm); petiole narrower (width of worker < 0.70, of female < 0.56 mm); worker yellowish brown to dark brown; Perú (Loreto, Cuzco, Madre de Dios) *luteola* (Roger)

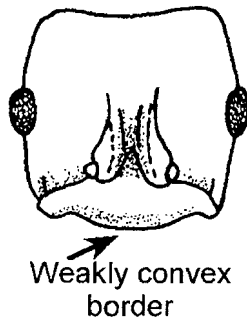


Fig. 280. Head of a cotype worker of *P. luteola* (MCZC).

96(94). Body shining nearly throughout, especially dorsum of mesosoma, which is finely and rather sparsely punctulate, nearly smooth (Fig. 281); most surfaces with bluish or greenish reflections; Nicaragua south to mountains of Ecuador to southwestern Venezuela 97

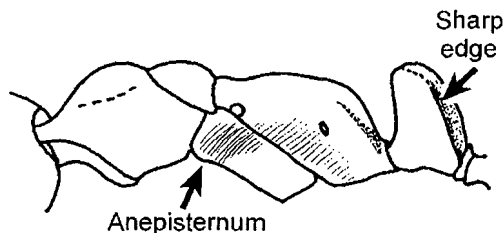


Fig. 281. Mesosoma and petiole of a worker of *P. carbonaria* (Selva Negra, Nicaragua, MCZC).

- Body densely rugulose-punctulate to punctate (Fig. 282) and opaque, except for shining finely punctulate metallic gaster; reflections may be present; metallic black; pronotal shoulder with carina; Nicaragua (Matagalpa) south to Bolivia (La Paz) ... *aenescens* Mayr

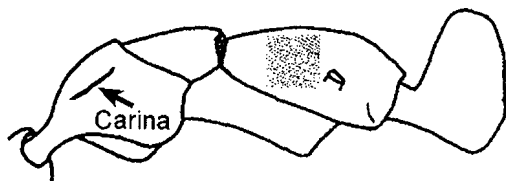


Fig. 282. Mesosoma and petiole of a worker of *P. aenescens* (Colombia, MCZC). The sculpture on the side of the propodeum is partially shown.

97(96). Anepisternum and side of propodeum and metapleuron partially covered with obliquely horizontal striae (Fig. 281); appressed pubescence on dorsum of gaster sparse, with few hairs overlapping adjacent hairs; posterior lateral edges of petiole very sharp; widely distributed from Nicaragua (Matagalpa) south to Ecuador (Carchi, Imbabura, Pichincha) and Venezuela *carbonaria* (F. Smith)

- Anepisternum, side of propodeum and metapleuron without striae (or with few), most of these surfaces smooth with scattered punctures (Fig. 283); pubescence on dorsum of gaster, golden fine dense with most hairs overlapping adjacent hairs; posterior lateral edges of petiole marginate, but not greatly differentiated from surface; known only from Ecuador (Pichincha, Cotopaxi)
 *schoedli* Mackay and Mackay

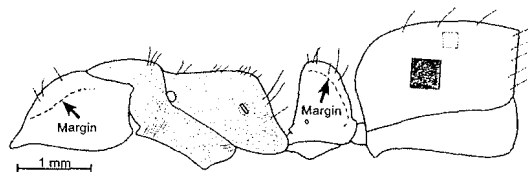


Fig. 283. Mesosoma and petiole of the holotype worker of *P. schoedli* (from Mackay and Mackay, 2006).

Clave para obreras y hembras del Nuevo Mundo

1. Superficie extensora de la tibia media con setas muy gruesas, rígidas, cubriendo por lo menos la mitad del largo de la tibia (Fig. 158 - pueden ser difíciles de ver); obrera amarilla o anaranjada; ojos ausentes o muy pequeños 2
- Superficie extensora de la tibia media sin setas muy gruesas y rígidas (Fig. 80 - setas finas normalmente presentes); obreras adultas usualmente rojizas o negras, ojos presentes, aunque a veces son pequeños 5
- 2(1). Mandíbulas sublineares, con el borde masticador casi contiguo al borde basal (Fig. 159), con 4 - 5 dientes, diente en la mitad de la mandíbula más grande (Fig. 159) que los demás (diente apical es el más grande); nodo peciolar, en vista lateral, subtriangular, más angosto cerca del ápice (Fig. 160); América Central al Sur hasta Brasil *guianensis* (Weber)
- Mandíbulas triangulares, bordes masticador y basal unidos en ángulo, los dientes (por lo menos 6) aproximadamente iguales en tamaño (Fig. 173); peciolo en vista lateral subcuboidal, lado anterior y posterior casi paralelos 3
- 3(2). Lado dorsal del peciolo convexo, casi tan largo como el lado posterior (Fig. 161); parte anterior del proceso subpeciolar no translúcido; Perú al este hasta las Guianas, al Sur hasta Bolivia 4
- Lado dorsal del peciolo convexo pero delgado, mucho más corto que el lado posterior (Fig. 162); parte anterior del proceso subpeciolar translúcido (Fig. 162); Norteamérica y América Central por lo menos al sur hasta Panamá *gilva* (Roger)
- 4(3). Mesosoma totalmente opaco; Perú al este hasta Trinidad, al sur hasta Brasil (Bahia) *holmgreni* (Wheeler)
- Mesosoma totalmente liso y brillante; Bolivia (El Bení) y Brasil (Mato Grosso) *mirabilis* Mackay y Mackay
- 5(1). Superficie dorsal del mesosoma (Fig. 163) y del nodo peciolar sin pelos erguidos 6
- Superficie dorsal del mesosoma (Fig. 164) y usualmente del nodo peciolar con pelos erguidos .. 10
- 6(5). Dorso del pronoto con estrías bien definidas (Fig. 573); superficie dorsal de la cabeza en la región posterior del ojo, a veces con un parche de pubescencia apresada de color dorado en cada lado del vértice, semejante a ojos grandes (Fig. 165), estado de Goiás y São Paulo, Brasil

..... *magnifica* Borgmeier
 - Pronoto sin estrías;
 usualmente sin parche de pubescencia
 en la cabeza 7

7(6). Ojos muy grandes y
 convexos (Fig. 166), más largos que el
 último segmento del funículo; ápice
 del pecíolo curvo en el lado posterior
 8

- Ojos más pequeños (Fig.
 167), la longitud máxima es menor
 que la del último segmento del
 funículo; ápice del pecíolo formando
 un ángulo abrupto con el lado
 posterior (Fig. 168); sur este de Brasil
 y el norte de Venezuela
 *bucki* (Borgmeier)

8(7). Márgenes posteriores y
 laterales del pecíolo con un filo agudo
 (Fig. 169), con las regiones anteriores
 y posteriores al filo cóncavas (visto
 desde arriba); hipopígidio con pocos
 pelos apesados en el área cerca del
 agujón (Fig. 171, izquierdo);
 funículos apicales de color marrón o
 raramente anaranjado; muy común, de
 México (Veracruz) al sur hasta
 Paraguay (Canindeyú)
 *verenae* (Forel)

- Márgenes posteriores y
 laterales del pecíolo redondeado (Fig.
 170), convexo en ambos lados donde
 se dobla; hipopígidio con pelos
 apesados normales (Fig. 171,
 izquierdo) hasta densos (Fig. 171,
 derecho); funículos apicales normal-
 mente amarillos brillantes; México
 (Veracruz, Chiapas, península de
 Yucatán) al Sur hasta Brasil (Rio de
 Janeiro) y Argentina 9

9(8). Tres a seis segmentos apica-
 les del funículo de color amarillo
 brillante; escapo antenal relativamente
 largo (más de 2,3 mm), mas largo que
 el largo de la cabeza; hipopígidio con
 pelos apesados (Fig. 171, izquierdo);
 muy común; norte de México hasta el
 sur de Brasil y Bolivia
 *apicalis* (Latreille)

- Los segmentos apicales del
 funículo marrón claro hasta marrón
 oscuro, nunca amarillo brillante;
 escapo relativamente corto (usual-
 mente menos de 2,3 mm), más corto
 que el largo de la cabeza; hipopígidio
 con pelos apesados muy densos (Fig.
 171, derecha); no muy común;
 Ecuador al este hasta Brasil oriental, al
 sur hasta Paraguay y Argentina
 *obscuricornis* (Emery)

10(5). Dorso del pigidio (ápice del
 gáster) en cada lado del agujón con
 un par de dientes fuertes, triangulares
 y curvados hacia arriba (Fig. 172);
 especie muy grande y negra, con el
 pecíolo cuboidal; muy común en
 bosques tropicales de Colombia al este
 hasta las Guianas, al sur hasta
 Paraguay, Caribe
 *crassinoda* (Latreille)

- Ápice del gáster sin dientes,
 aunque algunas setas fuertes pueden
 estar presentes en los lados 11

11(10). Mandíbula con 5 - 7
 dientes (Fig. 173); dorso del pronoto
 sin márgenes laterales, pronoto densa
 y finamente puntuado; relativamente
 pequeñas (menos de 5 mm en largo
 total); Estados Unidos (Florida) hasta
 el norte de Argentina; común en
 madera podrida 12

- Mandíbulas usualmente con más de ocho dientes y denticulos (Fig. 240); márgenes pronotales distintivas, o el dorso del pronoto liso y brillante, o de tamaño más grande (usualmente más de 7 mm en largo total) 21

12(11). Mandíbula con 5 - 6 dientes (Fig. 173); Estados Unidos (Florida) hasta el norte de Argentina 13

- Mandíbula con siete dientes (Fig. 178); México hasta Bolivia 16

13(12). Proceso subpeciolar redondeado posteriormente (Fig. 174); clipeo dividido por una carena horizontal indistinta (Fig. 177) 14

- Proceso subpeciolar angulado posteriormente (Fig. 175); clipeo dividido por una carena horizontal aguda (Fig. 176); Honduras al sur hasta el sur de Brasil y Bolivia, Caribe *succedanea* (Roger)

14(13). Carena horizontal del clipeo bien desarrollada y aguda (Fig. 177); Guianas, Brasil, no común *gilberti* (Kempf)

- Carena horizontal del clipeo poco desarrollada (Fig. 173), con solo una área doblada; muy común y de distribución amplia 15

15(14). Ancho máximo de la cabeza aproximadamente 1 mm; clipeo sin carena longitudinal (Fig. 173); proceso subpeciolar muy grueso (Fig. 174); común y de amplia distribución desde EUA (Florida), Bahamas, México al sur hasta Argentina) *stigma* (Fabricius)

- Ancho máximo de la cabeza aproximadamente 0.6 mm; clipeo con

una carena longitudinal sin filo (Fig. 178); parte anterior del proceso subpeciolar delgado y translúcido (Fig. 162); Estados Unidos (Tennessee al sur hasta Florida, al oeste hasta Louisiana), México al sur hasta Panamá (Chiriquí) *gilva* (Roger)

16(12). Carenas frontales no muy distantes (Fig. 179) en la sección posterior (distancia entre sí 0,07 mm o menos); proceso subpeciolar angulado posteriormente (Fig. 175); mandíbula con estrías longitudinales bien desarrolladas, poco brillante (Fig. 185); Costa Rica al sur hasta Colombia (Valle del Cauca) *cognata* (Emery)

- Carenas frontales (Fig. 180) bien separadas (con una distancia de 0,10 mm o más); proceso subpeciolar usualmente redondeado posteriormente (Fig. 174); mandíbulas sin estrías, o con estrías indistintas (Fig. 180), usualmente lisas y brillantes; México al sur hasta Bolivia 17

17(16). Tibias medias y posteriores con un sola espina pectinada apicalmente (Fig. 139, izquierdo); muy escaso, de Panamá (Veraguas), Venezuela (Mérida) al sur hasta Bolivia (Cochabamba) *leveillei* (Emery)

- Tibias medias y posteriores con dos espinas apicales, una grande y pectinada, otra sencilla y difícil de ver (Fig. 139, derecho); relativamente común 18

18(17). Espiráculo propodeal en forma de círculo (Fig. 182); obrera relativamente pequeña (largo total

usualmente menos de 5 mm); clípeo deprimido y sin carena longitudinal, borde anterior medial cóncavo, con dos ángulos laterales (Fig. 181); México (Chiapas) y Guatemala (Suchitepéquez)

..... *minuta* Mackay y Mackay
- Espiráculo propodeal en forma de ranura (Fig. 183); obrera usualmente de tamaño mediano (largo total más de 5 mm); clípeo no así (Fig. 184); Costa Rica al sur hasta Perú y Venezuela

19(18). Clípeo con una carena longitudinal (Fig. 180), sin ángulo medial en el borde anterior; sutura metanotal poco oprimida (Fig. 182); obrera relativamente pequeña (4 - 6 mm largo total)

..... **20**
- Clípeo sin carena longitudinal (Fig. 184), pero con una carena transversa bien desarrollada y con un ángulo medio que sobrepasa el clípeo (Fig. 184); sutura metanotal no impresa (Fig. 183); mas grande (largo total > 6 mm); Brasil (Mato Grosso, Distrito Federal), Bolivia (La Paz)

20(19) Superficie dorsal de la mandíbula lisa y brillante, con puntuaciones esparcidas (Fig. 180); Honduras al sur hasta Perú y Brasil (Goiás, São Paulo), al este hasta Venezuela, y al sur hasta Bolivia (Cocha-bamba), Caribe

..... *succedanea* (Roger)
- Superficie de la mandíbula totalmente cubierta con estrías fuertes (Fig. 185); México (Chiapas) al sur hasta Ecuador (Pichincha)

..... *gilloglyi* Mackay y Mackay

21(11). Abertura del espiráculo propodeal, en vista lateral, pequeña, en forma de círculo o elíptica (Fig. 186, izquierdo); obreras pequeñas y de tamaño mediano

22
- Abertura del espiráculo propodeal en forma de ranura (Fig. 186, derecho), más de dos veces tan largo como ancho; usualmente hormigas medianas o grandes

22(21). Hombro pronotal con margen o carena lateral (Fig. 187)

..... **23**
- Hombro pronotal redondeado a los lados, sin márgenes distintos (Fig. 188)

23(22). Pecíolo, en vista lateral, no muy cónico, con el lado dorsal redondeado u oblicuamente truncado (Fig. 188), el lado dorsal más o menos distinto del lado posterior (Fig. 188); no común, Brasil (Espírito Santo y Bahia)

..... **24**
- Pecíolo, en vista lateral, más agudo, con el ápice delgado y redondeado (Fig. 191); común y de amplia distribución

24(23). Lado anterior del postpecíolo (primer segmento del gáster) fuertemente cóncavo, el ápice forma un ángulo agudo que sobrepasa el lado anterior (Fig. 189, izquierdo); conocido solamente de Brasil (Bahia)

..... *concava* Mackay y Mackay
- Lado anterior del postpecíolo redondeado (Fig. 189, derecho); conocido solamente de Brasil (Espírito Santo y Bahia)

..... **25**

25(24). Lado del pronoto y de la mesopleura lisos y brillantes; pecíolo redondeado anteriormente y posteriormente, formando un lado dorsal poco definido (Fig. 190, izquierdo); Brasil (Espírito Santo y Bahía) ***venusta* Forel**
 - Lado del pronoto y de la mesopleura con estrías fuertes e irregulares; pecíolo angulado (anteriormente y posteriormente), formando un lado dorsal bien definido (Fig. 190, derecho); este de Brasil (Espírito Santo) ***schultzi* Mackay y Mackay**

26(23). Especie muy pequeña, el ancho máximo de la cabeza de la obrera 1,1 mm (de la hembra 1,25 mm); la fila estridulatoria ausente en el segundo acrotergito del gáster; ojo no más de 0,2 mm en diámetro (Fig. 336); Costa Rica al sur hasta el sur de Brasil ***arhuaca* (Forel)**
 - Especie más grande, ancho máximo de la cabeza de la obrera más de 1,4 mm; fila estridulatoria presente en el segundo pretergito del gáster (Fig. 192); diámetro del ojo de la obrera más de 0,28 mm en diámetro **27**

27(26). Sección medial y dorsal del clípeo lisa y brillante; lado posterior del pecíolo muy liso y brillante, con pocos hoyuelos y pubescencia apresada muy esparcida (Fig. 193); carena pronotal bien desarrollada, sobrepasando el lado (Fig. 193); montañas del sur de Brasil ***metanotalis* Luederwaldt**
 - Sección medial del clípeo opaca y con estrías longitudinales;

lado posterior del pecíolo densamente puntuado o con estrías irregulares, opaca, y con pubescencia apresada y dorada; carena pronotal casi ausente (Fig. 194); Colombia (Boyacá, Meta), Perú, y el norte de Venezuela (Aragua, Carabobo) ***emiliae* (Forel)**

28(22). Clípeo con un diente medial agudo, que se extiende más allá del margen anterior (Fig. 195); Panamá, Colombia Venezuela (Aragua) y Perú (Huánuco, Pasco) ***becculata* Mackay y Mackay**
 - Clípeo sin un diente medial, o con un ángulo pequeño (Fig. 199) y con el borde anterior convexo o enmuescado **29**

29(28). Tibia media más corta que el ancho máximo del pronoto (visto de arriba) **30**
 - Tibia media más larga que el ancho máximo del pronoto **36**

30(29). Pecíolo (visto de lado) delgado y subtriangular, con el lado anterior y posterior casi igual al largo, y débilmente convexo o derecho (Fig. 196); sutura metanotal oprimida en el dorso del mesosoma; obrera casi siempre marrón oscura con patas mas claras (raramente puede ser marrón pálido) **31**
 - Pecíolo, en vista lateral (Fig. 197), casi rectangular (posiblemente un poquito más delgado cerca del ápice); sutura metanotal (Fig. 197) no muy fuerte, (apenas interrumpiendo el perfil dorsal); obrera casi siempre rojiza oscura (raramente marrón oscura hasta negra); sur de México o hasta sureste de Brasil **34**

31(30). Tibias media y posterior con dos espuelas (Fig. 139, derecho); obreras adultas negras o marrones o con patas negras; comunes, América Central hasta Bolivia **32**

- Tibias media y posterior con una espuela (Fig. 139, izquierdo); marrón claro; Panamá, Venezuela (Mérida), Brasil (Río de Janeiro, São Paulo) y Bolivia (Cochabamba) **leveillei (Emery)**

32(31). Escapo antenal se extiende más allá de la esquina posterior lateral de la cabeza (Fig. 198); clípeo con una área medial oprimida longitudinalmente (Fig. 198); mesonoto relativamente corto (aproximadamente 0.18 mm en largo); los lados anterior y posterior del pecíolo casi paralelos, formando un lado dorsal (Fig. 203); Guatemala al sur hasta Perú **33**

- Escapo antenal apenas llega a la esquina posterior lateral de la cabeza (Fig. 199); área medial del clípeo con una carena, o una región elevada; mesonoto relativamente largo (más de 0,24 mm); lados del pecíolo convergiendo dorsalmente, formando una superficie redondeada y ancha (Fig. 196); no común, Colombia (Huila), Perú (Huánuco) y Venezuela (Aragua) **conicula Mackay y Mackay**

33(32). Parte posterior del proceso subpeciolar con un diente, dirigido hacia abajo (Fig. 200); Ecuador (Napó) ... **cernua Mackay y Mackay**

- Proceso subpeciolar sin un diente dirigido hacia abajo (Figs. 51, 201); Guatemala al sur hasta Perú **pergandei Forel**

34(30). Proceso subpeciolar sin espina dirigida hacia atrás, ángulo anterior desarrollado (Fig. 201, derecho); diente apical de la mandíbula tres veces más largo que los otros dientes (Fig. 201, izquierdo); Colombia (Meta) .. **longidentata Mackay y Mackay**

- Parte posterior del proceso subpeciolar con una espina o lóbulo agudo dirigido hacia atrás (Fig. 202, derecho); diente apical un poquito más grande que los otros dientes (Fig. 202, izquierdo) **35**

35(34). Pecíolo con el lado anterior derecho o débilmente cóncavo, con el lado dorsal curvo en el lado posterior (Fig. 202); ápice más ancho que largo (> 2,5X) visto de arriba; noreste de México (Tamaulipas) al sur hasta el sur de Brasil (São Paulo), Trinidad **ferruginea (F. Smith)**

- Pecíolo (Fig. 203) casi rectangular (visto de lado), a veces más ancho cerca del ápice, nodo (Fig. 203) no tan ancho (visto de arriba, < 2,0 X); Guatemala (Suchitepéquez) al sur hasta Paraguay (Canindeyú), Trinidad **lunaris (Emery)**

36(29). Pecíolo (en vista lateral) delgado y subtriangular, con los lados anterior y posterior débilmente convexos hasta débilmente cóncavos, formando un ápice redondeado (Fig. 204); sutura metanotal profunda, separando el mesonoto del propodeo (Fig. 204) **37**

- Pecíolo grueso, ápice subtruncado, con los lados anterior y posterior casi verticales (Fig. 205); sutura metanotal no muy profunda (Fig. 205) **38**

37(36). Relativamente más grandes (largo total > 5 mm); mandíbulas finamente estrioladas, opacas, y con la tercera parte apical lisa; común, Honduras al sur hasta el sur de Brasil y Bolivia *constricta* (Mayr)
 - Tamaño pequeño (largo total < 5 mm); mandíbulas lisas con hoyuelos esparcidos (Fig. 378); EUA (Virginia, North Carolina, Georgia)
 *chinensis* Emery

38(36). Sutura metanotal poco profunda, separando el mesonoto con superficie convexa del dorso del propodeo, que es casi derecho en vista lateral y que se une con el mesonoto a un nivel más bajo (Fig. 205) **39**

- Sutura metanotal más profunda, separando el mesonoto, que es derecho de perfil y relativamente corto, del dorso del propodeo, que es convexo (Fig. 206); mandíbulas opacas y con estrias; Ecuador (Los Ríos) *vieirai* Mackay y Mackay

39(38). Mandíbulas lisas y brillantes, con hoyuelos (Fig. 627); Panamá y el oeste de Colombia

..... *rupinicola* Mackay y Mackay

- Mandíbulas completamente estriadas (Fig. 185); Bolivia

... *breviscapa* Mackay and Mackay

40(21). Margen anterior del postpecíolo con un par de tubérculos o ángulos (Fig. 207); garras tarsales con un par de dientecillos en el margen interior (Fig. 208); conocido solamente de São Paulo, Brasil

..... *tarsata* (Fabricius)

- Postpecíolo sin tubérculos; garras tarsales sin dientecillos **41**

41(40). Mandíbulas muy largas y delgadas, aproximadamente tan largas como el largo de la cabeza (Fig. 209); pecíolo más largo que su altura (Fig. 210); no muy común, pero de amplia distribución en los trópicos de Sur América

..... **42**

- Mandíbulas no tan largas, más cortas que el largo de la cabeza (Fig. 198); pecíolo más alto que largo; muy común **43**

42(41). Lado anterior del pecíolo convexo (Fig. 210); carena desarrollada en el hombro pronotal; más común en el norte de Sur América (Colombia [Amazonas], Ecuador [Sucumbíos], Venezuela [Carabobo], sur de Brasil y Argentina [Salta]

..... *rostrata* Emery

- Lado anterior del pecíolo recto o muy débilmente cóncavo (Fig. 211); carena en el hombro pronotal poco desarrollada (Fig. 211); parte sur de Sur América (sur de Brasil [Goiás, Mato Grosso, São Paulo, Rio de Janeiro], Paraguay y Argentina [Misiones]

..... *agilis* (Forel)

43(41). Primer segmento del gáster con el lado anterior cóncavo y puntiagudo entre el lado anterior y el lado dorsal (Fig. 212), la punta sobresale en el lado anterior; ojos pequeños (Fig. 606); Perú al este hasta las Guianas, parte oeste de Brasil, poco común

..... *procidua* Emery

- Primer segmento del gáster con lado anterior formando un ángulo recto con lado dorsal (Fig. 211), o redondeado (Fig. 241), posiblemente sobresale un poquito sobre el lado anterior; ojos usualmente grandes .. **44**

44(43). Color negro, la mayoría de las superficies lisas y brillantes, con estrías en el lado del mesosoma (Fig. 213) y a veces en el dorso de la cabeza; hombro pronotal sin carena, o con un margen débil, y con pocos hoyuelos esparcidos; pecíolo subrectangular, en vista lateral (Fig. 213)

..... **45**

- Con escultura extensiva, si el integumento es liso y brillante, la cabeza no tiene estrías longitudinales; dorso del pronoto con estrías o intensamente y finamente punteada; hombro pronotal a veces con carina; pecíolo raramente rectangular, vista de lado (Fig. 384)

..... **47**

45(44). Especie muy grande, largo total mas de 15 mm, ancho de la cabeza más de 3 mm; área detrás del ojo con estrías distintas (Fig. 214); Costa Rica al sur hasta Paraguay, este hasta la parte este de Brasil

..... ***commutata* (Roger)**

- Especie más pequeña, largo total menos de 15 mm, ancho de la cabeza menos de 2,5 mm; cabeza detrás del ojo usualmente lisa y brillante (Fig. 215)

..... **46**

46(45). La superficie dorsal de la mandíbula dividida por una carina longitudinal que se extiende casi hasta el margen dental, con la parte lateral convexa y la parte interior cóncava (Fig. 215); Trinidad, el sur de Brasil y el norte de Argentina y Bolivia

..... ***marginata* (Roger)**

- La superficie dorsal de la mandíbula (Fig. 216) con una serie de hoyuelos gruesos alrededor del margen dental (no dividida por una

carina longitudinal); América Central al sur hasta el sureste de Brasil (São Paulo)

..... ***laevigata* (F. Smith)**

47(44). Hembra con las siguientes características: escapo antenal corto, no alcanza la esquina lateral posterior de la cabeza (Fig. 424); carinas preocular (Fig. 424) y pronotal ausente (Fig. 423); pecíolo cuboidal, lados anterior y posterior derechos y paralelos; cabeza, mesosoma y pecíolo cubiertos con estrías longitudinales (Figs. 423 y 424); estado de Amazonas, Brasil

..... ***curiosa* Mackay y Mackay**

- Sin todas estas características; común y de amplia distribución

..... **48**

48(47). El perfil dorsal del mesosoma en forma convexa, la ranura metanotal casi ausente (Fig. 233) o completamente ausente (Fig. 217) en el dorso del mesosoma; hombro del pronoto usualmente con una carina bien desarrollada (Fig. 217)

..... **49**

- El perfil dorsal del mesosoma interrumpido por una ranura metanotal distinta, oprimida, el mesonoto forma una convexidad separado de la convexidad del dorso del propodeo (Fig. 218); el hombro pronotal con una margen distinta (Fig. 218), indistinta, o ausente

..... **75**

49(48). Con una carina malar distinta (Fig. 219) desde el lado lateral de la cabeza cerca de la inserción de la mandíbula hasta o casi hasta el margen anterior del ojo (carina malar); pretergito del segundo tergo gastral con una lima estridula-

toria, con bandas de colores como un arco iris (Fig. 220); arolias presentes en las garras tarsales (Fig. 221, izquierdo) **50**
 - Carina malar ausente (Fig. 243) o poco desarrollada; lima estridulatoria ausente, arolias ausentes (Fig. 221, derecho) **66**

50(49). Pecíolo (visto de lado) con el lado anterior vertical (derecho o débilmente cóncavo), y con la cara posterior redondeada, los dos lados se unen cerca del margen anterior del pecíolo (Fig. 233) **51**
 - Pecíolo, visto de lado, no así, con el punto más alto en el centro o en la parte posterior del lado dorsal (Fig. 228) **55**

51(50). Lado lateral y posterior del pecíolo con estrías horizontales (Fig. 222); América Central hasta Bolivia (El Bení) *striatinodis* Emery
 - Pecíolo sin estrías (Fig. 223) **52**

52(51). Lado posterior del pecíolo convexo (Fig. 224); lado del propodeo raramente con estrías horizontales; norte de México hasta el sur de Brasil **53**
 - Lado posterior del pecíolo cóncavo (Fig. 225), hasta plana, lado del propodeo con estrías horizontales (Fig. 620); no común **54**

53(52). Dorso del pronoto con puntitos finos y aislados (Fig. 226, izquierdo); lados del propodeo sin estrías (Fig. 666) o con estrías poco definidas; común, de México (San Luis Potosí) hasta Bolivia y sureste de

Brasil *unidentata* (Mayr)
 - Dorso del pronoto con puntitos gruesos, formados en filas transversas, formando carinas (Fig. 226, derecho); lado del propodeo con estrías diagonales; pecíolo con estrías horizontales (Fig. 620); no común, pero de amplia distribución, de Costa Rica al sur hasta Bolivia (El Bení) *rugosula* Emery

54(52). Lados y especialmente el lado posterior de pecíolo lisos y brillantes (Fig. 225); conocida solamente de oeste de Colombia
 *recava* Mackay y Mackay
 - Lados y cara posterior del pecíolo punteados y posiblemente con estrías poco definidas en la mitad mas baja (Fig. 620), pecíolo no liso; Venezuela muestras raras y escasas de *rugosula* Emery

55(50). Pecíolo, visto de lado, más o menos rectangular, con los lados anterior y posterior verticales, y con un lado dorsal horizontal, pero convexo (Fig. 227) **56**
 - Pecíolo con los lados anterior y posterior convergiendo y formando un ángulo en la mitad o detrás de la mitad del lado dorsal (Fig. 228) **60**

56(55). Los lados anterior y posterior del pecíolo convexos, no paralelos; el lado dorsal convexo, con el punto mas alto atrás de la mitad (Fig. 232); común de sur de México al norte de Argentina **57**
 - Lados anterior y posterior del pecíolo casi rectos y paralelos, lado dorsal casi plano, con el punto

mas alto cerca de la mitad (Fig. 589); no común, pero de amplia distribución (México hasta el norte de Argentina) *moesta* (Santschi)

57(56). Pecíolo (visto de arriba) con el nodo casi circular, un poquito mas ancho que largo (Fig. 229); Colombia (Amazonas, Putumayo) al sur hasta Paraguay, al este hasta Venezuela y al sur hasta Brasil central

... *globularia* Mackay y Mackay
- Pecíolo no así, usualmente mas ancho que largo, con los lados convergiéndose anteriormente (Fig. 230)

58(57). Relativamente pequeña (largo total casi siempre menos de 7 mm); el nodo del pecíolo (Fig. 230, izquierdo) casi tan largo como ancho (visto de arriba); común y de amplia distribución (norte de México hasta Argentina)

- Más grandes (largo total > 8 mm); el nodo peciolar más ancho que largo (Fig. 230, derecho); no común

59(58). Pecíolo (Fig. 231, izquierdo) delgado (visto de lado) (obrero 0.64 - 0.70 mm, hembra 0.76 mm); reportadas solamente de Paraguay (Central, Guairá)

..... *fiebrigi* Forel
- Pecíolo (Fig. 231, derecho) grueso (obrero 0.88 - 1.04 mm, hembra 1.00 - 1.20 mm); Brasil (Mato Grosso, Espírito Santo, São Paulo), Guyana?. *latinoda* Mackay y Mackay

60(55). Los lados anterior y dorsal del pecíolo, vistos de lado, formando

una curva que termina en punta atrás, sobresaliendo en el lado posterior, que es vertical y cóncavo (Fig. 232); no común, de Panamá hasta el este de Brasil (Bahia)

- El lado posterior del pecíolo, visto de lado, convexo o plano, no formando punta atrás (Fig. 233); común

61(60). Pecíolo (visto de lado) con el lado anterior redondeado, el lado posterior doblado anteriormente cerca de la mitad (Fig. 233); parte norte de Sur América

- Pecíolo (visto de lado) con el lado anterior casi vertical por la primera mitad, y doblando hacia atrás en la mitad dorsal, el lado anterior y posterior formando un ángulo en la mitad del nodo (Fig. 234)

62(61). Superficie dorsal de la mandíbula totalmente estriada (Fig. 198); pelos suberguidos en las tibias media y posterior más largos que el diámetro máximo de las tibias (Fig. 235); al norte de Suramérica (Ecuador, Perú, Guiana Francesa, Trinidad y Brasil)

..... *goeldii* (Forel)
- Superficie dorsal de la mandíbula casi lisa y brillante (Fig. 240, izquierdo); pelos subrectos en las tibias más cortos como el diámetro máximo de las tibias (Fig. 236); Pichincha, Ecuador

..... *donosoi* Mackay y Mackay
63(61). Cabeza (vista frontal) en forma rectangular, con las esquinas posteriores laterales anguladas (Fig. 237); hoyuelos del vértice de la cabeza y el pronoto densos, débilmente

brillantes hasta opacos, con los espacios entre hoyuelos del pronoto casi tan estrechos como para formar estrías muy finas y transversas (Fig. 238, abajo); sur de México hasta Bolivia **64**

- Cabeza con las esquinas posteriores laterales redondeadas (Fig. 239); hoyuelos cerca del borde posterior de la cabeza esparcidos, con la superficie moderadamente brillante, hoyuelos en el dorso del pronoto esparcidos, finos (Fig. 238, arriba), superficie brillante y usualmente con iridiscencia azul; región Amazónica hasta Guiana Inglaterra y Bolivia .. **65**

64(63). Ápice del pecíolo en ángulo hacia atrás de la mitad (Fig. 234); común y de amplia distribución en México al sur hasta Bolivia *carinulata* (Roger)

- Ápice del pecíolo en ángulo antes de la mitad del pecíolo (Fig. 233); no común, de Costa Rica (Heredia) al sur hasta Brasil (Amazonas) *antecurvata* Mackay y Mackay

65(63). Mandíbulas moderadamente lisas y brillantes (Fig. 240, izquierdo); margen posterior del ápice del pecíolo terminando en ángulo, con la región mas baja un poco cóncava (Fig. 228); Perú (Loreto, Madre de Dios), al sur hasta Bolivia, al este hasta el estado de Pará, Brasil *oberthueri* Emery

- Mandíbulas opacas, coriáceas con puntitos esparcidos (Fig. 240, derecho); pecíolo redondeado posterior-mente (Fig. 405); sur de Perú *coveri* Mackay y Mackay

66(49). Pecíolo (vista lateral) grueso, con los lados anterior y posterior verticales, casi paralelos, con el lado dorsal bien formado (Fig. 241); escultura del dorso de la cabeza y del mesosoma usualmente fina, densa, y opaca; mandíbula con más de siete dientes (Fig. 61, derecho) **67**

- Pecíolo delgado, con el lado posterior formando una curva continua que se une con el lado anterior cerca en el punto más anterior (Fig. 242); escultura de la cabeza y del mesosoma con hoyuelos separados, con la superficie entre las hoyuelos brillante; mandíbula con siete dientes (Fig. 61, izquierdo); poco común, Distrito Federal y Mato Grosso, Brasil, Bolivia (La Paz) *lenkoi* Kempf

67(66). Tamaño pequeño, mesosoma menos de 3,6 mm de largo; pecíolo delgado (Fig. 241), visto de lado (menos de 1 mm arriba del espiráculo); Estados Unidos hasta el norte de Argentina **68**

- Tamaño más grande, mesosoma más de 3,6 mm de largo; pecíolo en vista lateral 1,0 mm o más arriba del espiráculo (Fig. 255) **69**

68(67). Clípeo con carina longitudinal medial (Fig. 243); hombro pronotal sin carina (Fig. 244, derecho - o poco definida); conocida solamente de Brasil (Distrito Federal, Rio de Janeiro, São Paulo, Paraná) *lenis* Kempf

- Clípeo sin carina longitudinal (Fig. 504); hombro pronotal con una carina en forma de línea marcada (Fig. 241); común y de

amplia distribución (EAU al sur hasta sur de Brasil, Caribe)
 *harpax* (Fabricius)

69(67). Hombro pronotal formado una carina bien marcada y brillante (Fig. 244, izquierdo); estrías en el pronoto longitudinales (Fig. 59, izquierdo); el borde anterior del clípeo redondeado o derecho en la mitad; pigidio punteado en los lados y liso en el dorso (Fig. 245); el sur de Brasil, Bolivia, Paraguay, Uruguay, y el norte de Argentina **70**

- Hombro pronotal sin carina notada (Fig. 244, derecho); estrías en dorso del pronoto, (si presentes), predominante transversas o en forma de semicírculos; borde anterior del clípeo débilmente convexo (Fig. 249) hasta fuertemente enmuescado en la mitad (Fig. 250); escultura del pigidio variable (Fig. 246); sur de México hasta las montañas de Perú, al este de Brasil **71**

70(69). Lado de la cabeza arriba del ojo no muy constricta (Fig. 247, izquierda); común en el sur de Sur América *striata* F. Smith

- Lado de la cabeza arriba del ojo fuertemente constricta (Fig. 247, derecho), conocida solamente en la región de Misiones en Argentina
 ... *constricticeps* Mackay y Mackay

71(69). Mandíbula con 8 - 9 dientes, además con unos pequeños dienteillos (Fig. 248); pigidio siempre con arrugas o estrías en los lados (Fig. 246), que muchas veces se extienden sobre el dorso de la parte

basal del tergo, la parte apical débilmente cóncava; común y de amplia distribución **72**

- Mandíbula con 5 - 6 dientes, y más 4 - 5 dienteillos (Fig. 249); pigidio sin arrugas y estrías, sin una región central cóncava; centro oeste de Colombia y norte de Venezuela *fuscoatrata* (Roger)

72(71). Distancia entre el margen anterior de lóbulo frontal y al margen anterior del clípeo de 0,14 - 0,25 mm, una distancia menos o igual al diámetro del escapo en la base (Fig. 250, izquierdo); muy común y de amplia distribución **73**

- Distancia entre el margen anterior del lóbulo frontal y el margen anterior del clípeo de 0,35 - 0,50 mm, más que el diámetro del escapo en la base (Fig. 250, derecho); no común, Costa Rica as sur hasta Bolivia ... **74**

73(72). Dorso del gáster esculpado, poco liso (pocas veces muy liso); dorso del pronoto con estrías usualmente transversas, poco definidas; pigidio cóncavo (Fig. 246); común y de amplia distribución desde el sur de México (Veracruz, Tabasco, Chiapas) hasta el sur de Brasil (São Paulo) y Bolivia (El Bení, Cochabamba, La Paz)
 *impressa* (Roger)

- Dorso del gáster liso y brillante; dorso del pronoto con estrías longitudinales, bien definidas; dorso del pigidio convexo (Fig. 251) o débilmente cóncavo; Venezuela (Aragua, Distrito Federal)
 *latkei* Mackay y Mackay

74(72). Superficie dorsal de la mandíbula lisa, con poca evidencia de estrías (Fig. 252, izquierdo); Costa Rica al sur hasta Bolivia *purpurascens* Forel
 - Superficie dorsal de la mandíbula con estrías distintas, ocupando por lo menos la mitad del superficie (Fig. 252, derecho); Perú y Bolivia *inca* Emery

75(48). Con la cabeza de vista frontal, una línea que pasa horizontalmente por el centro de los ojos, se localiza en la mitad o atrás de la mitad del largo de la cabeza (Fig. 253) **76**
 - Ojos colocados más anteriormente en la cabeza (Fig. 254) **88**

76(75). Pecíolo (vista lateral) con el lado anterior casi vertical, el ápice angulado, con el ángulo situado cerca del frente del pecíolo, seguido por una curva redonda en el lado posterior - dorsal (Fig. 255), los márgenes dorso laterales del pecíolo, cuando presentes, llegan casi hasta el ápice (Figs. 255 & 256); funículo de color café **77**

- Pecíolo con el lado anterior redondeado hasta el lado dorsal, formando un ápice redondeado en la región posterior del lado dorsal (Fig. 272); los últimos 4 - 5 segmentos del funículo amarillos **87**

77(76). Ápice del pecíolo redondeado (Fig. 256) con el margen dorsal - lateral ausente; especie delgada con el borde posterior de la cabeza derecho o débilmente convexo

(vista del frente); escapos antenales (Fig. 257) largos (largo del escapo / largo de la cabeza > 1,2); Costa Rica *dismarginata* Mackay y Mackay
 - Pecíolo casi rectangular, con el margen dorsal - lateral bien marcado y completo hasta el ápice (Fig. 258); escapo usualmente mas corto, extendiéndose un poquito mas allá del margen posterior lateral de la cabeza (Fig. 259) **78**

78(77). La mitad medial del dorso de la cabeza cubierta con estrías longitudinales muy fuertes y divergiéndose hacia atrás (Fig. 259), sin pubescencia, brillantes, y haciendo contraste fuerte con las áreas cercanas sin escultura, y con pubescencia; el lado posterior del pecíolo con estrías o arrugas verticales (Fig. 260), o brillante con poca escultura **79**

- La mitad medial de la cabeza con escultura y pubescencia (como la otra parte de la cabeza), con hoyuelos o con estrías finas; el lado posterior del pecíolo con estrías transversas o con arrugas o hoyuelos sin orientación **80**

79(78). El centro del lado posterior del pecíolo (Fig. 260) usualmente con arrugas verticales (raramente ausentes); relativa-mente pequeñas (largo total menos de 1 cm.); áreas tropicales de México hasta Panamá *lineaticeps* Mayr

- Lado posterior del pecíolo liso y brillante (Fig. 602); relativamente grande (largo total más de 1,2 cm.); reportada solamente del estado de Heredia, Costa Rica *solisi* Mackay y Mackay

80(78). Lados lateral y posterior del pecíolo con estrías horizontales, fuertes, las estrías del lado posterior llegan hasta el ápice (Fig. 261); México (Guerrero) hasta Bolivia (El Bení) *foetida* (Linnaeus)

- El lado posterior del pecíolo sin estrías horizontales, por lo menos en la mitad superior (Fig. 108, derecho), con hoyuelos u otra forma de escultura, el lado lateral puede tener estrías horizontales (Fig. 263) **81**

81(80). El lado lateral del pecíolo con estrías o arrugas horizontales, por lo menos en la mitad inferior (Fig. 263), el lado posterior puede tener estrías en la mitad inferior; Costa Rica (Puntarenas) hasta Perú y Brasil (Amazonas) *theresiae* Forel

- El lado lateral del pecíolo finamente punteada (Fig. 265) con la superficie débilmente brillante **82**

82(81). Especies grandes, robustas, el ancho de la cabeza usualmente más de 2 mm (Fig. 264), ancho del pronoto más de 1,55 mm; Estados Unidos hasta el norte de Argentina **83**

- Especies más pequeñas y delgadas (Fig. 265), ancho de la cabeza menos de 2,2 mm; ancho del pronoto menos de 1,55 mm; América Central hasta Ecuador **86**

83(82). Lado anterior del pecíolo derecho (en perfil), unido con el lado posterior (que es redondeado), en un ángulo casi recto (Fig. 265); muy común, EUA al sur hasta Argentina **84**

- El lado anterior del pecíolo fuertemente cóncavo, unido con el lado posterior en un ángulo agudo (Fig. 266); no común, México al sur hasta Brasil **85**

84(83). Hombro pronotal con una carina muy aguda (Fig. 267); mesonoto, vista desde arriba, corto (Fig. 267, izquierdo), con el margen posterior cóncavo; común y de amplia distribución, desde EUA (Texas) al sur hasta el norte de Argentina (Misiones, Salta) .. *villosa* (Fabricius)

- Hombro pronotal sin carina, totalmente redondeado (Fig. 267, derecho); mesonoto relativamente largo, margen posterior débilmente convexo (Fig. 267, derecho); conocido solamente del estado de Huánuco, Perú .. *zuparkoi* Mackay y Mackay

85(83). Proceso subpostpeciolar redondeado, separado del resto del postpecíolo con impresión profunda, raramente con región larga y abultada o carina posterior; ancho del pecíolo en la obrera menos de 1.3 mm (Fig. 268, izquierdo), y en la hembra menos de 1.5 mm; sur de México (Yucatán) al sur hasta el sur de Brasil (Santa Catarina) *inversa* (F. Smith)

- Proceso subpostpeciolar redondeado, no separada del resto del postpecíolo, conectada por una región larga y abultada o carina posterior; ancho del pecíolo en la obrera más de 1.3 mm (Fig. 268, derecho), y en la hembra más de 1.5 mm; Nicaragua (Río San Juan) al sur hasta el sur de Perú (Madre de Dios), al este hasta Venezuela (Delta) .. *curvinodis* Forel

86(82). Carinas o carinulas en la parte media del clípeo ausentes (Fig. 351) o predominantemente longitudinales; cuerpo casi negro, patas usualmente café claro o rojizo; Nicaragua (Matagalpa) al sur hasta Perú (Madre de Dios)

..... ***bugabensis* Forel**

- Carinulas en la parte media del clípeo horizontales o transversas (Fig. 269); patas café oscuro, casi del mismo color que el cuerpo; Costa Rica

..... ***insignis* Mackay y Mackay**

87(76). Cabeza finamente estriada (Fig. 270); mesosoma y pecíolo con áreas extensivas que son estrioladas (Fig. 271); pelo subrectos abundantes y por lo general distribuidos en toda la superficie dorsal de la cabeza y el cuerpo y toda la superficie de los escapos y patas (Fig. 271); Colombia (Meta), al sur hasta Ecuador (Napo), al este hasta Brasil (Amazonas)

..... ***cooki* Mackay y Mackay**

- Escultura predominantemente opaca, densamente punteada; cuerpo con pocos pelos rectos, de 0 – 10 en el promesonoto, usualmente menos de 15 en el pecíolo; pocos en los fémures y tibiae donde usualmente están restringidas a la superficie flexor; la región Amazónica

..... ***apicales* (Latreille)**

88(75). Lados del pecíolo cubierto con estrías fuertes y horizontales (Fig. 272); el dorso del pecíolo convexo, visto de lado (Fig. 272); Costa Rica (Guanacaste) al sur hasta Colombia (Valle del Cauca, Meta)

..... ***holcotyle* Mackay y Mackay**

- Lados del pecíolo finamente punteados o casi liso (Fig. 274), estrías, si presentes, muy finas y restringidas en la mitad inferior **89**

89(8). Pecíolo de la obrera, visto de arriba (Fig. 273, izquierdo), casi tan largo como ancho hasta más largo que ancho (el pecíolo de la hembra usualmente es más corto y más ancho que el de la obrera)

..... **90**
- Pecíolo (visto de arriba) más ancho que largo (Fig. 273, derecho)

..... **94**
90(89). De tamaño grande, ancho máximo de la cabeza de la obrera, excluyendo los ojos, más de 2,4 mm; cuerpo y patas negras, pubescencia amarilla - dorada; montañas de suroeste de Colombia hasta Bolivia

..... ***chyzeri* (Forel)**
- Tamaño más pequeño, ancho de la cabeza de la obrera y hembra, excluyendo los ojos, menos de 2,4 mm

..... **91**
91(90). Margen posterior lateral del pecíolo agudo (Fig. 277); negro, usualmente con patas café, y con pubescencia dorada abundante

..... **92**
- Margen posterior lateral del pecíolo redondeado (Fig. 275); negro con reflejos azules (en especímenes limpios), patas y antenas negras o café oscuro (ápice del funículo de la antena puede ser amarillo en muestras de *P. fauveli* de suroeste de Colombia y de Napo, Ecuador); pubescencia abundante, pero corta, de color amarillo-gris hasta rojizo; montañas de Colombia hasta Bolivia

..... **93**

92(91). Color negro, con reflejos bronceados, patas y antenas rojizo brillante; pubescencia abundante, largo y conspicuo, de color rojizo dorado; pelos en la tibia posterior relativamente largos, (aproximadamente la mitad del diámetro de la tibia), con mas de 10 pelos rectos en el dorso del pronoto (Fig. 276); lado dorsal del pecíolo convexo (Fig. 276); las montañas de Ecuador cerca Baños *eleonorae* (Forel)

- Color negro, patas rojizas; pubescencia esparcida; pelos en la tibia posterior cortos (menos que $\frac{1}{2}$ diámetro de la tibia), con menos de 10 pelos rectos poco aparentes en el dorso del pronoto (Fig. 277); lado dorsal del pecíolo cóncavo (Fig. 277) hasta débilmente convexo; Colombia (Cundinamarca)
.....*fusca* Mackay y Mackay

93(91). Mandíbulas totalmente estriadas (Fig. 38, izquierdo); escapo antenal (Fig. 37, derecho) usualmente sin pelos rectos (con pelos rectos cerca el ápice); montañas de Colombia hasta Bolivia (La Paz)*fauveli* Emery

- Mandíbulas lisas y brillantes (Fig. 38, derecho); escapo (Fig. 510) con pelos esparcidos y rectos en el total del escapo; oeste de Colombia (Valle del Cauca, Nariño) hasta el noroeste de Ecuador (Cotopaxi)
.....*hispidi* Mackay y Mackay

94(89). Pecíolo (visto de lado) cuboidal (Fig. 278), un poquito restringido anteriormente; el ápice casi horizontal o un poquito convexo; haciendo nidos en árboles de

Cecropia; Panamá y Perú **95**

- Pecíolo (visto de lado) más alto y más restringido anteriormente, con el ápice angulado (Fig. 281); negro, usualmente con tonos metálicos; Nicaragua hasta Bolivia **96**

95(94). Borde anterior del clipeo enmuescado en la mitad (Fig. 279); de tamaño más grande (ancho de la cabeza de la obrera más de 0,8, hembra más de 1,05 mm); el nodo del pecíolo ancho (ancho de la obrera más de 0,50, de la hembra más de 0,65 mm); obrera negra; Panamá (Colón, San Blas) .*fisheri* Mackay y Mackay

- Borde anterior del clipeo derecho hasta débilmente convexo (Fig. 280); tamaño más pequeño (ancho de la cabeza de la obrera menos de 0,7, de la hembra menos de 1,05 mm); pecíolo más delgado (anchura del pecíolo de la obrera menos de 0,7, de la hembra menos de 0,56); obrera amarillo - café hasta café oscuro; Perú (Cuzco, Madre de Dios)
.....*luteola* Roger

96(94). Cuerpo casi totalmente liso, especialmente el dorso del mesosoma, que es finamente cubierto con hoyuelos esparcidos (Fig. 281); la mayoría de la superficie con tonos o reflexiones azules o verdes; Nicaragua al sur hasta de Ecuador y Venezuela **97**

- Cuerpo densamente cubierto con arrugas hasta hoyuelos (Fig. 282), opaco, excepto el gáster que es brillante con tonos metálicos, otras reflexiones pueden estar presentes; negra; hombro pronotal con una carina; montañas de América Central

(Nicaragua) hasta Bolivia (La Paz de)
..... *aenescens* Mayr

97(96). Anepisterno y lado del propodeo y metapleurón con estrías horizontales (Fig. 281); pubescencia en el dorso del gáster esparcida (con pocos pelos sobrepasando pelos cercanos); el margen posterior - lateral del pecíolo muy agudo; amplia distribución de Nicaragua (Matagalpa) al sur hasta Ecuador (Carchi, Imbabura, Pichincha) y Venezuela
..... *carbonaria* (F. Smith)

- Anepisterno, lado del propodeo y metapleurón sin estrías (o con pocas), la mayoría de las superficies lisas y con hoyuelos esparcidos (Fig. 283); pubescencia del dorso del gáster dorado, fino, denso (con la mayoría de los pelos tocando pelos cercanos); el margen posterior - lateral del pecíolo marginado, pero no muy diferente de la superficie; conocido solamente de los estados de Pichincha y Cotopaxi, Ecuador ...
..... *schoedli* Mackay y Mackay

Chave para operários e fêmeas do Novo Mundo

1. Superfície extensora da tíbia média com pêlos muito grossos, rígidos, cobrindo pelo menos a metade de todo seu comprimento (Fig. 158 - podem ser difícil ver em *P. gilva*); coloração das operárias amarela ou alaranjada; olhos ausentes ou muito pequenos, e indistintos (*Wadeura* e *Cryptopone*) 2
- Superfície extensora da tíbia média sem pêlos cônicos - muito grossos e rígidos, com exceção de alguns no ápice (Fig. 80 - pêlos finos normalmente presentes); coloração das operárias adultas variando de avermelhado a preto; olhos presentes (grandes ou pequenos), mas sempre distintos e multifacetados 5
- 2(1). Mandíbulas sublineares, com a margem mastigadora quase contígua com a borda basal, contendo 4 - 5 dentes (Fig. 159); dente da região mediana da mandíbula mais longo que os demais (Fig. 159); nó peciolar, subtriangular, em vista lateral, com ápice marcadmente cônico a arredondado México (Fig. 160) (Veracruz), América Central ao sudeste do Brasil (Amapá, São Paulo) *guianensis* (Weber)
- Mandíbulas triangulares, formando um ângulo na articulação com a margem mastigadora; margem mastigadora com pelo menos seis dentes, de tamanho semelhante (Fig. 173); pecíolo, em vista lateral, subcuboidal, fracamente cônico dorsalmente 3
- 3(2). Face dorsal do pecíolo largamente convexa, quase do mesmo comprimento da sua face posterior (Fig. 161); Metade anterior do processo subpeciolar não translúcido; Leste do Peru até as Guianas, ao Sul até Bolívia 4
- Face dorsal do pecíolo convexa, mais curta que a sua face posterior (Fig. 162); metade anterior do processo subpeciolar translúcido (Fig. 162); América do Norte (Sul de Tennessee até Florida, oeste para Louisiana), México, América Central pelo menos até Panamá *gilva* (Roger)
- 4(3). Mesosoma completamente opaco; Leste do Peru até Trindade, ao sul até Brasil (Bahia) *holmgreni* (Wheeler)
- Mesosoma completamente liso e brilhante; Bolívia (El Bení) e Brasil (Mato Grosso, Acre) *mirabilis* Mackay e Mackay
- 5(1). Superfície dorsal do mesosoma (Fig. 163) e do pecíolo sem pêlos eretos 6
- Superfície dorsal do mesosoma (Fig. 164) e, usualmente, do nó peciolar com pêlos eretos 10
- 6(5). Dorso do pronoto regular e fortemente estriado (Fig. 573);

superfície dorsal da cabeça na região posterior dos olhos, frequentemente, com pubescência aderente, dourada, formando grande órbita oval em cada lado do vértice, parecendo grandes olhos, em espécimes limpos (Fig. 165), Brasil: Goiás e São Paulo

..... *magnifica* **Borgmeier**

- Pronoto sem estrias fortes; usualmente sem secção de pubescência na cabeça, formando falsos olhos

7(6). Olhos muito grandes e convexos (Fig. 166), mais longos que o último segmento do funículo; ápice do pecíolo gradualmente curvado na face posterior

- Olhos menores que o primeiro antenômero (Fig. 167), ápice do pecíolo formado um ângulo abrupto na sua intercepção com a face posterior (Fig. 168); norte da Venezuela, até o sudeste do Brasil (Distrito Federal, São Paulo, Rio Grande do Sul)

..... *bucki* (**Borgmeier**)

8(7). Faces posteriores e laterais do pecíolo com margens fortemente marcadas (Fig. 169), com bordas ântero e posteriores convexas, em vista dorsal; hipopígio com pêlos aderentes e esparsos na área adjacente ao ferrão (Fig. 171, esquerda); segmentos apicais do funículo castanho a raramente alaranjado;

muito comum; distribui-se do México (Veracruz) ao Paraguai (Canindeyú), Brasil (Amazonas, Rondônia, Bahia, Pará, Goiás, Mato Grosso do Sul, Distrito Federal, São Paulo)

..... *verenae* (**Forel**)

- Faces posteriores e laterais do pecíolo arredondadas (Fig. 170), convexas em ambos lados onde se curvam; hipopígio com moderada (Fig. 171, izsqurdo) a densa pubescência (Fig. 171, direita); segmentos apicais do funículo normalmente amarelo brilhantes; México até sudeste do Brasil (Rio de Janeiro) e Argentina

9(8). Segmentos (3 a 6) apicais do funículo amarelo brilhantes; escapo antenal relativamente longo (>2.3 mm), mais longo que o comprimento da cabeça; hipopígio com pubescência esparsa (Fig. 171, izsqurdo); muito comum; México até Bolívia e Brasil (Amazonas, Rondônia, Amapá, Pará, Bahia, Mato Grosso, Espírito Santo, Goiás, Rio de Janeiro, São Paulo)

..... *apicalis* (**Latreille**)

- Os segmentos apicais do funículo variam de castanho claro a escuro, nunca amarelo brilhante; escapo antenal relativamente curto (usualmente < 2.3 mm), mais curto do que o comprimento da cabeça; hipopígio com pubescência densa (Fig. 171, direita); raramente coletados; Equador ao sul até Paraguai, norte da Argentina, e norte do Brasil (Rondônia, Pará)

..... *obscuricornis* (**Emery**)

10(5). Dorso do pigídio (ápice do gáster), com um par de dentes fortes, triangulares e curvados para cima (Fig. 172); espécie muito grande e preta, com o pecíolo cuboide; muito comum em florestas tropicais do Caribe, da Colômbia ao leste das Guianas, e ao sul até Paraguai, Brasil

(Amapá, Amazonas, Rondônia, Acre, Mato Grosso, Pará, Paraíba)

..... *crassinoda* (Latreille)

- Ápice do gáster sem processos fortes ou dentes, embora algumas espécies apresentem poucas cerdas em forma de espinhos ou dentes, no ápice da borda gastral

11

11(10). Mandíbula com 5 - 7 dentes (se tiver 8, a área mais basal possui pequenos dentículos) (Fig. 173); dorso do pronoto sem margens laterais distintas, e com escultura densa e finamente pontuada; relativamente pequeno (comprimento total < 5 mm); Estados Unidos até norte da Argentina e sul do Brasil; comum em madeira em decomposição

12

- Mandíbulas usualmente com mais de oito dentes e /ou dentículos (Fig. 240); margens pronotais distintivas; dorso do pronoto liso e brilhante, ou de tamanho maior (usualmente >7 mm em comprimento total), de distribuição ampla incluindo Brasil

21

12(11). Mandíbula com 5 - 6 dentes (Fig. 173); Estados Unidos até o norte de Argentina e sul do Brasil

13

- Mandíbula com sete dentes, incluindo os dentes basais (Fig. 178); México até Bolívia e sul do Brasil

16

13(12). Processo subpeciolar arredondado posteriormente (Fig. 174); clipeo dividido por uma carena indistinta e horizontal (Fig. 177)

14

- Processo subpeciolar angulado posteriormente (Fig. 175); aproximadamente angulado na rainha (Fig. 133); clipeo dividido por uma carena forte e horizontal (Fig. 176); largura da cabeça ~0.8mm; sul das Honduras até Bolívia, Caribe, até centro e sudeste do Brasil (Goiás, Rio de Janeiro, São Paulo)

..... *succedanea* (Roger)

14(13). Carena horizontal do clipeo bem desenvolvida e aguda (Fig. 177); Guianas, incomum no Brasil (Amazonas, Bahia, Pará, Mato Grosso, Rio de Janeiro, São Paulo)

..... *gilberti* (Kempf)

- Carena horizontal do clipeo pouco desenvolvida (Fig. 173), apenas uma área dobrada; muito comum e de ampla distribuição

15

15(14). Largura máxima da cabeça aproximadamente 1 mm; clipeo sem carena longitudinal (Fig. 173); processo subpeciolar muito grosso (Fig. 174); comum e de ampla distribuição desde EUA, Bahamas, México até Argentina, Brasil (Amazonas, Rondônia, Amapá, Pará, Goiás, Pernambuco, Mato Grosso, São Paulo)

..... *stigma* (Fabricius)

- Largura máxima da cabeça aproximadamente 0,6 mm; clipeo com uma carena longitudinal sem fio (Fig. 178); parte anterior do processo subpeciolar delgado e translúcido (Fig. 162); Estados Unidos a sul até Panamá

..... *gilva* (Roger)

16(12). Carenas frontais não muito distantes (Fig. 179) na seção posterior (distanciam-se pelo menos 0,07 mm

ou menos); processo subpeciolar posteriormente angulado (Fig. 175); mandíbula com estrias longitudinais bem nítidas, pouco brilhante (Fig. 185); Costa Rica até Colômbia

..... ***cognata* (Emery)**

- Carenas frontais (Fig. 180)

separadas (distanciando-se 0,10 mm ou mais); processo subpeciolar usualmente arredondado

posteriormente (Fig. 174); mandíbulas

sem estrias, ou com estrias indistintas

(Fig. 180), usualmente lisas e brilhantes; México até Bolívia e Brasil

..... **17**

17(16). Tíbias médias e posteriores

com um único esporão apical, pectinado (Fig. 139, esquerdo); muito

rara, e Panamá, Venezuela (Mérida)

até Bolívia (Cochabamba), Brasil

(Rio de Janeiro, São Paulo)

..... ***leveillei* (Emery)**

- Tíbias médias e posteriores

com dois esporões apicais (um grande

pectinado, outro simple e difícil de

ver) (Fig. 139, direito); relativamente

comuns

..... **18**

18(17). Espiráculo propodeal de

forma circular (Fig. 182); operários

relativamente pequenas (comprimento

total usualmente < 5 mm); clipeo sem

carena longitudinal e

longitudinalmente deprimido, borda

mediana anterior côncava, com dois

ângulos laterais (Fig. 181); México,

Guatemala e Venezuela (Aragua)

..... ***minuta* Mackay e Mackay**

- Espiráculo propodeal

oblongo (Fig. 183); operárias

usualmente do tamanho meio

(comprimento total maior que 5 mm);

clipeo diferente da opção anterior

(Fig. 184); Costa Rica até Peru e

Venezuela

..... **19**

19(18). Clipeo com uma carena

longitudinal (Fig. 180), sem ângulo

mediano na margem anterior; sutura

metanotal pouco comprimida (Fig.

182); operárias relativamente

pequenas (comprimento total de 4 - 6

mm)

..... **20**

- Clipeo sem carena

longitudinal (Fig. 184), mas com um

carena transversa bem desenvolvida

formando um ângulo mediano que

ultrapassa o clipeo (Fig. 184); sutura

metanotal não imprimida (Fig. 183);

espécie maior (comprimento total > 6

mm); Bolívia (La Paz), Brasil (Mato

Grosso o Distrito Federal)

..... ***lenkoi* Kempf**

20(19). Superfície dorsal da

mandíbula lisa e brilhante, com

pontuações esparsas (Fig. 180);

Honduras até Peru, ao leste até

Venezuela, e ao sul Bolívia

(Cochabamba), Brasil (Goiás, Rio de

Janeiro, São Paulo)

..... ***succedanea* (Roger)**

- Superfície dorsal da

mandíbula revestida com fortes estrias

(Fig. 185); México ao sul até Equador

(Pichincha)

..... ***gilloglyi* Mackay e Mackay**

21(11). Abertura do espiráculo

propodeal (vista lateral) pequena, em

forma de círculo ou elíptica (Fig. 186,

esquerda); usualmente, um pouco mais

alongada nas fêmeas do que nas

operárias da mesma espécie; tamanho

pequeno a médio

..... **22**

- Abertura da espiráculo propodeal em forma de fenda ou alongado (Fig. 186, direita), usualmente, mais de duas vezes tão longo quanto largo; formigas médias ou grandes **40**

22(21). Margem ombro pronotal com uma carena lateral (Fig. 187) **23**

- Margem do ombro pronotal arredondada, sem bordas distintas (Fig. 188) **28**

23(22). Pecíolo, em vista lateral, não muito cônico, com o face dorsal arredondado ou obliquamente truncado (Fig. 188), face dorsal mais ou menos distinta do face posterior (Fig. 188); não comum, Brasil (Espírito Santo e Bahia) **24**

- Pecíolo, na vista lateral, mais agudo, com o ápice delgado e arredondado (Fig. 191); comum e da ampla distribuição **26**

24(23). Face anterior do postpecíolo (primeiro segmento do gáster) fortemente côncava, o ápice forma um ângulo agudo que excede a face anterior (Fig. 189, esquerdo); conhecido somente do Brasil (Bahia) ***concava* Mackay e Mackay**

- Face anterior do postpecíolo arredondada (Fig. 189, direita); conhecida somente do Brasil (Espírito Santo e Bahia) **25**

25(24). Laterais do pronoto e da mesopleura lisas e brilhantes; face dorsal do pecíolo pouco definida (Fig. 190, esquerda); Brasil (Espírito Santo e Bahia) ***venusta* Forel**

- Laterais do pronoto e da mesopleura com estrías fortes e irregulares; pecíolo angulado (anterior e posteriormente), formado um lado dorsal bem definido (Fig. 190, direita); este do Brasil (Espírito Santo) ***schultzi* Mackay e Mackay**

26(23). Espécie pequena, largura máxima da cabeça da operário (=1,1 mm), da fêmea (=1,25 mm); fila estridulatoria ausente na região mediana do segundo acrotergito do gáster; olhos da operária cerca de 0.2 mm em diâmetro (Fig. 336); Costa Rica ao sul do Brasil (Amazonas, Bahia, Pará, Espírito Santo, Mato Grosso) ***arhuaca* (Forel)**

- Espécie maior; largura máxima da cabeça da operária > 1,4 mm; fila estridulatoria presente no dorso do segundo pretergito do gáster (Fig. 192); diâmetro do olho das operárias > 0,28 mm **27**

27(26). Seção mediana e dorsal do clipeo lisa e brilhante; face posterior do pecíolo muito lisa e brilhante, com pontuações esparsas e pubescência aderente (Fig. 193); carena pronotal bom desenvolvida, ultrapassando as margens do pronoto (Fig. 193); Centro e sudeste do Brasil (Minas Gerais, Mato Grosso, São Paulo) ***metanotalis* Luederwaldt**

- Seção mediana do clipeo opaca e com estrías longitudinais; face posterior do pecíolo densamente pontuada ou com estrías irregulares, opaca, e com pubescência dourada, aderente; carena pronotal quase ausente (Fig. 194); Colômbia (Boyacá, Meta,) Perú e o norte de Venezuela

(Aragua, Carabobo), não citada para o Brasil *emiliae* (Forel)

28(22). Clípeo com dente mediano agudo, que se estende além da sua anterior margem (Fig. 195); Panamá, Colômbia, Venezuela (Aragua) e Peru (Huánuco, Pasco)
 *becculata* Mackay e Mackay
 - Clípeo sem dente mediano, ou com um ângulo pequeno (Fig. 199) e com o margem anterior convexo ou emarginada **29**

29(28). Tíbia média mais curta que a largura máxima do pronoto (vista dorsal) **30**
 - Tíbia média mais longa que a largura máxima do pronoto **36**

30(29). Pecíolo delgado e subtriangular em vista lateral, com as faces anterior e posteriore quase do mesmo comprimento, e fracamente convexas ou retas (Fig. 196); sutura metanotal profunda separando o dorso do mesosoma; operárias quase sempre castanho escuro com patas mais claras (raramente pode ser castanho pálido); América Central até Bolívia e Brasil **31**

- Pecíolo (vista lateral) quase rectangular (Fig. 197) (possível um pouquinho mais delgado próximo ao ápice); sutura metanotal (Fig. 197) não muito forte (apenas interrompendo o perfil dorsal do mesosoma); operária quase sempre avermelhada escuro (raramente pode ser castanho escuro ou negro); sul do México até sudeste do Brasil **34**

31(30). Tíbias médias e posteriores com dois esporões (Fig. 139, direito); operárias adultas pretas ou castanhas ou com as patas pretas; comuns, América Central até Bolívia **32**
 - Tíbias médias e posteriores com um esporão (Fig. 139, esquerdo); castanho médio; Panamá, Venezuela (Mérida), Bolívia (Cochabamba) e Brasil (Rio de Janeiro, São Paulo)
 *leveillei* (Emery)

32(31). Escapo antenal se estende além da borda póstero-lateral da cabeça (Fig. 198); clípeo com uma área mediana longitudinalmente comprimida (Fig. 198); mesonoto relativamente curto (aproximadamente 0,18 mm de comprimento em vista dorsal); face anterior e posterior do pecíolo quase paralelas, formado uma curta área dorsal (Fig. 203); Guatemala até Peru **33**

- Escapo antenal mais curto ou quase alcança a margem pósterolateral de cabeça (Fig. 199); carena longitudinal ou área elevada na região mediana; mesonoto relativamente longo (> 0,24 mm); faces do pecíolo convergem dorsalmente, formado uma superfície larga e arredondada (Fig. 196); não comum, Colômbia (Huila), Peru (Huánuco) e Venezuela (Aragua) *conicula* Mackay e Mackay

33(32). Parte posterior do processo subpeciolar com um dente ou ângulo ventral, dirigido para baixo (Fig. 200); Equador (Napo)
 *cernua* Mackay e Mackay
 - Processo subpeciolar arredondado, sem um dente ventral

dirigido para baixo (Figs. 51, 201); Guatemala até Peru (Junín)
 *pergandei* **Forel**

34(30). Processo subpeciolar sem espinho ou lobo dirigido para atrás, ângulo anterior desenvolvido (Fig. 201, direita); dente apical da mandíbula três vezes mais longo que os outros (Fig. 201, esquerda); Colômbia (Meta)
 *longidentata* **Mackay e Mackay**

- Parte posterior do processo subpeciolar com forte e bem desenvolvido espinho ou lóbulo agudo dirigido para trás (Fig. 202, direita); dente apical um pouquinho maior que os demais (Fig. 202, esquerda)
 **35**

35(34). Face anterior do pecíolo reta ou fracamente côncava; face dorsal curvada que se une com a convexa face posterior (Fig. 202); ápice mais largo que longo ($> 2,5 X$); nordeste do México até o sul do Brasil (São Paulo, Distrito Federal), Trindade
 *ferruginea* (**F. Smith**)

- Pecíolo (Fig. 203) quase rectangular (vista lateral), algumas vezes mais largo próximo ao ápice, não tão largo (vista dorsal, $< 2.0 X$) (Fig. 203); Guatemala (Suchitepéquez) até Paraguai (Canindeyú), Trindade, Brasil (Rio de Janeiro, São Paulo, Santa Catarina, Rio grande do Sul) *lunaris* (**Emery**)

36(29). Pecíolo (vista lateral) delgado e subtriangular, com as faces anterior e posterior débilmente convexas à fracamente côncavas (face anterior

reta a fracamente côncava nas fêmeas), que se unem formado um ápice arredondado (Fig. 204); sutura metanotal profunda, separando o mesonoto do propódeo (Fig. 204) **37**

- Pecíolo grosso, dorsalmente subtruncado, com as faces anterior e posterior quase verticais (Fig. 205); sutura metanotal não muito profundo (Fig. 205) **38**

37(36). Comprimento total > 5 mm; mandíbulas finamente estrioladas e opacas, com o terço apical liso; comuns, Honduras até Bolívia e Brasil (Amazonas, Amapá, Pernambuco, Bahia, Pará, Mato Grosso, Espírito Santo, Rio de Janeiro, São Paulo) *constricta* (**Mayr**)

- Tamanho pequeno (comprimento total < 5 mm); mandíbulas lisas com pontuações esparsas (Fig. 378); EUA (Virginia, North Carolina, Georgia)
 *chinensis* **Emery**

38(36). Sutura metanotal pouco profunda, separando a superfície convexa do mesonoto da base quase reta do propódeo (vista lateral) e que se unem ao mesonoto em nível mais baixo (Fig. 205) **39**

- Sutura metanotal muito profunda, separando o achatado e relativamente curto mesonoto da base convexa do propódeo (Fig. 206); mandíbulas opacas e com estrías; Equador (Los Rios)
 *vieirai* **Mackay e Mackay**

39(38). Mandíbulas lisas e brilhantes, com pontuações esparsas

(Fig. 627); Panamá e oeste de Colômbia
 *rupinicola* Mackay e Mackay
 - Mandíbulas completamente com estrías (Fig. 185); Bolívia
 *breviscapa* Mackay and Mackay

40(21). Margem ântero-lateral do postpeciolo (1º segmneto do tergo) com um par de tubérculos ou ângulos (Fig. 207); garras tarsais muito pequenas com denteculos na margem interior (Fig. 208); Novo Mundo conhecido somente de São Paulo, Brasil *tarsata* (Fabricius)
 - Postpeciolo sem tubérculos ou ângulos; garras tarsais sem denticulos **41**

41(40). Mandíbulas muito longas e delgadas, aproximadamente tão longas quanto o comprimento da cabeça (Fig. 209); peciolo mais longo que alto, crescendo gradualmente para formar um ápice arredondado posteriormente (Fig. 210); amplamente distribuídas, mas raras em localizadas dos trópicos da América do Sul **42**

- Mandíbulas mas curtas que o comprimento total da cabeça (Fig. 198); peciolo mais alto que longo, com forte crescente face anterior; muito comuns e amplamente distribuídas **43**

42(41). Face anterior do peciolo convexa (Fig. 210); carena no ombro pronotal (húmero) moderadamente desenvolvida; muito comuns no norte da América do Sul: Colômbia (Amazonas), Equador (Sucumbíos), Venezuela, (Carabobo), Argentina

(Salta) e Brasil (Goiás, São Paulo) *rostrata* Emery
 - Face anterior do peciolo reto ou débilmente côncava (Fig. 211); carena no húmero pouco desenvolvida (Fig. 211); América do Sul: Paraguai, Argentina (Misiones) e Brasil (Goiás, Mato Grosso, São Paulo, Rio de Janeiro) *agilis* (Forel)

43(41). Póspeciolo (primeiro segmento do gáster) com face anterior côncava e pontiaguda formando um ângulo agudo com a face dorsal (Fig. 212), olhos pequenos (Fig. 606); Peru até Guianas, pouco comum na parte oeste do Brasil (Amazonas)
 *procidua* Emery

- Primeiro segmento do gáster com a face anterior formado ângulo reto ou arredondado (Fig. 211) com a margem da face dorsal (Fig. 241), projetando-se para o peciolo; olhos usualmente grandes **44**

44(43). Cor preta, maioria das superfícies lisas e brilhantes, com áreas estriadas na margem lateral do mesosoma (Fig. 213) e às vezes no dorso da cabeça; Laterais do pronoto sem carena, ou com um fraca carena, e com pontuações esparsas; peciolo subrectangular (vista lateral) (Fig. 213) **45**

- Com escultura extensiva, se o integumento for brilhante e liso; cabeça sem estrías longitudinais; dorso do pronoto estriado ou intensa e finamente pontuado; húmero (ombro pronotal) usualmente com carena; peciolo raramente rectangular em vista lateral (Fig. 384) **47**

45(44). Espécie muito grande, comprimento total >15 mm; largura total da cabeça > 3 mm; área atrás dos olhos com estrías distintas ((Fig. 214); Costa Rica até Paraguai, leste ao oeste do Brasil (Amazonas, Acre, Rondônia, Amapá, Roraima, Goiás, Pará, Mato Grosso, Tocantins, Distrito Federal, Piauí) ***commutata* (Roger)**

- Espécie menor, comprimento total <15 mm; largura máxima da cabeça <2,5 mm; cabeça atrás dos olhos usualmente lisa e brilhante (Fig. 215) **46**

46(45). Superfície dorsal da mandíbula dividida por uma carina longitudinal que se estende quase até o margem dental, com margem parte lateral convexa e margem interna côncava (Fig. 215); Trindade, norte da Argentina e Bolívia, sul do Brasil (Goiás, Minas Gerais, Mato Grosso, Rio de Janeiro, São Paulo, Paraná, Rio Grande do Sul) ***marginata* (Roger)**

- Superfície dorsal da mandíbula (Fig. 216) com uma série de pontuações grossas ao longo da margem dental (não dividida por uma carena longitudinal); América Central até o sudeste do Brasil (Amazonas, Pará, Espírito Santo, São Paulo) ***laevigata* (F. Smith)**

47(44). Fêmea (e operária não descrita) com as seguintes características: escapo antenal curto, não alcança a borda latero-posterior da cabeça (Fig. 424); sem carenas preocular (Fig. 424) e pronotal (Fig. 423); pecíolo cuboidal, faces anterior

e posterior verticais e paralelas; cabeça, mesosoma e pecíolo, cobertos com estrías longitudinais (Fig. 423 e 424); estado de Amazonas, Brasil

..... ***curiosa* Mackay e Mackay**

- Sem todas as características mencionadas na opção anterior; comum e de distribuição ampla **48**

48(47). Em perfil, linha dorsal do mesosoma continua (rapidamente sinuosa em *P. goeldi*- Fig 233) com convexidade no mesonotum (Fig. 217); sutura metanotal obsoleta ou ausente; humero (ombro do pronoto) usualmente com uma carena bem desenvolvida (Fig. 217) **49**

- Linha dorsal do mesosoma interrompida pela sutura metanotal impressa e distinta, assim, o mesonoto forma convexidade mais ou menos separada da convexidade da base do propódeo (Fig. 218); margem do pronoto com carenas distintas (Fig. 218), indistintas ou ausentes **75**

49(48). Carena malar distinta (Fig. 219) desde o margem lateral da cabeça (cerca de inserção de mandíbula) até ou quase até $\frac{1}{4}$ da margem anterior dos olhos (carena malar); pretergito do segundo tergo gastral com uma lima estridulatória mediana, com bandas em cores do arco-íris (Fig. 220); arólios nas garras tarsais presentes (Fig. 221, esquerdo) **50**

- Carena malar ausente (Fig. 243) ou pouco desenvolvida; lima estridulatória ausente, arólios ausentes (Fig. 221, direita) **66**

50(49). Pecíolo (vista lateral) com face anterior vertical (reta ou fracamente côncava), e com face posterior amplamente arredondada, as faces se unem próximo a face anterior do pecíolo (Fig. 233) **51**
 - Pecíolo (vista lateral), com ápice horizontal ou fortemente arredondado, próximo ou posterior a área mediana dorsal (Fig. 228) **55**

51(50). Margens laterais e face posterior do pecíolo cobertas com com estrias horizontais e grossas (Fig. 222); América Central até Bolívia (El Bení), Brasil (Rondônia, Amapá) ***striatinodis* Emery**
 - Posterior face do pecíolo sem estrias, finamente esculpura (Fig. 223) **52**

52(51). Face posterior do pecíolo convexa, (Fig. 224), moderadamente brilhante; lateral do propódeo raramente com estrias horizontais; comum e amplamente distribuída norte de México ao sul do Brasil **53**
 - Face posterior do pecíolo fortemente côncava (Fig. 225) a plana; lateral do propódeo com estrias horizontais (Fig. 620); não comum **54**

53(52). Dorso do pronoto com pontuações finas e isoladas (Fig. 226, esquerdo); lados do propódeo e pecíolo sem estrias (Fig. 666) ou com estrias pouco definidas; comuns, do México até Bolívia e sudeste do Brasil (Amazonas, Acre, Rondônia, Amapá, Pará, Minas Gerais, Bahia, Mato

Grosso, Rio de Janeiro), Trindade ***unidentata* (Mayr)**
 - Dorso do pronoto com pontuações grosseiras, alinhadas, algumas vezes, em filas formado carenas (Fig. 226, direito); lado do propódeo com estrias oblíquas; pecíolo com estrias horizontais (Fig. 620); não comuns, de ampla distribuição: Costa Rica até Bolívia (El Bení) e Brasil (Rondônia) ***rugosula* Emery**

54(52). Margens laterais e especialmente a face posterior do pecíolo lisas e brilhantes (Fig. 225); conhecida somente de oeste de Colômbia ***recava* Mackay e Mackay**
 - Margens e face posterior do pecíolo pontuadas e possivelmente com estrias pouco definidas na sua metade inferior (Fig. 620), fracamente brilhante; Venezuela amostras raras de ***rugosula* Emery**

55(50). Pecíolo (vista lateral), mais ou menos rectangular, com as faces anterior e posterior verticais, e face dorsal convexa (Fig. 227) **56**
 - Pecíolo (vista lateral) com as face anterior ou ânterolateral e posterior fortemente convergido dorsalmente formado um ápice arredondado ou angular perto ou atrás da região mediana dorsal (Fig. 228) **60**

56(55). Face anterior e posterior do pecíolo convexas, não paralelas; face dorsal convexa, sendo mais elevada após sua área mediana (Fig. 232);

comum de sul de México ao norte de Argentina 57

- Faces anterior e posterior do pecíolo quase retas e paralelas; face dorsal quase plana, sendo mais alta na área mediana (Fig. 589); rara, de distribuição ampla (México até o norte de Argentina), Brasil (Amazonas, Rondônia, Pará, Goiás, Minas Gerais, Espírito Santo, Guanabara, Mato Grosso, Distrito Federal, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul)
..... **moesta (Santschi)**

57(56). Pecíolo (vista dorsal) com nó quase circular, aproximadamente mais largo que longo (podendo ser mais longo que largo) (Fig. 229); Colômbia (Amazonas, Putumayo,) ao sul até Paraguai, ao leste até Venezuela e ao sul até Brasil central (Amazonas, Rondônia, Pará)

..... **globularia Mackay e Mackay**
- Pecíolo não como o anterior; usualmente mais largo que longo, podendo ser (também) mais longo que largo; faces laterais convergem anteriormente (Fig. 230) ...
..... 58

58(57). Relativamente pequeno (comprimento total quase sempre < 7 mm); nó do pecíolo tão longo quanto largo em vista dorsal (Fig. 230, esquerdo); comum e de distribuição ampla (norte de México até Argentina); Brasil (Amazonas, Rondônia, Amapá, Pará, Minas Gerais, Espírito Santo, Mato Grosso, Rio de Janeiro, Guanabara, Santa Catarina, Paraná, Rio Grande do Sul)
..... **crenata (Roger)**

- Moderadamente grande (comprimento total do corpo > 8 mm); nó peciolar mais largo que longo (Fig. 230, direito); rara 59

59(58). Pecíolo (Fig. 231, esquerdo) delgado (vista lateral) (operárias 0,64 - 0,70 mm - fêmea 0,76 mm); reportado somente de Paraguai (Central, Guairá)

..... **fiebrigi Forel**
- Pecíolo relativamente grosso em perfil (Fig. 231, direita) (operária (0,88 - 1,04 mm), fêmea (1,00 - 1,20 mm); Guyana? Brasil (Mato Grosso, Espírito Santo, São Paulo)
..... **latinoda Mackay e Mackay**

60(55). Faces anterior e dorsal do pecíolo (vista lateral), formam uma curva arredondada quase apontada com ápice côncavo que sobrepõe sua face posterior (Fig. 232); rara, Panamá até Brasil (Amazonas, Rondônia, Pará, Bahia, Mato Grosso)

..... **cavinodis (Mann)**
- Face posterior do pecíolo (vista lateral), convexa (Fig. 233) ou plana, com rara tendência em tornar-se côncava na metade superior, esta superfície se enclina para o ápice (Fig. 234); comum 61

61(60). Pecíolo (vista lateral), face anterior largamente arredondada; face posterior inclinada anteriormente a partir do ponto médio do nó (Fig. 233); norte de América Sul 62

- Pecíolo (vista lateral) com face anterior distinta e quase vertical e com inclinação na face anterodorsal; face anterodorsal junta-se a face posterior em um ápice subangular

(Fig. 234) **63**

62(61). Superfície dorsal da mandíbula completamente estriada (Fig. 198); pêlos eretos nas tíbias médias e posteriores mais longos que o maior diâmetro das tíbias (Fig. 235); norte da América do Sul (Equador, Peru, Guiana Francês, Trindade), Brasil (Amazonas, Pará, Bahia) ***goeldii* (Forel)**
 - Superfície dorsal da mandíbula quase lisa e brilhante (Fig. 240, esquerda); pêlos subrectos nas tíbias posteriores mais curtos que seu maior diâmetro (Fig. 236); Pichincha, Equador ***donosoi* Mackay e Mackay**

63(61). Cabeça (vista frontal) em forma rectangular, com as bordas póstero-laterais anguladas e margem posterior quase reta ou côncava (Fig. 237); pontuações densas no vértice da cabeça e no pronoto, fracamente brilhante a opaco, espaçamentos entre as pontuações no pronoto diminutos formando estrias finas com sulcos transversas (Fig. 238, abaixo); sul do México até Bolívia e Brasil **64**
 - Bordas póstero-laterais da cabeça arredondadas (Fig. 239) ou se angulada, as bordas posteriores são convexas; pontuações esparsas e superfície moderadamente brilhante próximo da margem posterior da cabeça; pontuações finas e muito esparsas no dorso do pronoto (Fig. 238, acima), superfície muito brilhante e usualmente com iridiscencia azulada; região Amazônica até Guiana Inglaterra, Bolívia e Brasil **65**

64(63). Ápice do pecíolo ângulado atrás de sua metade (Fig. 234); comum e de ampla distribuição, México até Bolívia (El Bení), Brasil (Acre, Rondônia, Minas Gerais, Rio Grande do Sul) ***carinulata* (Roger)**
 - Ápice do pecíolo angulado antes da metade do nó (Fig. 233); não comum, de Costa-Rica até Peru (Madre de Dios) e Brasil (Amazonas) ***antecurvata* Mackay e Mackay**

65(63). Mandíbulas moderadamente lisas e brilhantes (Fig. 240, esquerda); margem posterior do ápice do pecíolo terminado em ângulo, e sua região mais baixa formando um ângulo rapidamente côncavo (Fig. 228); Peru (Loreto, Madre de Dios), até Bolívia, ao este até os estados de Amazonas e Pará ***oberthueri* Emery**
 - Mandíbulas opacas e coriáceas, com pontuações esparsas (Fig. 240, direita); Ápice do pecíolo posteriormente arredondado (Fig. 405); sul do Peru (Madre de Dios) ***coveri* Mackay e Mackay**

66(49). Pecíolo (vista lateral) grosso, com as faces anterior e posterior verticais e, quase paralelos, com o base dorsal mais ou menos bem diferenciada (Fig. 241); escultura de dorso de cabeça e de mesosoma usualmente densa, fina e opaca; mandíbula com mais de sete dentes (Fig. 61, direita) **67**
 - Pecíolo delgado, face posterior formado uma curva contínua que se une a face anterior formando um ápice arredondado mais estreito (Fig. 242); escultura brilhante com pontuações esparsas na cabeça e

mesosoma; mandíbula com sete dentes (Fig. 61, esquerda); pouco comum, Bolívia (La Paz) e Brasil (Distrito Federal e Mato Grosso)
 **lenkoi Kempf**

67(66). Tamanho pequeno, comprimento do mesosoma < 3,6 mm; pecíolo delgado (Fig. 241), em vista lateral (< 1 mm de comprimento acima do espiráculo); Estados Unidos até o norte de Argentina e sul do Brasil **68**

- Tamanho grande, comprimento do mesosoma > 3,6 mm; pecíolo, em vista lateral (>1,0 mm de comprimento acima do espiráculo) (Fig. 255); México até Brasil **69**

68(67). Clípeo com carena mediana longitudinal (Fig. 243); ombro pronotal sem carena (Fig. 244, direito - ou pouco definida); conhecido somente do Brasil (Distrito Federal, Rio De Janeiro, São Paulo, Paraná) **lenis Kempf**

- Clípeo sem carina longitudinal (Fig. 504); ombro pronotal com uma carena bem definida (Fig. 241); comum e de ampla distribuição, EUA, Caribe até sul do Brasil (Amazonas, Rondônia, Amapá, Pará, Minas Gerais, Pernambuco, Espírito Santo, Goiás, Mato Grosso, Distrito Federal, São Paulo, Rio de Janeiro, Santa Catarina, Rio Grande do Sul)
 **harpax (Fabricius)**

69(67). Ombro pronotal formado uma carena bom marcada e brilhante (Fig. 244, esquerda); estrias no pronoto predominantemente longitud-

inais (Fig. 59); a margem anterior do clípeo arredondado ou reta na sua área mediana; pigídio lateralmente pontuado e liso dorsalmente (Fig. 245); Bolívia, Paraguai, Uruguai, e o norte de Argentina, Brasil (Espírito Santo, Minas Gerais, Mato Grosso, Goiás, Distrito Federal, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul) **70**

- Ombro pronotal sem carena (Fig. 244, direita) ou com margem romba; estrias em dorso do pronoto (se presente), predominante transversas ou em forma de semicírculos; margem anterior do clípeo rapidamente convexa (Fig. 249) a emarginada na área mediana (Fig. 250); escultura do pigídio variável (Fig. 246); sul de México às montanhas de Peru, e ao leste do Brasil **71**

70(69). Lado da cabeça atrás do olho não muito constridido (Fig. 247, esquerdo); comum no sud de Sur América **striata F. Smith**

- Lado da cabeça atrás do olho fortemente constridido (Fig. 247, derieto), conhecido somente da região de Misiones na Argentina
constricticeps Mackay y Mackay

71(69). Mandíbula com 8 - 9 dentes e uns pequenos dentículos (Fig. 248); pigídio sempre com rugas ou estrías nas laterais (Fig. 246), que muitas vezes se prolongam acima do dorso de parte basal do tergo, parte apical rapidamente côncava; comum e de distribuição ampla **72**

- Mandíbula com 5 - 6 dentes, e 4 - 5 dentículos (Fig. 249);

pigídio sem rugas e estrias na área lateral, sem uma área central côncava; centro oeste da Colômbia e norte da Venezuela *fuscoatrata* (Roger)

72(71). Distância entre o margem anterior de lóbulo frontal e a margem anterior do clipeo ~0,14 - 0,25 mm, que é menor ou igual ao diâmetro da base do do escapo (Fig. 250, esquerdo); muito comum e de ampla distribuição **73**

- Distância entre o margem anterior do lóbulo frontal e o margem anterior do clipeo ~0,35 - 0,50 mm, maior que o diâmetro da base do escapo (Fig. 250, direito); não comum, Costa-Rica até Bolívia **74**

73(72). Dorso do gáster esculpado, pouco liso (poucas vezes muito liso); dorso do pronoto com estrias usualmente transversas, pouco definidas; pigídio côncavo (Fig. 246); comum e de ampla distribuição desde sul do México, Bolívia (El Bení, Cochabamba, La Paz) até o sul do Brasil (Amazonas, Ceará, Mato Grosso, Bahia, Pará, Distrito Federal, Rio de Janeiro, São Paulo) *impressa* (Roger)

- Dorso do gáster liso e brilhante; dorso do pronoto com estrias longitudinais bem definidas; dorso do pigídio convexo (Fig. 251) ou fracamente côncavo; Venezuela (Aragua, Distrito Federal) *lattkei* Mackay e Mackay

74(72). Superfície dorsal da mandíbula lisa, com poucas ou não evidentes estrias (Fig. 252, esquerdo); Costa Rica até Bolívia (Chuquisaca,

Cochabamba), não reportada no Brasil *purpurascens* Forel
- Superfície dorsal da mandíbula com estrias distintas, ocupando pelo menos a metade de sua superfície (Fig. 252, direita); Peru (Cuzco, Junín, Huánuco, Cajamarca), Bolívia (La Paz) e Brasil (Ceará) *inca* Emery

75(48) Olhos localizados na metade do comprimento da cabeça (Fig. 253) **76**

- Olhos localizados anterior a metade do comprimento da cabeça (Fig. 254) **88**

76(75). Pecíolo (vista lateral) com face anterior quase vertical, o ápice angulado ou fortemente arredondado próximo a sal face anterior, acompanhado por um larga e curva margem posterior (Fig. 255); margens dorso-laterais, quando presentes, alcançam ou se aproximam do ápice (Figs. 255 & 256); antenômeros nunca amarelos, podendo ser castanhos ou castanho avermelhado) **77**

- Pecíolo (em perfil) com o face anterior e área dorsal arredondadas, formado um ápice arredondado próximo a margem póstero-dorsal (Fig. 272); margens póstero-laterais quase verticais; antenômeros 4 - 5 do funículo amarelados **87**

77(76). Ápice do pecíolo quase arredondado (Fig. 256) sem margem dorsal - lateral ausente; espécie delgada com o margem posterior da cabeça reta (Fig. 257) ou débilmente convexa (vista frontal); escapos

antenas (Fig. 257) longos (comprimento do escapo / comprimento da cabeça (SI) > 1,2 mm); Costa Rica

..... ***dismarginata* Mackay e Mackay**
 - Ápice do pecíolo quase rectangular, com a margem dorso-lateral bem marcada e completa até o ápice (Fig. 258); escapo usualmente mas curto, pouco mais longo que a margem posterior lateral da cabeça (Fig. 259) **78**

78(77). Pelo menos a metade mediana do dorso da cabeça coberta com estrias longitudinais muito fortes e divergentes para trás (Fig. 259), brilhantes e sem pubescência, que contrasta fortemente com a fina escultura e pubescência das laterais da cabeça; face posterior do pecíolo com estrias ou rugas verticais (Fig. 260), podendo ser brilhante e escurado **79**

- Região mediana e dorso da cabeça escurada (pontuada e finamente estriada) e pubescente; face posterior do pecíolo com estrias transversas ou com rugas ou pontuações não indefinidas **80**

79(78). Área central da face posterior do pecíolo (Fig. 260) usualmente com rugas verticais (raramente ausentes); relativamente pequenas (comprimento total <1 cm); áreas tropicais de México até Panamá .

..... ***lineaticeps* Mayr**

- Face posterior do pecíolo lisa e brilhante; relativamente grande (comprimento total >1,2 cm); reportado somente de Costa-Rica

..... ***solisi* Mackay e Mackay**

80(78). Vista lateral e face posterior do pecíolo com estrias horizontais e fortes que se prolongam até o ápice (Fig. 261); clipeo não armado e arredondado na área mediana (Fig. 262). México (Guerreiro) hasta Bolivia (El Bení), Brasil (Amazonas, Abuná, Amapá, Pará)

..... ***foetida* (Linneaus)**

- Terço superior da face posterior do pecíolo finamente pontuado ou escurado, sem estrias horizontais (Fig. 108, direita), (cautela: pelos podem projetar-se transversalmente podendo assemelhar-se a estrias); face lateral pode ter estrias horizontais (Fig. 263)

..... **81**

81(80). Face lateral do pecíolo com estrias ou rugas horizontais, pelo menos em metade inferior ou mais (Fig. 263), frequentemente estriada ou rugulosa na porção inferior da face posterior; Costa Rica até Peru e Brasil (Amazonas)

- Face lateral do pecíolo finamente pontuado (Fig. 265) com a superfície débilmente brilhante

82

82(81). Espécies grandes robustas; largura da cabeça usualmente >2 mm (Fig. 264); largura do pronoto >1,55 mm; pernas vermelhas a pretas; parte do propódeo, base do pecíolo e gáster avermelhados, Estados Unidos até o norte de Argentina

- Espécies menor e delgada (Fig. 265); largura da cabeça <2,2 mm; largura do pronoto <1,55 mm;

América Central até Equador **86**

83(82). Face anterior do pecíolo vertical em perfil, se une com a margem posterior (que é arredonda) em ângulo quase reto (Fig. 265); muito comum, EUA ao sul até Argentina **84**

- Face anterior do pecíolo fortemente côncava, unido com a sua alargada face posterior num ângulo agudo (Fig. 266); não comum, México ao sul até Brasil **85**

84(83). Ombro pronotal com uma carena bem acentuada (Fig. 267, esquerda); mesonoto, dorsalmente curto (Fig. 267, esquerda), com a margem posterior côncava; comum e de ampla distribuição, desde EUA (Texas) até o norte da Argentina (Misiones, Salta), Brasil (Amazonas, Acre, Rondônia, Amapá, Pará, Goiás, Bahia, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Distrito Federal, Pernambuco, Espírito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina)

..... *villosa* (Fabricius)

- Ombro pronotal completamente arredondado, sem carena (Fig. 267, direita); mesonoto relativamente longo, margem posterior débilmente convexa (Fig. 267, direito); conhecido somente de Huánuco, Peru
..... *zuparkoi* Mackay e Mackay

85(83). Processo subpostpeciolar consiste numa projectão, separado do resto do pospecíolo pela uma depressão profunda, raramente siguida por uma região alongada longitudinal o carina posterior; largura do pecíolo

em os operárias < 1,3 mm, e na fêmea < 1,5 mm (Fig. 268, esquerda); sul do México até o sul do Brasil (Amazonas, Pará, Goiás, Bahia, Espírito Santo, Rio de Janeiro, Santa Catarina)

..... *inversa* (F. Smith)

- Processo subpostpeciolar consiste numa projectão, não separata do resto do pospecíolo pela uma depressão profunda, conectada por uma região alongada longitudinal o carina posterior; largura do pecíolo das operárias > 1,3 mm (Fig. 268, direita), da fêmea > 1,5 mm; face anterior do pecíolo completamente côncava, dando ao ápice uma aparência pontiaguda (Fig. 268, esquerda); Nicarágua até o sul de Peru (Madre de Dios), e Venezuela (Delta), não reportado do Brasil

..... *curvinodis* Forel

86(82). Carenas ou carenulas na parte mediana do clipeo, ausentes (Fig. 351) ou predominantemente longitudinais; corpo quase preto, patas usualmente claras: marrom avermelhado claro a marrom; Nicarágua até Peru (Madre de Dios), não reportado do Brasil

..... *bugabensis* Forel

- Carenulas na área mediana do clipeo horizontais (Fig. 269); patas marrom escuro, quase do mesmo cor que o corpo; Costa Rica
..... *insignis* Mackay e Mackay

87(76). Cabeça finamente estriada (Fig. 270); mesosoma e pecíolo com áreas extensivas estrioladas (Fig. 271); pêlos subrectos abundantes e em geral distribuídos em toda superfície frontal da cabeça, do corpo, superfície do

escapo e patas (Fig. 271); Colômbia (Meta), Equador (Napó), até Brasil (Amazonas)

..... ***cooki* Mackay e Mackay**

- Escultura predominantemente opaca, densamente pontuada; corpo com esparsos pêlos eretos, de 0 - 10 no promesonoto, usualmente menos de 15 no pecíolo; poucos nos fêmures e tíbias onde usualmente restringem a superfície flexora; região Amazônica, Brasil

..... ***apicalis* (Latreille)**

88(75). Laterais do pecíolo cobertas com estrías fortes e horizontais (Fig. 272); vista lateral do dorso do pecíolo convexo, aumentando rapidamente para trás (Fig. 272); Costa Rica (até Colômbia (Valle del Cauca, Meta)

..... ***holcotyle* Mackay e Mackay**

- Laterais do pecíolo finamente pontuadas ou quase lisas (Fig. 274), estrías, se presente, muito finas e restritas à metade inferior

89

89(88). Pecíolo da operária (vista dorsal - Fig. 273, esquerda), quase tão longo quanto largo a distintamente mais longo que largo (o pecíolo da fêmea usualmente é mais largo e mais curto que o das operárias)

90

- Pecíolo (vista dorsal) mais largo que longo (Fig. 273, direita)

..... **94**

90(89). Espécimes grandes (Fig. 274), largura máxima da cabeça da operária, excluindo os olhos, >2,4 mm; corpo e patas pretas e pubescência amarela - dourada; montanhas do sudoeste da Colômbia

até Peru (Madre de Dios), não reportada do Brasil

..... ***chyzeri* (Forel)**

- Tamanho menor, largura máxima da cabeça da operária e fêmea, excluindo os olhos, < 2,4 mm

91

91(90). Póstero-lateral margem do pecíolo fortemente aguda (Fig. 277); negro, usualmente com patas marrons, e com abundante e dourada pubescência

92

- Margem Póstero-lateral do pecíolo arredondado (Fig. 275); negro com reflexos azulados (nos espécimes claros), patas e antenas pretas ou marrom escuro (ápice do funículo antenal amarelado como em *P. apicalis* e amostras de *P. fauveli* de sudoeste da Colômbia e do Napó, Equador); a pubescência abundante, mais curta, não especialmente conspícua, cinza amarelada a avermelho escuro; montanhas de Colômbia até Bolívia

93

92(91). Cor preta, com reflexos bronze, patas e antenas brilhantes; patas e antenas marrom avermelhado claro; pubescência abundante longa e conspícua, vermelho-dourada, brilhante; pêlos nas tíbias posteriores relativamente longos (aproximadamente a metade do diâmetro da tíbia), com mais de 10 pêlos eretos no dorso do pronoto (Fig. 276); face dorsal do pecíolo convexa (Fig. 276); Equador, montanhas cerca de Baños

..... ***eleonora* (Forel)**

- Cor preto, patas marrom avermelhado escuro; pubescência esparsa; pêlos na tíbia posterior curtos

(menor que $\frac{1}{3}$ diâmetro da tíbia), com menos de 10 pêlos eretos inconspícuos no dorso do pronoto (Fig. 277); face dorsal do pecíolo côncava (Fig. 277) a débilmente convexa; Colômbia (Cundinamarca)
 ***fusca* Mackay e Mackay**

93(91). Mandíbulas completamente estriadas (Fig. 38, esquerda); escapo antenal (Fig. 37, direita) usualmente sem pêlos eretos (com pêlos eretos acerca do ápice); montanhas de Colômbia até Bolívia (La Paz), não reportado do Brasil
 ***fauveli* Emery**
 - Mandíbulas lisas e brilhantes (Fig. 38, direita); escapo (Fig. 510) com pêlos esparsos e eretos em todo o escapo; oeste de Colômbia (Valle del Cauca, Nariño) ao noroeste de Equador (Cotopaxi)
 ***hispidia* Mackay e Mackay**

94(89). Pecíolo cuboidal em vista lateral (Fig. 278), um pouquinho cônico anteriormente; o ápice quase horizontal e pouco convexo; nidificam em árvores de *Cecropia*; Panamá y Peru **95**
 - Pecíolo (vista dorsal) mais alto e mais cônico anteriormente, com o ápice agudo ou arredondado (Fig. 281); negro, usualmente com matiz metálico; Nicarágua até Bolívia
 **96**

95(94). Margem anterior do clipeo recortado ou impresso na área mediana (Fig. 279); tamanho grande; largura da cabeça (operários > 0,8 mm; e fêmea >1,05 mm); largura do nó do pecíolo : (operárias > 0,50 mm,

fêmea >0,65 mm); operários pretos; Panamá (Colon, San Blas)
 ***fisheri* Mackay e Mackay**
 - Margem anterior do clipeo reta a fracamente convexa (Fig. 280); tamanho menor; largura da cabeça: (operária <0,7 mm, fêmea <1,05 mm); pecíolo estreitado; largura do pecíolo (operária <0,7 mm, e fêmea < 0,56 mm); operária amarelo amarronzado a marrom escuro; Peru (Cuzco, Madre de Dios), Brasil (localidade desconhecida)
 ***luteola* Roger**

96(94). Corpo quase completamente liso, especialmente no dorso do mesosoma onde é fina e esparsamente pontuada, quase liso (Fig. 281); maioria da superfície com reflexos matizes de azulados ou verdes; Nicarágua até Equador e Venezuela **97**
 - Corpo densamente ruguloso pontuado a pontuado (Fig. 282) e opaco, exceto no gáster, que é finamente pontuado, brilhante, com matizes metálicos; reflexos podem estar presentes; negro; com uma carena no ombro pronotal; montanhas de América Central (Nicarágua) até Peru (Huánuco) e Bolívia (La Paz), não reportada do Brasil
 ***aenescens* Mayr**

97(96). Anepisterno, laterais do propódeo e metapleura com estrias horizontais (Fig. 281); pubescência aderente do dorso do gáster esparsa (com poucos pêlos sobrepondo pêlos adjacentes); a margem póstero - lateral do pecíolo muito aguda; ampla distribuição da Nicarágua ao sul do

Equador (Carchi, Imbabura Pichincha,) e Venezuela, não reportada do Brasil ***carbonaria* (F. Smith)**

- Anepisterno, laterais do propódeo e metapleura sem estrías (ou com poucas) a maioria das superfícies lisa e com esparsas pontuações (Fig. 283); pubescência do dorso do gáster

dourada, fina, densa (com a maioria os pêlos sobrepondo os pêlos adjacentes); margem póstero - lateral do pecíolo marginada, pouco diferente da superfície; conhecida somente dos estados de Pichincha e Cotopaxi, Equador ***schoedli* Mackay e Mackay**

Partial key to the males of *Pachycondyla*

Caution, males of most species are unknown and others are represented by small sample sizes. It is also possible that sibling species have identical workers, but different males. This key will be most useful for the identification of common species. Some males were not seen, including those of *P. chinensis* and *P. commutata*.

- 1. Relatively large (total length > 8 mm) 2
- Relatively small (total length < 8 mm) 16

- 2(1). Medial part of clypeus swollen, forming rounded lobe when seen in profile (Figs. 284 & 286), overhanging anterior part of clypeus 3

apicalis (Veracruz, México, CWEM) as seen from the front and from the side.

- Medial part of clypeus not forming swollen lobe in profile, although clypeal surface is convex (Fig. 285) 10

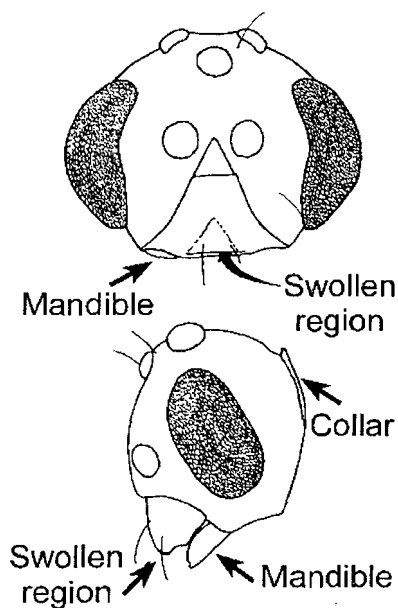


Fig. 284. Head of a male of *P.*

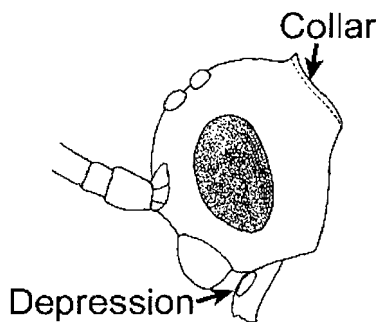


Fig. 285. Head of a male of *P. villosa*, as seen from the side (Monson Valley, Perú, CASC).

3(2). Most surfaces smooth and glossy black; Costa Rica south to Argentina *laevigata* (F. Smith) and *marginata* (Roger)

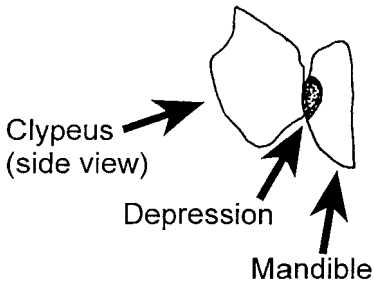


Fig. 286. Clypeus and mandible of a male of *P. marginata* as seen from the side with the depression near the base of the mandible (São Paulo, Brasil, MCZC).

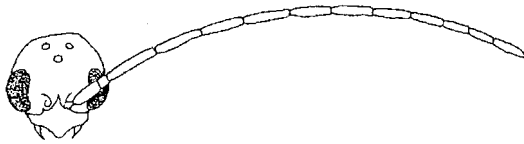


Fig. 287. Head of a male of *P. laevigata* (from Wheeler, 1936).

- Nearly all surfaces opaque, or at least sculptured; widely distributed 4

4(3). Medial and lateral ocelli relatively large (Fig. 288), diameter of medial ocellus (> 0.2 mm) usually greater than distance between medial ocellus and lateral ocellus (Fig. 288) 5

- Medial and lateral ocelli relatively small (Fig. 287), distance between them greater than diameter (< 0.2 mm) of medial ocellus (look obliquely from above) 6

5(4). Eye relatively small (Fig. 288), distance from posterior edge of eye to lateral ocellus slightly more than $\frac{1}{2}$ length of eye (measured in full face view); Nicaragua south to Bolivia *aenescens* Mayr

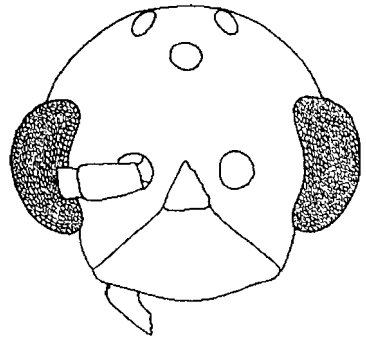


Fig. 288. Head of a paralectotype male of *P. aenescens*. Erect hairs are abundant, but are not shown.

- Eye large (Fig. 289), distance from posterior edge of eye to lateral ocellus $\frac{1}{3}$ or less length of eye (measured in full face view); Colombia south to Bolivia
..... *fauveli* Emery

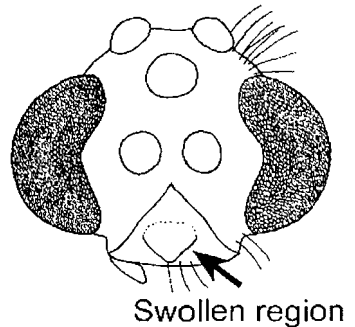


Fig. 289. Head of a male of *P. fauveli* (Perú, CASC).

6(4). Side of petiole with distinct rugae (Fig. 290); northern México south to Bolivia *apicalis* (Latreille)

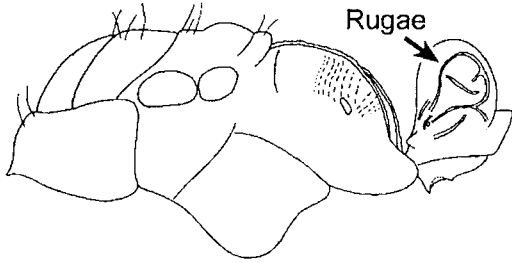


Fig. 290. Mesosoma and petiole of a male of *P. apicalis* (Veracruz, México, CWEM).

- Side of petiole without distinct rugae (Fig. 291) 7

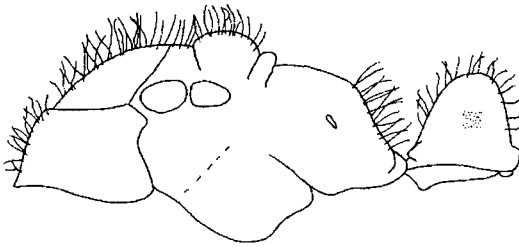


Fig. 291. Mesosoma and petiole of a male of *P. verenae* (Mato Grosso do Sul, Brasil, CWEM). Only a small portion of the sculpturing on the side of the petiole is shown.

7(6). Side of petiole punctate (Fig. 291); eye relatively large, diameter in frontal view nearly twice as long as distance between eye and lateral ocellus (Fig. 292); common and widely distributed 8

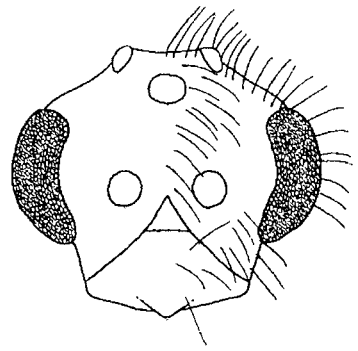


Fig. 292. Head of a male of *P. verenae* (Mato Grosso do Sul, Brasil, CWEM).

- Side of petiole mostly smooth and glossy; eye relatively small, diameter (frontal view) approximately equal to distance to lateral ocellus (Fig. 293); rarely collected, Panamá *fisheri* Mackay and Mackay

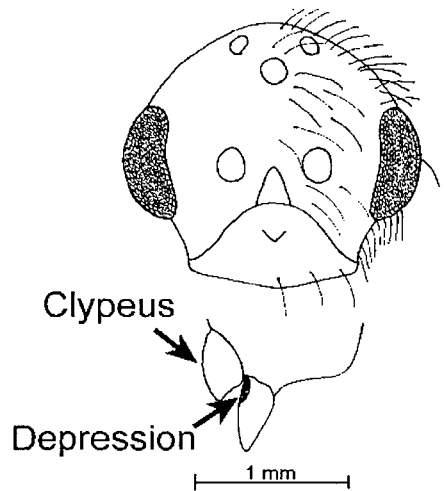


Fig. 293. Head of a paratype male of *P. fisheri* (CASC), as seen from the front and from the side.

8(7). Middle tibia without (or with fewer than 3) erect hairs; common and widely distributed; México south to Bolivia

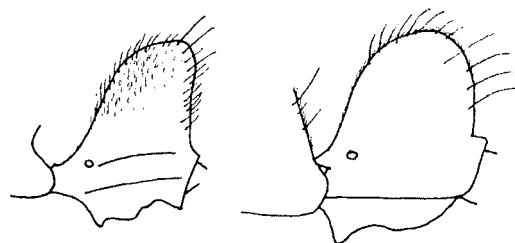
..... *verenae* (Forel)

- Middle tibia with abundant (> 3) erect hairs **9**

9(8). Middle tibia with ~ 5 erect hairs; posterior face of petiole slightly concave (Fig. 294, left); Panamá south to Brasil

..... *cavinodis* (Mann)
 - Middle tibia with ~ 10 erect hairs on outer surface; posterior face of petiole convex (Fig. 294, right); known only from Brasil

..... *latinoda* Mackay and Mackay



cavinodis

latinoda

Fig. 294. Petioles of males of *P. cavinodis* and *P. latinoda*.

10(2). Ocelli relatively large, diameter of median ocellus nearly twice distance between medial ocellus and lateral ocellus (Fig. 289)

11
 Ocelli relatively small, diameter of medial ocellus about 1/2 length of distance to lateral ocellus (Fig. 287)

11(10). Anterior margin of petiole nearly straight or convex (Fig. 295);

common and widely distributed from the USA south to Argentina

..... *villosa* (Fabricius)

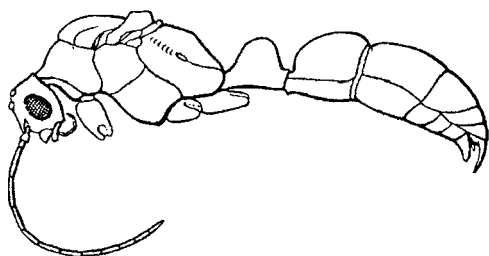


Fig. 295. Side view of a male of *P. villosa* (from Creighton, 1950).

- Anterior face of petiole concave; rarely collected; México south to Paraguay

..... *inversa* (F. Smith)⁷

12(10). The posterior lateral edges and usually the side of petiole with coarse rugae (Fig. 296)

13

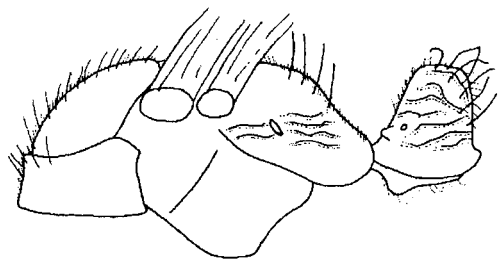


Fig. 296. Mesosoma and petiole of a paratype male of *P. lattkei* (Distrito Federal, Venezuela, CWEM).

⁷ The unknown male of *Pachycondyla curvinodis* would probably also key here.

- Side of petiole punctate (Fig. 291) or moderately smooth and glossy (Fig. 298), or occasionally with rugae **14**

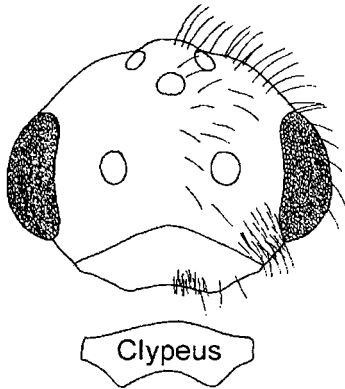


Fig. 297. Head of a male of *P. impressa* (Tungurahua, Ecuador, CASC). The inset shows the clypeus in frontal view.

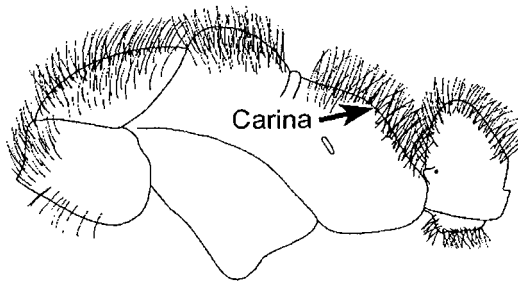


Fig. 298. Mesosoma and petiole of a male of *P. striata* (Santa Catarina, Brasil).

13(12). Anterior medial border of clypeus convex (Fig. 293); side of propodeum with distinct rugae (Fig. 296); known only from Venezuela ...
..... **latkei** Mackay and Mackay

- Anterior medial border of clypeus concave (Fig. 297); side of

propodeum often nearly completely lacking distinct rugae; widely distributed from Colombia south to Perú, east to Trinidad south to Paraguay **crassinoda** (Latreille)

14(12). Anterior medial border of clypeus concave (Fig. 297); common and widely distributed from México south to Bolivia
..... **impressa** (Roger)

- Anterior margin of clypeus convex (Fig. 293) or only weakly concave **15**

15(14). Anterior tibia with several erect or suberect hairs (Fig. 299, left); Brasil, Bolivia, Paraguay and Argentina **striata** F. Smith

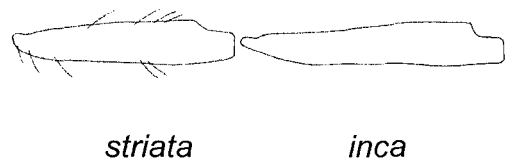


Fig. 299. Anterior left tibiae of males of *P. striata* (NHMW) and *P. inca* (MCSN).

- Anterior tibia without erect nor suberect hairs (Fig. 299, right); Perú and Bolivia
..... **inca** Emery ⁸

16(1). Mayrian furrows absent (Fig. 300) (*ochracea* species complex and part of *crenata* species complex) **17**

⁸ The unknown male of *P. purpurascens* would probably key to this couplet.

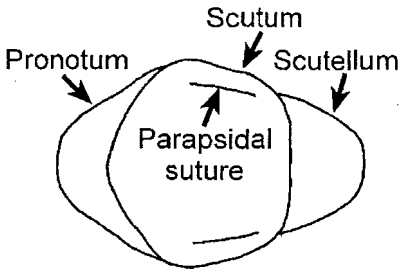


Fig. 300. Mesosoma of a male of *P. gilva*, as seen from above (Veracruz, México, CWEM).

- Mayrian furrows present and well developed (Fig. 301) **19**

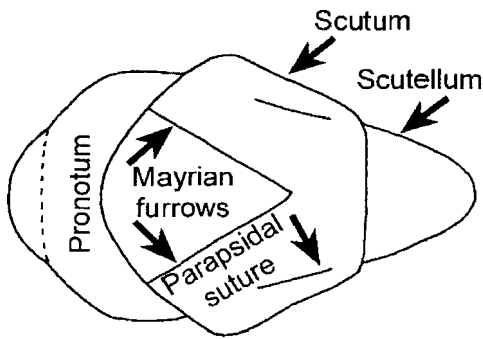


Fig. 301. Dorsum of the mesosoma of a male of *P. goeldii* (Amazonas, Colombia, CASC).

17(16). Grayish brown to brown; USA to Bolivia **18**
 - Yellow; Perú east to Guianas, south to Brasil and Bolivia .
 **oberthueri** Emery

18(17). Subpetiolar process poorly developed or absent (Fig. 302); USA south to Panamá **gilva** (Roger)

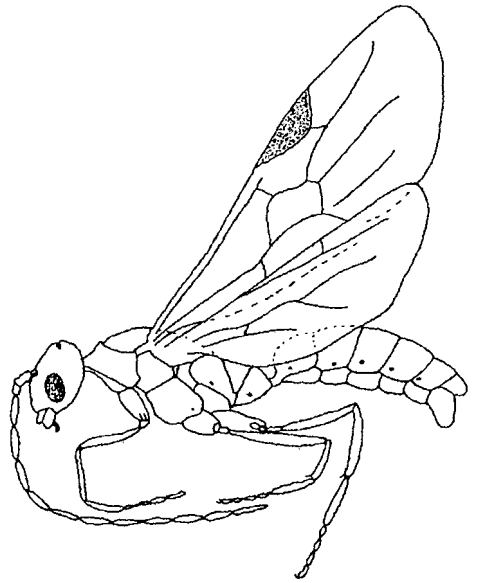


Fig. 302. Side view of a male of *P. gilva* (from Creighton and Tulloch, 1930).

- Subpetiolar process well developed (Fig. 303); Honduras south to Bolivia **constricta** Mayr

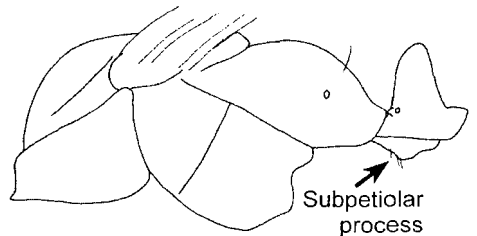


Fig. 303. Mesosoma and petiole of a male of *P. constricta* (Nariño, Colombia, MCZC).

19(16). Subpetiolar process angulate anteriorly (Fig. 304), or at least forming a rounded, anterior lobe, followed by a concave region (primarily *crenata* and *ferruginea* species complexes) **20**

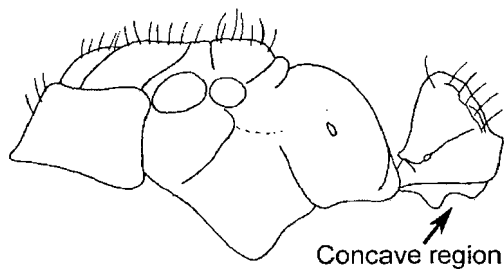


Fig. 304. Mesosoma and petiole of a male of *P. goeldii* (Amazonas, Colombia, CASC).

- Ventral surface of petiole with angulate anterior process, followed by a nearly straight surface (Fig. 305) **27**

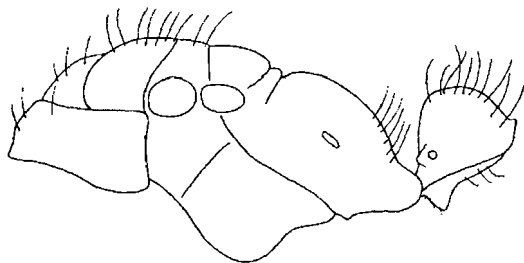


Fig. 305. Mesosoma and petiole of a male of *P. lineaticeps* (Managua, Nicaragua, CWEM).

20(19). Petiole narrowed dorsally (Fig. 306) **21**

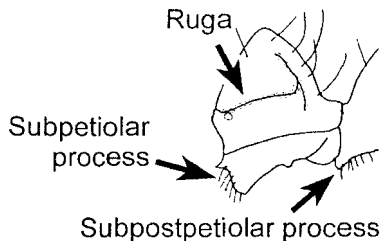


Fig. 306. Petiole of a male of *P. goeldii* (Pichincha, Ecuador, CWEM), as seen from the side.

- Petiole rounded dorsally (Fig. 310) with the anterior and posterior faces nearly parallel **24**

21(20). Posterior tibia with long (length mostly greater than diameter of tibia), yellow suberect hairs on extensor surface (Fig. 307); widely distributed in northern South America *goeldii* (Forel)

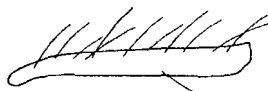


Fig. 307. Posterior left tibia of a male of *P. goeldii* (Amazonas, Colombia).

- Posterior tibia without erect or suberect hairs, or if present, mostly shorter than diameter of tibia (Fig. 308) **22**

22(21). Tibia with few erect or suberect hairs along entire length (Fig. 308); Pichincha, Ecuador *donosoi* Mackay and Mackay

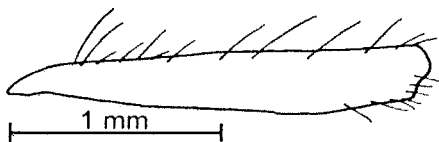


Fig. 308. Posterior left tibia of the paratype male of *P. donosoi*.

- Posterior tibia nearly without erect nor suberect hairs except possibly near spur (Fig. 309) 23

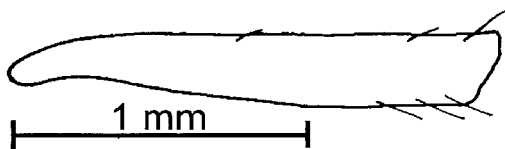


Fig. 309. Posterior left tibia of a paratype male of *P. rupinicola*.

23(22). Moderate sized, total length ~ 7 mm; Mayrian furrows meet medially (Fig. 630); known only from Panamá and Colombia

.... *rupinicola* Mackay and Mackay

- Tiny, total length ~ 4 mm; Mayrian furrows do not meet medially; known only from Ecuador (Napó)

..... *cernua* Mackay and Mackay

24(20). Ventral surface of petiole with two angulate regions (Fig. 310); México south to Bolivia and southern Brasil

unidentata (Mayr)

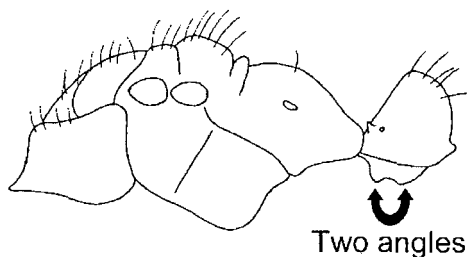


Fig. 310. Mesosoma and petiole of a male of *P. unidentata* (Granada, Nicaragua, CWEM).

- Ventral surface of petiole with single angle (Fig. 318) with convex rounded region posteriorly

..... 25

25(24). Surface of clypeus as seen in profile, broadly convex (Fig. 311); common and widely distributed from México south to Paraguay and Argentina

crenata Roger

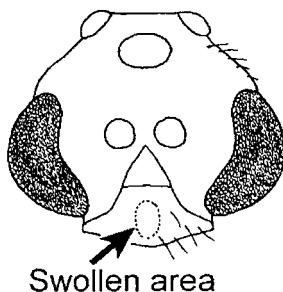


Fig. 311. Head of a male of *P. crenata* (Costa Rica, USNM).

- Surface of clypeus swollen medially (Fig. 312), forming a definite angle (side view); rarely collected, Guatemala south to Argentina

..... 26

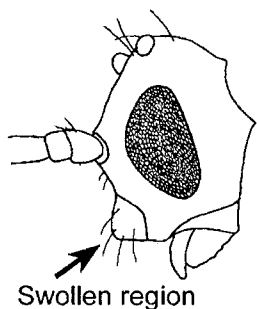


Fig. 312. Head of a male of *P. rugosula*, as seen from the side (Reserva Tambopata, Perú, LACM).

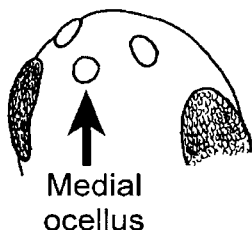


Fig. 313. Head of a male of *P. moesta*, seen obliquely from above and from the left side (Matagalpa, Nicaragua, CWEM).

26(25). Lower mesopleuron mostly smooth (Fig. 594) *moesta* Mayr
 - Lower mesopleuron mostly sculptured (Fig. 625)
 *rugosula* (Emery)

27(19). Posterior edge of subpetiolar process terminating in sharp point; eastern USA
 *chinensis* (Emery)⁹

⁹ The unknown males of *P. ferruginea* from Central and South America would probably key here, as well as males of related species.

- Posterior edge of subpetiolar process not terminating in sharp point 28

28(27). Medial ocellus larger (Fig. 314), maximum diameter greater than greatest width of scape; yellowish brown; México south to Panamá
 *lineaticeps* Mayr

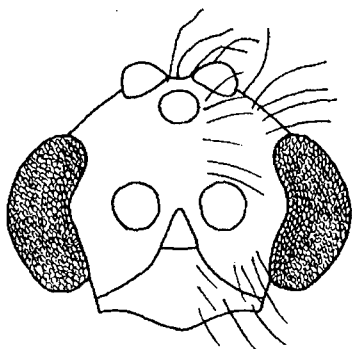


Fig. 314. Head of a male of *P. lineaticeps* (Managua, Nicaragua, CWEM).

- Median ocellus smaller (Fig. 315), maximum diameter equal to or less than width of scape 29

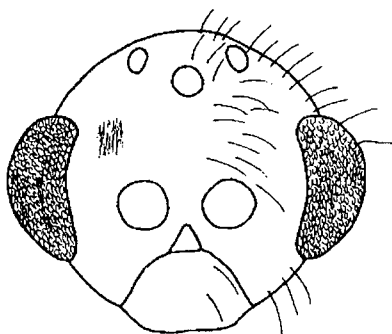


Fig. 315. Head of a male of *P. bugabensis* (Alajuela, Costa Rica, CASC).

29(28). More than 4 hairs on middle tibia raised from surface, suberect (Fig. 316) **30**

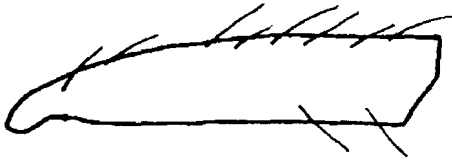


Fig. 316. Middle tibia of a male of *P. harpax* (Baños, Ecuador, CWEM).

- Three or fewer hairs of middle tibia raised from surface (Fig. 317) **32**



Fig. 317. Middle tibia of a male of *P. arhuaca* (Soberanía National Park, Panamá, CWEM).

30(29). Small (total length < 5 mm); rarely collected; México, Costa Rica and Panamá

..... *gilloglyi* Mackay and Mackay

- Larger (TL > 5 mm); widely distributed and common ... **31**

31(30). Anepisternum with nearly horizontal striae (Fig. 318); USA south to Paraguay, Jamaica

..... *harpax* (Fabricius)

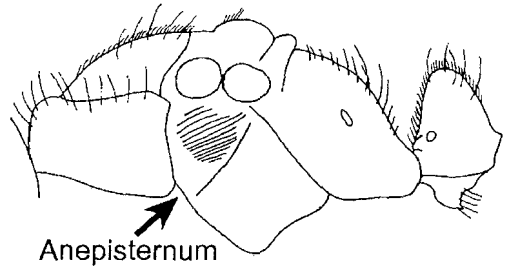


Fig. 318. Mesosoma and petiole of a male of *P. harpax* (Baños, Ecuador, CWEM).

- Anepisternum without horizontal striae (Fig. 319); Nicaragua south to Ecuador

..... *bugabensis* Forel

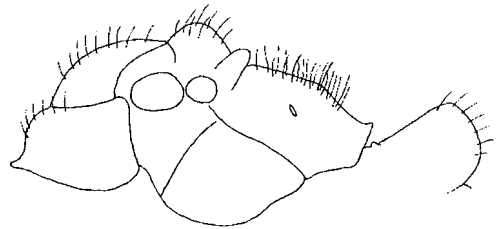


Fig. 319. Mesosoma and petiole of a male of *P. bugabensis* (Alajuela, Costa Rica, CASC).

32(29). Anterior lobe of subpetiolar process poorly developed (Fig. 320), barely evident; Costa Rica south to Brasil

..... *arhuaca* (Forel)

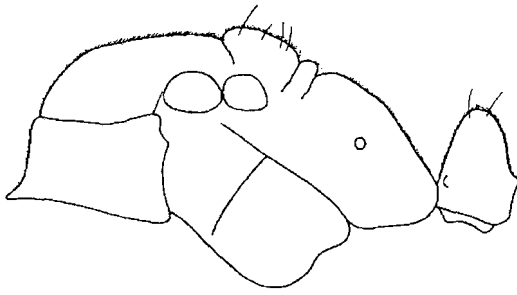


Fig. 320. Mesosoma and petiole of a male of *P. arhuaca* (Soberanía, Panamá, CWEM).

- Anterior lobe of subpetiolar process well developed (Fig. 321) 33

33(32). Posterior edge of subpetiolar lobe rounded (Fig. 325) or straight 34

- Posterior edge of subpetiolar process angulate (Fig. 321); Costa Rica south to Brasil, Caribbean region *succedanea* (Roger)

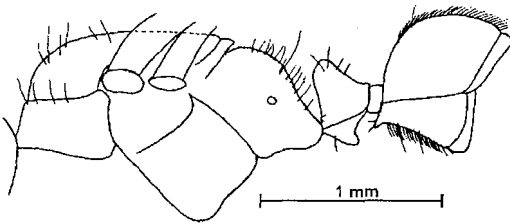


Fig. 321. Mesosoma and petiole of a male of *P. succedanea* (Tingo Maria, Perú, CWEM).

34(33). Anterior edge of subpetiolar process angulate (Fig. 322); legs, mandibles, palps, pronotum and scutum yellowish brown or reddish brown, remainder dark brown or black

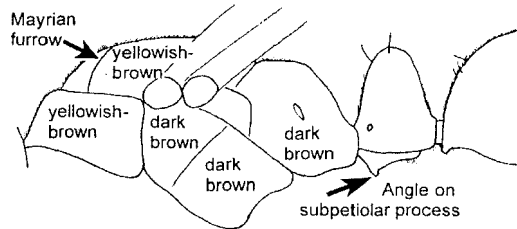


Fig. 322. Mesosoma and petiole of a male of *P. pergandei* (Perú, MCZC).

- Anterior edge of subpetiolar process rounded (Fig. 325) or weakly angulate; concolorous dark brown .. 36

35(34). Clypeus with raised region posteriorly, when viewed in profile (Fig. 323); Colombia, Venezuela and Perú *conicula* Mackay and Mackay

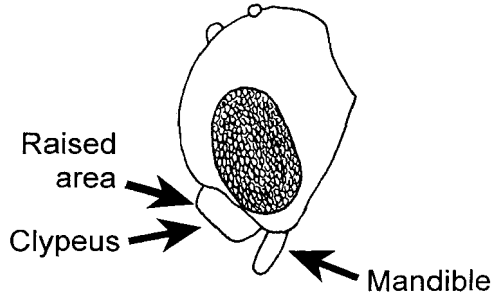


Fig. 323. Head of a paratype male of *P. conicula* as seen from the side.

- Surface of clypeus convex, but without noticeably raised area posteriorly, when viewed in profile (Fig. 324); Guatemala south to Perú *pergandei* (Forel)



Fig. 324. Head of a male of *P. pergandei* (Perú, MCZC) as seen from the side.

36(34). Subpetiolar process shallow (Fig. 325), about 0.9 mm in depth; common and widely distributed, United States to Argentina, Caribbean **37**

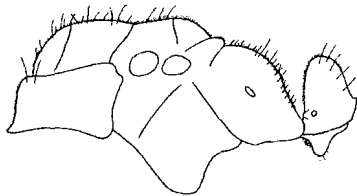


Fig. 326. Mesosoma and petiole of a male of *P. stigma* (Orange Walk, Belize, CWEM).

- Subpetiolar process deeper (Fig. 326), about 0.11 mm; not as common, known only from Costa Rica and Panamá *cognata* (Emery)

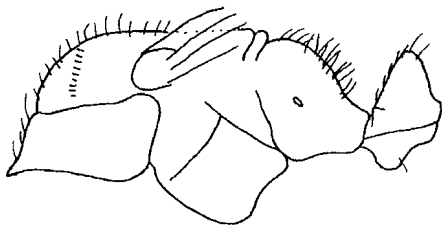


Fig. 325. Mesosoma and petiole of a male of *P. cognata* (Santa Clara, Costa Rica, CWEM).

37(36). Total length usually over 5 mm; common and widely distributed, USA south to Argentina; Caribbean ..
..... *stigma* (Fabricius)

- Total length usually less than 5 mm; rarely collected, Panamá south to Brasil *gilberti* (Kempf)

*List of species**Pachycondyla aenescens* Mayr

Figures - **Worker**: 22 (propodeum), 29 (metasternal process), 30 (petiole and subpostpetiolar process), 34 (antennal scape), 282 (side view), 327 (head); **Female**: 328 (side view), 329 (head); **Male**: 31 (wing), 288 (head), 330 (petiole); **Map 1**

aenescens species complex

Pachycondyla aenescens Mayr, 1870:396 ♀ Colombia (without locality) [lectotype worker, 13 paralectotype workers, 3 paralectotype males seen, NHMW]; Emery, 1890b:42 ♀; Forel, 1899:10 ♂; *Euponera* (*Mesoponera*) *aenescens*: Emery, 1901a:47; *Mesoponera aenescens*: Kempf, 1972:141; *Pachycondyla aenescens*: Bolton, 1995:302

DISCUSSION**Worker**

The worker is a *moderate sized* ant (total length about 9 mm). The anterior border of the *clypeus* is *indented medially with the region depressed*; the *eye* is *relatively large* and is located about one diameter from the insertion of the mandible (side view). The scape extends about two funicular segments past the posterior lateral corner of the head. The *malar carina* is *not developed* anterior to the eye, but is represented by a swollen region near the base of the mandible. The *pronotal shoulder* is *swollen* and nearly forms a carina; the *metanotal suture* is *depressed* on the dorsum of the mesosoma and divides the integument. The *petiole* is

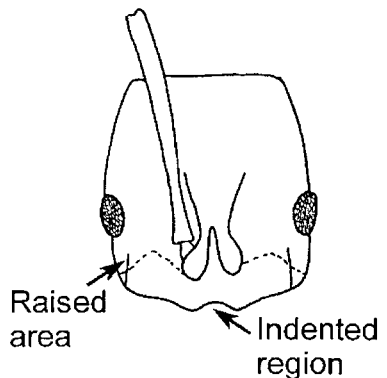


Fig. 327. Head of a worker of *P. aenescens* (Colombia, CWEM).

noticeably narrowed toward the apex. The *stridulatory file* is *present* on the dorsum of the gaster. The metasternal process consists of two widely spaced triangular lobes, similar to those of *P. schoedli* and *P. fauveli*.

Erect hairs are moderately abundant on all surfaces including the dorsum of the mesosoma and the petiole. *Erect hairs are absent or sparse* (1 - 2) on the scape.

Most of the *mandible is roughly sculptured*, but it is smooth and shiny near the apex. The head and mesosoma are mostly punctate with some evidence of striae, especially on the medial part of the clypeus (longitudinal), the dorsum of the head, the mesopleuron and the side of the propodeum. The petiole is finely punctate and some areas, especially the posterior face, are partially smooth and shiny. The gaster is very finely sculptured and mostly shiny.

The worker is mostly black with the appendages slightly lighter in color.

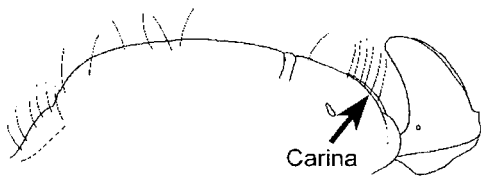


Fig. 328. Mesosoma and petiole of a female of *P. aenescens* (Perú, NHMW).

Female

The female is a *large* (total length 12 - 13 mm) black ant, similar to the worker, with the *malar carina being slightly developed* near the base of the mandibles. The mandibles have about 12 teeth, with alternating large and small teeth. The anterior border of the clypeus is convex, but with the medial section being notably concave. The

eyes are large, with the maximum diameter (0.5 - 0.7 mm) being greater than the distance to the anterior edge of the head (side view). The *ocelli are small* (lateral 0.08 mm - maximum diameter of medial ocellus 0.13 mm), the medial ocellus is located about two diameters from the lateral ocellus. The *scape (2.76 mm) extends nearly the first two funicular segments* past the posterior lateral corner. The *pronotal shoulder is swollen* and nearly forms a carina; the *propodeal spiracle is elongated*. The shape of the *petiole is quite different from that of the worker*, being narrower with a slightly concave anterior face and a broadly rounded posterior face, which meets the anterior face at the anterior edge. The posterior lateral margins are sharp. The subpetiolar process consists of a thick lobe.

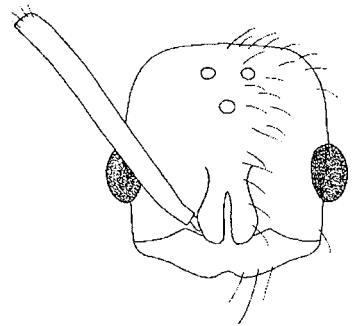


Fig. 329. Head of a female of *P. aenescens* (Perú).

Erect hairs are scattered on most surfaces, moderately long (most about 0.2 mm in length, a few up to 0.6 mm) and are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, the scape has a few scattered suberect hairs,

moderately abundant erect hairs are present on the mesosoma, petiole and gaster; the hairs on the legs are mostly suberect.

The *mandibles are finely striate*, with scattered elongate punctures, the middle of the clypeus is longitudinally striate, the dorsum of the head is finely and densely punctate, the sculpture on the dorsum of the mesosoma is similar, except the punctures are coarser on the pronotum, the sides of the mesosoma are mostly finely striolate and moderately shining, the petiole is finely punctate and shining, as is the gaster.

Male

The male is a *large* (total length 12 mm) black ant. The *anterior clypeal border is weakly convex* and not concave medially as in the worker and female (a probable male from Tiputini, Ecuador has a concave anterior border). The mandibles are tiny. The *ocelli are large*, approximately as large as the length between them. The *petiole is thick* when viewed in profile, with a rounded apex.

Erect hairs are sparse with a few on the dorsum of the head, several on the ventral surface of the head, scattered on the mesosoma, petiole and gaster. Appressed pubescence is very fine and abundant on all surfaces, giving the surfaces a pruinose appearance.

Surfaces are coriaceous or finely punctate, but weakly shining.

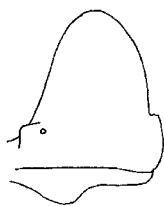


Fig. 330. Petiole of a paralectotype male of *P. aenescens*.

COMPARISON

The workers of *P. aenescens* could be confused with *Pachycondyla harpax* but can be easily separated as the metanotal suture of *P. harpax* does not break the integument on the dorsum of the mesosoma. *Pachycondyla aenescens* differs from *P. carbonaria* in lacking the shiny appearance of the dorsum of the head and the pronotum although bluish or greenish reflections may be present. *Pachycondyla aenescens* is very similar to *P. schoedli*. It can be separated by the roughly sculptured and dull mesopleuron, which is smooth and glossy in *P. schoedli*. The shape of the petiole would separate *P. aenescens* from *P. fisheri* and *P. luteola*, in which the petiole is not narrowed gradually toward the apex. The shape of the petiole would separate *P. aenescens* from several other species including *P. striata*, *P. impressa* and *P. crassinoda* in which the petiole is rectangular-shaped. *Pachycondyla aenescens* could be confused with *P. eleonora* and *P. fauveli*, but differs in that the petiole is broader than long when viewed from above (longer than broad *P. eleonora* and *P. fauveli*).

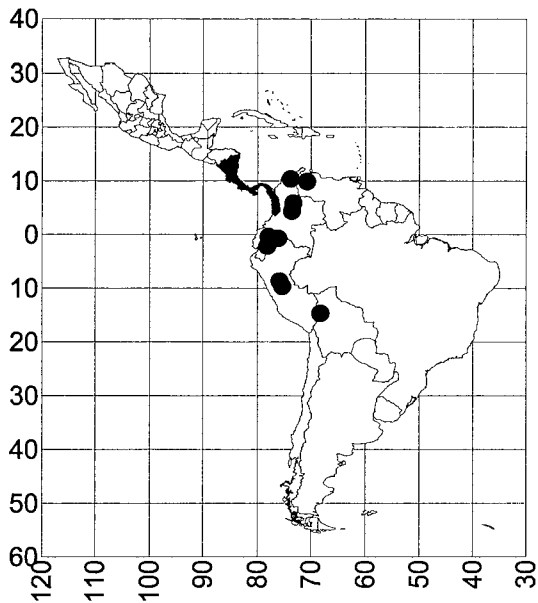
The female of *P. aenescens* would probably be nearly identical to what would be expected of the female of *P. emiliae* (unknown), probably differing in having a concave medial border of the clypeus (expected to be completely convex in the unknown female of *P. emiliae* based on the form of the worker). The propodeal spiracle may be circular in the female of *P. emiliae*, not elongated as in *P. aenescens*. Otherwise they would be expected to be similar, especially as the shape of the petiole of the female of *P. aenescens* is identical to that of the worker of *P. emiliae*. This shows the apparent close relationship between the *aenescens* and *crassinoda* species complexes and the lack of importance of the shape of the propodeal spiracle in the phylogeny of the species of *Pachycondyla*.

Two workers of *P. aenescens* in the LACM (Trujillo, Venezuela, via Boconó Guaramacal, Parque Laguna de los Cedros, 12-vi-1986, J. Lattke) are somewhat intermediate between *P. schoedli* and *P. aenescens*, but are considered to be *P. aenescens* as they have punctate heads (but smoother and more shining with less dense punctures than the typical *P. aenescens*) and the mesopleuron is completely striate, not mostly smooth as in *P. schoedli*.

DISTRIBUTION

NICARAGUA: *Matagalpa* (Hotel Selva Negra, [139 km N Matagalpa]). COSTA RICA: *Alajuela* (Forel, 1899; Emery, 1890b, Emery, 1894b); *Puntarenas* (Monteverde Cloud Forest Reserve [Longino and Nadkarni,

1990], 6 k SW Estación La Cruces, 11 k SW Estación Biológica Las Cruces, Estación Biológica Alturas, 4 k NNW Estación Biológica Alturas, Monteverde); *San José* (San Isidro, 19kN San Isidro [Pan American Highway], Estación Cuericí [4.6 k E Villa Mills]); *Guanacaste* (Pitilla Field Station, Cacao Field Station, Rincón de Vieja, La Palma); *Heredia* (16 k SSE La Virgen [INBio], 8 k N Volcán Barba, 13 k N Volcán Barba); *Cartago* (9 k E Paraíso). PANAMA: *Bocas del Toro* (15 k N Hato Grande, Las



Map 1. *Pachycondyla aenescens*.

Nubes); *Chiriquí* (13 k N Hato Chamí, 2.5 K N Boquete, 8.4 k W Boquete [Parque Nacional, Volcán Barú], 12 k NE Cerro Prado, 5.6 k NE Boquete, Hartman Finca, Finca La Suisse, Cerro Hornito, Parque Amistad, Reserva La Fortuna, above Las Nubes, above Cerro Punta, 12 k NE Santa Clara); *Colón* (Santa Rita Range); *Darién*

(Caña Station, Pirre Trail); *Panamá* (Parque Soberanía); *Veraguas* (6.1 k N Santa Fé [Cerro Tute]). COLOMBIA: *Valle del Cauca* (Bosque Yotoco, 6 mi W Cali); *Magdalena* (Santa Marta Mts., Vista Nieve, Sierra Nevada de Santa Marta, Cincinati, 2 k NW San Pedro); *Boyacá* (Villa de Leiva); *Cundinamarca* (Laguna Pedro Palo). ECUADOR: *Pichincha* (road from Nono to Nanegalito [km 44]); *Napo* (Tiputini Biodiversity Station); *Morona Santiago* (5 k S Macas). PERU: *Huánuco* (Monsón Valley, Rio Charapa). VENEZUELA (see above). BOLIVIA: *La Paz* (Suri).

HABITAT

These ants have been collected in wet tropical rain and cloud forest as well as montane forest, to dry oak forest at 1150 - 2300 m.

BIOLOGY

One colony was nesting under a stone. Alate females were collected in a nest in August (Colombia). Loose winged sexuals were collected in June (Panamá), July (Costa Rica [Forel, 1908]), between January and July (Ecuador, canopy fogging), August (Costa Rica) and December (Ecuador). Dealate females were extracted from litter in June (Costa Rica, Panamá), others were collected in October (Perú) and December (Colombia). Three dealate females were collected in a rotten log, suggesting pleometrosis (multiple females forming a new nest). Workers are fast and wary. Specimens are often collected in pitfall traps or extracted from litter. These ants are parasitized by *Apocephalus constrictus* (Phoridae).

ETYMOLOGY

The name of this species comes from the Latin word *aeneus*, which means brazen and refers to the color.

***Pachycondyla agilis* (Forel)**

Figures - **Worker**: 119 (head), 211 (side view); **Map 2**

rostrata species complex

Neoponera (Eumecopone) agilis Forel, 1901a:335-336, ♀, USA, California [locality in error, listed as Cal., possibly Col. indicating Colombia?]; *Pachycondyla agilis*: Bolton, 1995:302

Neoponera (Eumecopone) goyana Borgmeier, 1937:230-231, Figs 11-14, ♀, Brasil, Goiás: Campinas; *Neoponera (Eumecopone) goyana*: Brandão, 1991:360; *Pachycondyla goyana*: Bolton, 1995:305 **new synonym**

Neoponera (Eumecopone) golbachii Kusnezov, 1969:36, ♀, Argentina, Puerto Iguazú (transferred from synonymy with *P. goyana*, by Kempf, 1978:36)

DISCUSSION**Worker**

(Based on Forel, 1901a and Borgmeier, 1937): the worker is a *moderately large* (the lengths of the mesosoma and gaster are 10.5 mm, the length of the head, including the mandibles 4.8 mm, length of mandibles 2.3 mm) dark ant with the mesosoma, gaster, antenna, clypeus and legs in part reddish brown and petiole dark brown. The mandibles are yellowish ferruginous. The *mandibles are extremely long* with 18 *teeth* or denticles, which alternate between large and small. The clypeus is convex anteriorly; the head is narrowed anteriorly, with the posterior corners rounded and the posterior border straight. The *malar carina is developed*, but does not reach the eye. The eyes are located slightly anterior

to the middle of the head and are strongly convex (diameter 0.5 mm). The *scape extends about 1/3 its length past the posterior lateral corner* of the head. The *pronotal shoulder is completely rounded* without a carina, the *metanotal suture is deeply impressed* on the dorsum of the mesosoma (similar to *P. constricta*) and breaks the sculpture; the *propodeal spiracle is slit-shaped*. The petiole is wider than tall with the anterior face ascending to the apex and is posteriorly truncated. The subpetiolar process is triangular anteriorly followed by a broad con-cave region.

The body is completely covered with a fine yellowish pubescence. The pilosity is sparse, short on the head and the antenna, sparse on the mesosoma, but abundant on the gaster and the anterior face of the mandibles. The middle of the clypeus has two

agilis southern Brasil, Paraguay, Argentina

short hairs.

The head is covered with foveolate punctures; the clypeus is covered with longitudinal striae (not present in the description of *P. agilis*) and with two or three transverse coarse rugae. The mandibles are shiny with sparse punctures. The mesosoma has punctures finer than those on the head; the propodeum has fine transverse striae. The petiole is reticulated and truncated, the apex has a brilliant smooth area. The gaster is finely punctate and subopaque.

Female and Male

The female and male are unknown, although Kempf (1978) lists an alate female from Brasil. Kusnezov (1969) mentions that he collected a ergatotype in a footnote, which is deposited in the Instituto Miguel Lillo, # 4792.

COMPARISON

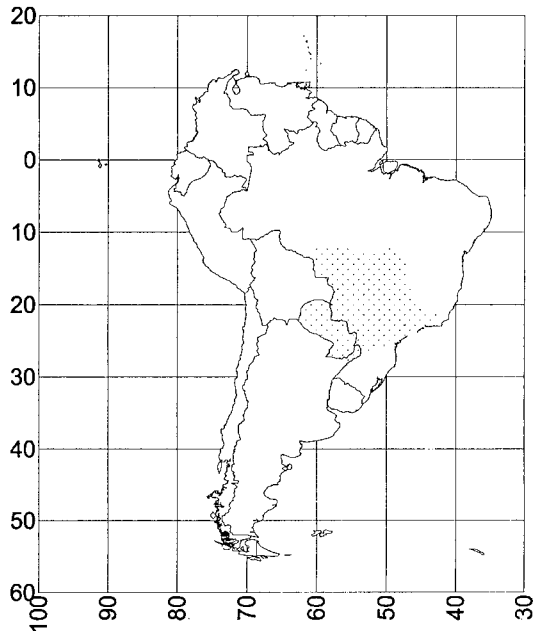
There are only two species of *Pachycondyla*, which have greatly elongated mandibles: *P. agilis* and *P. rostrata*. *Pachycondyla agilis* can be separated from *P. rostrata*, by the lack of a pronotal carina. Forel also mentioned that the eyes are larger than those of *P. rostrata*, but this may not be the case, as the illustrations of Borgmeier (1937) demonstrate relatively large eyes and the measurement of the eye of *P. rostrata* is slightly larger.

The holotype of *P. agilis* is apparently lost and the holotype of *P. goyana* was not available. Borgmeier (1937) distinguishes *P. goyana* from *P. rostrata*, but not from *P. agilis*. The

two taxa do not appear to differ significantly, based on the descriptions and *P. goyana* is considered to be a synonym of *P. agilis*. It is doubtful that *P. agilis* can be separated from *P. rostrata*, but sufficient material is not available to evaluate the variation in the two species. The specific distinction of the three species was doubted by Kempf (1978).

DISTRIBUTION

Unknown type locality, listed as California in the original description (Forel, 1901a). BRASIL: *Goiás* (Campinas); Kempf (1978) lists: BRASIL: *São Paulo* (Monte Aprazivel); *Rio de Janeiro* (São Silvestre); *Goiás* (Goiânia, Campinas, 7 k S Anápolis); *Mato Grosso* (Sinop, Kempf, 1978).



Map 2. *Pachycondyla agilis*.

agilis southern Brasil, Paraguay, Argentina

PARAGUAY (Kempf, 1972). ARGENTINA: *Misiones* (Puerto Iguazú [Kusnezov, 1969]).

HABITAT

Kempf (1978) mentioned that they occur in cerrado [dense scrub vegetation] in Brasil. Kusnezov (1969) collected three specimens along a path in a tropical rain forest.

BIOLOGY

Kempf (1978) lists an alate

female being captured in March (Brasil). Kusnezov (1969) collected two workers and a ergatogyne female on a path, foraging on the soil surface. Otherwise nothing is known of this unusual species.

ETYMOLOGY

The name of this species comes from the Latin word *agilis*, which means nimble, presumably referring to the activity of this species.

Pachycondyla antecurvata new species

Figures - **Worker**: 331 (side view), 332 (head); **Map** 3

crenata species complex

DISCUSSION & DESCRIPT.

Worker

The *worker* is a small (total length 7 mm) black ant with dark brown appendages. The mandible has approximately 14 teeth which alternate in size. The anterior margin of the clypeus is convex with a poorly developed medial lobe, which overhangs the anteclypeus. The head length is 1.75 mm; the head width is 1.55 mm. The *malar carina* is well defined. The maximum eye diameter is 0.5 mm and the eye is located less than one diameter from the anterior

margin of the head. The scape (1.7 mm) extends slightly more than the first funicular segment past the posterior lateral corner of the head. The sides of the head are nearly straight and narrowed anteriorly, the posterior lateral corners are angulate and the posterior margin is concave. The *pronotal carina* is well developed and overhangs the side of the pronotum. The *metanotal suture* is not depressed on the dorsum of the mesosoma and is barely evident. The *propodeal spiracle* is slit-shaped. The *anterior face of the petiole* is vertical and straight, but at a point slightly

antecurvata Costa Rica to Perú and northern Brasil

more than one half of the height, it turns posteriorly and meets the posterior, broadly rounded face near the midpoint. The subpetiolar process consists of a small ventrally directed anterior angle, with the remainder of the process diminishing in width posteriorly. The anterior face of the postpetiole is vertical and meets the dorsal face at an obtuse angle. The *stridulatory file* is well developed on the second pretergite. The arolia are present, but only moderately developed.

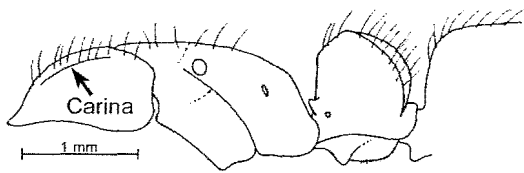


Fig. 331. Mesosoma and petiole of the holotype worker of *P. antecurvata*.

Erect and suberect hairs are abundant on the clypeus, dorsal and ventral surfaces of the head, sides of the head and the posterior margin, the shaft of the scape and dorsum of the mesosoma, dorsum of the petiole, all surfaces of the gaster and all the parts of the legs. Appressed silver pubescence is present on the head, dorsum of the mesosoma, dorsum and posterior faces of the petiole and all surfaces of the gaster.

The *mandibles* are finely striate with scattered punctures and are weakly shining. The dorsum of the head and dorsum of the mesosoma are

covered with dense fine punctures and are mostly dull; the side of the pronotum is weakly sculptured and moderately shining. The mesopleuron is sculptured, but weakly shining; the side of the propodeum is mostly covered with fine horizontal striae. All surfaces of the petiole are densely but finely punctate and weakly shining and the gaster is finely punctate and moderately shining.

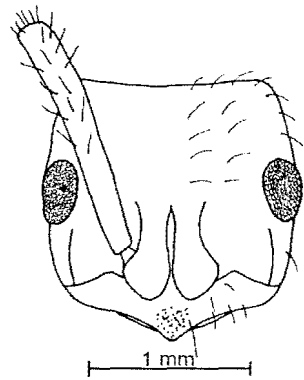


Fig. 332. Head of the holotype worker of *P. antecurvata*.

Female and male

Unknown.

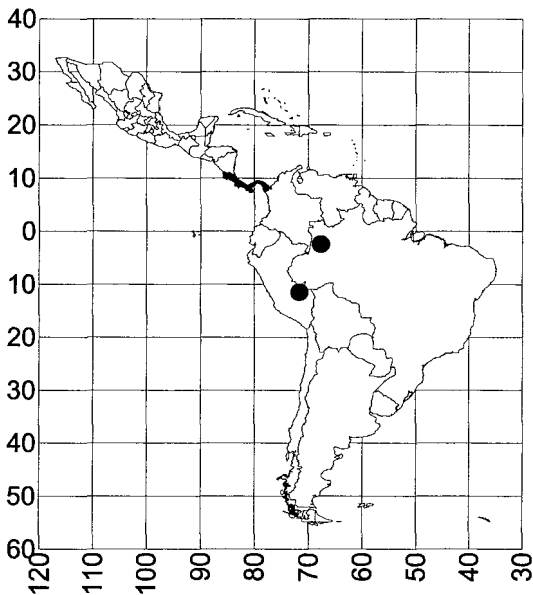
COMPARISON

The worker of *P. antecurvata* is similar to that of *P. unidentata*. *Pachycondyla antecurvata* can be distinguished by the form of the petiole, in which a short oblique dorsal face is present, with the highest point being just anterior to the midpoint of the petiole. In *P. unidentata* the highest point is near the anterior edge of the petiole where the vertical anterior face meets the broadly

rounded posterior face. *Pachycondyla antecurvata* could also be confused with *P. carinulata*, but the petiole is different with the highest point being anterior to the midpoint, not posterior to the midpoint as in *P. carinulata*.

DISTRIBUTION

COSTA RICA: *Heredia* (La Selva Biological Station, Puerto Viejo). **PANAMA:** *Chiriquí* [LACM]. **PERU:** *Madre de Dios* (Río Tambopata Reserve [LACM]). **BRASIL:** *Amazonas* (Ilha de Curari Várzea [LACM]).



Map 3. *Pachycondyla antecurvata*.

HABITAT

These ants were collected in wet tropical rain forest.

BIOLOGY

The type series was collected from a canopy-fogging sample, from a malaise trap in *Coumarouna oleifera* [Fabaceae] and on foliage of *Byttneria aculeata* [Sterculiaceae].

ETYMOLOGY

From Latin, *ante* meaning before and *curvus* meaning bent, referring to the bend on the apex of the petiole, which is found anterior to the midpoint.

TYPE SERIES

Holotype worker (INBio, # INB0003207598) and one paratype worker (CWEM, # INB0003207503), COSTA RICA, Heredia: Est. Biol. La Selva, 5-150m, 12°26'N 84°01'W, INBio-OET; PROJECT ALAS, canopy fogging sample, 3-Nov-1994, FVK / 32 / 01-40 (holotype), 19 Oct-1994. FOT / 26 / 01-40 (paratype); additional paratypes from near Puerto Viejo, 19-26 June 1995, D. R. Perry; 3 k S Puerto Viejo, 10°26'N 84°01'W, 22.iii.1980, H. A. Hespeneide; Puerto Viejo, 15 May 1974, R. L. Jeanne (LACM).

Pachycondyla apicalis (Latreille)

Figures - **Worker**: 3 (palps), 4 (coxal cavity), 5 (metasternal process), 18 (head, side view), 20 (petiole), 43 (larva), 166 (head, frontal view), 170 (side view); **Female**: 333 (side view), 334 (head); **Male**: 42 (forewing), 284 (head, frontal & side view), 290, 335 (side view); **Map** 4

apicalis species complex

Formica apicalis Latreille, 1802:204, plate 7, Fig. 42A, ♀, South America; *Ponera apicalis*: Smith, 1858:97; *Pachycondyla apicalis*: Mayr, 1863:439; Forel, 1899:11; *Neoponera apicalis*: Emery, 1901a:47; Wheeler and Wheeler, 1952:615, larva; *Neoponera (Neoponera) apicalis*: Emery, 1911:72; Mann, 1916:410; *Pachycondyla apicalis*: Bolton, 1995:302; Wild, 2005:5-9

Formica flavicornis Latreille, 1802:202, plate 7, figs. 42B, 43, ♀, ♀, nec Fabricius, 1798; *Ponera flavicornis*: Lepeletier, 1836; *Pachycondyla flavicornis*: Mayr, 1863:439, Dalla Torre, 1893:33; *Neoponera flavicornis*: Emery, 1901a:47 (synonymy by Brown, 1957:230)

Neoponera Latreillei Forel, 1905:161, ♀, ♀, Surinam [new name for the junior homonym of *Formica flavicornis* Fabricius, 1798 which is synonym of *Atta sexdens* (Forel, 1905:161)], [lectotype worker, 1 paralectotype worker, 2 paralectotype females seen, MHNG]; Wheeler and Wheeler, 1952: 613-614, larvae; variety of *obscuricornis*: Emery, 1911:72 (synonymy by Brown, 1957:230)

Neoponera obscuricornis race *latocciput* Forel, 1921:132-133, ♀, ♀, Ecuador, Quito [lectotype worker, 2 paralectotype workers, lectotype female seen, MHNG]; *Pachycondyla obscuricornis* race *latocciput*: Bolton, 1995:306 (synonymy by Wild, 2005:5)

DISCUSSION

Worker

This species is easily recognized, even in the field, as being a common *moderately large* (total length ~ 12 mm) *black* ant with a *yellow-tipped funiculus*. The *eyes are large* with a diameter greater than the distance to

the insertion of the mandible and occupy about $\frac{1}{3}$ of the length of the side of the head (side view). A *well-defined malar carina* is present between the anterior edge of the eye and the clypeus. The *mesosoma is weakly depressed at the metanotal suture*; the *petiole is thick* and cuboidal-shaped when viewed in

profile. The *stridulatory file* is present on the dorsum of the gaster, but is poorly defined. The metasternal process consists of two widely spaced triangular lobes, with *horizontal striae on the inner posterior surface*. Specimens from Colombia often have metasternal lobes similar to those of *P. verenae* with the striae on the posterior face being more oblique and the inner distal half of the process being concave.

Erect hairs are sparse and mostly restricted to the head and the gaster; a few suberect hairs are present on the flexor surface of the distal half of the tibiae.

The *mandibles* are moderately shining, with fine striate, the remainder of the ant is densely, but finely punctate with *all surfaces dull*.

This common attractive ant is mostly black, except for the yellow distal half of the funiculus.

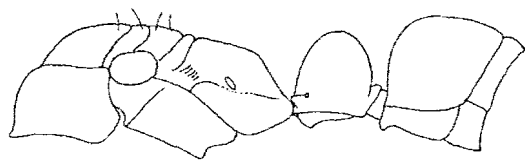


Fig. 333. Mesosoma, petiole and postpetiole of a female of *P. apicalis* (Grenada, Nicaragua, CWEM).

Female

The female is a *large* (total length 13 mm) *dull black* ant with approximately the *last five funicular segments yellow*. The remainder of the ant is similar to that of the workers, except three ocelli are well developed

and the mesosoma is adapted for flight.

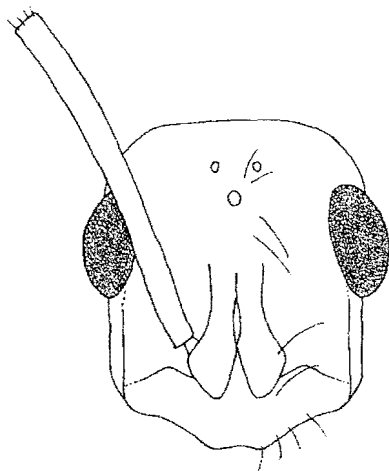


Fig. 334. Head of a female of *P. apicalis* (Petén, Guatemala, CWEM).

Male

The male (undescribed) is a dark ferrugineous brown ant of moderate size (total length 10 mm) with the *entire funiculus being pale brown*

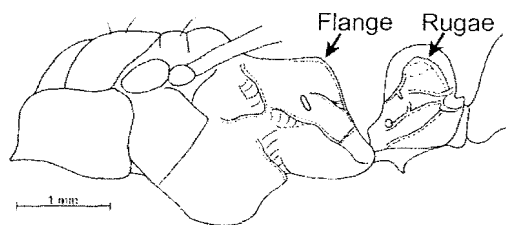


Fig. 335. Mesosoma and petiole of a male of *P. apicalis* (México, Veracruz, CWEM).

(flesh-colored). The length of the head is 1.5 mm, the width (posterior to the eye) is 1.2 mm, the scape is short

(0.35 mm) and the eye is large (0.95 mm). The shape of the petiole is similar to that of the worker, but differs in having the *side of the petiole covered with irregular rugae*.

Erect hairs are sparse with a few present on the clypeus, dorsum of the head, medial part of pronotum, dorsum of the mesosoma and ventral surface (a few hairs are present on the posterior dorsal surface) of the gaster.

Most surfaces of the male are dull and finely punctured with poorly defined striae. The sculpture of the side of the petiole is characteristic of this species, covered with *coarse wrinkle-like rugae*.

COMPARISON

There are only a few species of *Pachycondyla* in which the workers lack erect hairs on the dorsum of the mesosoma (*P. magnifica*, *P. bucki*, *P. apicalis*, *P. obscuricornis* and *P. verenae*). Of these species, three have very large eyes, which occupy more than 1/3 of the side of the head (*P. apicalis*, *P. obscuricornis* and *P. verenae*). *Pachycondyla apicalis* can nearly always be separated from the other two species with large eyes, as at least part of the funiculus of the worker, female and even the male is yellow (or pale brown in the male). This characteristic can be easily seen in the field. *Pachycondyla apicalis* could be confused with the closely related *P. cooki*, which also has a yellow-tipped funiculus, but *P. cooki* also has abundant erect hairs on the dorsum of the mesosoma, which are lacking in *P. apicalis*. The funiculi of the worker, female and male of *P.*

verenae (and the worker of *P. obscuricornis*) are usually dark brown, but may be reddish brown near the apex, but are never yellow. The posterior lateral edge of the petiole of *P. apicalis* is broadly rounded into the posterior face, whereas it is mostly angulate in the petiole of *P. verenae*. This characteristic will also separate the females of the two species. The males are quite different, as the male of *P. verenae* is completely dark brown, (including the entire antennae) and the side of the petiole lacks the rugae found on the petiole of the male of *P. apicalis*. The last few segments of the funiculus of workers and females of *P. fauveli* from Colombia and Ecuador are often yellow and it looks similar to workers of *P. apicalis*. They can be instantly recognized by the moderately abundant erect hairs on the dorsum of the mesosoma of *P. fauveli*, which are mostly or completely lacking in *P. apicalis*.

Rarely *P. apicalis* may have hairs on the dorsum of the mesosoma and petiole, which may cause confusion with the Amazonian *P. cooki*. Such specimens of *P. apicalis* can be distinguished as the head is dull and covered with small punctures, not distinctly striate as it is in *P. cooki*.

A specimen (NHMB) differs from the typical form in having a longer petiole (1.3 mm vs. 1.2 mm in the usual specimens), which is also shorter (1.6 mm from bottom margin, versus 1.65 in usual specimens), but is considered to be *P. apicalis*.

Wild (2005) discusses geographic variation in the shape of the petiole, number of erect hairs, especially on

the gaster and the size of the eye.

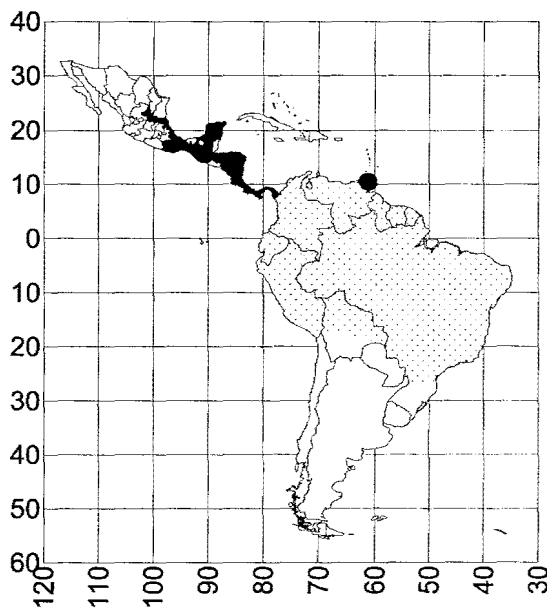
DISTRIBUTION

MEXICO: *San Luis Potosí* (1 mi S Tamazunchale, Huichihuayán); *Veracruz* (2 mi W Fortín, Cueva de la Sala de Agua, 16 k W Tezonapa, Laguna Encantada, in cave near origin of Río Atoyac [near Córdoba], Las Hamacas, Los Tuxtlas [Quiroz-Robledo and Valenzuela-González, 1995], Los Tuxtlas Presidio, near Presidio, trail above Presidio, Pueblo Nuevo near Tezonapa, Santa Teoviscocla, Tlacotalpán, 10 k N Cárdenas); *Campeche* (10 km E of Campeche, Grutas de Xtacumbilxunam [Reddell and Cokendolpher, 2001], 2 k SW Bolonchenticul [Reddell and Cokendolpher, 2001]); *Quintana Roo* (Reserva Ecológica El Edén, Cenote de Juan Coh [Reddell and Cokendolpher, 2001], Cobá, Puerto Felipe Carrillo [Reddell and Cokendolpher, 2001], Cenote de Tos Virlool [Reddell and Cokendolpher, 2001], 13 k S Señor, Cobá, Felipe Carrillo Puerto, Reserva Ecológica El Edén); *Yucatán* (Chichén Itzá, Laguna Ocotal Grande, Ocosingo, Cenote Aká Chen [Reddell and Cokendolpher, 2001], 1 k E Tixcancal [Reddell and Cokendolpher, 2001], Grutas de Balantanche [Reddell and Cokendolpher, 2001], 4 k E Chichén Itzá [Reddell and Cokendolpher, 2001], Cueva Segunda del Camino a San Roque [Reddell and Cokendolpher, 2001], road from Oxkutzcab to San Roque [Wheeler, 1938], Cueva del Cinco de Mayo [Wheeler, 1938], 1 k SW Tekax [Wheeler, 1938], Actún Puz [Wheeler, 1938], Actún Tucil

[Reddell and Cokendolpher, 2001], Actún Xpukil [Reddell and Cokendolpher, 2001], 1 k NE Tixcancal, Actún Xpukil, Grutas de Balantanche); *Oaxaca* (Temascal); *Chiapas* (8 k SE Monte Río, 10 k S Palenque, Ruinas de Palenque, 1.3 mi S Unión Juárez, 1.5 mi S Unión Juárez). Wild (2005) lists the following additional localities: *San Luis Potosí* (18 mi S Tamazunchale); *Veracruz* (park canyon Hwy 150, El Palmar, Laguna Encantada, 17 k N Santiago [near Tuxtlas], Presidio, *Yucatán* (3 k S Calcehtoc); *Chiapas* (Ocosingo, Laguna Ocotal Grande, Ruinas de Palenque). GUATEMALA: *Petén* (Parque Nacional Tikal); *Alta Vera Paz* (Estación Biológica Lechua); *Retalhuleu* (El Asintal); *Suchitepéquez* (Finca Los Tarrales); state unknown (El Reposo [Forel, 1899]); Wild (2005) lists *Petén* (Nacum). HONDURAS: *Atlántida* (14 km S La Ceiba, Lancetilla [Tela]); state unknown (Portilla Grande). NICARAGUA: *Chinandega* (Chinandega); *Managua* (Punta Negra N. of Managua, Tuli Creek [near San Miguel]); state unknown (Indio Maíz Res.); *Granada* (Mombacho Volcano); *Río San Juan* (San Juan and Sarapiquí Rivers). COSTA RICA: *Alajuela* (Jiménez [Emery, 1890b; Forel, 1899], Pozo Azul [Emery, 1890b], Juan Viñas [Emery, 1894b]); *Limón* (Zent); *Puntarenas* (Guaria, Palmar, Parque Nacional Corcovado, 5 k W Rincón); *Cartago* (Juan Viñas [Forel, 1899]); *Heredia* (Río Toro Amarillo, vic. Guápiles, Parque Nacional Braulio Carrillo, Estación Biológica La Selva [Sandoval and

Zambrano, 2007]); *Guanacaste* (Pozo Azul [Forel, 1899]). Wild (2005) lists *Cartago* (1 mi S Tuis, Turrialba); *Guanacaste* (Pitilla Research Station); *Heredia* (Parque Nacional Braulio Carrillo, Sarapiquí River); *Limón* (Río Toro Amarillo, Sarapiquí River); *Puntarenas* (Corcovado National Park, Sirena, Palmar). PANAMA: *Coclé* (Cerro Gaital, La Mesa north of El Valle, 3 k S La Mesa); *Darién* (Caña Station, Estación Peresinico, Serranía de Pino); *Panamá* (Canal Zone [Barro Colorado Island], Cerro Azul, Cerro Campana, Parque Soberanía); *San Blas* (Nusagandi); *Colón* (Bugaba [Forel, 1899]); *Chiriquí* (Volcán de Chiriquí [Forel, 1899]). COLOMBIA: *Chocó* (10 k SW San José de Palmar, Río Sucio); *Bolívar* (Cartagena); *Magdalena* (base of the Sierra Nevada de Santa Marta [Forel, 1912], Río Frio [Forel, 1912]); *Vaupés* (Río Vaupés); *Antioquia* (Río Claro); *Valle del Cauca* (Puerto Merizalde, Río Tatabro [km 98 - old road to Cali], Bajo Anchicayá and Bajo Calima [Baena, 1993], Medio Calima); *Meta* Reserva La Macarena [Fernández and Schneider, 1989, Carimagua). Wild (2005) lists, *Guajira* (Don Diego); *Magdalena* (Tayrona Park). ECUADOR: *Sucumbios* (Limón Cocha and vicinity, Shushufindi, Sacha Lodge); *Pichincha* (Santo Domingo de los Colorados [Santschi, 1913], 13.5 k NW Santo Domingo de los Colorados); *Los Ríos* (Río Palenque [47 k S Santo Domingo]); *Napo* (20 k E Puerto Napo, Yasuni Research Station, Tiputini Biodiversity Station, Agurica). Wild (2005) lists *Guayas*

(10 mi N Manglar Alto, 3 k SW Bucay); *Los Ríos* (Río Palenque Biological Station); *Morona-Santiago* (Sucúa); *Napo* (Misahualli, 2-8 mi N Puyo); *Pichincha* (ENDESA Forest Reserve). PERU: *Madre de Dios* (30 k SW Puerto Maldonado, Parque Nacional Pampas de Heath, Iberia, Estación Biológica Cocha Cashu); *Arequipa* (Challanca); *Ucayali* (Middle Río Ucayali). Wild (2005) lists *Huánuco* (12 k SW Tingo Maria, Cueva de Castillo [near Tingo Maria], Monson Valley, Tingo Maria); *Loreto* (Boquerón, Previsto, Quebrada Yanayaco [NE of Iquitos]); *Madre de Dios* (Estación Biológica Cocha Cashu, 15 k NE Puerto Maldonado); *San Martín* (Davidcillo). VENE-



Map 4. *Pachycondyla apicalis*.

ZUELA: *Aragua* (Rancho Grande); *Barinas* (17 k SSW Ciudad Bolívar); *Bolívar* (1 k S confluence Río Nichare

& Río Caura, Nichare Field Station); *Delta Amacuro* (140 k NE Barrancas). Wild (2005) lists *Amazonas* (3 k N San Carlos de Río Negro), Emery (1890a) lists San Esteban (specific state unknown). TRINIDAD: Wild (2005) lists *Saint George* (Caura, Guanapo Valley Quarry). FRENCH GUIANA: *Cayenne* (Paracou Experimental Forest, Nouveau Chantier, Petit Saut [Soroker et al., 2003]). GUYANA: *Dememera-Mahaica* (Kaieteur); *Cuyuni-Mazaruni* (Cuyuni, Kamakusa, Kartabo); *Upper Takutu-Upper Essequibo* (North side Acari Moun-tains). SURINAME: *Para* (Zanderij). Wild (2005) lists Raleigh [Vallen-Voltzberg Reserve *Sipaliwini*]. BRASIL: *Amazonas* (Ilha de Curarí Várzea); *Amapá* [Kempf, 1972]; *Acre* [Kempf, 1972]; *Mato Grosso* (Chapada dos Guimarães); *Pará* (Manaus, Santarém/ Taperinha, Tucuruí, Utinga tract near Belém); *Rondônia* (Porto Velho, Rio Madeira); *Espírito Santo* [Kempf, 1972]; *Goiás* [Kempf, 1972]; *Rio de Janeiro* (Ilha Grande, Rio de Janeiro [Kempf, 1972]); *São Paulo* (Reserva Florestal Caraguatatuba, Parque Estadual Intervalos [Pizo and Oliveira, 2000]). Wild (2005) lists *Amazonas* (Ypiranga, 300 k E Humaita, Ponta Negra.); *Bahia* (CEPEC/CEOLEC [Rodovia, Ilhéus/ Itabuna]). BOLIVIA: *El Bení* (Huachi Bení); *Santa Cruz* (3.7 k SSE Buena Vista Hotel Flora y Fauna, 10 k NM Terevinto [Wild, 2005]).

HABITAT

This species is common in primary and secondary wet tropical

forests and in medium elevation rain forests (150 - 1500 m). It even occurs in coffee plantations and second growth thorn forest (Wild, 2005). Wild (2005) lists the elevations from sea level to 1600 meters with a mean of 642 meters. This species has been collected in caves near the entrances (Reddell and Cokendolpher, 2001). This is one of the most common species in the tropical forest in the state of Veracruz, México, but is not found in the adjacent grassland (Quiroz-Robledo and Valenzuela-González, 1995).

BIOLOGY

Pachycondyla apicalis nests in rotten wood (Levings and Franks, 1982; Dietemann and Peeters, 2000; Baena, 1993; Longino, website), including logs and stumps, or in the soil (Levings and Franks, 1982). A nest was found in root mass of a large *Ficus* within one meter of the ground (Fresneau, 1985). Another nest was found in bamboo (*Guadua* sp.) (Wild, 2005). Nests have about 30 (Mann, 1916) to 90 workers (Fresneau, 1985). Males and females were present in nests in January (Costa Rica) and May (Panamá). Dealate females have been captured in March (Costa Rica), June (Panamá), July (Costa Rica) and August (Ecuador, Venezuela). Winged males were collected in January to July (Ecuador, tree fogging) and November (Perú).

Workers are individual foragers and apparently not optimal foragers (Goss et al., 1989), but show a high degree of regional specialization that persists for extended periods of time

(Fresneau, 1985). There is no recruitment and tandem running only occurs during nest translocation (Fresneau, 1985). They are very active predators and are often captured on the ground or in pitfall traps. These ants are opportunist predators on termites in the genera *Constrictotermes* and *Nasutitermes* (Mill, 1982a); and an important predator on *Nasutitermes costalis* (Traniello, 1981). Foragers were attracted to tuna bait and were found feeding on a dead *Iguana iguana*, the large green tropical lizard. Workers carry droplets of food in their mandibles, which they share with the other members of the nest, including the larvae (Dejean and Corbara, 1990a). When they feed smaller larvae they hold the droplet and the larva at the same time and deposit the droplet on the body of the larger larvae.

Foragers disperse the seeds of *Calathea ovandensis* (Marantaceae) approximately 9 meters from where they were collected (Horvitz and Schemske, 1986a, 1986b). Foragers collect diaspores on the forest floor (Pizo and Oliveira, 2000).

Colony odor is apparently produced in the postpharyngeal gland and transferred to the epicuticle by allogrooming and not by trophallaxis (Soroker et al., 1998, 2003). Lachaud and Fresneau (1987) discuss the social

regulation following an experimental sociotomy of a colony. Workers develop a dominance order with a single dominant worker, which lays eggs and maintains her position by physical attack on others and the destruction of eggs laid by subordinates (Oliveira and Hölldobler, 1990). They respond and attempt to escape from the collector and have a painful sting.

The venom has a bitter taste due to the presence of cyclic dipeptides of leucine and phenylalanines (López and Morgan, 1997). The function of the venom may thus be both defensive and offensive. The mandibular glands contain δ -decalactone and benzaldehyde (López and Morgan, 1997).

Caetano (1988) described the digestive and excretory system of the worker. Hölldobler and Engel-Siegel (1982) described the tergal and sternal glands of the male.

Pachycondyla apicalis is mimicked by the spider *Castianeira memnonia* (Reiskind, 1977; Wild, 2005).

ETYMOLOGY

The name of this species comes from Latin, *apicalis* meaning “pertaining to the apex”, a reference to the yellow color on the tip of the antenna.

***Pachycondyla arhuaca* (Forel)**

Figures - **Worker**: 44 (metasternal process), 51 (subpetiolar process), 187 (pronotum), 191 (side view), 336 (head); **Female**: 45 (forewing), 337 (side view), 338 (head and mandible); **Male**: 317 (tibia), 320 (side view), 339 (forewing), 340 (head); **Map** 5

arhuaca species complex

Euponera (*Mesoponera*) *arhuaca* Forel, 1901b:339-340 ♀, ♂, Colombia Sierra de Santa Marta: San Antonio [lectotype worker designated, 5 paralectotype workers, 4 paralectotype males, MHNG, 1 paralectotype worker designated, NHMW]; Forel, 1901c: 397-398, Fig. a; *Mesoponera arhuaca*: Kempf, 1972:141; *Pachycondyla arhuaca*: Bolton, 1995:303

DISCUSSION**Worker**

The workers are relatively *small* (total length < 5 mm) *dark brown* ants with pale brown appendages. The anterior margin of the clypeus is convex; the *eyes are small* (maximum diameter about 0.15 mm) and separated from the insertion of the mandible by slightly less than one maximum diameter (side view). There is *no malar carina* between the eye and the insertion of the antenna, although the region is swollen. The *antennal scape is relatively short*, extending only slightly past the posterior lateral corner of the head. The *pronotal shoulder is slightly swollen*, but does not form a shelf or even a well-defined carina. Most of the dorsum of the mesosoma is in the same plane, although the *metanotal*

suture interrupts the integument on the dorsum of the mesosoma. The *propodeal spiracle is circular*. The *middle tibia is relatively short* (0.72 mm), only slightly longer than the width of the pronotum (0.66 mm seen from above). The petiole is relatively narrow when viewed in profile

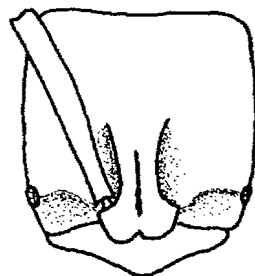


Fig. 336. Head of a worker of *P. arhuaca* (Antioquia, Colombia, MCZC). Erect hairs are not shown.

(maximum width 0.40 mm), the anterior face is slightly concave, the posterior face is convex with relatively distinct posterior lateral margins. The metasternal process consists of two well-developed triangular lobes.

Erect hairs are scattered on the head, mesosoma, petiole and gaster, the hairs on the tibiae are mostly appressed, although there are a few short (up to 0.03 mm) erect hairs on the extensor surfaces.

Most surfaces are dull and punctate, the mandibles are finely striate with regions near the teeth being glossy and shiny, the gaster is moderately shining with relatively coarse punctures.

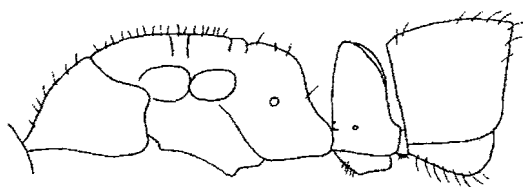


Fig. 337. Mesosoma, petiole and first gastral tergite of a female of *P. arhuaca* (Soberanía, Panamá, CWEM).

Female

The female (undescribed) is a *small* (total length 6 mm) *black* specimen with brown legs. The mandible has approximately 12 teeth; the anterior border of the clypeus is convex, the *eye is large* (maximum diameter 0.32 mm) and is located less than half the diameter from the anterior edge of the head (side view). The *scape* (length 1.12 mm) *extends*

slightly past the posterior lateral corner of the head. The head length is 1.48 mm and the width is 1.26 mm. The *pronotal shoulder is swollen*, but does not form a carina. The *propodeal spiracle is circular*; the anterior face of the petiole is vertical and meets the convex broadly rounded posterior face at a relatively sharp angle. The *stridulatory file is absent* on the pretergite of the second tergum of the gaster and the arolia are absent.

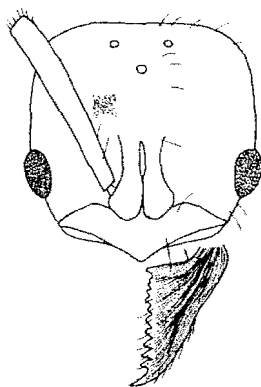


Fig. 338. Head and mandible of a female of *P. arhuaca* (Soberanía, Panamá, CWEM). Only a portion of the sculpturing is shown.

A few erect hairs are scattered on the mandibles, clypeus, dorsal and ventral surfaces of the head. The scape has a few scattered erect hairs, mostly near the base. Scattered erect hairs are present on the dorsum of the mesosoma, mostly short (0.1 mm); hairs on the legs are erect but short, hairs similar to those on the mesosoma are present on the petiole and gaster. Appressed whitish hairs are present on most surfaces, but are not abundant.

The mandibles are finely striate; the dorsum of the head is punctate with the punctures forming poorly defined striae, which diverge posteriorly. The dorsum of the mesosoma is punctate; the sides are punctate with weakly developed striae. The petiole and the gaster are finely punctate.

Male

The male is a *small* (total length 4.5 mm) *black* ant. The anterior border of the clypeus is broadly convex, the *clypeus is swollen in the middle*. The scutellum is swollen and the opening of the propodeal *spiracle is elongated*, although the surrounding swollen area (peritreme) is circular. The *petiole is thick* in profile with a relatively sharp apex. The wing is typical of the genus with a slightly elongated third discoidal cell.

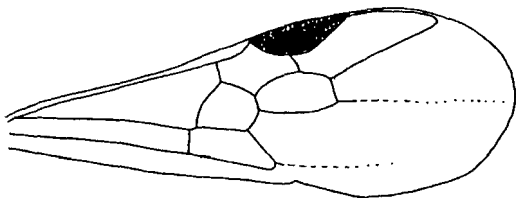


Fig. 339. Left forewing of a male of *P. arhuaca* (Parque Nacional Soberanía, Panamá, CWEM).

Erect and suberect hairs are nearly absent, a few are present on the mandible, scutellum, propodeum, dorsum of the petiole and all surfaces of the gaster, hairs are generally absent on the antennae, head, remainder of the mesosoma and legs;

fine, nearly appressed pubescence is present on nearly all surfaces.

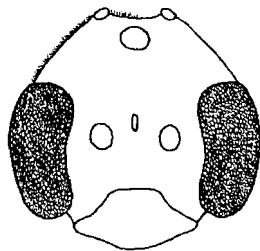


Fig. 340. Head of a male of *P. arhuaca* (Soberanía, Panamá, CWEM).

All surfaces are finely sculptured (coriaceous with fine punctures) but dull.

COMPARISON

The workers of *P. arhuaca* could be separated from most of the other *Pachycondyla* by the circular propodeal spiracle. The swollen margin on the pronotal shoulder would distinguish *P. arhuaca* from other similar small species, such as *P. ferruginea*, *P. constricta*, *P. conicula* and *P. pergandei*. *Pachycondyla arhuaca* could be confused with the Brazilian *P. metanotalis* and the Venezuela *P. emiliae*, but differs in being smaller (the head width of the worker is < 1.2 mm, that of the female is about 1.25 mm, the head width of the worker is > 1.4 mm in *P. metanotalis* and *P. emiliae*) and the eye of *P. arhuaca* is relatively small (maximum diameter of the eye of the worker is about 0.2 mm, not greater than 0.2 mm as in workers of *P.*

metanotalis and *P. emiliae*).

The female of *P. arhuaca* could be easily confused with that of *P. constricta*. *Pachycondyla arhuaca* differs in that the carina on the pronotal shoulder is weakly developed (completely rounded in the female of *P. constricta*).

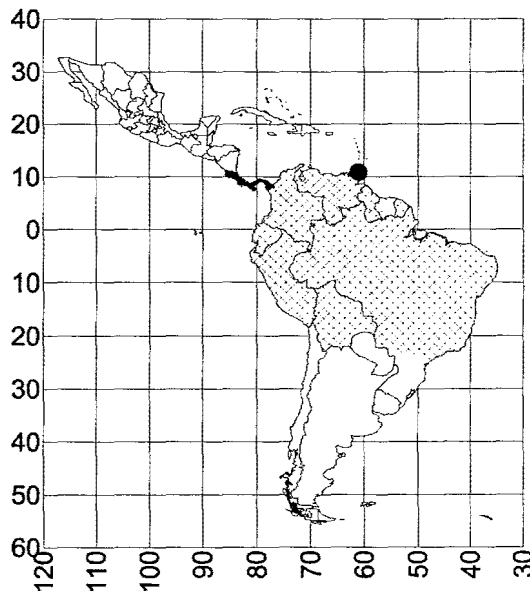
The male of *P. arhuaca* is nearly identical to that of *P. stigma*. *Pachycondyla stigma* is slightly more hairy, specifically with erect or suberect hairs between the eye and the clypeus, and on the scutum. The apex of the petiole is more rounded in *P. stigma*.

It is interesting to note that *P. arhuaca* is very similar to *P. bruno* Forel from the Ivory Coast of Africa, as well as *P. striatula* Karavaiev from New Guinea, *P. melanaria* (Emery) of Sri Lanka and especially *P. ambigua* André from Madagascar and Sierra Leon. It is apparently a relic of an Old World lineage, or may have even been introduced into the New World.

DISTRIBUTION:

COSTA RICA: *Heredia* (Estación Biológica La Selva). **PANAMA:** *Panamá:* (Barro Colorado Island, Plantation Trail, km 3.5, Canal Zone, El Llano - Cartí Road); *Colón* (Soberanía National Park near Gamboa, France Field); *Darién* (Estación Peresinico). **COLOMBIA:** *Guajira* (Quebrada Guacoche, R. Don Diego 25-50 m, San Antonio [Forel, 1912]); *Magdalena* (Río Frio [Forel, 1912], Sierra Nevada de Santa Marta [Forel, 1901b, 1912]); *Antioquia:* (Zona Buenos Aires, Río Porce,

Providencia Estación Biológica, Quebrada La Tirana); *Cundinamarca:* (Bogotá-Villavicencio Road [km 85-86, Río Negro bridge, Finca Bella Vista near Sasaima]; *Valle del Cauca* (Buenaventura [Bajo Calima], Villa Clara); *Huila* (17k NW La Plata). **ECUADOR:** *Napo:* (Limón Cocha, 11 k W Pano, Tiputini Biodiversity Station). **PERU** *Madre de Dios* (Cuzco Amazónico 5 k SE Puerto Maldonado, 15 K NE Puerto Maldonado, 5 km SE on Río Tambopata, Río Tambopata Reserve, Finca Medina); *Yurac* (67 mi E of Tingo Maria). **VENEZUELA** (Kempf,



Map 5. *Pachycondyla arhuaca*.

1972). **TRINIDAD:** *Saint Andrew* (Arena Forest Reserve); *Nariva* (Nariva Swamp, Northern Range). **GUYANA:** *Cuyuni-Mazaruni* (Kart-

abo, Forest Settlement, R. Mazaruni). FRENCH GUIANA: state unknown (25 k SE Régina [4.317°N 52.133°W]). BRASIL: *Amazonas* (Aleixo, 14 k SE of Manaus, Manaus to Itacoatiara, 14 k S E Manaus, Benjamin Constant & Vicinity); *Bahia* (Ilhéus); *Pará* (Pirelli Plantation [Iriboca], Utinga tract, near Belém, Tucurul). Kempf, 1972 lists *Espírito Santo* and *Mato Grosso*). BOLIVIA: *Santa Cruz* (San Fermin [Wheeler, 1925]).

HABITAT

These ants are found in wet lowland tropical forests, secondary lowland rain forest and urban habitats (lawns), from 10 - 1000 m elevation.

BIOLOGY

Nests are found in rotten wood and the soil under the wood. Workers are also collected in leaf litter extractions. Brood was present in a

nest in January. A dealate female was collected in May (Panamá). A winged male and winged female were collected in May (Panamá), winged males in January (Brasil), May (Perú), July (Panamá), between January and July (Ecuador, canopy fogging) and October (Perú). Most flights occur in the middle of the summer (Kaspari et al., 2001).

ETYMOLOGY

The name of this species was derived from the Arawak Indians of the Caribbean region. The name is somewhat of a misnomer, as the region of the type locality was populated by the Guajiran Indians, which although related to the Arawak (the Waúu language is related to Arawak), are not actually Arawaks. Forel (1901b) mentions he collected the type series near the arhuaque village of San Antonio.

Pachycondyla becculata new species

Figures - **Worker**: 27 (petiole), 47 (clypeus), 195 (head), 341 (side view), 342 (tibia), 343 (metasternal process), 344 (clypeus, mandible and petiole); **Female**: 345 (side view), 346 (head and mandible); **Map** 6

arhuaca species complex

DISCUSSION & DESCRIPT.

Worker

The worker of this species is relatively small (total length 5.5 - 7 mm) nearly black with medium brown appendages and reddish brown mandibles. The *anterior edge of the clypeus forms a sharp tooth* medially. The head length (including the clypeal tooth) is 1.3 - 1.4 mm, the head width 1.1 mm. The *eyes are relatively small* (maximum length 0.2 mm), which is nearly twice the length of the distance from the eye to the anterior edge of the head (side view). The *scape is relatively short* (1.1 mm) and extends only slightly past the posterior lateral corner of the head. *The metanotal suture is deeply impressed* on the dorsum of the mesosoma, the *propodeal spiracle is circular*. The anterior face of the petiole is straight or slightly convex, the posterior face appears convex (both seen from the side), the posterior face appears concave (when seen from above) with sharp lateral margins. The *stridulatory file is absent* on the dorsum of the gaster. The *metasternal process*

consists of two well-developed triangular lobes.

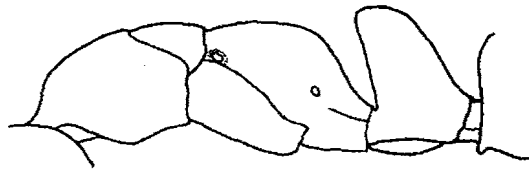


Fig. 341. Mesosoma and petiole of the holotype worker of *P. becculata*. The erect hairs are not shown.

Erect hairs are moderately abundant on nearly all surfaces, including the head, *scapes*, mesosoma, petiole and gaster; most hairs on the tibiae are appressed, although short bristly hairs are present on the extensor and flexor surfaces.

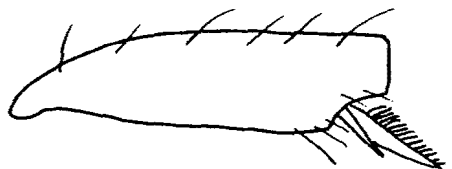


Fig. 342. Middle left tibia of a worker of *P. becculata* (Chiriquí, Panamá, CWEM).

The *mandible is mostly striate*, the remainder of the surfaces is mostly punctate and dull and the posterior face of the petiole is very finely punctate shiny and glossy.



Fig. 343. Metasternal process of a worker of *P. becculata* (Chiriquí, Panamá, CWEM), as seen from behind.

Occasional worker specimens from the states of Valle del Cauca in Colombia, Chiriquí and Veraguas, Panamá are small (total length 5 mm) and could represent an undescribed species. A specimen from Perú is larger than normal (total length 8 mm) and the medial clypeal tooth is very well developed. The subpetiolar process is more developed and triangular-shaped (Fig. 344). It could be a new species, but as there is a single worker, it will not be recognized here.

Female

The female is *similar to the worker*, with a less developed clypeal tooth (length 0.12 mm). It is a simple angle or process in some females. The head length is 1.6 mm; the head width is 1.4 mm and the scape length is 1.25 mm. The *eye is moderately large* (0.25

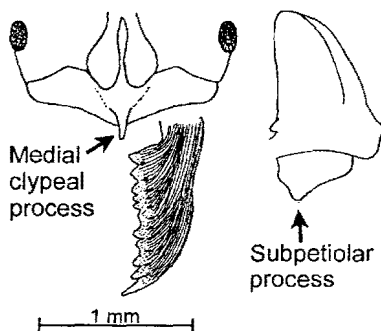


Fig. 344. Clypeus, mandible and petiole of a large worker of *P. becculata* (20 mi SW Tingo Maria, MCZC).

mm in maximum diameter) located < 1 diameter from the anterior edge of the head (side view). The ocelli are well developed; the *scape extends to the posterior lateral corner of the head*. The pronotal carina is absent. The *propodeal spiracle is nearly circular*. The anterior face of the petiole is vertical and meets the broadly rounded posterior face in a moderately sharp angle.

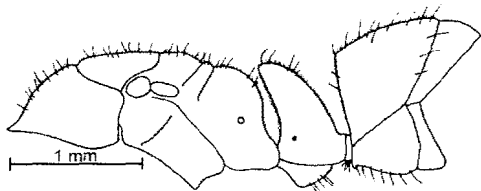


Fig. 345. Mesosoma, petiole and postpetiole of a female of *P. becculata* (Pichincha, Ecuador, CWEM).

Erect hairs are moderately abundant on most surfaces, including the legs, but mostly short (0.1 - 0.2 mm); appressed pubescence is golden and short.

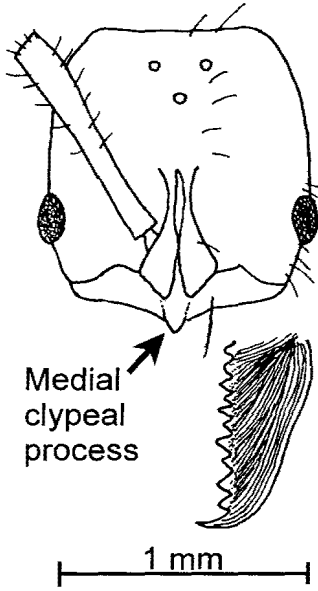


Fig. 346. Head and mandible of a female of *P. becculata* (Pichincha, Ecuador, CWEM).

The sculpture is similar to that of the worker.

Male

The male is unknown.

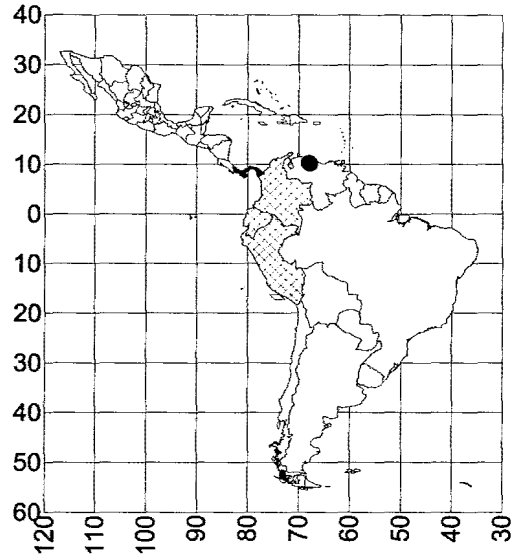
COMPARISON

Pachycondyla becculata could be easily confused with *P. arhuaca*. The worker and female can be separated by the sharp tooth or process on the anterior edge of the clypeus, which is absent in *P. arhuaca* as well as in most of the other species of *Pachycondyla*. Other species with

angulate medial borders of the clypeus include *P. concava* and *P. coveri*, which can be easily separated by the presence of a pronotal carina, which is lacking in *P. becculata*.

DISTRIBUTION

PANAMA: *Chiriquí* (La Fortuna area [Finca La Suisse, CWEM]); *Panamá* (Barro Colorado Island [MCZC]); *Veraguas* (6.1 k N Santa Fé [Cerro Tute, CWEM]). COLOMBIA: *Magdalena* (San Pedro de la Sierra



Map 6. *Pachycondyla becculata*.

[MCZC]). ECUADOR: *Pichincha* (20 - 30 k ENE Alluriquin [MCZC], 4 k E Santo Domingo de los Colorados [MCZC], 3 k E Tandapi [MCZC], 16 E Tandapi [MCZC], Maquifucuna, 5 k ESE Nanegal [MCZC], 7 k S Nanegalito [CASC], Reserva Biológica Maquifucuna [CASC], 27.9 k W

becculata Panamá to Perú

Machachi [CWEM]); *Pastaza* (22 k SW Puyo [MCZC], 25 k N Puyo [MCZC]); *Cotopaxi* (Otonga [QCAZ]). PERU: *Huánuco* (20 mi SW Tingo Maria [MCZC], 32 mi NE Huánuco [CASC]); *Pasco* (3 k N Oxapampa [MCZC]). VENEZUELA: *Aragua* (Cumbre de Rancho Grande [Parque Nacional Henri Pittier, 10°21'34"N 67°41'6W, 1450m, Miguel Riera pers. Comm.]).

HABITAT

Specimens have been collected in bamboo forests, moss-bamboo forests, on an oak ridge, on steep slopes of primary forest, cloud forest at 1450 and 2024m, riparian montane evergreen forest, ridge top montane forest and even second growth rain forest, at elevations between 1000 - 2000 meters.

BIOLOGY

This species nests in rotten logs. Workers are found in leaf litter and in leaf mold. Dealate females were collected in June and July (Ecuador).

ETYMOLOGY

From Latin, *beccus* meaning beak and *lattus* meaning flank, referring to the spine on the anterior margin of the clypeus. William Brown suggested the name.

TYPE SERIES

Holotype worker (MCZC), 18 paratype workers (CASC, CWEM, GBFM, IAVH, LACM, MIZA, MZSP, QCAZ), ECUADOR: Prov. Pichincha, S.&J.Peck 1975; 20-30 Km ENE Alluriquin on Chiriboga Rd 1400-1800 m, moss for. B301.

***Pachycondyla breviscapa* new species**

Figures - **Female:** 347 (side view), 348 (head and mandible), 349 (tibia);
Map 7

ferruginea species complex

DISCUSSION

Worker
 Unknown.

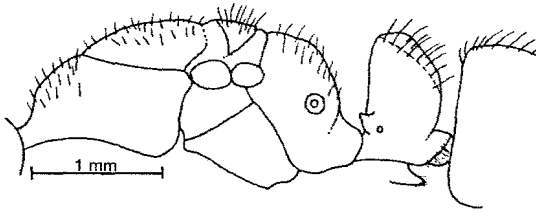


Fig. 347. Mesosoma and petiole of the holotype female of *P. breviscapa*.

Female

The female is a *moderate sized* (total length 12 mm) *ferrugineous red* specimen. The mandible has approximately 9 teeth alternating in size. Some of the teeth are tiny and poorly developed. The *anterior medial border of the clypeus is concave with two lateral angles*. The head length and width are 1.7 mm. The maximum eye diameter is 0.3 mm and the eye is located slightly less than one diameter from the anterior margin of the head. The ocelli are tiny (0.06 mm diameter). The scape (1.35 mm) nearly

reaches the posterior lateral corner of the head. The *propodeal spiracle is circular* and the posterior face of the propodeum is outlined by a poorly defined carina. The petiole is narrowed toward the apex, but has a *definite dorsal face*; the subpetiolar process has a *posteriorly directed*

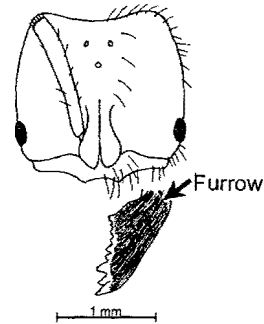


Fig. 348. Head and mandible of the holotype female of *P. breviscapa*.

lobe. The anterior face of the postpetiole is nearly straight and meets the dorsal face at nearly a right angle. The stridulatory file on the second pretergite is absent.

Erect hairs are present on the mandibles, posterior margin and sides of the head, anterior margin of the

breviscapa Bolivia

clypeus, along the shaft of the scape, on the dorsum of the mesosoma, dorsum of the petiole, posterior edge of the subpetiolar process and all surfaces of the gaster. The hairs on the tibiae are sparse and suberect to erect. Appressed silver pubescence is present on all surfaces.

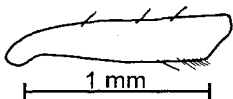
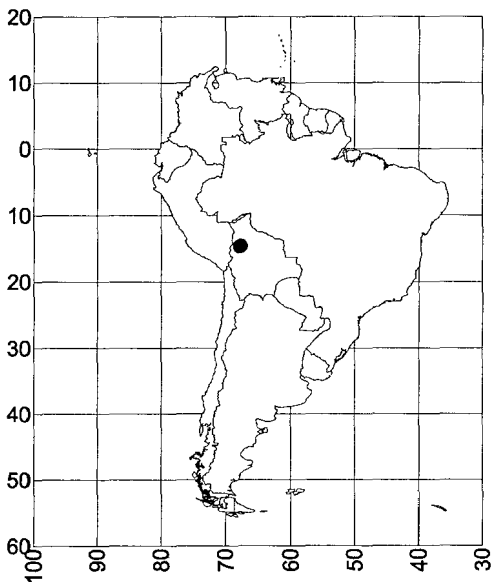


Fig. 349. Posterior left tibia of the holotype female of *P. breviscapa*.

The *mandibles* are finely striate; the remainder of the surfaces is mostly finely punctate and dull, except for the gaster, which is punctate, but slightly shining.

Male

Unknown.



Map 7. *Pachycondyla breviscapa*.

COMPARISON

The female of *P. breviscapa* is very similar to that of *P. rupinicola*, but can be easily separated by the short scape. The scape of the female of *P. rupinicola* extends well past the posterior lateral corner of the head. *Pachycondyla breviscapa* is much larger than the females of other members of the *ferruginea* species complex. The worker of *P. breviscapa* would be expected to be similar to those of *P. rupinicola*, but have shorter scapes than the female (based on the relative scape length of the females and workers of *P. rupinicola*), which would allow *P. breviscapa* to be easily recognized.

DISTRIBUTION

Known only from the type locality in the state of *La Paz*, BOLIVIA.

HABITAT

Unknown.

BIOLOGY

The dealate female was collected in December. It is pinned together with a worker of *P. unidentata*.

ETYMOLOGY

From Latin, *brevis*, meaning short and *scapus* meaning stalk, referring to the relatively short antennal scape.

TYPE SERIES

Holotype dealate female (USNM), Tumupasa, BOLIV., WM MANN; Dec.; MULFORD Biological Exploration, 1921-1922.

Pachycondyla bucki (Borgmeier)

Figures - **Worker**: 167 (head), 168 (side view); **Map** 8

stigma species complex

Leptogenys bucki Borgmeier, 1927:57-59, ♀, Brasil: Rio Grande do Sul: Porto Alegre (Gloria) [lectotype designated, NHMB, 1 cotype seen, MCZC]; *Euponera* (*Mesoponera*) *bucki*: Borgmeier, 1959:315-316, worker petiole, Fig. 14; *Mesoponera bucki*: Kempf, 1972:141; *Pachycondyla bucki*: Bolton, 1995:303

DISCUSSION

Worker

The worker is a *small* (total length 6 mm) *dark brown* ant with reddish brown appendages. The *mandibles* have approximately 12 teeth, which alternate in length. The anterior medial border of the clypeus is angulate and is followed by a sharp carina, which extends posteriorly between the frontal lobes. The sides of the head are convex and rounded, the *eyes* are relatively large (maximum diameter 0.28 mm), approximately the length between the anterior edge of the eye and the anterior edge of the head (side view). The *malar carina* is absent. The antennal scape extends past the posterior lateral corner of the head by about the first funicular segment; the posterior border of the head is weakly concave. The *outline of the dorsum of the mesosoma* is nearly straight. The *pronotal shoulder* is rounded; the *metanotal suture* is not

marked on the dorsum of the mesosoma and is poorly indicated on the sides. The *propodeal spiracle* is slit-shaped and the propodeum is angulate between the two faces. The posterior lateral edges of the propodeum form a sharp carina. The *petiole* is thickened when viewed in profile, the anterior face is convex and rounded, the *posterior face* is concave and surrounded by a carina. The anterior face of the postpetiole is broadly rounded into the dorsal face.

Erect hairs are sparse with a few present on the mandibles and clypeus, frontal lobes, absent on the scapes, remainder of the dorsal surface of head and the posterior border of head, a few hairs are present on ventral surface of the head, *hairs* are absent on the dorsal surface of the mesosoma, the petiole and most of the gaster (present on the posterior part of the gaster). Erect hairs are present on the front coxa, but absent on the remainder of the other legs. Fine silver

appressed pubescence is scattered on most surfaces, especially the dorsum of the gaster.

The mandibles are weakly shining, with scattered punctures, the remainder of the ant is mostly dull, especially the coriaceous head, mesosoma, petiole and gaster.

Female and Male
Unknown.

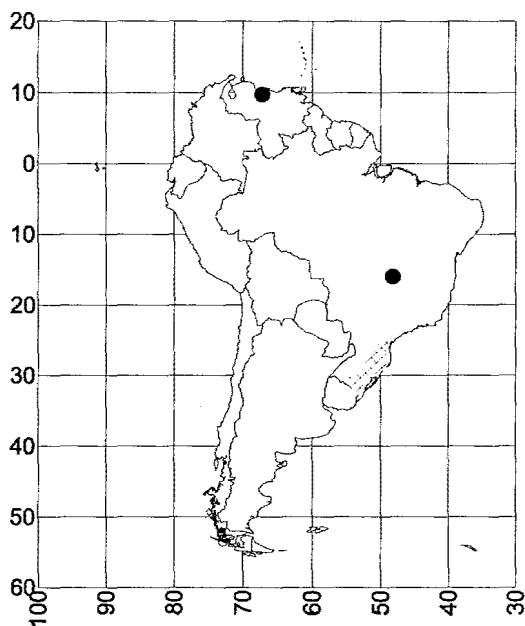
COMPARISON

It would be unlikely that *P. bucki* would be confused with any of the others in the genus. The complete absence of hairs on the dorsum of the mesosoma, petiole and first two terga of the gaster would separate it from nearly all of the others. The unusual shape of the petiole, with a broadly convex and rounded anterior face and the distinctly concave posterior face is unlike that of any of the other species in the genus. *Pachycondyla cavinodis* has a somewhat similar petiole, but also has a malar carina.

DISTRIBUTION

VENEZUELA: *Distrito Federal* (Los Canales Naguaza). BRASIL: *São Paulo* (São Paulo [Borgmeier, 1959], Alto da Serra [MCZ]); *Distrito*

Federal (Brasilia [MCZC, Sandoval and Zambrano, 2007]); *Rio Grande do Sul* [Kempf, 1972].



Map 8. *Pachycondyla bucki*.

HABITAT

Unknown.

BIOLOGY

A nest was reported in the subsoil (Borgmeier, 1927).

ETYMOLOGY

This species was named after the collector father P. Pio Buck.

Pachycondyla bugabensis Forel new status

Figures - **Worker**: 265 (side view), 350 (metasternal process), 351 (head); **Female**: 352 (mesosoma), 353 (head); **Male**: 315 (head), 319 (side view); **Map 9**

foetida species complex

Pachycondyla theresiae var. *bugabensis* Forel, 1899:14, ♀, Panamá: Bugaba [lectotype designated, MHNG]; *Neoponera theresiae* var. *bugabensis*: Emery, 1901a:47; *Pachycondyla theresiae* var. *bugabensis*: Bolton, 1995:303

DISCUSSION

Worker

The anterior border of the clypeus is broadly convex and the *malar carina is well developed*, but does not extend to the anterior edge of the eye. The *eyes are located slightly posteriorly to the midline* of the length of the head (measured from the anterior tip of the clypeus). The scape extends nearly the first two funicular segments past the posterior lateral corner of the head. The *pronotal carina is well developed and sharp*. The *mesosoma is broadly depressed at the metanotal suture*, which passes over the dorsum of the mesosoma and breaks the sculpture. The *propodeal spiracle is elongated* and the posterior lateral edges of the propodeum are marked by a sharp carina. The *petiole is thick* when viewed in profile with a *vertical slightly concave anterior face* and a *broadly rounded posterior face* that meets the anterior face at a right angle.

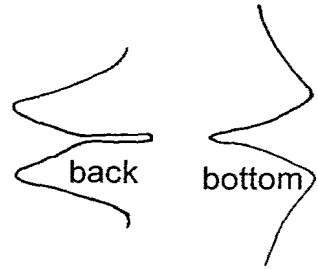


Fig. 350. Metasternal process of a worker of *P. bugabensis* (Heredia, Costa Rica, CWEM), as seen from behind and from below.

Erect hairs are present on the dorsum of the head, the scapes, dorsum of the mesosoma, all surfaces of the legs, dorsum of the petiole and all surfaces of the gaster. Most surfaces are covered with dense appressed golden pubescence, which partially hides the surface, especially on the dorsum of the head, dorsum of the mesosoma, posterior face of the petiole and the dorsum of the gaster.

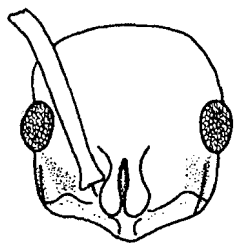


Fig. 351. Head of a worker of *P. bugabensis* (Alajuela, Costa Rica, CWEM). The erect hairs are not shown.

The mandibles are finely striated with scattered punctures, but much of the surface is smooth and shining. The dorsum of the head, dorsum and side of the mesosoma, side and posterior face of the petiole and the gaster are finely punctate and dull, with only the gaster being somewhat shining.

Most surfaces are dark reddish brown to black; the tarsi are brown as is the apical $\frac{2}{3}$ of the funiculus.

Female

The female (undescribed) is a *moderately sized* (total length 14 mm) *dark brown* ant. The head length is 2.5 mm and the head width is 2.2 mm. The eyes are relatively large (0.65 mm maximum diameter) located about 1 diameter from the anterior edge of the head (side view). The *malar carina* is *sharp and well developed*. The scape (2.55 mm) extends about two funicular segments past the posterior lateral corner of the head. The *pronotal carina* is *sharp* and overhangs the side of the pronotum. The *propodeal spiracle* is *elongated*. The *anterior face of the petiole* is

vertical and slightly concave and meets the *broadly rounded posterior face* at angle near the anterior edge of the petiole.



Fig. 352. Mesosoma and petiole of a female of *P. bugabensis* (Alajuela, Costa Rica, INBio).

Long (up to 0.7 mm in length) hairs are abundant on all surfaces, including the scapes. Most surfaces are covered with fine appressed golden pubescence. Erect hairs are abundant on the mandibles, clypeus, sides of the head, posterior margin of the head, dorsal and ventral surfaces of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, the hairs on the coxae are suberect and a few hairs on the femur and tibiae are suberect.

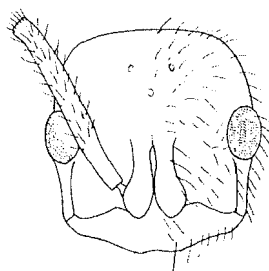


Fig. 353. Head of a female of *P. bugabensis* (Alajuela, Costa Rica, INBio).

The mandibles of the female are

finely striate and partially smooth, the head is densely punctate, forming weak striae; the mesosoma is finely punctate and partially smooth as is the petiole and gaster. The dorsum of the head is densely punctate and moderately shining, most of the mesosoma and petiole have similar sculpture, the gaster has scattered punctures and is mostly smooth and glossy.

Male

The male (undescribed) is a relatively large (total length about 10 mm) black specimen. The head length is 1.29 mm; the head width is 1.26 mm. The eye is large (maximum diameter 0.73 mm) separated from the lateral ocellus by a distance of 0.35 mm. The ocelli are relatively small (maximum diameter of median ocellus 0.18 mm) the medial ocellus is separated from the lateral ocellus by slightly less than one diameter. The propodeal spiracle is slit-shaped. The petiole is broad when viewed in profile with a straight anterior face and a broadly sloping posterior-dorsal face, which meets the posterior face near the anterior edge.

COMPARISON

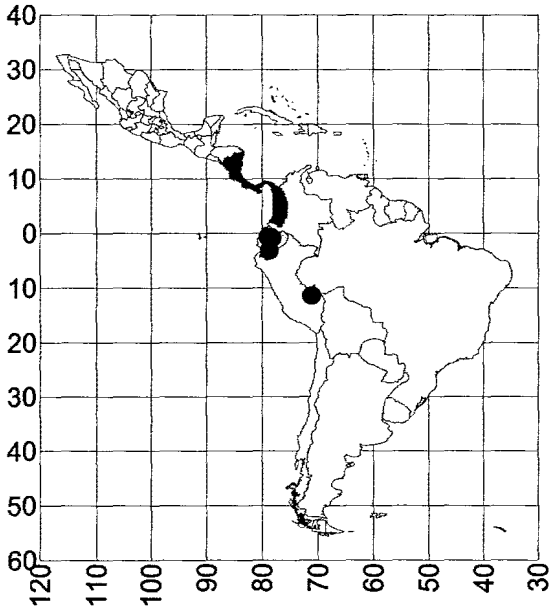
Pachycondyla bugabensis is nearly identical to *P. villosa*, but differs in being smaller (head width usually less than 2 mm). *Pachycondyla bugabensis* can be separated from the similar *P. foetida* and *P. theresiae* as it lacks striae on the side of the petiole (the surface is

coriaceous or finely punctate). It is smaller (total length < 10 mm) than other similar species in the genus such as *P. insignis* and *P. dismarginata*. *Pachycondyla bugabensis* can be separated from *P. unidentata* by the depression at the metanotal suture, which is not depressed in *P. unidentata*.

DISTRIBUTION

NICARAGUA: *Matagalpa* (Hotel Selva Negra [Km 139 N Matagalpa, CWEM]). COSTA RICA: *Heredia* (Estación Biológica La Selva [CWEM, INBio], Río Toro Amarillo vic. Guápiles, 10°20'N 84°4'W [LACM], Plástico [LACM], Parque Nacional Braulio Carrillo [LACM], 3 k S Puerto Viejo [LACM]); *Alajuela* (Monteverde Cloud Forest Reserve [Esperanza, CASC], 6.5 k E Monte Verde [LACM], Peñas Blancas [LACM]); *San José* (San José [MCZC]). PANAMA: *Panamá* (San Blas [Nusagandi, MCZC], El Llano-Cartí Road [km 8.4]); *Colón* (Bugaba [Forel, 1899]); *Coclé* (Cerro Gaital, La Mesa above El Valle); *San Blas* (Nusagandi [CASC]); *Darién* (Ranchito Frío, Caña, Cruce de Mono); *Chiriquí* (without locality [LACM]). COLOMBIA: *Chocó* (10 k SW San José del Palmar [MCZC]); *Valle del Cauca* (3.2 k E Río Aguaclara [old Cali Road, MCZC], Bajo Calima [MCZC], Anchicayá [MCZC], Parque Nacional Farallones de Cali Anchicayá [IAVH], Cali [Río Bravo [IAVH]); *Cauca* (Isla Gorgona [Baena, 1993]). ECUADOR: *Pich-*

incha (Endesa Forest Reserve, 6 mi W Santo Domingo de los Colorados); *Guayas* (3 k SW Bucay [MCZC]). PERU: *Madre de Dios* (near Puerto Maldonado [CSTD]).



Map 9. *Pachycondyla bugabensis*.

HABITAT

Pachycondyla bugabensis is found in lowland rain forest, wet forest, primary forest and secondary forest to rocky wet canyons, from 50 - 1650 m elevation.

BIOLOGY

Workers inhabit the canopy and subcanopy, where they are encountered on low vegetation, in treefalls and in fogging samples (Longino, website); foragers are often found on vegetation.

Longino (website) encountered a nest in a canopy *Guarea* tree. It was a small chamber under an epiphyte mat on the side of a trunk about 10 m high. Longino reported another nest high in a canopy tree, which consisted of large chambers under an orchid clump. Brood was abundant, but there were only about 20 workers. A third small nest was found in dead wood suspended in low vegetation along a trail in mature forest (Longino, website).

The collection in Colombia was nesting in bamboo (*Guadua*), others in the stems of *Cecropia insignis*. Longino (website) found two nests embedded in the larger nests of *Cyphomyrmex cornutus*. The *C. cornutus* nest consisted of a 30 cm long mass of accreted soil suspended from a low branch.

ETYMOLOGY

This species was named for the locality where it was first collected, Bugaba, Panamá.

Pachycondyla carbonaria (F. Smith)

Figures - **Worker** 29 (metasternal process), 33 (petiole, side view), 35 (mesopleuron and propodeum), 273 (petiole, top view), 281 (side view), 354 (head), 355 (metasternal process); **Female**: 356 (side view), 357 (head); **Map** 10

aenescens species complex

Ponera carbonaria F. Smith, 1858:97, ♂, Ecuador: Quito [lectotype worker and 1 paralectotype worker designated, NHMW]; Mayr, 1863:447; *Pachycondyla carbonaria*: Mayr, 1886:358; *Euponera* (*Mesoponera*) *carbonaria*: Emery, 1901a:47; *Mesoponera carbonaria*: Kempf, 1972:141; *Pachycondyla carbonaria*: Bolton, 1995:303

Pachycondyla atrovirens Mayr, 1866a: 890, ♂, ♀, Colombia Antioquia; *Euponera* (*Mesoponera*) *atrovirens*: Emery, 1901a:47; *Mesoponera atrovirens*: Santschi, 1913: 34; Kempf, 1972:141; *Pachycondyla atrovirens*: Bolton, 1995:303 **new synonymy**

Euponera (*Mesoponera*) *atrovirens* race *splendida* Forel, 1901b:340-341, ♀, Ecuador, without specific locality [lectotype worker designated, MHNG]; *Mesoponera atrovirens splendida*: Kempf, 1972:141; *Pachycondyla atrovirens* race *splendida*: Bolton, 1995:309-310 **new synonymy**

DISCUSSION

Worker

These ants are *moderately large* (total length 10 mm) *black ants* with *shiny green or blue reflections*. The anterior edge of the clypeus is indented medially, the eyes are moderately large (maximum diameter 0.43 mm) and separated from the anterior edge of the head by less than one maximum diameter (side view). There is *no malar carina* between the eye and the anterior edge of the head. The scape extends about two funicular segments past the posterior lateral

corner. The *pronotal shoulder is swollen and nearly forms a carina*. The *metanotal suture is impressed and breaks the integument* of the dorsum of the mesosoma. The *propodeal spiracle is elongate* and the propodeum forms carinae laterally. The anterior face of the petiole is slightly concave and meets the convex sloping posterior face at a blunt angle. The *stridulatory file is present* on the dorsum of the gaster. The metasternal process is formed of two low triangles, which are widely separated. *The metasternal process is less well developed than in the other species of*

the *aenescens* species complex.

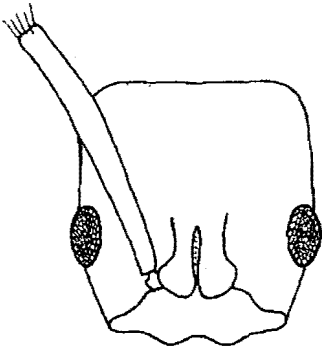


Fig. 354. Head of a worker of *P. carbonaria*.

Erect hairs are moderately abundant on all surfaces of the head, but are lacking on the shaft of the scape. The mesosoma, petiole and gaster have several erect hairs, the hairs on the tibiae are appressed, except for a few hairs near the spur. Golden appressed pubescence is abundant on the head, mesosoma and gaster.

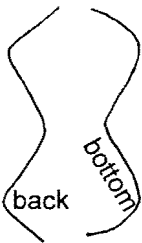


Fig. 355. Metasternal process of a worker of *P. carbonaria* (Tolima, Colombia, CWEM), as seen from behind and from below (bottom of process).

Most surfaces are moderately smooth and some are glossy, especially the posterior half of the head, the pronotum and the gaster. Other surfaces are punctate or finely striate.

These ants are mostly black, the mandibles are reddish brown and the other appendages may be slightly lighter in color.

Female

The female is a moderate sized (total length 13 mm) *black ant with shiny greenish and bluish reflections*. The mandible has approximately 12 teeth. The *clypeus is concave along the medial anterior border*. The head is narrowed anteriorly, with a concave posterior margin. The eye (0.55 mm) is located less than one diameter from the anterior margin of the head. The *malar carina is absent*. The scape (2.72 mm) extends slightly more than the first funicular segment past the posterior lateral corner of the head.

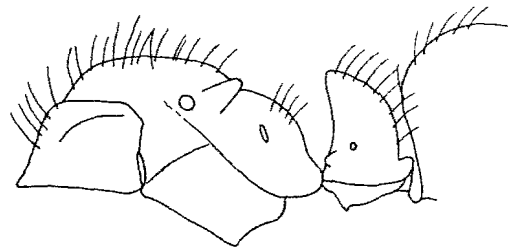


Fig. 356. Mesosoma and petiole of a female of *P. carbonaria* (11 mi SE Maldonado, Ecuador, MCZC).

The *pronotal shoulder* is swollen and forms a moderately sharp carina. The *propodeal spiracle* is slit-shaped. The *anterior face of the petiole* is concave and meets the broadly rounded posterior face near the anterior edge of the apex. The subpetiolar process forms a small downwardly directed tooth anteriorly and a gradually diminishing process posteriorly. The *stridulatory file* is present on the second pretergite.

There are several erect and suberect hairs on the clypeus and mandibles, malar area, ventral surface of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster. The scape is without erect hairs; there are few erect and suberect hairs on the legs.

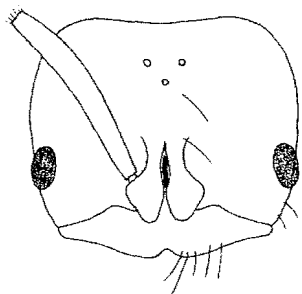


Fig. 357. Head of a female of *P. carbonaria* (11 mi SE Maldonado, Ecuador, MCZC).

The dorsal surface of the mandible is finely striate, the remainder of the surfaces is finely and sparsely punctate with bluish and greenish reflections.

Male

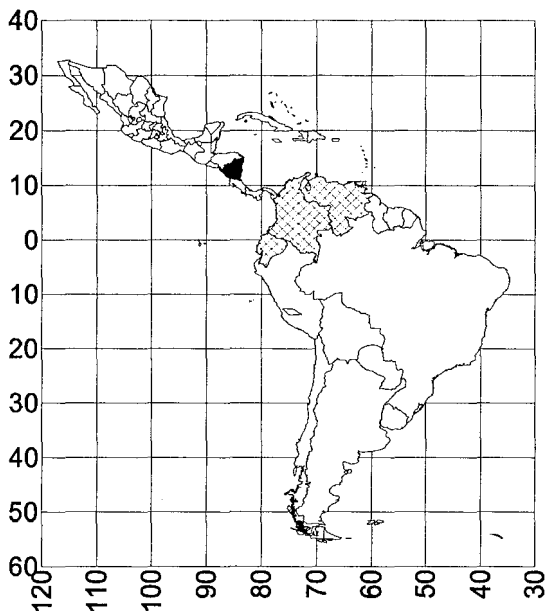
Unknown.

COMPARISON

Pachycondyla carbonaria could be easily confused with *P. laevigata*, another glossy ant. They can be easily separated as the side of the propodeum of *P. carbonaria* has poorly defined striae, whereas that of *P. laevigata* is coarsely sculptured, with well-defined striae. The appressed golden pubescence found in *P. carbonaria* is nearly absent on the head, mesosoma and gaster of *P. laevigata*. *Pachycondyla carbonaria* is very similar to *P. schoedli*. The worker of *P. carbonaria* can be separated as it has much more extensive bluish or greenish reflections and is more sculptured, specifically the anepisternum has several oblique horizontal striae, which are lacking in *P. schoedli*. The relatively smooth surface and the greenish or bluish reflections would separate *P. carbonaria* from other similar species including *P. aenescens*, *P. crassinoda*, *P. emiliae*, *P. harpax*, *P. impressa*, *P. procidua* and *P. striata*.

There is little doubt that *P. atrovirens* is actually *P. carbonaria*, although type material of *P. atrovirens* was not located. The description fits *P. carbonaria* well. *Pachycondyla carbonaria* keys easily to *P. atrovirens* in both Mayr's key (1870) and Emery's (1890a) key and is a relatively common ant in Colombia (subject of Mayr's key). The lectotype of *Euponera (Mesoponera) atrovirens*

race *splendida* is a typical specimen of *P. carbonaria*.



Map 10. *Pachycondyla carbonaria*.

DISTRIBUTION

NICARAGUA: *Matagalpa* (Hotel Selva Negra, Km 139 N Matagalpa [MCZC]). COLOMBIA: *Antioquia* (Kempf, 1972); *Tolima* (El Diamante [CWEM]); *Huila* (12 k W Belén

[CWEM], La Plata [CWEM]). ECUADOR: *Carchi* (San Gabriel [QCAZ], 11 mi SE Maldonado [Tulcán-Maldonado Road MCZC]); *Imbabura* (Otavalo [Cas. Peguche, QCAZ]); *Pichincha* (Quito, Ibarra [MCZC], Base of San Gabriel, 2840m [Santschi, 1913]). VENEZUELA: state unknown (Trujillo - in three states [MCZC]).

HABITAT

This species usually occurs at high elevation between 2250 - 2800 meters in wet cloud forest. Forel (1901b) mentions they occur between 1000 and 2000 m.

BIOLOGY

One colony was collected in a rotten stump 30 cms high. The ants were under the bark to a depth of 15 cms. Sexuials and brood were present in the nest in January (Colombia).

ETYMOLOGY

The name comes from the Latin word for coal, *carbo*, referring to the black color of this species.

Pachycondyla carinulata (Roger)

Figures - **Worker**: 80 (tibia), 234 (side view), 237 (head), 238 (pronotum, top view), 358 (metasternal process); **Female**: 359 (side view), 360 (head), 361 (tibia), 362 (petiole, top and posterior view); **Map** 11

crenata species complex

Ponera carinulata Roger, 1861a:4-5, ♀, Brasil: Minas Gerais, São João D'el Rey; Mayr, 1863:447; Emery, 1890a:73 ♀; *Pachycondyla carinulata*: Roger, 1863a:18, Dalla Torre, 1893:33; *Neoponera carinulata*: Emery, 1901a:47; *Neoponera (Neoponera) carinulata*: Emery, 1911:73; Mann, 1916:412-413, ♀; Plate 1, Fig. 10; *Pachycondyla carinulata*: Bolton, 1995:303

Pachycondyla carinulata race *azteca* Forel, 1899:11, ♀, Panamá, Volcán de Chiriquí [types not found]; *Neoponera carinulata azteca*: Emery, 1901a:47; *Pachycondyla carinulata* race *azteca*: Bolton, 1995:303 **new synonymy**

Neoponera carinulata gibbinota Forel, 1909:246-247, ♀, Guatemala, without specific locality [lectotype worker, 1 paralectotype worker designated, MHNG, 1 cotype worker seen, AMNH, erroneously labeled as type of *P. carinulata* race *azteca*]; *Pachycondyla gibbinota*: Bolton, 1995:305 **new synonymy**

DISCUSSION

Worker

The worker is a *relatively small* (total length up to 7 mm) dark reddish ant with reddish brown mandibles and appendages. The *anterior medial edge of the clypeus forms a blunt angle*. The *malar carina is present, but not greatly developed*. The eyes are located slightly less than one maximum diameter from the anterior edge of the head (side view). The scape extends about two funicular segments past the posterior lateral corner. The *pronotal shoulder is*

formed into a sharp carina, which slightly overhangs the side of the pronotum. The metanotal suture is present, but is not depressed and barely breaks the sculpture on the dorsum of the mesosoma. The *propodeal spiracle is elongated*. The *anterior and posterior faces of the petiole are nearly parallel* on the lower half; the anterior face abruptly bends and forms an *obliquely sloping dorsal face*, which *meets the posterior face at an angle in the middle of the petiole*. The posterior face is convex and rounded. The *stridulatory file is present* on the dorsum of the gaster.

carinulata México to Bolivia and southern Brasil

The metasternal process consists of two closely spaced lobes.

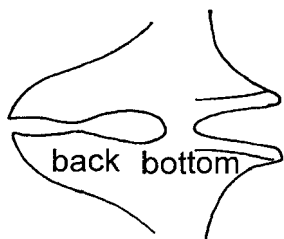


Fig. 358. Metasternal process of a worker of *P. carinulata* (Heredia, Costa Rica, CWEM), as seen from behind and from below.

Erect hairs are numerous on most surfaces, including the head, the scape, the dorsum of the mesosoma, the petiole and all surfaces of the gaster, the hairs on the tibiae are abundant and mostly suberect, all hairs are bright golden-yellow. Appressed golden yellow pubescence is also abundant on the dorsum of the head, dorsum of the mesosoma, the dorsum of the petiole and dorsum of the gaster. Other surfaces such as the ventral surface of the head, the sides of the mesosoma and the petiole also have golden appressed hairs, which are not as numerous.

The head and the dorsum of the mesosoma are densely and evenly punctate appearing like a thimble, the side of the mesosoma is weakly sculptured with fine punctures and is partially smooth and shining. The anterior half of the petiole is mostly punctate and weakly shining, the posterior face is glossy and polished. The gaster is finely punctate, but the

sculpture is difficult to see because of the dense golden appressed pubescence.

Female

The female (undescribed) is a *small* (total length 8 mm) *black* ant with *yellow legs*. The head length is 1.7 mm by 1.6 mm wide. The eye (maximum diameter 0.44 mm) is located less than $\frac{1}{2}$ of the length from the anterior edge of the head (side view). The scape (length 1.5 mm) extends about the first funicular segment past the posterior lateral corner of the head. The *pronotal carina is sharp* and overhangs the side of the pronotum. The *propodeal spiracle is elongated*. The *petiole is similar to that of the worker*, with both the anterior and posterior faces convex and meeting at a *sharp angle in the middle of the apex*. The posterior lateral edges of the posterior face are sharp and form a carina. The stridulatory file is well developed.

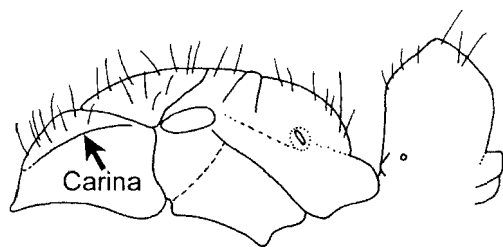
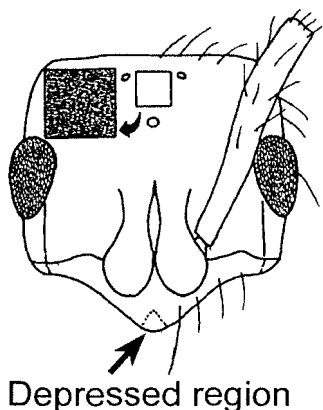


Fig. 359. Mesosoma and petiole of a female of *P. carinulata* (Maloa, Honduras, USNM).

Erect hairs are relatively short (0.2 mm) and moderately abundant on most surfaces, including the scapes.

The hairs on the tibiae are mostly suberect and sparse. Appressed silver pubescence is sparse, but covers most surfaces.



Depressed region

Fig. 360. Head of a female of *P. carinulata* (Maloa, Honduras, USNM). Only a small part of the sculpture is shown.

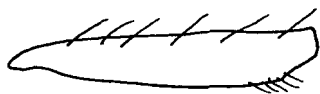


Fig. 361. Posterior left tibia of a female of *P. carinulata* (Maloa, Honduras, USNM).

The mandibles are covered with fine striae and scattered punctures, and are dull, as is the remainder of the ant. The head and most surfaces are densely covered with small punctures. The side of the pronotum is weakly shining and the posterior face of the petiole is mostly smooth and glossy, except for the upper edge, which is punctate.

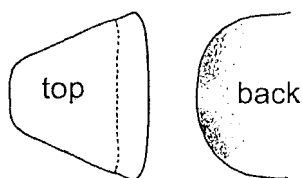


Fig. 362. Top and posterior face of a petiole of a female of *P. carinulata* (Maloa, Honduras, USNM).

Male

The male is unknown.

COMPARISON

Workers of *P. carinulata* could be separated from other members of the *crenata* species complex as the highest point on the apex of the petiole is approximately in the middle. *Pachycondyla carinulata* could only be confused with *P. goeldii* in which the petiole has a similar shape. In both species the malar carina is well developed as is the pronotal carina, which overhangs the side of the pronotum. *Pachycondyla carinulata* differs in having the dorsum of the head densely punctate and dull, whereas the head of *P. goeldii* is weakly punctate and moderately shining. *Pachycondyla carinulata* could be confused with *P. oberthueri*, but can be separated as the highest point on petiole is not near the posterior edge, the mandibles are finely striate, not smooth and glossy and it is nearly black with reddish legs, not reddish brown with yellow legs as in *P. oberthueri*. *Pachycondyla carinulata* can be distinguished from

the similar *P. coveri* from Perú as the punctures on the dorsum of the pronotum are coarse and form poorly defined transverse striae. The punctures on the dorsum of the pronotum of *P. coveri* are very fine leaving the remainder of the pronotum smooth and glossy.

The workers of the new Costa Rican species *P. antecurvata* could be confused with those of *P. carinulata*. They can be easily separated as the highest point on the petiole of *P. antecurvata* is anterior to the midpoint, that of *P. carinulata* is at the midpoint.

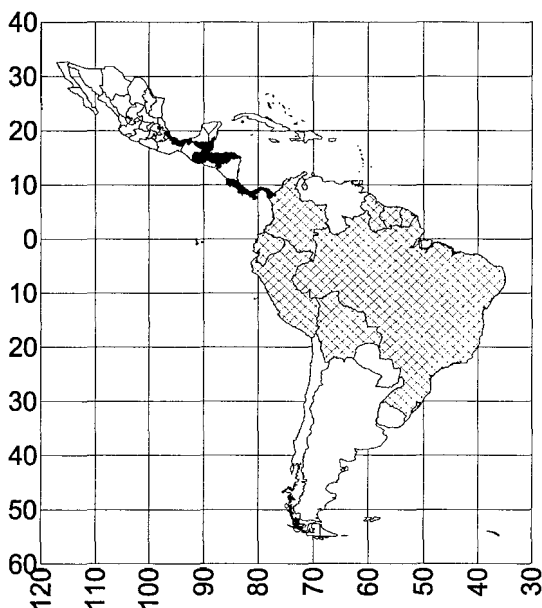
Pachycondyla carinulata race *azteca* was not seen, but based on the description, it does not appear to differ from the typical *P. carinulata* and is thus synonymized. Forel (1909) separated *P. carinulata gibbinota* from the typical *P. carinulata* by the evenly convex propodeum. Comparison of two type workers with typical *P. carinulata* worker shows there is no difference and this subspecies is thus synonymized.

DISTRIBUTION

MEXICO: *Tabasco* (10 k N Cárdenas [CWEM]); *Veracruz* (Las Hamacas [17 km n. Santiago Tuxtla], Córdova [LACM], Estación Biológica Los Tuxtlas [LACM]). GUATEMALA: *Petén* (Tikal [LACM]; *Izabal* (Quiriguá [AMNH]); *Alta Vera Paz* (Tres Aguas [USNM]); without locality (intercepted at Hoboken [NJ, USNM]). BELIZE: *Cayo* (Rio On Falls, Cebada Cave [Reddell and Cokendolpher, 2001]). HONDURAS:

Cortés (Lago Yojoa [MCZC]); *Atlántida* (Lancetilla [near Tela, MCZC]); *Yoro* (Maloa). COSTA RICA: *Heredia* (Estación Biológica La Selva [CWEM, CASC, Olson 1991], Parque Nacional Braulio Carrillo [LACM], 3 k S Puerto Viejo [LACM], R. Toro Amarillo vic. Guápiles [MCZC], 10°20'N 84°4'W [LACM]); unknown state (La Lola [MCZC]); *Alajuela* (Monteverde Cloud Forest Reserve, 11 mi N Florencia); *Cartago* (Turrialba [MCZC]); *Puntarenas* (Península Osa Parque Nacional Corcovado Sirena [MCZC, LACM]); *Limón* (Los Diamantes [LACM]. Longino (website) lists Cordillera de Tilarán and Cordillera de Talamanca. PANAMA: *Panamá* (Barro Colorado Island, Canal Zone, Cerro Campana, Bella Vista, Nusagandi, 8 k N El Llano, El Llano-Cartí Road [km. 8], 3 k E El Valle, Bellavista [MCZC], Canal Zone [MCZC], Barro Colorado Island [MCZC], Cerro Campana [MCZC]); *Chiriquí* (Volcán de Chiriquí); *Coclé* (La Mesa north of El Valle); *Darién* (Serranía de Pinos); *Veraguas* (8 k W Santa Fé); *San Blas* (Nusagandi). COLOMBIA: *Valle del Cauca* (Bajo Calima [CWEM]); *Cauca* (Isla Gorgona [Baena, 1993]). Fernández (1990) lists the state of *Meta*. ECUADOR: *Pichincha* (Endesa Forest Reserve [QCAZ]); *Sucumbíos* (Shushufindi); *Napo* (2-8 mi N Puyo [MCZC], Coca, MCZC); *Napo-Pastaza* (2-8 mi N Puyo [LACM]). PERU: *Huánuco* (Monson Valley); *Ucayali* (Upper R. Pachitea); *Cuzco* (Quincemil [MCZC]); *Madre de Dios*

(15 mi NE Puerto Maldonado [MCZC], near Puerto Maldonado). GUYANA: *Cuyuni-Mazaruni* (Kamakusa [MCZC]; *Potaro-Siparuni* (Tukeit [AMNH]); *Bartica* (Penal Settlement [Wheeler, 1918b]). FRENCH GUIANA [Kempf, 1972]). BRASIL: *Acre* (Rio Branco [MCZC]); *Rondônia* (Abuná [Mann, 1916]; *Mato Grosso* [Kempf, 1972]); *Minas Gerais* (type locality); *Rio Grande do Sul* (São Lourenço [Emery, 1894a]). BOLIVIA: *El Bení* (Huachi, Ivón [USNM]).



Map 11. *Pachycondyla carinulata*.

HABITAT

This species can be found in disturbed habitats such as a cocoa plantation as well as on mountain pine ridges. Longino (website) reports it is

widespread in mature rain forests from sea level to 1300 m. It was collected in the twilight zone of a cave less than 20 m from the entrance (Reddell and Cokendolpher, 2001).

BIOLOGY

Pachycondyla carinulata often nests in rotten trunks. Longino (website) reports that they nest opportunistically in almost any small cavity, such as under epiphytes, in small pieces of deadwood and in dead hollow stems. He found a nest in two internodes of a *Cecropia insignis* sapling. Wheeler (1942) found this species nesting in the living internodes and fistulose stems of *Patima formicaria* as well as in dead twigs. All of the nests that Longino observed were small with few workers.

Longino (website) reports that this species is a common arboreal ant foraging in the canopy of mature rain forests. The workers run very rapidly on tree trunks and are difficult to collect. The sting is painful (Baena, 1993).

Pachycondyla carinulata is mimicked by the salticid spider *Myrmarachne parallela* (Reiskind, 1977).

ETYMOLOGY

The name is derived from Latin, *carina*, meaning keel and the *ulata* making it the diminutive, thus the name means "little keel", probably referring to the carina on the pronotal shoulder.

Pachycondyla cavinodis (Mann)

Figures - **Worker**: 77 (petiole), 232 (side view), 363 (head), 364 (metasternal process); **Female**: 365 (side view), 366 (head); **Male**: 294 (petiole), 367 (mesosoma), 368 (head); **Map** 12

crenata species complex

Neoponera (*Neoponera*) *cavinodis* Mann, 1916:414, plate 2, Fig. 14, ♀, Brasil: Puerto Velho [holotype Rondônia designated, MCZC]; Wheeler and Wheeler, 1971:1205, Fig. 11 a-e, larva; *Pachycondyla cavinodis*: Bolton, 1995:304

DISCUSSION

Worker

The worker is a *small* (total length 8 mm) dark brown specimen that can be easily recognized as the *posterior face of the petiole is strongly concave, the anterior face is convex and broadly rounded and the petiolar node ends in a point posteriorly. The anterior margin of the clypeus forms a medial angle; the eyes are located anteriorly on the head at less than one diameter from the anterior margin of the head. The malar carina is well developed and sharp. The scape is elongate and extends nearly the first three funicular segments past the posterior lateral corner. The carina on the pronotal shoulder is sharp and well developed. The region between the dorsal and posterior faces of the propodeum is angulate. The propodeal spiracle is slit-shaped.*

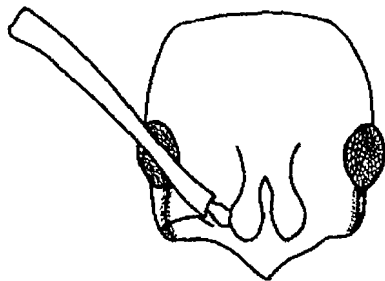


Fig. 363. Head of the holotype worker of *P. cavinodis*.

Erect hairs are present on most surfaces, including the dorsum and ventral surface of the head, scapes, dorsum of the mesosoma, all surfaces of the legs, dorsum of the petiole and all surfaces of the gaster; fine silver appressed pubescence is present on most surfaces, especially the dorsum of the head and the dorsum of the gaster.

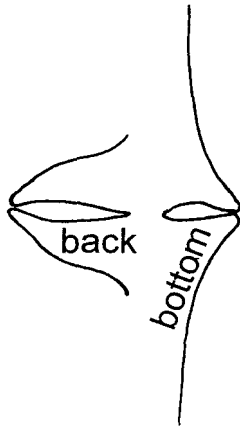


Fig. 364. Metasternal process of a worker of *P. cavinodis* (Madre de Dios, Perú, CWEM), as seen from behind and from below.

The dorsum of the head is finely punctate as is the dorsum of the mesosoma, the side of the mesosoma is mostly coriaceous and partially shining, the dorsum of the petiole and dorsum of the gaster are covered with fine punctures.

The lectotype specimen is medium brown with yellowish brown legs.

Female

The female (undescribed) is a *small* (total length 8 mm) *dark reddish brown* ant with brown appendages. The mandible has approximately 13 teeth. The *anterior margin of the clypeus is convex* and angulate medially with a lobe which overhangs the anteclypeus. The head length is 2.05 mm; the head width is 1.68 mm. The *malar carina is well developed* and extends past the anterior border of the eye, which has a maximum

diameter of 0.56 mm. The sides of the head are slightly narrowed anteriorly and the posterior border is nearly straight or convex. The *pronotal shoulder forms a sharp carina*, which slightly overhangs the side of the pronotum. The propodeal spiracle is elongated. The *petiole is shaped like that of the worker* with a broadly convex anterior face and concave posterior face, which forms a dorsal angle, which overhangs the posterior face.

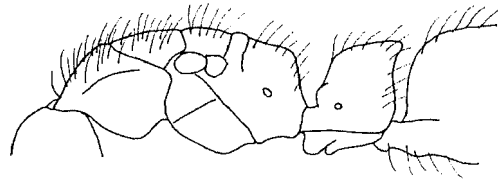


Fig. 365. Mesosoma and petiole of a female of *P. cavinodis* (Madre de Dios, Perú, MCZC).

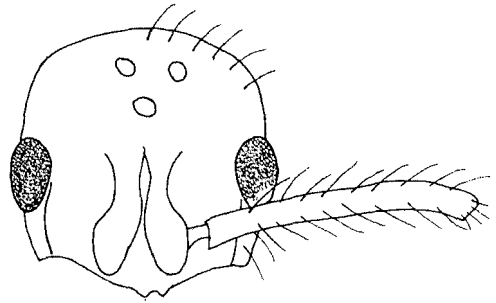


Fig. 366. Head of a female of *P. cavinodis* (Madre de Dios, Perú, MCZC).

Erect hairs are abundant on most surfaces including the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin of the head,

sides of the head, scapes, dorsum of the mesosoma, petiole and all surfaces of the gaster; the hairs on the legs are mostly suberect. Golden appressed pubescence is abundant on the head, dorsum of the mesosoma and all surfaces of the gaster.

The mandibles are finely striate and weakly shining, the dorsum of the head is densely punctate, the dorsum of the mesosoma is sparsely punctate and the sides of the mesosoma are similar with most surfaces moderately to strongly shining. The side of the petiole is punctate as is the dorsal face, the posterior face is smooth and glossy and gaster has scattered punctures and is moderately shining.

Male

The male (undescribed) is a *small* (total length 8 mm) medium brown specimen with a yellowish brown head, pronotum, meso-pleuron and appendages. The *clypeus* is *swollen* anteriorly, with the anterior margin broadly convex. The head length is 1.13 mm; the head width is 0.91 millimeters. The malar carina is absent. The eye is large (maximum diameter 0.66 mm, seen from the side) with the posterior edge extending to approximately $\frac{1}{3}$ diameter from the lateral ocellus. The median ocellus is large (maximum diameter 0.16 mm), located approximately 1 diameter from the lateral ocellus (maximum diameter 0.16 mm). The pronotal shoulder lacks a carina, the Mayrian furrows are well developed, but do not connect medially; the propodeal spiracle is slit-shaped. The *anterior face of the petiole is convex and*

broadly rounded and meets the posterior face near the posterior edge of the petiole, but does not form an angle as in the worker and female. The posterior face is slightly concave. The subpetiolar process consists of a broad large anterior angle followed by a concave area and a small broadly rounded angle posteriorly. The stridulatory file on the second acrotergite is well developed. The arolium between the tarsal claws is well developed.

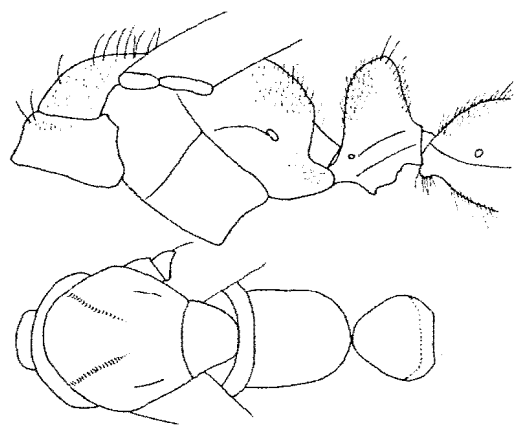


Fig. 367. Mesosoma and petiole of a male of *P. cavinodis* (Tiputini, Ecuador, CWEM). The inset shows the mesosoma as seen from above.

The dorsal and ventral surfaces of the head have several erect hairs as does the posterior border and the clypeus. The mesosoma is covered with short (up to 0.2 mm in length) erect hairs, erect hairs are abundant on the node of the petiole and all surfaces of the gaster; the coxae and femora have several erect hairs as do the tibiae, with most hairs on the tibiae

being shorter than the diameter of the tibiae; silver appressed pubescence is moderately abundant on all surfaces.

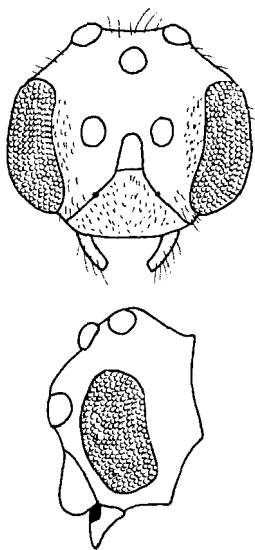


Fig. 368. Head of a male of *P. cavinodis* (Tiputini, Ecuador, CWEM), as seen from the front and from the side.

The dorsum of the head is finely punctate, moderately shining, the dorsum of mesosoma is more coarsely punctate, but shining, especially the pronotum and the mesopleuron, the petiole is punctate and weakly shining and gaster is densely, but finely punctate and moderately shining.

COMPARISON

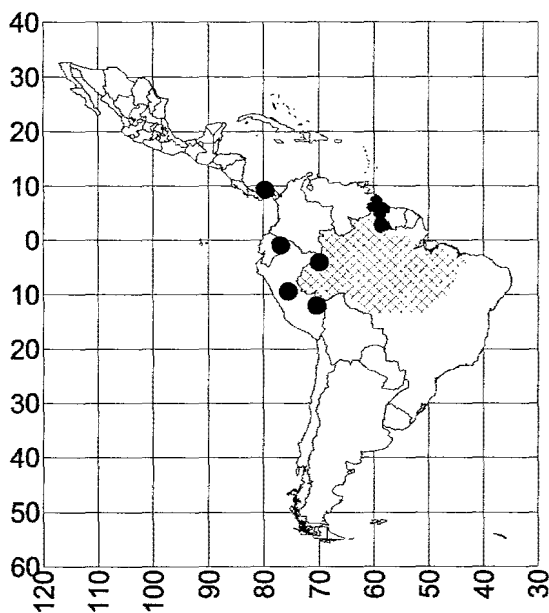
The unusual form of the petiole of the worker and female of *P. cavinodis* would separate this species from all of the others. Two similar species, *P. goeldii* and *P. carinulata*, have the posterior face of the petiole noticeably convex and the highest point is near the middle of the dorsal face. Other

species of the *crenata* species complex lack the strongly concave posterior face of the petiole. *Pachycondyla cavinodis* is most similar to *P. oberthueri*, but can be easily separated as the lower part of the posterior face of the petiole of *P. oberthueri* is strongly convex and the posterior edge does not overhang the posterior face (but is weakly concave near the apex). Mann (1916) compares *P. cavinodis* to *P. crenata*, although they have little in common other than both belonging to the *crenata* species complex. They can be instantly separated even with the unaided eye by the concave posterior face of the petiole of *P. cavinodis*, which is convex or at most straight in *P. crenata*. *Pachycondyla bucki* has a similar petiole, but lacks the malar carina.

Mann (1916) considered *P. cavinodis* to be near *P. luteola*. Actually they have little in common. The worker of *P. luteola* is pale yellowish brown, versus the darker brown *P. cavinodis* (the female of *P. luteola* is dark brown). The posterior face of the petiole is convex in *P. luteola*. The malar carina is nearly absent in *P. luteola*, whereas it is well developed in *P. cavinodis*. The posterior border of the head of both the worker and female of *P. luteola* is strongly concave, not nearly straight as in *P. cavinodis*. Thus there is no likelihood that the two species would be confused or even be considered to be closely related.

The male of *P. cavinodis* was not associated with workers or females, but was collected from the same

fogging experiment as a worker. The shape of the petiole suggests that it is conspecific with the worker and should allow it to be easily recognized and separated from the males of most of the other species.



Map 12. *Pachycondyla cavinodis*.

DISTRIBUTION

PANAMA: *Panamá* (Canal Zone [MCZC, CASC]). ECUADOR: *Napo* (Tiputini Biodiversity Station [MCZC]). PERU: *Huámuco* (15 Mi NE Tingo Maria [MCZC]); *Madre de*

Dios (15 k NE Puerto Maldonado [MCZC], Manu National Park, [Tobin, 1997]). GUYANA: *Essequibo* (Essequibo River [Morabali Creek, MCZC]); *Berbice-Courantyne* (Oronoque River [MCZC]). BRASIL: *Amazonas* (Benjamin Constant [MCZC]); *Bahia* (Ilhéus [LACM]). Kempf (1972) lists the states of *Pará* and *Mato Grosso*.

HABITAT

This species has been collected in mature terra firme forest at 200 m elevation.

BIOLOGY

Samples have been collected with dealate females when fogging the tropical canopy. Winged females were collected in June and a winged male was collected between January and July (Ecuador, in a tree fogging experiment). Otherwise nothing is known of this unusual species.

ETYMOLOGY

The species name comes from Latin, with *cavus* meaning hollowed out and *nodus*, meaning swelling, referring to the hollowed out posterior face of the petiolar node.

Pachycondyla cernua new species

Figures - **Worker**: 46 (larva), 47 (clypeus), 48 (petiole), 200 (subpetiolar process), 369 (side view), 370 (head and mandible), 371 (metasternal process); **Male**: 372 (side view), 373 (subpetiolar process), 374 (head), 375 (forewing); **Map** 13

arhuaca species complex

DISCUSSION

Worker

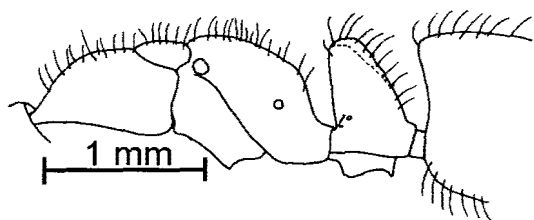


Fig. 369. Mesosoma, petiole and postpetiole of the holotype worker of *P. cernua*.

The worker is a *small* (total length 6 mm) *dark reddish brown* specimen with *lighter reddish brown* appendages. The five apicalmost mandibular teeth are well developed, followed by two or three smaller teeth and basally by small denticles. The anterior margin of the clypeus is broadly convex; a *longitudinal medial depressed area* is present in the middle of the clypeus. The head is nearly rectangular-shaped, with the sides nearly parallel and only

slightly narrowed anterior to the eyes. The posterior margin is nearly straight. The head length is 1.2 mm, the head width 1 mm. The eyes are small (maximum diameter 0.2 mm) located about one diameter from the anterior margin of the head (side view). The antennal scape (1.0 mm) extends approximately the first funicular segment past the posterior lateral corner of the head. The *pronotal shoulder is swollen* and forms a longitudinal raised area, but a carina is not developed. The *mesosoma is only slightly depressed at the metanotal suture*; the *propodeal spiracle is circular*. The *anterior face of the petiole is nearly straight and vertical*, the *posterior face is broadly rounded* and a short dorsal face is present. The subpetiolar process consists of a swollen rounded lobe anteriorly and a *small downwardly directed angle posteriorly*. The *anterior face of the postpetiole is slightly concave* and the dorsal face forms an abrupt acute angle. The stridulatory file and arolia are absent. The *metasternal process is fang-like* as viewed from the side and

has two slender lobes when viewed from behind.

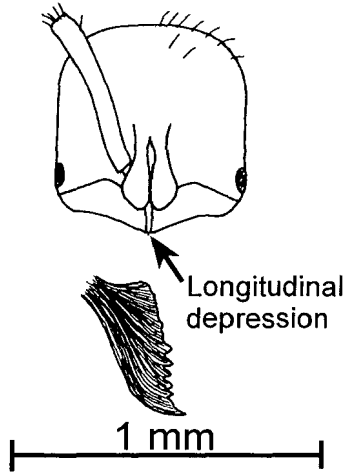


Fig. 370. Head and right mandible of the holotype worker of *P. cernua*.

Erect hairs are sparse, with a few on the mandibles, clypeus, malar area, along the posterior margin of the head;

fine but erect hairs are scattered on the scape, erect hairs are present on the ventral surface of the head, the dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and all surfaces of the gaster. Most hairs on the legs are appressed, but a few are raised from the surface, including on the tibiae. Fine golden pubescence is present on the head, dorsum of the mesosoma, anterior face of the petiole and all surfaces of the gaster.

The dorsal surface of the mandible is finely and evenly striate, with the few scattered punctures near the teeth, most other surfaces are covered with scattered punctures and dull to weakly shining; the side of the pronotum, dorsal half of the side of the propodeum, the posterior face of the petiole, as well as the dorsum of the gaster are slightly more shiny than the remainder of the surfaces.

Female

Unknown.

Male

The mandibles are tiny, but have well-developed depressions near the bases. The surface of the clypeus is swollen and slightly overhangs the mandibles, when viewed from the side. The head length is 0.95 mm, the head width 0.85 mm. The eyes are large, the maximum diameter (viewed from side) is 0.55 mm, the eye is located approximately $\frac{1}{2}$ of its diameter from the lateral ocellus. The diameter of the median ocellus is 0.11 mm, located approximately one diameter from the lateral ocellus (viewed obliquely from above and from the

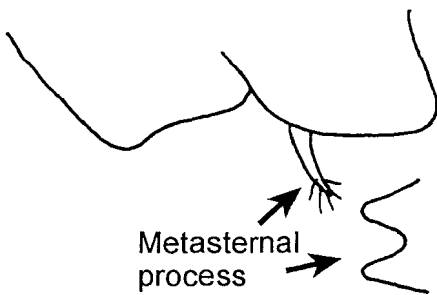


Fig. 371. Metasternal process of a paratype worker of *P. cernua* (CWEM). The inset shows the process as seen from behind.

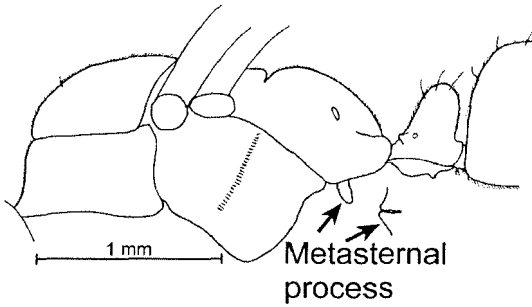


Fig. 372. Mesosoma and petiole of a male of *P. cernua* (Napo, Ecuador, CWEM). The inset shows the metasternal process as seen from behind.

sloping at approximately 45° , the posterior face is slightly convex; the two faces meet at a rounded apex. The *subpetiolar process* is similar to that of the worker, with a well-developed thickened lobe anteriorly and the ventrally directed angle posteriorly. The anterior face of the postpetiole is broadly rounded into the dorsal face. The wing is typical of the genus, except that the third discoidal cell is somewhat elongated.

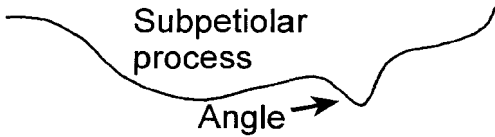


Fig. 373. Subpetiolar process of a male of *P. cernua* (Napo, Ecuador, CWEM).

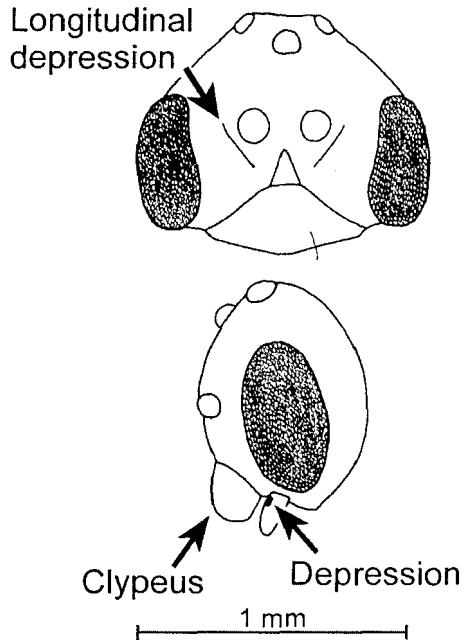


Fig. 374. Head of a male of *P. cernua* (Napo, Ecuador, CWEM), as seen in frontal view and side view, showing the clypeus and the depression on the mandible.

side), which has a diameter of 0.12 mm. The Mayrian furrows are moderately well developed, but do not meet medially; the parapsidal sutures are well developed. The propodeal spiracle is nearly circular, but appears elongated due to the surrounding peritreme (cuticular swelling around the spiracle). The petiole is narrow when viewed in profile with the anterior face slightly concave and

Erect hairs are sparse, with a few on the mandibles and maxillary palps, a pair of obvious hairs on the clypeus; the malar area and the dorsal and ventral surfaces of the head are without erect hairs. The *dorsum of the mesosoma is nearly without erect hairs*, the apex of the petiole and the lobe of the subpetiolar process have a few erect hairs, many hairs on the gaster are erect or suberect. The hairs on the legs are all appressed. Appressed pubescence is sparse, with a few hairs on the head and mesosoma; the appressed hairs on the gaster are more numerous.

COMPARISON

The worker of *P. cernua* is nearly identical to that of *P. pergandei*, differing in being slightly smaller and in possessing the ventrally directed angle on the posterior edge of the subpetiolar process, which is absent in *P. pergandei*. *Pachycondyla cernua* is similar to *P. pergandei* in having a longitudinal depression in the middle of the clypeus and having relatively long antennal scapes, which extend past the posterior lateral margin of the head. The petiole of *P. cernua* is narrower than that of *P. pergandei* with a shorter dorsal face.

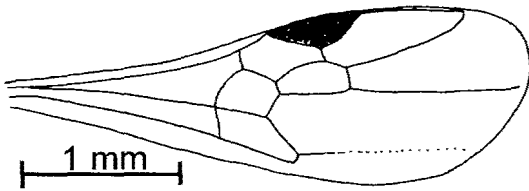
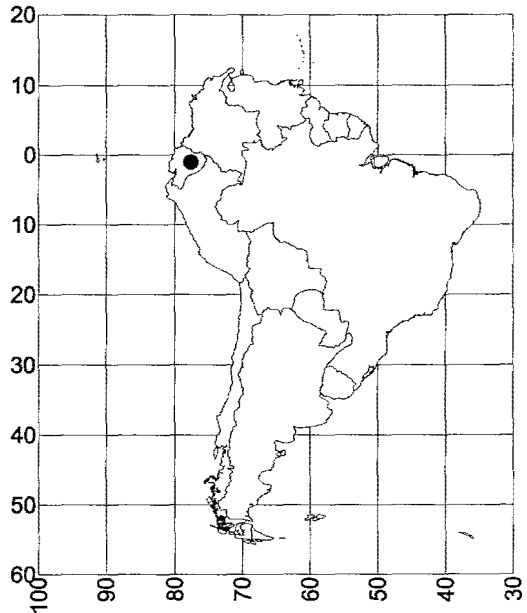


Fig. 375. Left forewing of a male of *P. cernua* (Napó, Ecuador).

Most surfaces are rough, dull and punctate, the side of the pronotum, the lateral edges of the scutum and gaster are weakly shining.

The males were not associated with workers, but the similarities of the subpetiolar process and the distribution strongly suggest they are conspecific.



Map 13. *Pachycondyla cernua*.

Pachycondyla cernua could also be confused with the larger *P.*

conicula. It can be easily separated by the form of the subpetiolar process (the ventrally directed angle is absent in *P. conicula*). Additionally *P. conicula* lacks the longitudinal depression on the clypeus and the scape barely reaches the posterior lateral margin of the head. The shape of the petiole of *P. cernua* is very similar to that of *P. conicula*.

The male of *P. cernua* is similar to those of *P. conicula* and *P. pergandei*, but differs in color (concolorous reddish brown compared to the males of the other two species, in which the pronotum and scutum are lighter in color). *Pachycondyla cernua* is also much smaller and has the ventrally directed angle on the subpetiolar process, which is absent in the males of the other two species.

The angle on the subpetiolar process of *P. cernua* is similar to that found in the *ferruginea* and *rubra* species complexes and appears to simply be bent downward and not as posteriorly as in the other two species complexes. The process suggests a relationship of the *constricta* species complex with the other two species complexes.

DISTRIBUTION

Known only from the state of *Napo*, ECUADOR. The male was collected in *Napo* (20 k E Puerto Napo [CWEM]).

HABITAT

Specimens were collected in a rain forest with clay soil.

BIOLOGY

The nest of the type series was in a log with brood and a single male (July).

ETYMOLOGY

From Latin, *cernuus*, meaning drooping or facing earthward, referring to the posterior edge of the subpetiolar process.

TYPE SERIES

Holotype worker (MCZC) and 9 paratype workers (CASC, CWEM, IAVH, LACM, MZSP, MCZC, QCAZ, USNM), Ecuador, Napo, near Dureno, 287m, 20-vii-2005, W&E Mackay # 21270; 0°4'40.8"N 76°43'50.5"W.

***Pachycondyla chinensis* (Emery)**

Figures - **Worker**: 28 (mesosoma), 376 (side view), 377 (metasternal process), 378 (head and mandible); **Map** 14

rubra species complex

Ponera solitaria F. Smith, 1874:404 ♀; Mayr, 1863:450; *Euponera* (*Brachyponera*) *solitaria*: Emery, 1901a:47; larva Wheeler and Wheeler, 1952:624, 629 [translated from Teranishi, 1927]; synonym of *Brachyponera chinensis*: Brown, 1958: 22; *Brachyponera solitaria*: Emery, 1909: 366, Fig. 6 (♀) [junior primary homonym of *Ponera solitaria* F. Smith, 1860:103]

Ponera nigrita Emery, 1895a:459-460 ♀, China, Shanghai; *Euponera* (*Brachyponera*) *nigrita*: Emery, 1900a:668; *Brachyponera nigrita chinensis*: Emery, 1909:367 ♀; Wheeler, 1921:530, ♀; Ogata, 1987:116-118 ♂, Figs. 82-92; Wheeler, G. and J. Wheeler, 1986:88, larva; synonym of *P. solitaria* (F. Smith: 1874:404); *Brachyponera nigrita chinensis*: Emery, 1909:367 ♀; M. Smith, 1934:559-561; *Brachyponera chinensis*: Brown, 1958:22 [first available replacement name (Brown, 1958:22; Bolton, 1995:304)]

DISCUSSION**Worker**

The worker is a *small* (total length 3.5 mm) brown specimen with yellowish brown mandibles, funiculi and legs. The mandibles have approximately 9 teeth, which alternate in size. The three apicalmost teeth are the largest with the first tooth approximately twice the length of the other two, which are approximately the same size. The *transverse medial carina* is *poorly marked* on the clypeus, the sides of the head are nearly parallel and the posterior margin is slightly concave. The head

length is 0.88 mm; the head width is 0.75 mm. The *eye is relatively large* (maximum diameter 0.15 mm), located less than one diameter from the anterior margin of the head. The *scape* (0.85 mm) *extends approximately two funicular segments past the posterior lateral corner of the head*. The funicular segments are slightly swollen toward the apex, but do not form a club. The mesonotum is well defined on all sides and the mesosoma notably depressed at the metanotal suture. The propodeal spiracle is circular. The petiole is narrow when viewed in profile, with the anterior face being slightly concave near the

chinensis eastern USA

apex and posterior face being slightly convex. Both faces narrow towards the apex and form a small horizontal dorsal surface. The subpetiolar process is a broad thick lobe, with a posteriorly directed sharp process. The metasternal process consists of two fang-like sharp elongate projections, similar to those found in members of the *stigma* species complex.

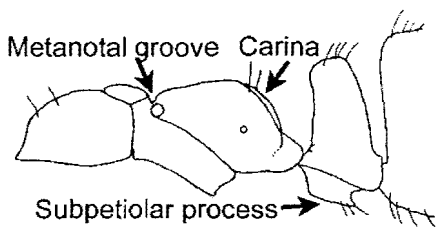


Fig. 376. Mesosoma and petiole of a worker of *P. chinensis* (Fukuoka, Japan, CWEM).

Erect hairs are sparse, but are present on the mandibles, clypeus, frontal lobes, a few hairs are present

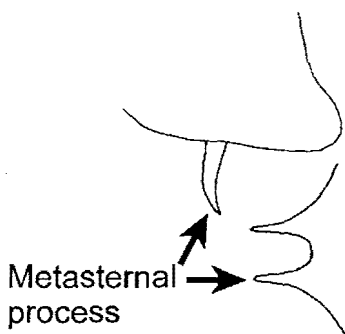


Fig. 377. Metasternal process of a worker of *P. chinensis* (Fukuoka,

Japan, Perú, CWEM), as seen from the side and from behind.

on the dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, a few hairs on the legs are erect. Very fine appressed sparse golden pubescence is found on most surfaces.

The mandibles are finely striated with scattered punctures the dorsum of the head is very finely and densely punctate and weakly shining, the dorsum of the mesosoma has similar sculpture. The sculpture on much of the side of the mesosoma, especially the side of the pronotum and mesopleuron and the lower part of the propodeum is smooth and glossy. The petiole has scattered punctures and is weakly shining; the gaster is sculptured and is slightly shinier.

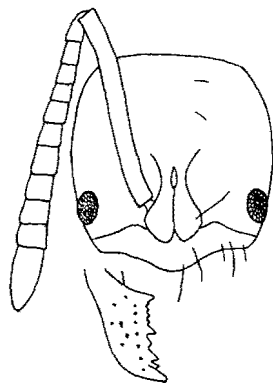


Fig. 378. Head and mandible of a worker of *P. chinensis* (Fukuoka, Japan, CWEM).

Female and male

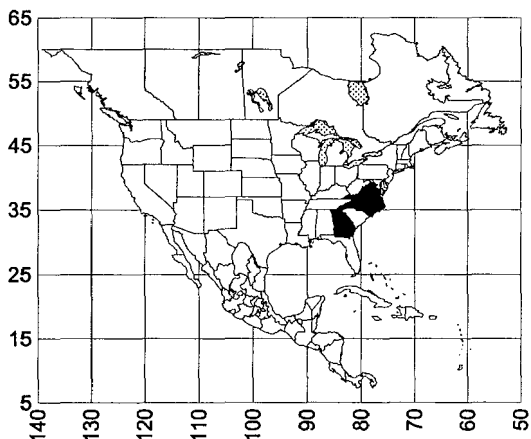
The female and male were not seen.

COMPARISON

Pachycondyla chinensis is an Old World species that was introduced into the New World. The combination of poorly developed mandibular teeth, the constriction at the metanotal suture and the form of the subpetiolar process, with a posteriorly directed lobe separate this species from all of the others present in the New World. Only the introduction of additional Old World species would make recognition of this species difficult.

DISTRIBUTION

Smith (1934) lists UNITED STATES: *Virginia* (Norfolk, Petersburg and Richman); *North Carolina* (Wilmington, Newbern, Washington and Elizabeth City) and *Georgia* (Decatur), as well as Japan and China.



Map 14. *Pachycondyla chinensis*.

HABITAT

Smith (1979) reports they occur in dark damp habitats in urban environments (Smith, 1934) and disturbed rural environments (Brown, 1958).

BIOLOGY

Smith (1934), Koriba (1963) and Gotoh and Ito (2008) summarized the bio-logy of this species. Small colonies were found in moist rotten wood or in the soil under stones, logs, debris, etc. (Smith, 1934). Sexu-als were found in a nest in August in Norfolk, Virginia. Foragers were more active on cloudy days as compared with sunny days. They fed on dead insects, fish scraps and juices of decayed fruits lying on the ground. People at one unspecified locality claimed that they were occasionally stung. At the time of collection (spring, 1932) they were most common in the vicinity of the docks. They occurred over the entire town of Washington, North Carolina and to a lesser extent of Norfolk, Virginia. These ants are unusually common and successful in China and apparently feed on dead insects (Brown, 1958).

ETYMOLOGY

The name means that this species is from China.

Pachycondyla chyzeri (Forel)

Figures - **Worker**: 33 (petiole, side view), 37 (scape), 254 (head), 273 (petiole, top view), 274 (side view); **Map** 15

aenescens species complex

Euponera (*Mesoponera*) *chyzeri* Forel, 1907:5-6, ♀, Colombia: Valle del Cauca [lectotype designated, MHNG]; *Mesoponera chyzeri*: Kempf, 1972:141; *Pachycondyla chyzeri*: Bolton, 1995:304

DISCUSSION

Worker

This is a *large* (total length 13 mm) *black* species with abundant appressed golden hairs. Most of the segments of the funiculus are rich brown; the tip may be slightly yellow. The anterior border of the clypeus is broadly convex. The scape extends approximately three funicular segments past the posterior lateral corner of the head. The *eyes are relatively large* (maximum diameter 0.55 mm), approximately the same length is a distance to the anterior edge of the head (side view). The *malar carina is absent*, but the pronotum is swollen and nearly forms a carina. The *mesosoma is depressed at the metanotal suture*, which breaks the surface of the dorsum. The *petiole is characteristic in shape* with the anterior and posterior faces being convex and broadly rounded and forming the *highest point at the midpoint of the node*. The posterior

lateral surfaces nearly form a carina. The stridulatory file is absent on the second pretergite and the arolia are only slightly developed.

Most surfaces have erect hairs as in most of the other species in the genus, including *erect hairs on the shaft of the scape*. The *golden appressed pubescence* is especially obvious on the dorsum of the head and dorsum of the gaster.

Most surfaces are punctate and dull. The mandibles have a few fine striae and are weakly shining, the side of the mesosoma, especially that of the pronotum, is moderately shining.

Female

The female (undescribed) is *large* (12 mm TL). The head length is 2.6 mm and the width is 2.55 mm. The eyes are large (0.75 mm), located 1 diameter from the anterior edge of the head (side view). The scape extends past the posterior lateral edge of the head by less than the first funicular segment. The posterior margin of the

chyzeri Colombia to Perú

head is strongly concave and the posterior lateral corners are angulate. The *propodeal spiracle is elongate*; the petiole is similar to that of the worker and broadly rounded dorsally.

Erect hairs (up to 0.5 mm) are abundant on all surfaces including the scapes and the legs. Appressed yellow pubescence is present on nearly all surfaces.

Most surfaces are finely punctate and weakly shining.

Male

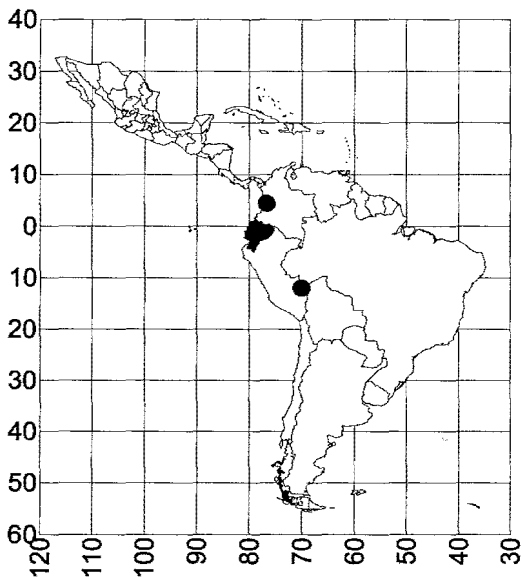
Unknown.

COMPARISON

The unusual shape of the petiole of *P. chyzeri* would separate this species from most of the others in the genus. *Pachycondyla chyzeri* could be confused with *P. fauveli*, but differs in being larger (total length of *P. fauveli* is 12 mm) and has a few erect hairs on the scape (absent except possibly near the apex in *P. fauveli*). *Pachycondyla chyzeri* is similar to *P. solisi*, but differs in having the eyes situated anteriorly on the head (placed in the middle of the side of the head in *P. solisi*), completely lacking the malar carina (present at least anteriorly on *P. solisi*), having the highest point in the middle of the apex of the petiole (at anterior edge in *P. solisi*) and having the posterior face of the petiole weakly punctate (smooth and glossy in *P. solisi*).

The worker of *P. chyzeri* is similar to those of two closely related species: *P. eleonorae* and *P. fusca*. *Pachycondyla chyzeri* differs from *P. eleonorae* in lacking the dense golden

appressed pubescence. It differs from both of these species in having the highest point in the middle of the petiolar node, not near the posterior edge as in *P. eleonorae* and *P. fusca*.



Map 15. *Pachycondyla chyzeri*.

DISTRIBUTION

COLOMBIA: *Valle del Cauca* (near Queremal [MCZC], Río San Juan [MCZC], Saladito [MCZC], Bajo Calima [CWEM]). ECUADOR: *Imbabura* (Chalguay Acu [0°25'48"N 77°57'42"W QCAZ], La Magnolia [0°15'12"N 78°39'6"W QCAZ]); *Pichincha* (27 k W Machachi [CWEM]); *Cotopaxi* (Las Pampas [QCAZ], Otonga [QCAZ]). PERU: *Madre de Dios* (Avispas [MCZC]).

HABITAT

Specimens were collected in mountain rain forest at 1500 - 2000 m.

BIOLOGY

Males were collected in May (Colombia) and September (Perú).

ETYMOLOGY

The species was named after Mr. Chyzer, possibly the collector of the type series. (not specified in the description nor on the label).

***Pachycondyla cognata* (Emery)**

Figures - **Worker**: 5 (metasternal process), 138 (clypeus), 141 (mandible), 179 (head), 379 (side view), 380 (metasternal process); **Female**: 381 (side view), 382 (head and mandible); **Male**: 12 (genitalia), 326 (side view), 383 (head); **Map** 16

stigma species complex

Ponera cognata Emery, 1896a:56-57, ♀, ♀, Costa Rica, Jiménez and Suerre [lectotype worker seen, USNM, paralectotype female seen, MCZC]; *Pachycondyla* (*Pseudoponera*) *cognata*: Emery, 1901a:46; *Euponera* (*Trachymesopus*) *cognata*: Emery, 1911:85; *Trachymesopus cognata*: Kempf, 1960a:423; *Pachycondyla cognata*: Bolton, 1995: 304

DISCUSSION**Worker**

The worker is a *relatively small* (total length approximately 5 mm) reddish brown opaque ant. The *mandibles have 7 teeth* and the clypeus has a *well-defined horizontal transverse sharp ridge*, which is only interrupted in the middle and separates the anteclypeus from the postclypeus. The *frontal carinae are located close together* and are separated by

approximately 0.07 mm (at least less than 0.1 mm) at the narrowest point. The eyes are relatively small (maximum diameter 0.1 mm excluding the surrounding ocular ring) and located approximately one diameter from the anterior edge of the head (side view). The *scapes are relatively short* and fail to reach the posterior lateral corners of the head by nearly the first funicular segment. The dorsum of the mesosoma is nearly straight, but slightly depressed at the metanotal

suture, which interrupts the sculpture on the dorsum of the mesosoma. The propodeal spiracle is oval in shape, but nearly as long as wide. The petiole

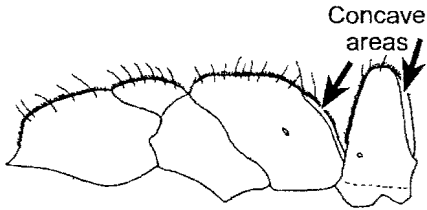


Fig. 379. Mesosoma and petiole of the lectotype worker of *P. cognata* (mirror image of right side of mesosoma). The shape of the subpetiolar process is not typical for *P. cognata*.

is relatively narrow and tapered to the apex. The sub-petiolar process is rounded anteriorly and angulate posteriorly with two distinct angles. The anterior face of the postpetiole meets the dorsal face at a right angle. The stridulatory file on the pretergite is absent as are the arolia.

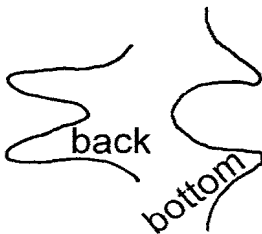


Fig. 380. Metasternal process of a worker of *P. cognata* (Heredia, Costa Rica, CWEM) as seen from behind and from below.

Erect hairs are sparse on the worker and scattered on most surfaces, including the scapes. Most surfaces are punctate and dull and only the mandibles, the petiole and the gaster are moderately shining.

Female

The female is slightly larger than the worker (total length 6 - 7 mm) dark reddish brown with lighter colored appendages. The mandible has 7 teeth, the transverse horizontal carina is well developed on the clypeus and overhangs the anteclypeus; the longitudinal carina is also present. The eyes are large (maximum diameter 0.35 mm) located less than $\frac{1}{3}$ diameter from the anterior edge of the head (side view). The ocelli are small (maximum diameter of median ocellus 0.06 mm). The scape is narrow basally and thickened apically and the scape does not reach the posterior lateral corner of the head. The pronotum is swollen on the shoulder, but does not form a carina.

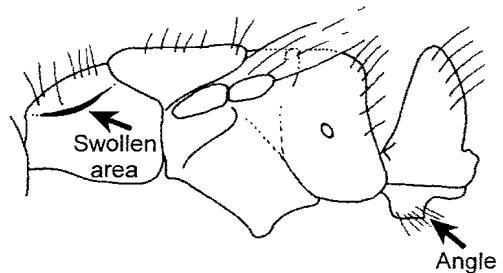


Fig. 381. Mesosoma and petiole of a female of *P. cognata* (Santa Clara, Costa Rica, CWEM).

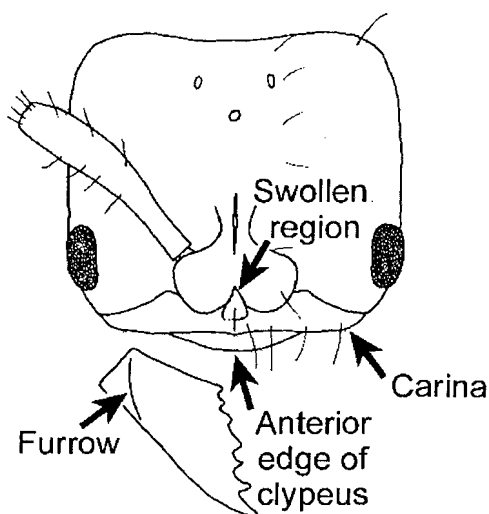


Fig. 382. Head and mandible of a female of *P. cognata* (Santa Clara, Costa Rica, CWEM).

The side of the propodeum is slightly depressed, apparently for the reception of the posterior femur. The petiole is narrow when viewed in profile with a straight or slightly concave anterior face and a convex posterior face. The subpetiolar process is lobe-shaped or rectangular-shaped, but with a distinct, but poorly defined posterior angle. The anterior face of the postpetiole forms nearly a right angle with the dorsal face. Erect hairs are scattered on the mandibles, dorsal and ventral surfaces of the head, scape, posterior margin of the head, on the mesosoma, petiole and gaster, the hairs on the legs are erect or suberect. Appressed golden pubescence is short, but abundant on the head, dorsum of the

mesosoma and gaster.

The mandibles of the female are finely striate and moderately glossy, with an oblique furrow; the dorsum of the head is finely punctate and dull, the dorsum of the mesosoma has similar sculpture, the sides of the mesosoma have indistinct striae. The petiole is moderately shining (front and sides) to strongly shining (posterior face) with poorly defined striae. The gaster is finely punctate or coriaceous and moderately shining.

Male

The male (undescribed) is a *small* (total length 5 mm) *dark brown* ant. The anterior margin of the clypeus is weakly convex and the *surface of the clypeus is swollen* when viewed in profile. The head length and width are both 0.8 mm. The *eyes are relatively small* (maximum diameter 0.4 mm) and located nearly one diameter from the lateral ocellus. The *ocelli are relatively small* (diameter of the median ocellus 0.09 mm); the medial ocellus is located approximately one diameter from the lateral ocellus (diameter 0.1 mm). The *Mayrian furrows are weakly developed*, but present and do not connect in the middle of the scutum. The parapsidal sutures are well developed. The *propodeal spiracle is circular-shaped*. The *petiole is nearly triangular shaped* with both faces sloping and forming a moderately sharp apex. The subpetiolar process consists of a rounded blunt process.

Erect hairs are present on the dorsum of the clypeus, head, posterior margin of the head, mesosoma, petiole

and gaster, the hairs on the legs are suberect to erect on most surfaces, including the tibiae. Golden appressed pubescence is present on the head, mesosoma and gaster.

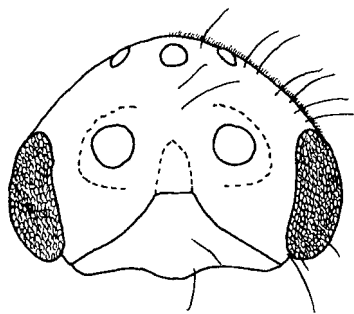


Fig. 383. Head of a male of *P. cognata* (Heredia, Costa Rica, CWEM).

Most surfaces are coriaceous or finely punctate and only weakly shining.

COMPARISON

The worker and female of *Pachycondyla cognata* would most likely be confused with those of *P. succedanea* from which it apparently only differs in having the frontal carinae closely spaced (separated at the narrowest point by about 0.07 mm, at least less than 0.10 mm as compared with *P. succedanea* in which the separation is 0.13 mm or more). *Pachycondyla cognata* can be separated from the similar *P. succedanea* and *P. stigma* in having seven mandibular teeth as compared to six teeth in the other two species.

The male of *P. cognata* can be

separated from that of *P. succedanea* in being somewhat larger (the total length of the male of *P. succedanea* is about 4 mm) and in not having the subpetiolar process angulate posteriorly. The separation of *P. cognata* from males of *P. stigma* is more difficult (possibly due to the small amount of material that is available). The subpetiolar process of *P. cognata* is deeper (0.11 mm) than that of *P. stigma* (0.09 mm). The apex of the petiole is sharper than it is in *P. stigma*. Otherwise the males of the three species (*P. cognata*, *P. stigma* and *P. succedanea*) are very similar.

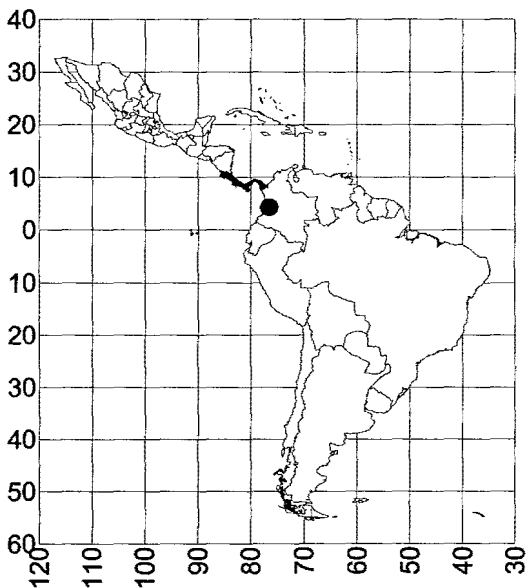
Members of *P. cognata* could be confused with those of the genus *Hypoponera*, but differ in having two tibial spurs on the posterior tibia of *P. cognata* as compared with a single tibial spur in workers of *Hypoponera*.

The mandibles of workers and females of *P. cognata* are nearly always covered by striae, specimens from the Estación Biológica La Selva in Costa Rica tend to have smooth and glossy mandibles.

DISTRIBUTION

COSTA RICA: *Cartago* (3 - 5 km E Turrialba [MCZC]); *Heredia* (Finca La Selva [CWEM, INBio, LACM MCZC], Río Toro Amarillo near Guápiles [MCZC]); *Alajuela* (Santa Clara [Hamburg Farm, CWEM], Jiménez [Forel, 1899]); *Limón* (Zent [MCZC, AMNH, LACM, USNM], Suerre [Forel, 1899]). Longino (website) lists the Atlantic lowland rain forest, up to 600 m elevation. **PANAMA:** *Panamá* (El Lano-Cartí Road [COOK]); *San Blas* (Nusagandi

[COOK]); *Veraguas* (Alto de Piedra, [COOK]); *Chiriquí* (15 k N Fortuna [CASC]). COLOMBIA: *Valle del Cauca* (Bajo Calima [MCZC]).



Map 16. *Pachycondyla cognata*.

HABITAT

These ants are found in tropical rain forest and mature lowland rain forest at 450 m and 600 m (Longino, website) up to 1150 m in elevation.

BIOLOGY

Nests are located in rotten logs and stumps and under bark on rotten logs, often near clearings at the edges

of forests. Winged females and males were collected in July and August (Costa Rica). Three dealate females are on a single pin in the USNM, suggesting that this species may be pleometrotic. Brood was found in nests in August (Costa Rica). They occasionally nest together with ants in the genera *Hypoponera* and *Apterostigma*.

Longino (website) reports this species nesting in loose bark of dead wood on or near the ground. He reported that occasionally workers were collected under dead wood and he once collected workers from a dead branch of a recently fallen tree at La Selva, Costa Rica, suggesting that it can occur high in the canopy. He has never collected this species in sifted litter samples, which suggests that even though it nests in rotten wood at the ground level, it does not forage in the leaf litter. We have not found any specimens in hundreds of Winkler extractions we have examined from Costa Rica and Panamá.

ETYMOLOGY

The name of this species is derived from the Latin word *cognatus*, meaning "related to". Emery considered it to be closely related to *P. stigma*.

Pachycondyla commutata (Roger)

Figures - **Worker**: 115 (metasternal process), 214 (head), 384 (side view); **Female**: 385 (mesosoma and petiole), 386 (head); **Map** 17

laevigata species complex

Ponera commutata Roger, 1860:311-12, ♀, South America [misidentified as *P. tarsata*]; Mayr, 1863:447; *Pachycondyla commutata*: Emery, 1890a:72; *Neoponera* (*Neoponera*) *commutata*: Emery, 1911:71; Mann, 1916:410; *Termitopone* (*Syntermitopone*) *commutata*: Wheeler, 1936:169-177, ♀, Fig. 3a-b; Borgmeier, 1959:313-314, ♂; *Pachycondyla commutata*: Bolton, 1995:304

DISCUSSION

Worker

The worker is a *large* (total length 17 mm) *shining black* ant. The mandibles have many teeth, the anterior border of the clypeus is broadly convex, the *eye is large* (maximum diameter 1 mm), much greater in length than the distance between the anterior edge of the eye and the anterior edge of the head (side view). The scapes extend about the first two funicular segments past the posterior lateral corner of the head. The *malar carina is present*, but the *pronotal carina is absent*. The *mesosoma is depressed at the metanotal suture*, which is well marked on the dorsum. The propodeal spiracle is elongated. The petiole is wide when viewed in profile with the anterior and posterior faces being almost parallel and with the dorsal face rounded and forming the highest

point near the posterior edge of the petiole. The *posterior lateral carina of the petiole is well developed and sharp*. The *stridulatory file on the second pretergite is present*, the arolia are poorly developed.



Fig. 384. Side view of a worker of *P. commutata* (from Wheeler, 1936).

Erect and suberect hairs are abundant on most surfaces; appressed golden pubescence is sparse, except near the insertions of the antennae, on the anterior edge of the pronotum and on the middle and posterior coxae.

Most surfaces are shiny black, striae cover much of the dorsum of the head, diverging posteriorly and converging on the ventral surface of

the head. The side of the propodeum has obvious oblique striae.



Fig. 385. Mesosoma and petiole of a female of *P. commutata* (Sucumbíos, Ecuador, QCAZ).

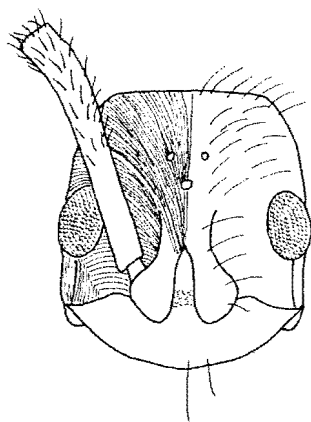


Fig. 386. Head of a female of *P. commutata* (Sucumbíos, Ecuador, QCAZ).

Female

The female is a *large* (total length 19 mm) *shining black* ant. The head and the side of the mesosoma are covered with striae. The eyes are large, covering about one third of the side of the head and located about one half of their maximum diameter from the anterior margin of the head. The

malar carina is well developed, but the *pronotal carina* is absent. The *propodeal spiracle* is slit-shaped. The petiole is similar to that of the worker with the anterior face being nearly straight and meeting the broadly rounded posterior face at the apex and with the posterior lateral margins forming sharp carinae.

The pilosity and sculpture are similar to those of the worker.

Male

The male was not seen.

COMPARISON

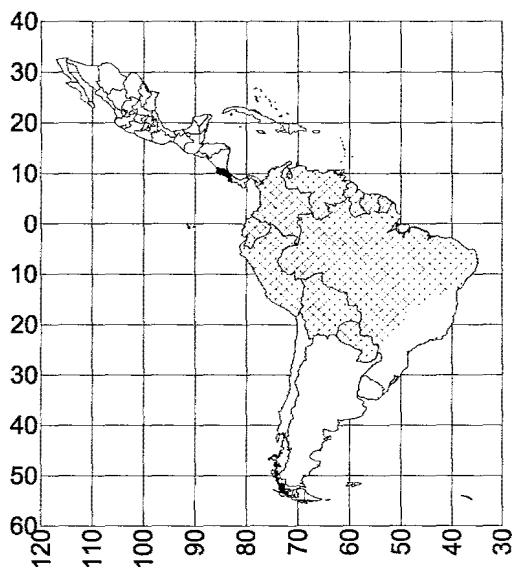
The worker and female of *P. commutata* are easily recognized by their large size and mostly shining integument. *Pachycondyla commutata* can be separated from the three other shiny black species (*P. carbonaria*, *P. marginata* and *P. laevigata*) by their larger size. Occasionally workers of *P. laevigata* are nearly as large, but differ in the shape of the petiole. The apex of the petiole of *P. commutata* is highest near the posterior edge; the dorsum of the petiole of *P. laevigata* is at approximately the same height over the entire dorsal face. The mandibles of *P. commutata* are dull and covered with striae; they are smooth and glossy in *P. laevigata*.

DISTRIBUTION

COSTA RICA: *San José* (San José). COLOMBIA: *Meta* (near Puerto Gaitán, Puerto Lleras, Reserva La Macarena [Fernández and Schneider, 1989], Estación Las Dantas); *Vichada* (Gaviotas); *Huila*

(Neiva); *Amazonas* (30k W Leticia); *Vaupés* (Río Vaupés). ECUADOR: *Pichincha* (Quito [Forel, 1921]); *Napo* (Sunka, Limón Cocha [Hermann, 1968]); *Tungurahua* (5 mi S Tena); *Sucumbíos* (Cuyabeno la Hormiga); *Pastaza* (Bosque Moretecocha); state unknown (en route Río Boniboisa). PERU: *Lima* (Lima); *Putumayo* (El Encanto, La Chorrera, La Sombra); *Piura* (Hacienda de San Juan [San Juan]); *Ica* (Río Topará); *Loreto* (Iquitos, near Iquitos, Pucallpa); *Madre de Dios*, (Iberia, Río Tapiche, near Puerto Maldonado); *Junín* (Satipo, Colonia de Perené, El Campamento [Colonia Perené]); state unknown (Chaquimayo [Wheeler, 1925, 1936], Chaupimayo from state of Cuzco?); states unknown (El Campamento to Hacienda de Magdalena, Unión de la Isla, Paraná, San Nicolas Campamiento del Pichis, Chorrera [5 localities in Perú]). VENEZUELA: *Bolívar* (Canaima, Yuri Falls, Suapure Caura River, Akuriman, 18 k SW Mt. Roraima [Peraitepui]); *Amazonas* (Culebra, Cerro Unturan Camp, Mount Marahuaca [north slope]); *Cojedes* (Lower Orinoco [Wheeler, 1936]). GUYANA: *Mazaruni-Potaro* (Potaro Lodge, Upper Mazaruni River); *Cuyuni-Mazaruni* (Bartica, Kamakusa, Penal Settlement, Kartabo, Kartabo Point, Wenamu River, Forest Settlement); *Dememera-Mahaica* (Kaieteur); *Northwest* (Wanaina); *Essequibo* (Río Essequibo, Guyuwini River [Upper Essequibo], Meamu Mouth); *Rupununi* (Rupununi River, Kaieteur). Wheeler (1936) lists *Mahaica-Berbice* (Blairmont); *Pot-*

aro-Siparuni (Tukeit, Tumatumari, Potaro Landing); *Bartica* (Penal Settlement [Wheeler, 1918b]). FRENCH GUIANA: *Cayenne* (Cayenne). SURINAME: *Kerie* (King Frederick William IV Falls [Courantyne River]); *Sipaliwini* (Raleigh, Vallen-Voltzberg Reserve); states unknown (Ongelijk, Bara River, Zanderij Island [Wheeler,



Map17. *Pachycondyla commutata*.

1936]). BRASIL: *Amapá* (Kempf, 1972); *Amazonas* (Reserva Ducke; Rio Branco, Vista Alegre, Ponta Negra [north of Manaus]; Cururuzinho, Arimã [on Rio Purus] and Rio Autaz [Wheeler, 1936]); *Roraima* (Maracá Island [Mill, 1982a]); *Rondônia* (Porto Velho, Madeira-Mamoré railroad [Mann, 1916; Wheeler, 1936]); *Goiás* (Chapada [Wheeler, 1936], 24 k E Formoso); *Abuná* (Rio Madeira); *Pará* (Utinga near Belém, Jaboty; Fonteboa,

Óbidos, Tucurul, Manaus and Belém [Wheeler, 1936]); *Mato Grosso* (Diamantino, Rio Paraguai, Cuiabá [Wheeler, 1936]); *Tocantins* (Rio Tocantins); *Distrito Federal* (Parque Nacional Araguaia [Sandoval and Zambrano, 2007]); state unknown (Uassa Island [Wheeler, 1936]). Kempf (1972) lists the Brazilian states of *Acre* and *Piauí*. BOLIVIA: *El Beni*: (Quayaramarila); *Santa Cruz* (San Fermin). PARAGUAY (Kempf, 1972; Wild, 2002).

HABITAT

Specimens have been collected in tropical rain forests along jungle trails (Hermann, 1968), in open savannah and on the shady forest floor (Wheeler, 1936) and tropical semi-humid forest (Mill, 1983). One series was collected at 250 m, another at 580m.

BIOLOGY

Mill (1984) found a density of 10 colonies per hectare in Brasil. A dealate female was collected in December (Ecuador).

This is a group raiding species in which stridulation causes an escape behavior among the other workers (Hermann, 1968). Nests have about 400 workers and they are group mass recruitment foragers, which prey exclusively on three species termites in the leaf-cutting genus *Syntermes* spp. (Wheeler, 1936), especially *S. molestus* (Mill, 1982a, 1982b, 1984). The other two species of termites are *S. solidus* and *S. calvus* (Mill, 1984).

Wheeler (1936) reported they feed on *S. chaquemayensis*, *S. territus*, *S. snyderi*, *S. grandis* and *S. brasiliensis*. Foragers employ two different modes of searching for termite prey (Mill, 1982a). The first involves a forager encountering a foraging column of termites. She returns to the nest laying a pheromone trail. She leads other workers back to attack the termites. They stockpile the dead and wounded termites and each ant often returns to the nest with two or more termites (Mill, 1984). The second method involves a group of foragers (20 - 117 workers - Mill, 1984), which work together, or may separate into smaller groups of individuals (Mill, 1984). When a worker encounters termites she stridulates to attract the other ants and they attack as a group. Stridulation by a worker may result in the other foragers scattering into the surrounding litter (Mill, 1984). Termites instantly become immobile when stung (Mill, 1984).

They may be parasitized by a phorid fly (see Wheeler, 1936:174). The workers from different colonies are antagonistic and individuals may be killed (Mill, 1984).

This species is associated with menarche and female initiation rites in the Tupi-Guarani language family in South America (Balée, 2000).

ETYMOLOGY

Apparently the name of this species is derived from the Greek words *kommos* meaning embellishment and the intensifier *tatos*, meaning they are really shiny.

Pachycondyla concava new species

Figures - **Worker**: 87 (pronotum), 88, 189 (side of postpetiole), 387 (side and top view), 388 (head), 389 (tibia), 390 (petiole, posterior face); **Map** 18

emiliae species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *small* (total length 5 mm) *black ant with red appendages and a red-tipped gaster*. The mandibles have nine teeth; the *medial lobe of the clypeus is angulate and overhangs the anteclypeus*. The head length (including the lobe of the clypeus) is 1.15 mm; the head width is 0.95 mm. The eyes (maximum diameter 0.26 mm) are located anteriorly on the head slightly more than $\frac{1}{2}$ diameter from the anterior margin of the head. The *malar carina is well developed* and extends nearly to the middle of the inner border of the eye. The scape (1.15 mm) extends approximately $\frac{1}{3}$ length past the posterior lateral corner of the head. The head is slightly narrowed anteriorly, the posterior lateral margins are rounded and the posterior margin is slightly concave. The *carina is moderately developed* on the side of the pronotum and partially overhangs the side. The *mesosoma is depressed at the metanotal suture*. The *propodeal spiracle is circular*. The petiole is relatively narrow when viewed in profile with a

straight or slightly concave anterior face; the *broadly rounded posterior face meets the anterior face near the anterior edge of the apex*. The posterior face is separated from the side by a carina.

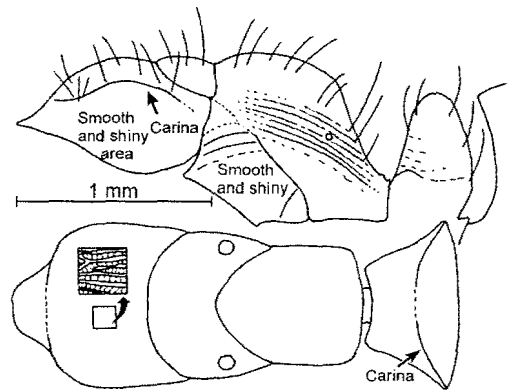


Fig. 387. Mesosoma, petiole and anterior face of the postpetiole of the holotype worker of *P. concava*, as seen from the side and from above.

The subpetiolar process has a small anterior ventrally directed angle followed by short concave region and a rounded lobe posteriorly. The *anterior face of the postpetiole is strongly concave* and forms an acute angle with the dorsal face. The *stridulatory file is*

well developed on the second pretergite, the arolia are moderately developed.

Erect hairs are present on the mandibles, the clypeus, the dorsal surface of the head, the sides of the head, the posterior margin, the scape (where the hairs are approximately equal in length to the diameter of scape), on the dorsum of the mesosoma, petiole and all surfaces of the gaster. Appressed pubescence is very sparse; a few appressed golden hairs are obvious on the head, the mesosoma and gaster.

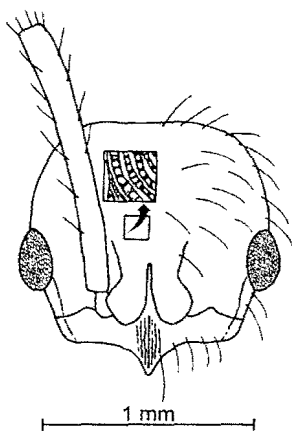


Fig. 388. Head of the holotype worker of *P. concava*.

The mandibles are smooth and glossy with scattered punctures, the medial lobe of the clypeus is covered with longitudinal striae, the head is heavily and densely punctate, but the punctures are in rows forming poorly defined striae. The punctures on the dorsum of the pronotum are coarse and align in definite rows forming striae, which are mostly longitudinal,

but somewhat concentric around the center of the pronotum. The sculpture of the mesonotum is similar, but with less obvious striae. The dorsum of the propodeum is mostly smooth and glossy, the side of the pronotum below the carina is very smooth and glossy as is most of the mesopleuron (a few striae are present near the dorsal edge), the upper part of the propodeum is covered with coarse striae, and the lower third is glossy.

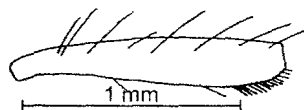


Fig. 389. Posterior right tibia of the holotype worker of *P. concava*, as seen from behind.

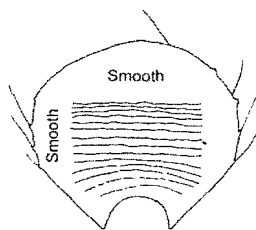


Fig. 390. Posterior face of the petiole of a paratype worker of *P. concava*.

The upper part of the anterior face the petiole is smooth and glossy, the lower half has transverse striae, the side of the petiole is mostly glossy, the posterior surface is smooth and glossy on sides of the upper $\frac{1}{3}$, the lower $\frac{2}{3}$ is covered with transverse striae. The gaster is densely punctate, but smooth and glossy between the punctures.

Female and male

Unknown.

COMPARISON

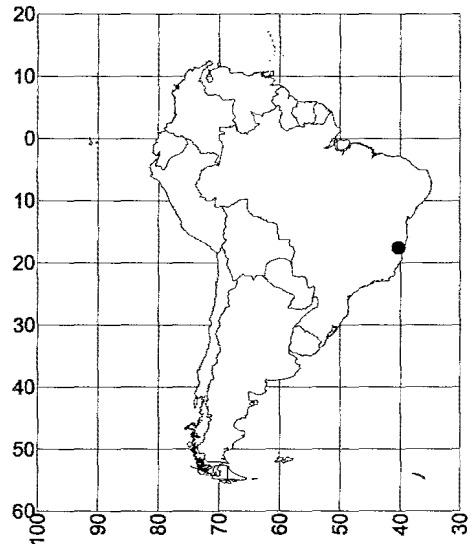
The worker of *Pachycondyla concava* is very similar to those of *P. venusta* and *P. schultzi*, but can be easily separated as the anterior face of the postpetiole of the latter two species is not strongly concave. Additionally these two species lack the well-developed angulate lobe, which overhangs the clypeus of *P. concava*. Most of the mesopleuron of *P. concava* is smooth and glossy, which easily separates it from the worker of *P. schultzi* in which the entire mesopleuron is covered with horizontal striae. The anterior margin of the clypeus of *P. venusta* does not have a well-developed sharp lobe, which overhangs the remainder of the clypeus as it does in *P. concava*. The males and females of the three species are unknown.

The sharp point on the clypeus *P. concava* could cause confusion with *P. becculata*, but the concave anterior face of the postpetiole in *P. concava* would easily separate them. The form of the anterior face of the postpetiole of *P. concava* could cause confusion with *P. prociua* and even *P. harpax*, in which the anterior face of the postpetiole is concave. The well-defined malar carina would separate *P. concava* from both of these species, which lack the carina.

DISTRIBUTION

Known only from the state of *Bahia*, in southeastern BRASIL,

including the type series and from CEPLAC [15°16'S, 39°5'W], collected by A. Anderson in August, 1996 [CASC, LACM, MZSP].



Map 18. *Pachycondyla concava*.

HABITAT

Unknown.

BIOLOGY

Unknown, one specimen was collected from a Winkler extraction.

ETYMOLOGY

From Latin, *concauus*, meaning concave, referring to the anterior face of the postpetiole.

TYPE SERIES

Holotype worker (MCZC), 2 paratype workers (CWEM, MCZC), Rebio, UNA-BA, 22-10-92, Col. Ivan C. 45798. One paratype worker REBIO/IBDF, UNA-BA, Data - Nov. '89, Col. M. C. Alves, 4333 (MCZC).

Pachycondyla conicula new species

Figures - **Worker**: 49 (mandible), 50, 199 (head), 196, 391 (side view), 392 (metasternal process), 393 (head and mandible); **Female**: 394 (side view), 395 (head); **Male**: 323 (head, side view), 396 (side view), 397 (head, frontal view); **Map** 19

arhuaca species complex

DISCUSSION & DESCRIPT.

Worker

Workers of *Pachycondyla conicula* are *moderately small* (total length about 8 mm) *black* ants with reddish brown appendages. The clypeus has a longitudinal medial raised area, but the region anterior to the eye is *without a malar carina*. The eye is relatively small (0.25 mm maximum diameter) which is longer than the distance between the anterior border of the eye and the anterior border of head (side view). The scape extends to the posterior lateral corner of the head. The overall dorsum of the mesosoma is convex, but is distinctly impressed at the promesonotal suture and is more *deeply impressed at the metanotal suture* and the mesonotum is developed, although poorly. The *propodeal spiracle is circular* and relatively small (diameter of the opening is 0.04 mm). The dorsal face of the propodeum is broadly rounded into the posterior face. The petiole is relatively narrow when viewed in profile with a vertical anterior face

and a curved convex posterior face that meet at a moderately sharp apex. The anterior face of the postpetiole is vertical and straight and meets the dorsal face at an angle. The metasternal process consists of two well-developed triangular lobes.

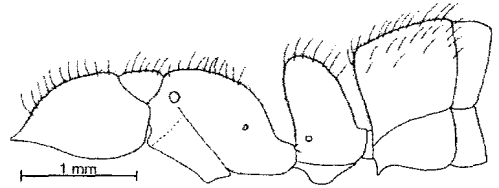


Fig. 391. Mesosoma, petiole and postpetiole of the holotype worker of *P. conicula*.



Fig. 392. Metasternal process of a paratype worker of *P. conicula* (CWEM) as seen from behind.

Erect hairs are mostly short (0.15 - 0.25 mm) and present on most surfaces, including the dorsal and ventral surfaces of the head, the sides of the head, the scapes, the dorsum of the mesosoma, the legs, the dorsum of the petiole and all surfaces of the gaster. Appressed golden pubescence is abundant on nearly all surfaces.

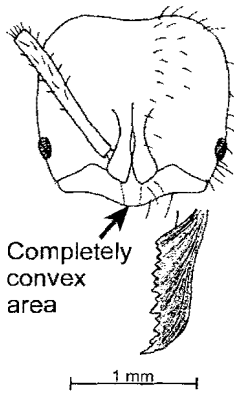


Fig. 393. Head and mandible of the holotype worker of *P. conicula*.

Most surfaces are dull and punctate, except for the mandibles, which are finely striate and the coxae, which are partially punctate.

Female

The female is a *small* (total length 6.5 mm) dark reddish brown specimen with ferruginous red appendages. The *mandibles have 13 or 14 teeth*, which alternate in size with the apicalmost tooth being more than twice as long as any of the other teeth and basalmost teeth small and poorly developed. The anterior margin of the clypeus is broadly convex and the *medial part of the clypeus appears to be "pinched"*

and raised to a higher level than the remainder of the clypeus. The head length is 1.65 mm; the head width is 1.55 mm. The greatest eye diameter is 0.36 mm and the eye is located less than $\frac{1}{2}$ of its diameter from the anterior margin of the head. The sides of the head are weakly convex and nearly parallel, the posterior margin is distinctly concave. The *ocelli are relatively small*, the diameter of the median ocellus is 0.08 mm, slightly larger than the lateral ocellus (0.06 mm). The scape (1.3 mm) extends slightly past the posterior lateral margin of the head. The pronotal shoulder is slightly swollen, but does not form a carina. The *propodeal spiracle is circular*. The petiole is relatively narrow when viewed in profile with a nearly straight anterior face and a convex posterior face, both narrowed towards the apex and forming a sharply rounded apex.

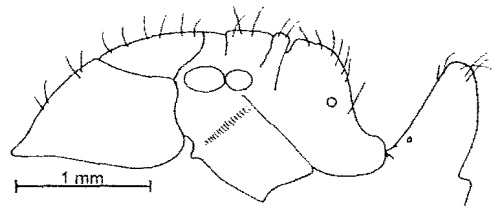


Fig. 394. Mesosoma and petiole of a paratype female of *P. conicula*.

Erect hairs are present on the mandibles, clypeus, dorsal surface of the head, sides of the head, along the posterior margin, on the entire shaft of the scape, on the ventral surface of the head, the dorsum of the mesosoma and all surfaces of gaster. Fine appressed

golden pubescence is present on the head, the mesosoma and is slightly more abundant on the gaster.

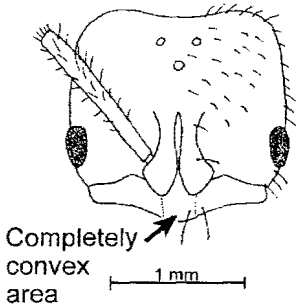


Fig. 395. Head of a paratype female of *P. conicula*.

The mandibles are striate and the dorsum of the head is densely and evenly punctate. The punctures on the mesosoma are finer than those on the head and the sides of the mesosoma are punctate, or very finely striolate. The petiole and the gaster are weakly to moderately shining.

Male

The male is a *small* (the head, mesosoma and petiole are 4 mm in length, the gaster is missing in the only available specimen) *dark reddish brown specimen with yellow legs, mandibles and palps and a ferruginous red pronotum and scutum*. The mandibles are tiny but have a well-developed depression near the base, which occupies approximately $\frac{1}{2}$ of the surface. The anterior margin of the clypeus is broadly convex, in profile the surface of the clypeus is raised into a flattened surface, which is abruptly lowered

near the posterior edge, *making that region appear to have a bump*. The head length is 1.05 mm; the head width is 0.93 mm. The maximum diameter of the eye is 0.53 mm, located nearly one diameter from the lateral ocellus. The median ocellus is 0.10 mm diameter, located about one diameter from the lateral ocellus (diameter 0.09 mm). The head is narrowed anteriorly and the posterior half of the head is broadly rounded. The *propodeal spiracle is nearly circular* in shape. The petiole is moderately thickened with the anterior and posterior faces being nearly straight and forming a broadly rounded apex. The subpetiolar process cannot be seen well enough to describe.

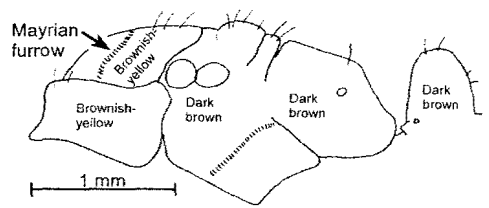


Fig. 396. Mesosoma and petiole of the paratype male of *P. conicula*. The colors are indicated.

Erect hairs are sparse with a few on the posterior edge of the head, on the mesosoma and on the petiole, most surfaces are covered with a plush of fine golden hairs.

The head is finely punctate and slightly shining. The sculpture on the mesosoma consists of finer punctures and at least some of the surfaces, especially the side of the pronotum

and mesopleuron are moderately shining. The propodeum is mostly sculptured and has poorly defined striolae. The petiole is finely sculptured, but only weakly shining.

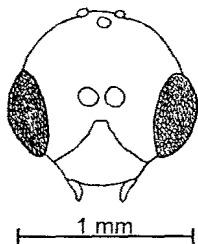


Fig. 397. Head of the paratype male of *P. conicula*.

COMPARISON

The small round propodeal spiracle would separate *P. conicula* from most species of *Pachycondyla*. The lateral margins of the pronotum of *P. conicula* are without a carina, which would distinguish this species from the widespread *P. arhuaca*, the Venezuelan *P. emiliae* and the Brazilian *P. metanotalis*. *Pachycondyla conicula* could be easily confused with *P. becculata*, which is also small, has a clypeal carina and has a depression at the metanotal suture. *Pachycondyla conicula* can be separated as *P. becculata* has a sharp point on the anterior medial border of the clypeus, not rounded or slightly concave as it is *P. conicula*. The relatively short medial tibia (shorter than the maximum width of the pronotum, about 1 mm in length) of *P. conicula* would separate this species from other similar species such as *P. constricta*, *P. rostrata*, and *P. procidua*. *Pachy-*

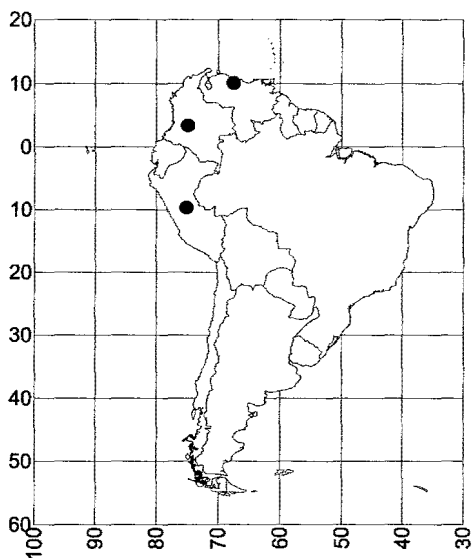
condyla conicula could be especially confused with *P. constricta*, but can be separated as the metanotal suture is not as deeply impressed. *Pachycondyla conicula* can be separated from the normally dark reddish brown *P. ferruginea* by the relatively larger eyes (maximal diameter of the eye of *P. ferruginea* is 0.15 mm), much less than the distance between the anterior border of the eye and the anterior border of the head.

This new species has been misidentified as *P. pergandei*, but differs in the shape of the petiole, which is narrowed towards the apex with a poorly defined dorsal face (not with nearly parallel faces and a well defined dorsal face as in *P. pergandei*), relatively short antennal scape that fails to reach the posterior lateral corner (extends past the posterior lateral corner of the head in *P. pergandei*) and a normal mesonotum (shortened in *P. pergandei*).

Pachycondyla conicula could be easily confused with the smaller Ecuadorian *P. cernua*. It can be easily separated as it lacks the ventrally directed angle on the posterior edge of the subpetiolar process as well as the longitudinal depression in the middle of the clypeus and the longer scapes, which extend approximately the first funicular segment past the posterior lateral corner of the head in *P. cernua*.

The unusual coloration is present in nearly all of the males of *P. conicula* and *P. pergandei* and would separate the males of these two species from all of the others in the genus. The males of *P. conicula* can

be separated from those of *P. pergandei* by the shape of the clypeus when viewed in profile. The surface is essentially flat in *P. conicula*, but abruptly lowers posteriorly, which gives it the appearance of a posterior bump. In *P. pergandei* the clypeal surface is convex and rounded, not forming a relatively flat surface and not abruptly lowered posteriorly.



Map 19. *Pachycondyla conicula*.

Additionally the posterior part of the head is broadly rounded in *P. conicula*, not oval-shaped as in *P. pergandei*. Males of *P. conicula* can be separated from the tiny males of *P. cernua* as they lack the ventrally directed tooth on the subpetiolar process. Additionally the mesopleuron of *P. conicula* is relatively smooth and glossy, not roughly sculptured as in *P. cernua*.

DISTRIBUTION

COLOMBIA: *Huila* (Concentración Jorge Villamil [CWEM]). PERU: *Huánuco* (unknown locality [MCZC]). VENEZUELA: *Aragua* (Rancho Grande [MCZC]).

HABITAT

This species has been collected in the rain forest, transitional montane forest and secondary rain forest, at elevations ranging from 300 - 1500 meters.

BIOLOGY

Specimens are occasionally collected in leaf litter extractions (rain forest, bamboo). The nest in Colombia was collected under a stone in red-yellow clay soil. Baena (1993) reported a specimen collected in a rotten log (listed as *P. pergandei*), suggesting that logs may be the normal nesting sites.

ETYMOLOGY

From Latin, *coniculus*, meaning cone, referring to the shape of the petiole.

TYPE SERIES

Holotype worker (MCZC), 14 paratype workers (CASC, CWEM, IAVH, LACM, MIZA, MZSP, MCZC, USNM), 1 paratype female (MCZC) and one paratype male (MCZC), Estado Aragua, Rancho Grande, 23-27 June, 1100 m, rainfor.; VENEZUELA, 1971, WL & DE Brown.

Pachycondyla constricta (Mayr)

Figures - **Worker**: 3 (palps), 5, 21 (metasternal process), 14 (larva, side view); 20 (petiole), 204 (side view), 398 (head); **Female**: 399 (side view), 400 (head); **Male**: 302 (side view), 401 (head); **Map** 20

constricta species complex

Ponera constricta Mayr, 1884:31-32, ♀, French Guiana, Cayenne; Forel, 1899:15; *Euponera* (*Mesoponera*) *constricta*: Forel, 1908:37, ♀, ♂; Emery, 1901a:46; Forel, 1912:40; Wheeler and Wheeler, 1952:624-625, 1964:452 larvae; *Mesoponera constricta*: Kempf, 1972:141; *Pachycondyla constricta*: Bolton, 1995:304

Ponera josephi Forel, 1886:xl, ♀, Brasil (synonymy by Dalla Torre, 1893:39)

DISCUSSION

Worker

The worker of this species is easily recognized as it is *relatively small* (about 5 mm total length) with the *mesosoma strongly and deeply constricted at the metanotal suture*. It is dark reddish brown with lighter reddish brown appendages, including the mandibles. The anterior border of the clypeus is broadly rounded; the malar carina is absent between the eye and the anterior edge of the head (side view). The scape extends the first two funicular segments past the posterior lateral corner; the eyes are located about one diameter from the anterior edge of the head (side view). The *propodeal spiracle is circular*. The petiole is shaped somewhat as a triangle with the anterior and posterior

faces converging to a bluntly rounded apex. The *stridulatory file is present* on the second pretergite on the dorsum of the gaster. The *metasternal process consists of two elongated slender fang-like appendages*, similar to the processes in the *stigma* species complex.

Erect hairs are present on most surfaces, including the dorsal and ventral surfaces of the head, the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster, the hairs on the tibiae are suberect. The scape has a few scattered erect hairs. Appressed pubescence is sparse, but is present on the head, especially the dorsum, the top of the mesosoma and on the gaster.

The head and mesosoma are densely but finely punctate, as is the anterior face of the petiole, the post-

erior face is more finely sculptured, but dull, the dorsum of the gaster is mostly finely punctate.

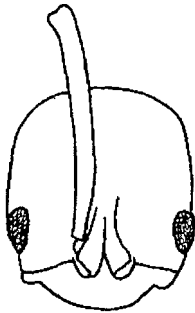


Fig. 398. Head of a worker of *P. constricta* (Atlántida, Honduras, MCZC).

Female

The female is a *small* (total length 8 mm) *dark reddish brown* ant. The mandibles have approximately 12 teeth; the anterior border of the clypeus is broadly convex. The *malar carina is absent*, the eyes are relatively large (maximum diameter 0.35 mm) located about $\frac{1}{2}$ diameter from the anterior margin of the head. The *scape extends about $\frac{1}{3}$ times its length past the posterior lateral corner* of the head. The pronotal shoulder is not swollen; the *propodeal spiracle is nearly circular*. The petiole is narrow when viewed in profile with the anterior and posterior faces being nearly straight and meeting at a relatively sharp apex. The subpetiolar process consists of a moderately sharp anterior section followed by a narrow concave region and a rounded posterior section.

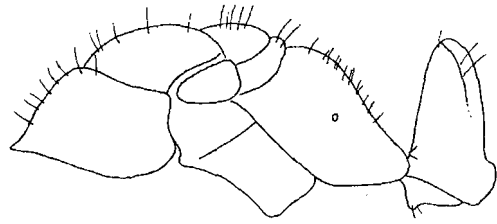


Fig. 399. Mesosoma and petiole of a female of *P. constricta* (Cauca, Colombia, MCZC).

Short (0.1 mm) erect hairs are present on most surfaces, including the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, scapes, mesosoma, petiole and gaster; similar hairs are present on the legs. Appressed golden pubescence is present on most surfaces.

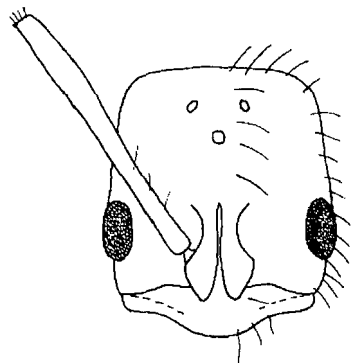


Fig. 400. Head of a female of *P. constricta* (Cauca, Colombia, MCZC).

The mandibles are finely striate, the dorsum of the head is very finely punctate, as is the mesosoma, petiole and gaster and all surfaces are dull or only moderately shining.

Male

The male is a *small* (total length 5.5 mm) dark brown specimen. The *pronotal shoulder is not swollen*, the *spiracle is nearly circular* and the petiole is narrow when viewed in profile. Both the anterior and posterior faces of the petiole are slightly convex and the apex is moderately sharp. The *subpetiolar process is angulate anteriorly* and diminishes in width posteriorly.

Erect hairs are very sparse and only obvious on the clypeus and the apex of the gaster.

Most surfaces are punctate with a few poorly defined striae on the side of the pronotum and surfaces are dull or only slightly shining.

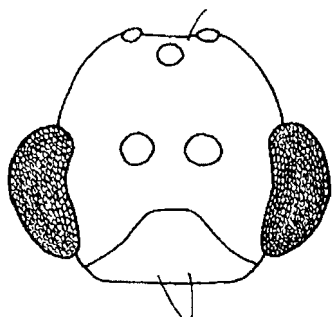


Fig. 401. Head of a male of *P. constricta* (Nariño, Colombia, MCZC).

COMPARISON

The worker of *P. constricta* is easily separated from all of the other species of New World *Pachycondyla* by the deeply depressed metanotal suture and the noticeably convex dorsal surface of the mesonotum. It is not closely related to any of the other New World species. Perhaps its closest relative is *P. australis* (Forel) from Australia. Although they are very similar in most aspects, the mandibles of *P. australis* are finally punctate (not striate as in *P. constricta*), the mesosoma is not as deeply constricted in *P. australis* and the subpetiolar process is abruptly truncated posteriorly, not gradually decreasing in width as in *P. constricta*.

The female of *P. constricta* could easily be confused with that of *P. arhuaca*. It differs in the lack of a carina on the pronotal shoulder, which is present in the female of *P. arhuaca*.

The small size of the male of *P. constricta* and the near absence of erect hairs would separate it from the males of most similar species.

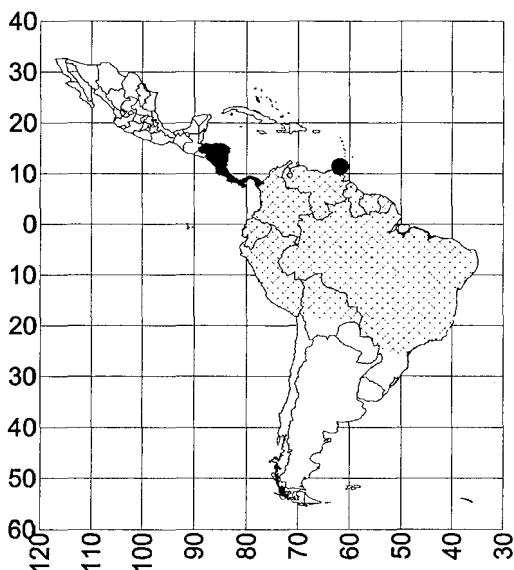
DISTRIBUTION

HONDURAS: *Atlántida* (14 km S of La Ceiba). NICARAGUA: *Grenada* (4.3 mi SW San Jorge); *Río San Juan* (5.1 mi SE El Castillo [Bartola]). COSTA RICA: *Heredia* (La Selva, Puerto Viejo, 3 k S Puerto Viejo, 5 k SW Puerto Viejo); *Puntarenas* (Parque Nacional Corcovado, Sirena, Cerro Helado, Fundación Neotrópica, 17 k NE Rincón, 10 k W Rincón); *Guanacaste* (4.5 k W Bagaces). PANAMA:

constricta Honduras to Bolivia and southern Brasil

Panamá (Barro Colorado Island, Canal Zone [Gatún, Culebra]); *Colón* (Bugaba [Forel, 1899]). COLOMBIA: *Guajira* (near Don Diego, Dibulla and San Antonio [Forel, 1912]); *Magdalena* (Sierra Nevada de Santa Marta [Forel, 1912], Quebrada Guacocoche nr. Don Diego, Pueblito, 2 -3 k above Minca, 3 k SE Minca, 4 k N San Pedro); *Antioquia* (Quebrada La Tirana); *Cundinamarca* (Guayabetal); *Meta* (S. Villavicencio, Cano El Buque, Reserva La Macarena); *Valle del Cauca* (Cali, SW of Cali, 17 mi W Sevilla, 4 km W. Queremal, Buga, Bajo Calima); *Tolima* (Mariquita [Sandoval and Zambrano, 2007]); *Huila* (Rivera Hot Springs, 1 k NE Rivera, 3 k E Rivera); *Vichada* (Fernández, 1990); *Cauca* (2°26'40"N 76°37'17"W, Isla Gorgona [Baena, 1993]); *Nariño* (Reserva Natural La Planada). ECUADOR: *Napo* (20 k S Tena, Limón Cocha, Coca - Loreto [km. 26], Tiputini Biodiversity Station, Yuturi, 1 k NNE Archidona, Archidona, Daimi, Talag, Jumandy); *Pastaza* (25 k N Puyo, Tena - Puyo [km. 44]); *Sucumbios* (Shushufindi). PERU: *Loreto* (Ramon Castillo 5 k NW Leticia); *Ucayali* (Pichita Caluga); *Junín* (Huacapistana); *Cuzco* (Machu Picchu, Huadquina); *Pasco* (near Pozuzo, Chontilla [22 k SE Iscozazin]); *Madre de Dios* (14 k NE Puerto Maldonado, Cuzco Amazónico 15 km NE Puerto Maldonado, Cocha Cashu, Los Amigos Research Center, Reserva Tambopata); *Huánuco* (Monsón Valley, Tingo Maria). VENEZUELA: *Amazonas* (San Carlos de Río Negro); *Anzoátegui*

(Anzoátegui); *Delta* (Orinoco Delta); *Bolívar* (Canaima). TRINIDAD: *Saint George* (Arima Valley); *Mayaro* (Mayaro Bay, Maracas Valley, Tacarigua River, Guayaguayare Bay); *Saint Andrew* (Cumuto); *Port of Spain* (Port of Spain); *Nariva* (Nariva Swamp, Northern Range). GUYANA: *Cuyuni-Mazaruni* (Bartica, Kartabo, Kamakusa, Kalacoon, Oko River, Cuyuni tribe, Kamaria); *Essequibo* (Essequibo River [Morabali Creek]); *Berbice-Courantyne* (Oronoque), *Demerara-Mahaica* (Kaieteur). FRENCH



Map 20. *Pachycondyla constricta*.

GUYANA: *Cayenne* (Paracou Experimental Forest [45 k W Karou], 10 k W Sinnamary). SURINAME: *Kerie* (King Fred William IV Falls, Courantyne); *Sipaliwini* (Witi Creek [Wittie Kreek, Brownsberg Natuur Park]). BRASIL: *Amapá* (Vila Amazonas); *Amazonas* (Benjamin Con-

stant, Reserva Ducke, 20 k NE Manaus, Ponta Negra, 66 k N Manaus); *Mato Grosso* (Diamantino, Utiariti [Rio Papagaio], Buriti); *Pará* (Pirelli plantation near Belém, Utinga, Faz Junqueira Vilela, Tucurul, Icoaraci); *Rio de Janeiro* (Munic. Diamantino, Paineras); *Espirito Santo* (Sooretama). Kempf (1972) lists *Pernambuco*, *Bahia* and *São Paulo* states. BOLIVIA: *Santa Cruz* (35 k SSE Flor de Oro, 3.7 k SSE Buena Vista Hotel Flora y Fauna); *Cochabamba* (67.5 k E Villa Tunsati, 78.6 k E Cochabamba, 109 k E Cochabamba).

HABITAT

This species has been found in lowland wet rain forest, riparian rainforest, mature rain forest, in a secondary forest, in an ecotone between tropical forest and grasslands, yungas forest [premontane forest], a swamp forest, in steep primary forest and in a cacao plantation (Roth et al., 1994) and other farm habitats, at elevations of 5 - 2500 meters.

BIOLOGY

Pachycondyla constricta nests in

dead branches (~ 8 cm diameter), logs and trunks on the forest floor or simply in the soil (often under stones) and is commonly collected in litter samples on clay soils. Baena (1993) reported that it nests near ants of the genus *Solenopsis*. Nests contain 5 - 29 workers with a few reproductives (Baena, 1993). Brood was collected in August (Costa Rica). Winged males were collected in nests in April and late November (Colombia) and between January and July (Ecuador, canopy fogging). A dealate female was collected in September (Colombia) and loose males were collected in March (Perú) and July (Costa Rica). Most flights occur in the middle of the summer (Kaspari et al., 2001). Flights occur between 1800 and 05:00 hrs (Costa Rica). These ants are commonly collected in Winkler extractions of litter and in pitfall traps.

ETYMOLOGY

The derivation of the name of this species is from the Latin word *constrictus*, meaning contracted, referring to the constriction at the metanotal suture.

Pachycondyla constricticeps* new species**Figures - **Worker:** 60, 247, 402 (side view), 403 (head); **Map 21crassinoda* species complex**DISCUSSION & DESCRIPT.****Worker**

The worker is a *large* (total length 14 mm) *black* ant. The head length is 2.94 mm; the head width (at the posterior edge of eye) is 2.40 mm. The *head is strongly constricted posterior to the eye and the eye is relatively small* (maximum diameter 0.55 mm).

slightly overhangs the side of the pronotum. The *metanotal suture is barely marked*. The propodeal spiracle is slit-shaped. The metasternal process is similar to that of *P. striata* (Fig. 644). The subpetiolar process consists of a broadly rounded lobe. The *stridulatory file* on the second pretergite is *absent*, the aroli \bar{a} between the tarsal claws are absent.

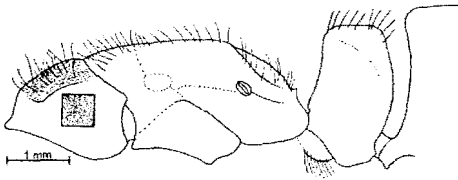


Fig. 402. Mesosoma, petiole and postpetiole of the holotype worker of *P. constricticeps*. The box on the side of the pronotum shows a portion of the sculpture. The illustration is $\frac{1}{2}$ the standard size.

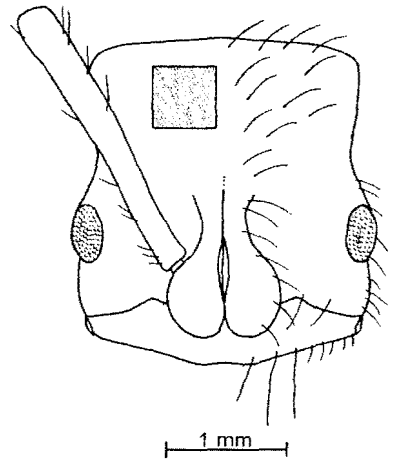


Fig. 403. Head of the holotype worker of *P. constricticeps*. Only a small part of the sculpture is shown in the box.

The mandibles have 11 teeth with the apical tooth much larger than the others, which are approximately equal in size. The medial anterior border of the clypeus is slightly concave. The posterior *border of the head is slightly convex*. The *pronotal shoulder is formed into a sharp carina*, which

Erect hairs are abundant on the

mandibles, clypeus, dorsal and ventral surfaces of the head, the sides of the head near the eyes and the posterior border of the head. Erect hairs are absent on most of the side of the head posterior to the eyes. The scape has several suberect hairs on the shaft. The dorsum of the mesosoma, legs, ventral and dorsal surfaces of the petiole and all surfaces of the gaster have erect and suberect hairs; sparse appressed pubescence is present on the dorsum of the head, dorsum of the mesosoma, anterior and dorsal faces of the petiole, appressed hair is abundant on the gaster.

The mandibles are polished to finely striated. The dorsum of the head is covered with irregular striae, which diverge posteriorly; the striae on the dorsum of the pronotum are concentric anteriorly and diverging posteriorly, those on the mesonotum and anterior part of the dorsal face to the propodeum are longitudinal, those on the posterior half of the dorsal face are transverse or concentric, striae on the posterior face of the propodeum are transverse; those on the mesopleuron and side of the propodeum are mostly longitudinal. The striae on the dorsum of the petiole are very fine and mostly transverse, the striae on the side of the petiole are indistinct, the gaster is dull and very finely punctated.

Female and male

Unknown.

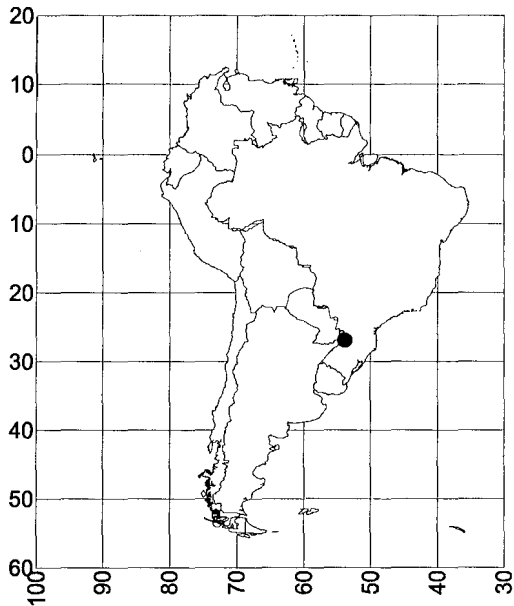
COMPARISON

Pachycondyla constricticeps is very similar to *P. striata* with the

mesosoma, petiole and gaster being identical. It is easily separated by the constricted region of the head posterior to the eyes (convex in *P. striata*), the relatively smaller eyes and the nearly straight posterior border (concave in *P. striata*). The constriction on the head of *P. constricticeps* would separate this species from all other New World species. The shape of the head resembles that of members of the genus *Odontomachus*, but the head is less narrowed and the mandibles are not elongated as in *Odontomachus*.

DISTRIBUTION

Known only from the type locality in the state of *Misiones*, ARGENTINA.



Map 21. *Pachycondyla constricticeps*.

HABITAT

The holotype was collected in a disturbed tropical rain forest.

BIOLOGY

The single worker was foraging on the ground. *Pachycondyla striata* was common in the same area.

ETYMOLOGY

From Latin, *constrictus*, meaning

drawn together or contracted and *caput*, meaning head, characterizing how the head is constricted posterior to the eyes.

TYPE SERIES

Holotype worker (IMLA), ARGENTINA, Misiones, 20 km E Wanda, Picada Tirica, 2-i-2008, W&E Mackay # 22750.

***Pachycondyla cooki* new species**

Figures - **Worker**: 36 (petiole), 164 (mesosoma), 270 (head), 271 (side view), 404 (metasternal process); **Map** 22

apicalis species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *moderate sized* (total length 13 mm) *black ant with a yellow-tipped funiculus*. The mandibles are elongated (total length 2.05 mm); the clypeus is broadly rounded anteriorly. The head is widest near the eyes and noticeably narrowed both anteriorly and posteriorly. The posterior margin of the head is nearly straight. The *malar carina is well developed*; the *eye is large* (maximum diameter 0.8 mm). The eye is located slightly posteriorly to the middle of

the head when viewed in full-face view (measured from the anterior edge of the clypeus). It is located slightly less than one maximum diameter from the anterior edge of the head (as seen in side view). The head length is 2.54 mm; the head width is 2.14 mm. The scape is relatively long (2.74 mm) and extends about 2½ funicular segments past the posterior lateral corner of the head. The *pronotal shoulder forms a carina*, which slightly overhangs the side of the pronotum. The metanotal suture is depressed on the dorsum of the mesosoma (seen in profile) and breaks the sculpturing on the dorsum.

cooki Colombia, Ecuador to northern Brasil

The *propodeal spiracle* is slit-shaped. The petiole is thick when viewed in profile with a long broadly convex anterior face and a weakly convex posterior face with the two faces meeting at an angle near the posterior edge of the petiole. Part of the anterior face forms a strongly sloping dorsal face. The subpetiolar process is poorly developed and consists of a rounded anterior process with a sharp ventrally directed angle followed by a gradually diminishing thickened area. The stridulatory file on the second pretergite is well developed and the arolia are present. The metasternal lobes are well separated as in the other species of the *apicalis* species complex, but are wider and more bluntly rounded than in the other species. They are also *concave posteriorly and lack the horizontal striae*, both characteristics of *P. apicalis*.

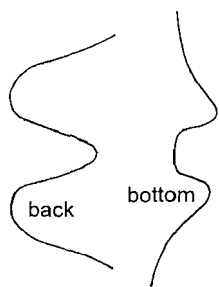


Fig. 404. Metasternal process of a worker of *P. cooki* (Amazonas, Brasil, CWEM), as seen from behind and from below.

Erect hairs are long (0.25 - 0.70 mm) abundant and present on the mandibles clypeus, dorsal and ventral surfaces of the head, sides of the head,

posterior margin of the head, *dorsum of the mesosoma, dorsum of the petiole*, the subpetiolar process and all surfaces of the gaster, the hairs on the legs are erect to suberect. Appressed whitish pubescence is sparse.

The mandibles are covered with poorly defined striae and are partially smooth and glossy, the *dorsum of the head is covered with fine longitudinal striae*, which diverge posteriorly, the dorsum of the pronotum is covered by very fine mostly transverse striae, which form concentric circles on the posterior half, the mesonotum is covered with longitudinal striae, the dorsum of the propodeum with transverse striae, the striae on the side of the pronotum are poorly developed, as they are on the remainder of the side of the mesosoma. The side of the petiole is mostly covered with very fine striae, which pass across the front of the petiole; the striae on the posterior face are very fine, giving it a silky appearance. The gaster is very finely punctate. The head is weakly shining; the remainder of the ant is mostly dull.

Female and Male

Unknown.

COMPARISON

Pachycondyla cooki is closely related to *P. apicalis*, but differs in being covered with long erect hairs and in having fine striae on the dorsum of the head. The metasternal process of *P. cooki* is distinct in that the posterior faces of the lobes are smooth and shining and notably

concave, not striate and weakly concave as in *P. apicalis*. *Pachycondyla cooki* can be easily separated from *P. verenae* and *P. obscuricornis* by the same two characteristics. *Pachycondyla cooki* lacks the sharp margins on the posterior lateral edges of the petiole, which would easily separate it from *P. verenae*. The yellow-tipped funiculus of *P. cooki* would distinguish it from *P. obscuricornis* as well as from *P. verenae*. *Pachycondyla cooki* could be confused with *P. fauveli* in which specimens from Colombia and Ecuador can have a yellow-tipped funiculus. It can be easily separated as *P. fauveli* lacks the striae on the dorsum of the head.

DISTRIBUTION

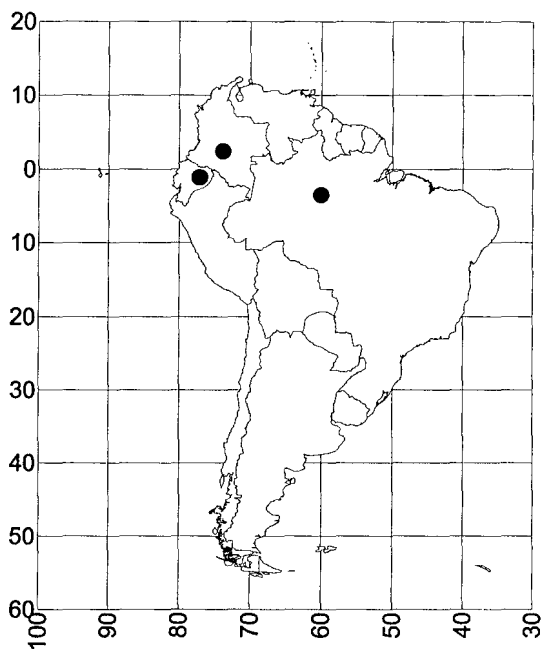
COLOMBIA: *Meta* (Reserva La Macarena [Caño Curía, MCZC]). ECUADOR: *Napo* (Sucumbíos [Limón Cocha Biological Reserve, COOK], Durena [LACM]). BRASIL: *Amazonas* (Manaus [type series]).

HABITAT

Unknown, specimens were collected between 215 - 200 meters.

BIOLOGY

The type specimens were collected foraging on the surface of leaf litter.



Map 22. *Pachycondyla cooki*.

ETYMOLOGY

This new species is named in honor of Jerry Cook, close friend and fellow myrmecologist.

TYPE SERIES

Holotype worker (MCZC), 1 paratype worker (CWEM), BRAZIL, Am, Manaus, EEST, INPA, km. 44.5 on BR-174, 6-viii-81, Phenology area; Col. W. W. Benson.

Pachycondyla coveri new species

Figures - **Worker**: 82 (petiole), 238, 240 (mandible), 405 (side view), 406 (head), 407 (pronotum, top view), 408 (tibia); **Map** 23

crenata species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *moderately small* (total length 7 mm) *black* ant with *reddish brown appendages*, including most of the coxae. The mandible has approximately 11 teeth. The *medial clypeal tooth or lobe is large* and well developed and overhangs the remainder of the clypeus. The sides of the head are nearly parallel and posterior margin is slightly concave. The head length is 1.64 mm; the head width is 1.40 mm. The eye (maximum diameter 0.44 mm) is located approximately 1 diameter from the anterior margin of the head (side view). The *malar carina is well developed* and nearly reaches the eye. The scape (1.60 mm) extends about $\frac{1}{3}$ of its length past the posterior lateral corner of the head. The *pronotal shoulder is formed into a sharp carina*, which overhangs the side of the pronotum. The promesonotal suture breaks the sculpturing on the dorsum of the mesosoma, but the *metanotal suture is barely marked*. The propodeal spiracle is slit-shaped. The lower $\frac{1}{2}$ of the anterior face of the

petiole is nearly vertical and bends posteriorly to form a sloping dorsal face with the remaining half, which meets the posterior face near the posterior edge of the petiole. The posterior face is convex and not concave near the apex. The subpetiolar process consists of small angle followed by a concave region and a gradually diminishing process posteriorly. The *stridulatory file* on the second pretergite is *well developed*, the arolia between the tarsal claws are poorly developed but present.

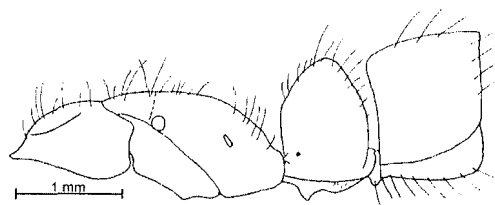


Fig. 405. Mesosoma, petiole and postpetiole of the holotype worker of *P. coveri*.

Erect hairs are present on the dorsal and ventral surfaces of the

head, the mandibles, the shaft of the scape, the sides of the head, the posterior margin of the head, the dorsum of the mesosoma, dorsum of the petiole, on the angular process on the subpetiolar process and all surfaces of the gaster. The hairs on the tibiae are suberect. Appressed pubescence is present on the dorsum of the head, dorsum of the mesosoma and all surfaces of the gaster.

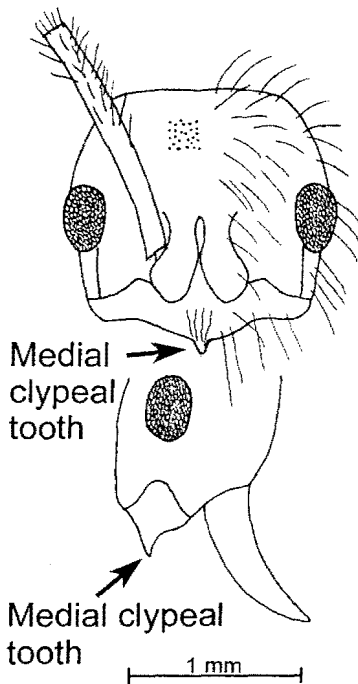


Fig. 406. Head of the holotype worker of *P. coveri*, as seen from the front and from the side. Only a small part of the sculpture is shown.

The mandibles are coriaceous with scattered punctures, the medial lobe of the clypeus has poorly defined

longitudinal striolae, the dorsum of the head is completely punctate with the regions between the punctures being smooth and shining, the punctures on the dorsum of the mesosoma are fine and the regions between the punctures polished, as is the side of the pronotum; the mesopleuron and side of the propodeum are partially covered with poorly defined striae, but portions are smooth and glossy, the side, anterior face and posterior face of the petiole are mostly glossy. The gaster is smooth and glossy, the punctures on the dorsum of the postpetiole are very fine, those on the remainder of the second tergum are slightly coarser.

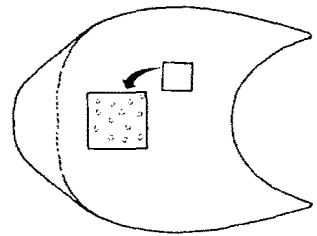


Fig. 407. Pronotum of the holotype worker of *P. coveri* as seen from above. Only a small part of the sculpture is shown.

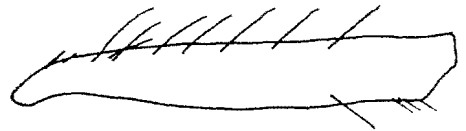


Fig. 408. Posterior left tibia of the holotype worker of *P. coveri*.

Female and male

Unknown.

COMPARISON

Pachycondyla coveri is closely related to *P. oberthueri*, but can be distinguished by the coriaceous and punctate mandible with a dull surface (mandible is shining in *P. oberthueri*). Additionally the apex of the petiole of *P. coveri* is rounded, especially posteriorly, whereas the apex is angulate posteriorly at the apex, nearly pointed in *P. oberthueri*. *Pachycondyla coveri* is similar to *P. carinulata*, but can be separated by the weak punctures on the dorsum of the pronotum, which are coarse and form poorly defined transverse striae in *P. carinulata*. The highest point on the apex of the petiole of *P. coveri* is located posteriorly as in *P. oberthueri*, not at mid length as in *P. carinulata*.

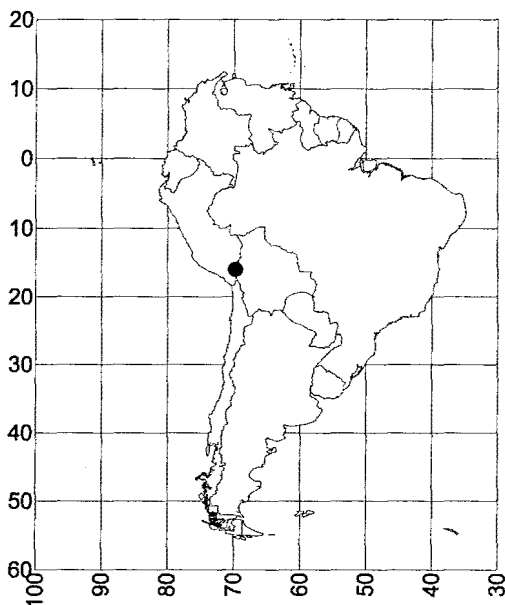
The angulate medial clypeal border of *P. coveri* could cause confusion with *P. becculata*, which has a similar clypeus. The two species are easily separated as *P. becculata* lacks the carina on the pronotal shoulder. *Pachycondyla coveri* lacks the strongly concave anterior border of the postpetiole of *P. concava*, which also has an angle in the middle of the anterior border of the clypeus.

DISTRIBUTION

Known only from the type locality in the state of *Madre de Dios*, PERU.

HABITAT

The holotype was collected in a camp clearing at the forest edge, at 200 m elevation.



Map 23. *Pachycondyla coveri*.

BIOLOGY

The holotype was collected in a dead hollow twig hanging in the foliage.

ETYMOLOGY

This species is named in honor of our close friend Stefan Cover of the Museum of Comparative Zoology, in recognition for all he has done for us and for the field of Myrmecology. Stef also collected the holotype.

TYPE SERIES

Holotype worker (MCZC, # CAZ-167), Cuzco Amazónico, 15 km NE Puerto Maldonado, PERU, Madre de Dios, 6-29-91, SP Cover.

Pachycondyla crassinoda (Latreille)

Figures - **Worker**: 5 (metasternal process), 172 (pygidium), 409 (side view), 410 head); **Female**: 411 (side view), 412 (head), 413 (pygidium); **Male**: 414 (petiole), 415 (head), 416 (pygidium); **Map** 24

crassinoda species complex

Formica crassinoda Latreille, 1802:198, plate 7, Fig. 41, ♂, ♀, French Guiana: Cayenne; *Pachycondyla crassinoda*: F. Smith, 1858:105; Mayr, 1863:439; larvae, Wheeler and Wheeler, 1952: 617; Kempf, 1961:193; *Pachycondyla (Pachycondyla) crassinoda*: Emery, 1901a:45; Emery, 1911:74

DISCUSSION

Worker

The worker of this species is easily recognized as being the *largest species* in the New World (total length nearly 20 millimeters). The *shape of the pygidium* (dorsum of the end of the gaster) is unusual in that it terminates in *two lateral blunt processes* and a medial process, which covers the dorsum of the sting. The region *between the two lateral processes is concave*. The sides of the pygidium are covered with longitudinal striae. The form of the pygidium can be easily recognized in the field with the naked eye. Other characters of this species include the clypeus being concave medially and convex laterally. The *malar carina is absent*. The eye is located anteriorly on the head about one diameter from the

anterior edge of the head (side view) and the scape barely extends past the posterior lateral corner. The *pronotal shoulder is swollen*, but does not form a carina; the *mesosoma is not depressed at the metanotal suture*, which barely interrupts the sculpture on the dorsum. The *propodeal spiracle is elongated*. The *petiole is rectangular-shaped* and often slightly wider near the apex as compared to near the base (as seen from the side). There is a definite dorsal surface, which is separated from the anterior and posterior faces by approximately right angles. The anterior face of the postpetiole is nearly vertical and forms a right angle with the dorsal surface.

Erect hairs are abundant on most surfaces including the dorsum and ventral surfaces of the head, the scapes, the dorsum of the mesosoma, the dorsum of the petiole and all

crassinoda Colombia, Venezuela to Paraguay, southeastern Brasil, Caribbean

surfaces of the gaster, the hairs on the tibiae are suberect, all hairs are golden yellow in color, contrasting with the



Fig. 409. Mesosoma, petiole and postpetiole of a worker of *P. crassinoda* (Bolívar, Venezuela, CWEM). Erect hairs are not shown.

black background color of the integument. Appressed pubescence is also present and golden yellow in color and is especially abundant on the dorsum of the head, dorsum of the mesosoma, dorsum of the petiole and dorsum of the gaster.

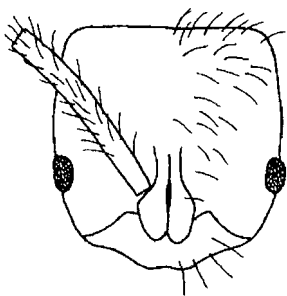


Fig. 410. Head of a worker of *P. crassinoda* (Bolívar, Venezuela, CWEM).

Nearly all surfaces are densely but finely punctate and dull or weakly shining, the mandibles are polished with scattered punctures, the posterior

face of the petiole is glossy and shining, the anterior face of the postpetiole is finely sculptured, but not as glossy and shining as the petiole.

This ant is nearly completely black, the mandibles are dark reddish brown and the tarsi are slightly lighter in color.

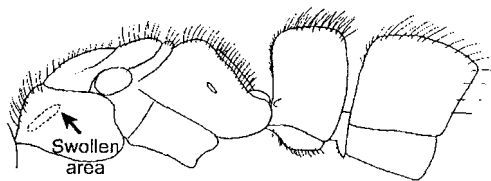


Fig. 411. Mesosoma, petiole and postpetiole of a female of *P. crassinoda* (Bolívar, Venezuela, CWEM).

Female

The female is similar to the worker, except the mesosoma is more massive. The total length is about 23 mm. The anterior border of the clypeus is broadly convex with a concave

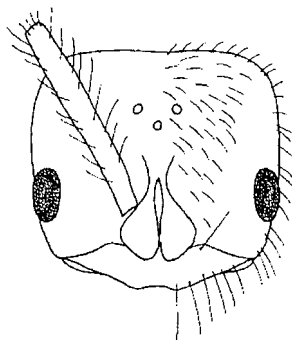


Fig. 412. Head of a female of *P. crassinoda* (Bolívar, Venezuela, CWEM).

medial area. The *malar carina* is *absent*; the eyes are large (maximum diameter 0.94 mm). The scape extends slightly past the posterior lateral corner of the head. The *pronotal shoulder* is *swollen*, but does not form a carina. The *propodeal spiracle* is *elongated*. The *petiole* is *thick and rectangular* when viewed in profile, similar in shape to that of the worker. The *pygidium* forms a *concave dorsal face* with *two well-developed lateral sharp processes*.

Long (up to 1 mm) erect and suberect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin, scapes, dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and gaster, the hairs on the legs are mostly suberect. Appressed golden fine pubescence is present on essentially all surfaces.

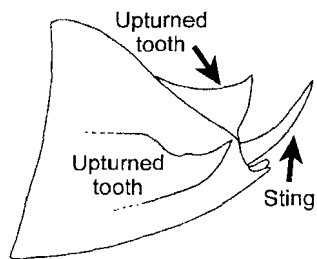


Fig. 413. Pygidium of a female of *P. crassinoda* (Bolívar, Venezuela, CWEM) seen obliquely from the side.

The mandibles are covered with coarse punctures and very fine striae, but are mostly dull, the remainder of the head is covered with very fine dense punctures, the mesosoma is

covered by a combination of fine punctures mostly arranged in rows (transverse on the pronotum, longitudinal on the scutum, transverse on the scutellum and propodeum), the sides of the mesosoma are covered with a mixture of punctures and striae. The anterior face of the petiole is punctate and moderately shining, the dorsum and sides are covered with fine punctures, the posterior face is coriaceous and moderately shining, the gaster is punctate and weakly shining.

The ant is predominantly black with dark reddish brown mandibles.

Male (identification questionable)

The male is a *large* (total length 15 mm) black specimen. The mandibles are tiny but have a well-developed depression at the base. The *anterior margin of the clypeus* is *broadly concave* and is *not strongly swollen* when viewed from side. The head length is 2.10 mm; the head width is 2.04 mm. The eye (maximum diameter viewed from side 1.02 mm) is located about $\frac{2}{3}$ of the diameter from the lateral ocellus. The median ocellus (maximum diameter 0.23 mm) is located slightly more than 1 diameter from the lateral ocellus (maximum diameter 0.23 mm). The pronotal shoulder is slightly swollen but does not form a carina. The *propodeal spiracle* is *slit-shaped*. The petiole as wide (1.44 mm from above the anterior peduncle to above the posterior peduncle); the spiracular horn is developed into an angle; the spiracle is small. The apex of the node

is broadly rounded. The subpetiolar process consists of a rounded angle anteriorly and a smaller angle posteriorly with the region between them distinctly concave. The subpostpetiolar process is poorly developed. The wing venation is similar to that of *P. lattkei*. The *pygidium* lacks the two lateral teeth which are found in the female and a worker.



Fig. 414. Petiole of a possible male of *P. crassinoda* (Cuzco, Perú, MCZC).

Erect hairs are abundant but fine and flexuous on all surfaces except the

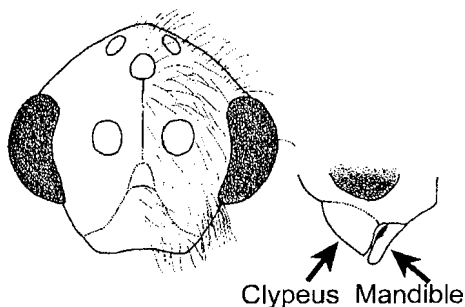


Fig. 415. Head of a possible male of *P. crassinoda* (Cuzco, Perú, MCZC). The inset shows the anterior part of the head as seen from the side.

legs where they are very fine on the femora and nearly absent on the tibiae. Most surfaces are covered with a golden pubescence which is appressed to slightly raised from the surface.

The surface of the clypeus is distinctly punctate; the remainder of the head is very finely punctate with small punctures. The dorsum and sides of the mesosoma are mostly finely punctate, the sides of the pronotum, mesopleuron and lower half of the propodeum are moderately shining and mostly without any evidence of rugae, except for the area above and anterior to the propodeal spiracle. The *petiole is completely and coarsely rugose* with the areas between the rugae being shining. The gaster is finely punctate and weakly shining.

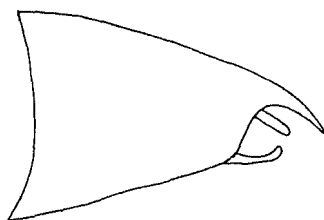


Fig. 416. Pygidium of a possible male of *P. crassinoda* (Cuzco, Perú, MCZC).

This male was not associated with workers, but may be *P. crassinoda* based on the relatively wide petiolar node and the concave subpetiolar process, which is also concave in the females and workers, although less so. A process of elimination suggests it is apparently not the male of any other

species of the *crassinoda* species complex found in Perú.

The male can be separated from the very similar male of *P. lattkei* as it nearly lacks all of the rugose sculpturing on the side of the propodeum, which is present in *P. lattkei*. The rugae on the side of the petiole would separate it from that of *P. impressa*.

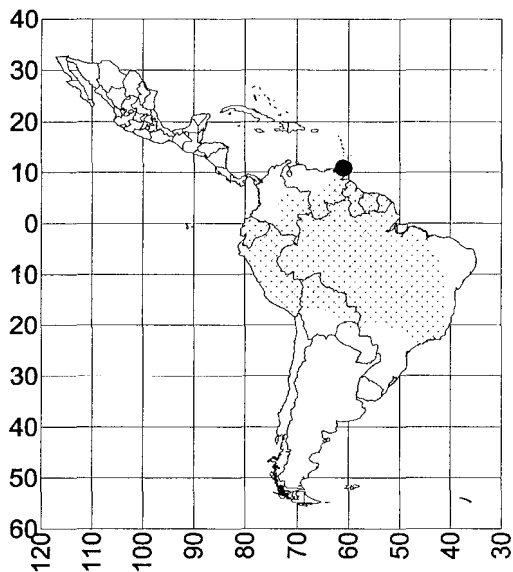
COMPARISON

The large size and the two large teeth at the sides of the apex of the gaster would separate both the workers and the females of *P. crassinoda* from all other species in the New World. These processes can be easily seen with the naked eye. *Pachycondyla impressa* is very similar with the concave upper surface of the pygidium, but lacks the two lateral angulate processes (a raised area with coarse short hairs may be present on the lateral margins).

DISTRIBUTION

COLOMBIA: *Meta* (Restrepo, 2 k N Villavicencio, 14 k N Villavicencio, Granada, Carimagua, Reserva La Macarena [Fernández and Schneider, 1989]); *Vaupés* (Río Vaupés); *Caquetá* (Florencia). ECUADOR: *Pichincha* (Quito [Forel, 1921]); *Sucumbios* (Limón Cocha Biological Reserve, Limón Cocha and vicinity, 2.84 k N Shushufindi, Sacha Lodge); *Napo* [*Orellana*] (Yasuni Research Station, Tiputini Biodiversity Station); *Chinchipe* (Río Bomboiza); *Pastaza* (Oriente), *Morona* (Santiago Sucua). PERU: *Huánuco*

(Tingo Maria, 6 k W Tingo Maria, Parque Nacional Tingo Maria, Cocha Cashu); *Cuzco* (Cuzco, Quincemil, K'osñipata [Paucartambo, Escalante, 1993]); *Madre de Dios* (Los Amigos Research Center, Puerto Maldonado, 15 k NE Puerto Maldonado, 30 k SW Puerto Maldonado, Parque Nacional Pampas de Heath, Río Tambopata); *Yurac* (63 mi E Tingo Maria); *San Martín* (Tarapoto); *Lima* (Callanga); *Loreto* (Pucallpa, without locality, Iquitos, Quebrada Yanayaco [NE Iquitos], Río Amazonas [Yanamono], near Iquitos); *Pasco* (Pan de Azúcar); state unknown (Upper Río Papiche). VENEZUELA: *Amazonas* (40 k SE Puerto Ayacucho, Mount Marahuaca [north slope], San Fernando Atabapo); *Barinas* (Ticopora); *Bolívar* (Canaïma, Yuri Falls, Orchid Island); *Delta* (Orinoco Delta). TRINIDAD: *Port of*



Map 24. *Pachycondyla crassinoda*.

crassinoda Colombia, Venezuela to Paraguay, southeastern Brasil, Caribbean

Spain (Port of Spain); *Nariva* (Nariva Swamp); *Saint George* (Simla [Arima Valley], Tucuche, foothills N of Tunapuna); *Saint Andrew* (Mount Tamana); *Monagas* (42 k SE Maturin). GUYANA: *Cuyuni-Mazaruni* (Kamakusa, Barabara, Bartica, Kalacoon, Kartabo, Oko River, Camaria, Forest Settlement); *Courantyne* (Oronoque River); *Demerara-Mahaica* (Dunoon, Kaieteur); *Kerie* (Courantyne River); *Barima-Waini* (Wauna Creek); *Essequibo* (Rio Essequibo); *Potaro-Siparuni* (Hoori Creek - Barama). FRENCH GUIANA: *Cayenne* (Cayenne [Latreille, 1802]). BRASIL: *Amapá* (Serra do Navio); *Amazonas* (near Belén, Benjamin Constant, 14 k SE Manaus, Barcelos, Estirão do Ecuador, Rio Branco); *Acre* (Kempf, 1972); *Rondônia* (Rio Madeira, Porto Velho [Mann, 1916]), Camp 39 [Mad-eira-Mamoré Railroad]; *Mato Grosso* (Borati, Chapada dos Guimarães); *Paraíba* (Mamanaguape, Coremas); *Pará* (Belém, near Belém [Rio Guamá], Alto Cuminá, Cachimbo, Jacareacanga). BOLIVIA: *La Paz* or *Santa Cruz* (San Antonio); *El Beni* (Versalles); *Santa Cruz* (35 k SSE Flor de Oro, 3.7 k SSE Buena Vista Hotel Flora y Fauna). PARAGUAY: *Alto Paraguay* (Parque Nacional Río Negro [Wild, 2002]). BRITISH WEST INDIES: Caporo.

HABITAT

Pachycondyla crassinoda is a common species found in tropical rain

forest, seasonal rain forest, secondary tropical forest, a forest ravine, tierra firme forest and gallery forest, often at gap edges, at elevations between 200 - 750 meters.

BIOLOGY

This species nests under rotten logs or in damaged parts of trees. Alate females were collected in May (Ecuador), July (Venezuela and Perú), in a pitfall trap in October (Venezuela) and December (Ecuador). Dealate females were collected loose in April, May, July to September (Ecuador) and September (Perú). Males were collected in June (Perú), August and September (Ecuador). One colony was collected in a nest of the army ant *Eciton rapax*.

Workers can be found foraging in the rain forest and on leaf litter at the edge of the forest. These ants are opportunist predators on termites in the genera *Cornitermes*, *Labiotermes* and *Syntermes* (Mill, 1982a). Some workers were collected in a dung (human) baited pitfall trap.

The pupae of this species are parasitized by the eucharid wasp *Kapala cuprea* (Myers, 1931:276).

ETYMOLOGY

The name of this species is derived from two Latin words: *crassus*, meaning thick and *nodus*, meaning swelling, referring to the thick petiolar node of the worker and female of this species.

Pachycondyla crenata (Roger)

Figures - **Worker**: 5 (metasternal process), 19 (dorsum of mesosoma), 67 (anterior part of head), 69 (subpostpetiolar process and petiole, side view), 72 (larva), 77, 230 (petiole, top view), 219, 417 (head), 227 (side view); **Female**: 418 (side view), 419 (head), 420 (forewing); **Male**: 11 (Palps), 311 (head), 421 (propodeum and petiole), 422 (forewing); **Map 25**

crenata species complex

Ponera pallipes F. Smith, 1858:98, ♀ [junior primary homonym of *Ponera pallipes* F. Smith, 1858:87]; *Pachycondyla pallidipes* [sic]: Dalla Torre, 1893:34; *Pachycondyla pallipes*: Forel, 1899:13; *Neoponera pallipes*: Emery, 1901a:47; Forel, 1901b:349

Ponera crenata Roger, 1861a:3-4, replacement name for *Ponera pallipes* F. Smith, 1858:98, [worker identified by Mayr seen, NHMW]; Mayr, 1863:448; Mayr, 1887:534 ♀; Santschi, 1921:85-86, ♂; *Pachycondyla crenata* Roger, 1863a:18; *Neoponera (Neoponera) crenata*: Emery, 1911:73; Eidmann, 1936:33; *Neoponera crenata*: Wheeler and Wheeler, 1974: 278, larva; *Pachycondyla crenata*: Bolton, 1995:304

DISCUSSION

Worker

The worker is a relatively *small ant* (total length about 6 mm) *reddish brown with pale brown appendages*. The anterior medial region of the clypeus is bluntly protuberant; the *eyes are very large* (maximum diameter 0.36 mm), about three times in diameter as the length between the anterior border and the anterior margin of the head (side view). A *poorly defined malar carina* is located between the eye and the clypeus. The

pronotal carina is present, but poorly developed, the metanotal suture barely breaks the integument on the dorsum of the mesosoma. The *propodeal spiracle is elongated*; the *petiole is thickened* when viewed in profile and *somewhat cuboidal-shaped* with the anterior and posterior faces being nearly parallel and with a definite dorsal face. The anterior face is straight, the dorsal face and the posterior face are convex and rounded. The *petiole is strongly narrowed anteriorly* (viewed from above). The *stridulatory file is present* on the

second pretergite on the dorsum of the gaster, but is poorly developed.

Erect hairs are abundant on the dorsal and ventral surfaces of the head, the dorsum of the mesosoma, the dorsal and posterior faces of the petiole and all surfaces of the gaster; the hairs on the tibiae are mostly suberect. Appressed pubescence is mostly sparse, a few hairs are present on the head, dorsum of the mesosoma, dorsum of the petiole and dorsum of the gaster, where they are moderately abundant.

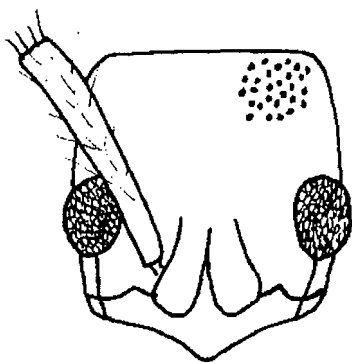


Fig. 417. Head of a worker of *P. crenata* (Gamboa, Panamá, CWEM). Only a small part of the sculpture is shown.

The head and the dorsum of the mesosoma are punctate, appearing like the surface of a thimble, the side of the pronotum is weakly punctate and moderately smooth and glossy, the mesopleuron is mostly smooth and glossy, the side of the propodeum has poorly defined striae and is weakly shining. The petiole is punctate on the sides and the top, the posterior face is mostly smooth and glossy, the dorsum

of the gaster is finely punctate and moderately smooth and glossy.

Female

The female is a *small* (total length 7 - 8 mm) *reddish brown ant with slightly lighter colored appendages*.

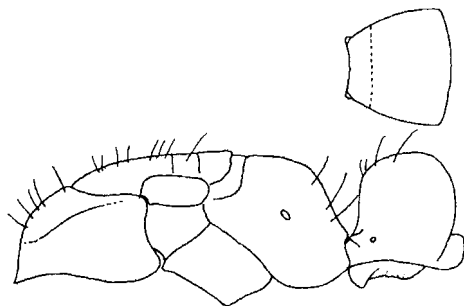


Fig. 418. Mesosoma and petiole of a female of *P. crenata* (Morelos, México, USNM). The inset shows the petiole as seen from above.

The mandibles have approximately 11 teeth; the clypeus has a lobed medial process which overhangs the anteclypeus. The surface of the *process* is *longitudinally concave*. The *malar carina* is *well developed* and extends completely to the eye, which is large (maximum diameter 0.5 mm) and located about $\frac{1}{2}$ diameter from the anterior margin of the head. The scape extends approximately the first funicular segment past the posterior lateral corner of the head. The *carina on the pronotal shoulder* is *sharp* and well developed and overhangs the side of the pronotum. The petiole is thick when viewed in profile and noticeably narrowed anteriorly when viewed from above. The subpetiolar process is

poorly developed and forms a ventrally directed sharp angle followed by a concave region and finally by a swollen region approximately in the middle of the surface. The wing is typical for the genus, but with the third discoidal cell being somewhat elongated.

Relatively short (0.1 mm) erect hairs are abundant on most surfaces of the mandibles, dorsal and ventral surfaces of the head, scapes, mesosoma, petiole and gaster, the hairs on the legs are mostly suberect. Fine appressed whitish pubescence is present on the dorsum of the head, dorsum of the mesosoma, dorsum and anterior face of the petiole and all surfaces of the gaster.

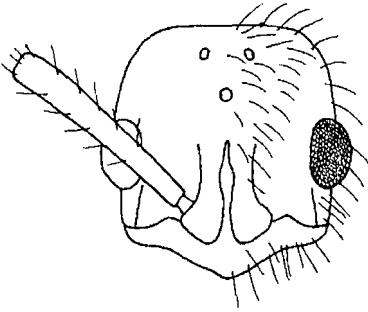


Fig. 419. Head of a female of *P. crenata* (Morelos, México, USNM).

The mandibles are finely striated with scattered punctures, the median lobe of the clypeus has fine longitudinal striae, the frontal lobes and dorsum of the head are covered with dense coarse punctures, the pronotum and dorsum of the remainder of the mesosoma have similar punctures, the sides of the

mesosoma have a mixture of punctures with striae, the petiole is slightly punctated as is the gaster, most surfaces are dull to moderately shining, the posterior face of the petiole is smooth and glossy.

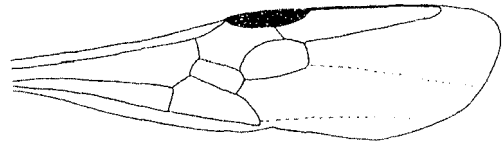


Fig. 420. Forewing of a female of *P. crenata* (Sucumbios, Ecuador, CWEM).

Male

The male is a *small* (total length 5 mm) *brown* specimen. The anterior border of the clypeus is straight or slightly convex, the *clypeus is swollen medially, but does not form an angulate structure* and the *eyes are large, occupying more than 1/2 of the sides of the head*. The medial ocellus is intermediate in size (Brasil, maximum diameter 0.11 mm) to large (Costa Rica, maximum diameter 0.16 mm), the lateral ocelli extend slightly past the posterior lateral margin of the head (Brasil) or well beyond (Costa Rica). The location of the malar carina is slightly raised, but a *definite carina is not evident*. The *pronotal shoulder is not swollen into a carina*. The *propodeal spiracle is slit-shaped*. The petiole is broad when viewed in profile with a rounded apex. The *subpetiolar process is characteristic of this species* and is formed by a *sharp anterior angle, a concave*

surface and a posterior swollen region. The wing is similar to that of the female.

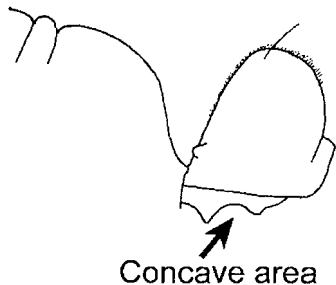


Fig. 421. Propodeum and petiole of a male of *P. crenata* (Porto Velho, Brasil, USNM).

Erect hairs are sparse, a few are present between the eye and the lateral ocellus, on the clypeus, on the dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, most hairs on the legs are suberect. Appressed pubescence is present on the head, the dorsum of the mesosoma, anterior and dorsal faces of the petiole and all surfaces of the gaster.

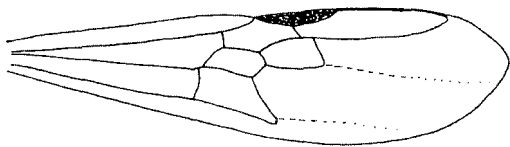


Fig. 422. Forewing of a male of *P. crenata* (Sucumbíos, Ecuador, CWEM).

The surface of the head is finely coriaceous and moderately to strongly shining, the dorsum of the mesosoma is finely coriaceous to punctate or with poorly defined striae and moderately shining, the side of the pronotum is nearly glossy and shining, as is the mesopleuron, the side of the propodeum is irregularly striate and dull. The petiole is finely sculptured and at least moderately to strongly shining. The gaster is coriaceous and shining.

COMPARISON

Workers of *P. crenata* could be easily confused with *P. moesta*, which is found from Guatemala south to Argentina. The shape of the petiole as seen from above is the best character to separate the two species. *Pachycondyla crenata* has the petiole strongly narrowed anteriorly (seen from above), whereas it is blunt and rounded in *P. moesta*. The worker of *P. crenata* can often be separated from that of *P. moesta* as the malar carina is more developed, as is the pronotal carina and the dorsal face of the propodeum slopes downward anteriorly. The malar and pronotal carinae are poorly developed in *P. moesta* and the dorsum of the petiole forms a convex horizontal surface. *Pachycondyla crenata* can be separated from the other members of the *crenata* species complex, as the pronotal carina is not as sharp and does not extend over the side of the pronotum (seen from behind).

Wheeler and Wheeler (1974) provide characteristics to separate the

larvae of *P. crenata* from those of *P. moesta*.

Pachycondyla crenata is similar to the Paraguayan *P. fiebrigi* and Brazilian *P. latinoda*, but differs in being smaller (the total length of the other two is 8.5 - 10 mm) and in having a *relatively* longer petiolar node (0.55 mm in length, 0.65 mm in width, versus length 0.7 mm, width 1.05 mm in *P. fiebrigi*).

Pachycondyla crenata (as well as the related species) could be confused with *P. holcotyle* as the petioles are very similar in shape. *Pachycondyla crenata* can be easily separated by the presence of a malar carina (absent in *P. holcotyle*) and the lack of striae on the side and petiole (present in *P. holcotyle*).

The relatively small size, the brown color, together with the thick petiole, would separate the male of *P. crenata* from most of the others in the genus. *Pachycondyla crenata* males would be most likely confused with males of *P. moesta*, but can be separated as males of *P. moesta* lack the concave region on the lower surface of the petiole. Additionally the clypeus is less swollen in *P. crenata* and does not overhang the anterior edge of the clypeus as it does in *P. moesta*. The apex of the petiole is broadly rounded in *P. crenata*, not angulate as in *P. moesta*. The third discoidal cell of the wing of *P. crenata* is not as long (longest diagonal length of cell 0.41 mm) and is strongly narrowed anteriorly as compared to the third discoidal cell of *P. moesta* (length 0.63 mm).

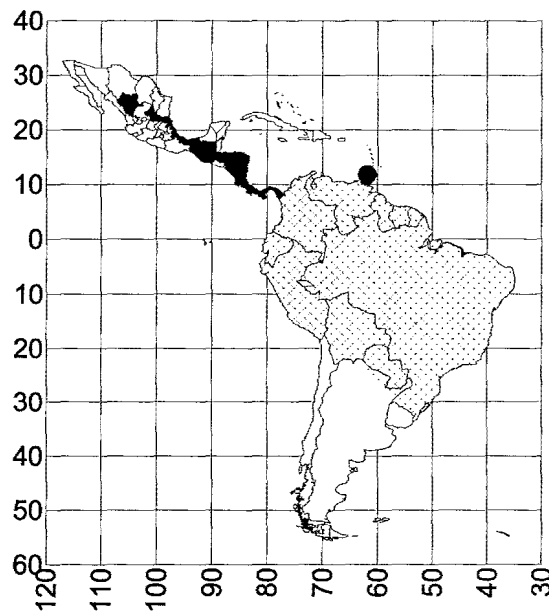
Both Longino (website) and Wild (2005) consider *P. crenata* to be a variable species or possibly a species complex. Once *P. moesta*, *P. globularia*, *P. latinoda* and *P. fiebrigi* are recognized as being different, it becomes much more homogeneous.

DISTRIBUTION

MEXICO: *Durango* (Monte Morelos); *San Luis Potosí* (10 mi E Xilitla); *Veracruz* (El Palmar nr. Tezonapa, Laguna Ocotál Grande, Pureza, Río Metlac, Mirador, Los Tuxtlas [Quiroz and Valenzuela, 2003]); *Tabasco* (near border with Chiapas [Route 186]); *Chiapas* (Palenque Ruins, Ocosingo). GUATEMALA: *Alta Verapaz* (Trece Aguas, Cacao - Trece Aguas); *Izabal* (Quiriguá, Livingston). HONDURAS: without locality. NICARAGUA: *Río San Juan* (5.1 mi SE El Castillo [Bartola]). COSTA RICA: *Heredia* (Finca La Selva, Río Toro Amarillo [vicinity Guápiles], near la Virgen, 3 k S Puerto Viejo, 17 k S Puerto Viejo, Parque Nacional Braulio Carrillo, 10°20'N 84°4'W); *Puntarenas* (Sirena, Corcovado, Península Osa, 8.28°N 83.35°W, 4 k SSE San Vito, Reserva Biológica Carara, 2.5 mi SW Rincón); *Cartago* (Turrialba); *Alajuela* (Reserva Forestal Arenal, Monteverde Cloud Forest, 6.5 k E Monteverde, Jiménez [Forel, 1899], Peñas Blancas); *Guanacaste* (6 mi S & 6 mi W Las Cañas); *Limón* (Tortuguero, Reserva Biológica Hitoy-Cerere, 10 k ESE Moravia); *San José* (San José [intercepted in 1946 in San Francisco, CA]). PANAMA: *Panamá*

(Barro Colorado Island, Canal Zone [Quebrada de Oro], Gamboa [Soberanía National Park], Cerro Campana, Margarita Swamp, Quebrada de Oro [Wheeler, 1942]); *Colón* (Santa Rita Ridge). COLOMBIA: *Magdalena* (Sierra Nevada de Santa Marta [Kempf, 1972]); *Cundinamarca* (Guaya-betal, Bridge over Quebrada Blanca); *Meta* (San Antonio, El Castillo, Bridge at Quebrada Blanca, Puerto Lleras [Loma Linda]); *Cauca* (Parque Nacional Gorgona Alta El Mirador); *Valle del Cauca* (Cali, SW of Cali, Buenaventura); without state [intercepted in San Francisco in 1945]). ECUADOR: *Pichincha* (6 mi W. Santo Domingo de los Colorados); *Orellana* (Sc Yasuni, E. C. Yasuni); *Napo* (Tiputini Biodiversity Station, Cuyabeno); *Napo-Pastaza* (Shell Mera, 2-8 mi N Puyo); *Sucumbíos* (2.84 k N Shushufindi, Sacha Lodge). PERU: *Huánuco* (Monson Valley); *Madre de Dios* (3 k NE Puerto Maldonado, 15 k NE Puerto Maldonado, Socilejo, Manu National Park, [Tobin, 1997]). VENEZUELA: *Distrito Federal* (Caracas); without locality (intercepted at Hoboken [USNM]); *Carabobo* (Puerto Cabello [type locality]); state unknown (10 k NW Pucalipa). TRINIDAD: *Nariva* (nr. Rio Claro). GUYANA: *Cuyuni-Mazaruni* (Kartabo). FRENCH GUIANA: *Cayenne* (20 k S Sinnamary). BRASIL: *Amazonas* (Tio Taruma Mirim-Igató); *Rondônia* (Porto Velho [Rio Madeira]); *Espírito Santo* (without locality); *Paraná* (Rio

Negro, Curitiba); *Pará* (without locality); *Guanabara* (Floresta, Alto da Serra, São Paulo, Petrópolis, Estación Biológica de Boracéia); *Rio de Janeiro* (Rio de Janeiro, Paineras); *Minas Gerais* (Parque Nacional Itatiaí); *Santa Catarina* (Nova Teutônia). Kempf (1972) also lists *Mato Grosso*, *Amapá* and *Rio Grande do Sul*. BOLIVIA: *El Bení* (Huachi - Río Bení, Rurrenbaque); *La Paz* (Tumupasa, Ixiamas); *Santa Cruz* (Santa Elena, 3.7 k SSE Buena Vista Hotel); *Potosí* (Vivero Illinani [22 k N Paranaivai]). PARAGUAY: *Canindeyú* (Reserva Natural Bosque Mbaracayú Jejuimi). ARGENTINA: *Misiones* (20k SE Puerto Iguazú, Puerto Magdalena); *Formosa* (Chaco Austral).



Map 25. *Pachycondyla crenata*.

HABITAT

This species occurs in wet forest and rain forest, secondary rain forest, a guava plantation, a cacao plantation and disturbed areas, between 5 - 1700 meters and in grasslands (Quiroz-Robledo and Valenzuela -González, 1995).

BIOLOGY

This species usually nests in hollow twigs, including in bamboo, but can be found in damaged areas of living trees and in logs and in trunks. One nest was in a damaged guava tree, still containing beetle larvae, four meters from the ground. Colonies are usually small, with fewer than 20 workers. One complete nest had a single queen. Brood was collected in nests in July (Nicaragua), August (Costa Rica) and December (Colombia). Males and females were collected in nests in April and May (México), July (Ecuador) and September (Costa Rica). An alate female and a loose male were collected in July (Costa Rica). A dealate queen with brood was found in July (Nicaragua). An alate female was collected in a malaise trap in November (Colombia). Specimens are often collected in extractions of sifted leaf litter, mold and rotten wood. Workers can be seen foraging on trees and vegetation.

Workers are extremely fast and often exit the nest without taking the brood when a nest is collected. It is

difficult to collect many specimens. One captured worker was unable to penetrate a finger with the stinger.

Colonies from French Guiana were nesting in the ant-plant genus *Tococa* [Melastomataceae]. Data labels state they are found in *Tococa formicaria* and *Cecropia insignis*. Specimens from Colombia and Venezuela were intercepted on *Catleya* [Orchidaceae] orchids [USNM]. Wheeler (1942) found this species nesting in the domatia of *Cordia alliodora* [Boraginaceae] (*P. moesta*), in the petiolar swellings of *Triplaris paniculata* [Polygonaceae], in the branches of *Cecropia sciadophylla* var. *decurrens* [Cecropiaceae] (*P. crenata* [= *P. stipitum*]), in dried fruit of *Bromelia fastuosa* [Bromeliaceae] and *B. epiphytica* (*P. crenata* and *P. moesta*), in hollow petioles of *Tachigalia paniculata* [Leguminosae], in cauline swellings of *Cordia gerascanthus* and in bamboo, occupying the nests made by the ant *Camponotus alboannulatus* (*P. crenata* and *P. moesta*). This species lives in the epiphyte *Tillandsia bulbosa* [Bromeliaceae] (Dejean et al., 1995).

ETYMOLOGY

The name of this species is based on the Latin word *crenatus*, meaning toothed, possibly referring to the angulate medial clypeal process which overhangs the ante-clypeus of the worker (and female) of this species.

Pachycondyla curiosa* new species**Figures - **Female:** 423 (side view), 424 (head and mandible); **Map 26curiosa* species complex**DISCUSSION & DESCRIPT.****Worker**

Unknown.

Female

The *female* is a small (total length 7.5 mm) reddish black specimen with brown mandibles, antennae, appendages and gaster. The mandibles have approximately 10 teeth. The anterior margin of the clypeus is slightly convex. The head length is 1.50 mm; the head width is 1.32 mm. The eye (maximum diameter 0.40 mm) is located approximately one diameter from the anterior margin of the head. The ocelli are small (diameter of median ocellus 0.05 mm, lateral ocellus 0.06 mm) and are located about 3 - 4 diameters from each other. The *scape* is short (length 1.05 mm) and does not reach the posterior lateral margin of the head. The sides of the head are convex, but nearly parallel, the posterior margin is only slightly concave. The *pronotal carina* is absent, the propodeal spiracle is slit-shaped. The node of the *petiole* is nearly rectangular-shaped, but slightly wider near the base. The subpetiolar process and the metasternal process

cannot be seen due to glue. The postpetiole is slightly angulate between the two faces. The stridulatory file is present but poorly developed on the second pretergite. The arolium is poorly developed.

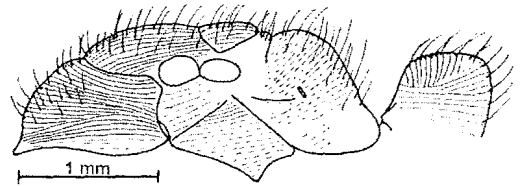


Fig. 423. Mesosoma and petiole of the holotype female of *P. curiosa*.

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, shaft of the scape, mesosoma, petiole and gaster, the hairs on the legs are mostly suberect. Most surfaces have sparse fine golden appressed pubescence, especially on the mesosoma and petiole

The mandibles are mostly smooth and shining, but with deep elongated punctures. The *dorsum* of the head has fine *costulae*, which diverge posteriorly; the *dorsum* of the pronotum

has mostly transverse costulae, which become semicircular posteriorly and pass horizontally on the side of the pronotum. The mesopleuron has mostly horizontal costulae, the costulae on the dorsal face of the propodeum are transverse, horizontal on the posterior face and oblique on the side of the pronotum. The *dorsum of the petiole has transverse costulae*, which become mostly horizontal on the side, the costulae on the anterior and posterior faces are horizontal. The gaster is mostly smooth and glossy, but with coarse punctures.

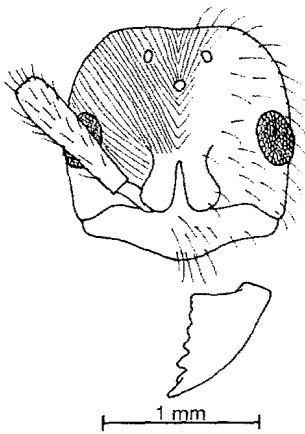


Fig. 424. Head and mandible of the holotype female of *P. curiosa*.

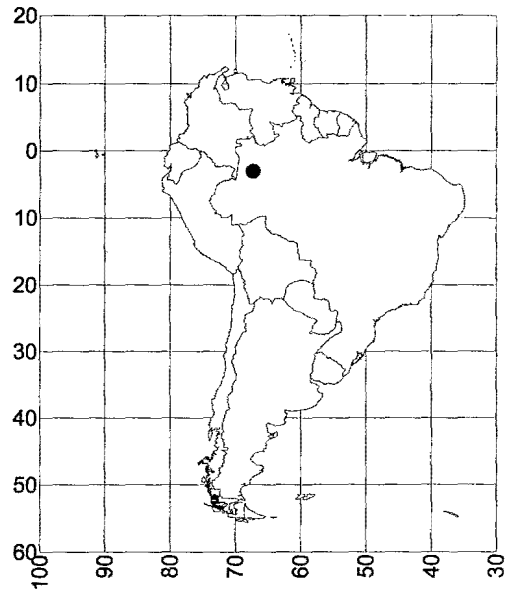
Male

Unknown.

COMPARISON

The costulae, which cover most surfaces of *P. curiosa*, could cause confusion with members of the genus *Gnamptogenys*. *Pachycondyla curiosa* can be separated as the costulae are not as well developed and regular as

they are in *Gnamptogenys* and costulae are lacking on the postpetiole and the third tergite of the gaster of *P. curiosa*, which are normally covered with costulae in members of *Gnamptogenys*. The frontal carinae are narrowed as in other *Pachycondyla*, not widely spaced as in *Gnamptogenys*. The mandibles of *P. curiosa* are typical of those of *Pachycondyla* and are not narrowed and elongated as they are in many species of *Gnamptogenys*.



Map 26. *Pachycondyla curiosa*.

The presence of the costulae would separate *P. curiosa* easily from most of the other species in *Pachycondyla*. The costulae on the head of *P. curiosa* could cause confusion with species such as *P. lineaticeps* and *P. striata*, but both of these species have well defined carinae on the shoulder of pronotum.

Species that have short antennal scapes, including *P. mirabilis*, *P. luteola*, and members of the *crenata* species complex (e.g. *P. crenata*), lack the costulae found in *P. curiosa*. Thus it is unlikely that this species would be confused with any other member of the genus in *Pachycondyla*.

DISTRIBUTION

Known only from the type locality in the state of *Amazonas*, BRASIL.

HABITAT Unknown.

BIOLOGY Unknown.

ETYMOLOGY From Latin, *curiosus*, meaning odd or strange, indicating the tenuous relationship of this species with the rest of the genus.

TYPE SERIES Holotype dealate female (LACM), BRAZIL: Amazonas; Rio Taruma Mirim-Igapó; J. Adis, 6.I.76 Dt-1.

Pachycondyla curvinodis Forel new status

Figures - **Worker**: 110, 268 (petiole, side view), 425 (metasternal process); **Female**: 426 (side view), 427 (head); **Map** 27

foetida species complex

Pachycondyla villosa race *curvinodis* Forel, 1899:15, Plate 1, Fig. 12, ♀, Guatemala: Las Mercedes, Torola; Panamá: Bugaba, Volcán de Chiriquí; *Neoponera villosa curvinodis*: Emery, 1901a:47 (considered a synonym of *P. inversa* by Emery, 1911: 73)

Pachycondyla subversa Lucas et al., 2002: 256, ♀, Fig. 1c, 2 and 3, **unavailable name, material referred here**, no types were designated and apparently they did not intend to describe a new species, not listed in Bolton et al., 2006.

DISCUSSION

Worker

The worker is a *large* (total length 13 mm) *black* ant. The mandible has approximately 15 teeth; the anterior

margin of the clypeus is convex, but slightly concave medially. The *malar carina* is well developed, sharp and extends the entire distance from the anterior edge of the head and the anterior edge of the eye. The head

curvinodis Nicaragua to Venezuela and southern Perú

length is 3.2 mm; the head width is 2.7 mm. The scape (3.2 mm) extends approximately the first two funicular segments past the posterior lateral margin of the head. The *pronotal shoulder forms a sharp carina*, which extends over the side of the pronotum. The *mesosoma is depressed at the metanotal suture* and the *propodeal spiracle is slit-shaped*. The anterior face of the petiole is strongly concave and meets the broadly rounded posterior face at an acute angle. The anterior part of the subpetiolar process is angulate and is followed by a process that gradually diminishes in width. The *stridulatory file on the second pretergite is well developed*, the arolia are poorly developed. The metasternal process consists of two widely separated triangular-shaped lobes.



Fig. 425. Metasternal process of a worker of *P. curvinodis* (Boyacá, Colombia, CWEM), as seen from behind.

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, along the posterior margin, on the shaft of the scape, on the dorsum of the mesosoma, dorsum of the petiole

and all surfaces of the gaster, similar hairs are abundant on all parts of the legs. Golden appressed pubescence is present on the head and on all other surfaces, including the legs.

The mandible is finely sculptured and moderately shining, the remainder of the ant is mostly punctate with parts being moderately shining, including the side of the pronotum, side of the petiole and gaster.

Female

The female (undescribed) is a relatively *large* (total length 13 mm) *dark brown* to nearly black specimen. The mandible has approximately 12 teeth, the clypeus is concave medially. The eyes are relatively large (0.85 mm), separated from the anterior edge of the head (side view) by approximately 1 diameter. The *malar carina is well developed* and extends all the way to the eye. The scape extends one or two funicular segments past the posterior lateral corner of the head; the posterior border of the head is concave. The *pronotal shoulder forms a sharp well-developed carina*, which overhangs the side of the pronotum. The *metanotal suture is well developed* and breaks the sculpture on the dorsum of the mesosoma, the metanotum is well defined. The *propodeal spiracle is elongated and slit-shaped*; the posterior lateral edges of the posterior face of the propodeum are developed into sharp carinae, which rise above the surface. The *anterior face of the petiole is strongly concave* and meets the broadly rounded posterior face at

an angle of approximately 50°. The subpetiolar process is developed into a broad swelling.

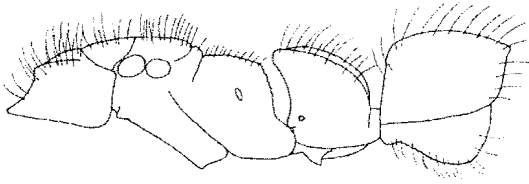


Fig. 426. Mesosoma, petiole and postpetiole of a female of *P. curvinodis* (Guaviare, Colombia, CWEM).

Erect hairs are present on most surfaces, including the dorsal and ventral surfaces of the head, the scape,

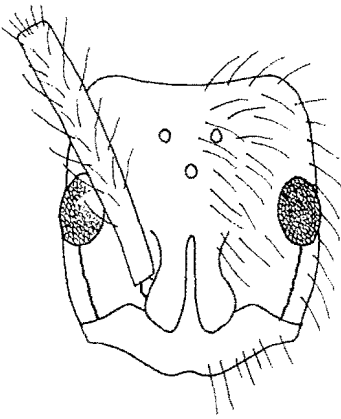


Fig. 427. Head of a female of *P. curvinodis* (Guaviare, Colombia, CWEM).

the sides of the head, the clypeus, the dorsum of the mesosoma, dorsum of the petiole, legs, including the tibiae and all surfaces of the gaster; appressed silver pubescence is present on all surfaces.

Most surfaces are dull and covered with punctures or with coriaceous sculpture; the mesosoma and gaster are moderately shining.

Male

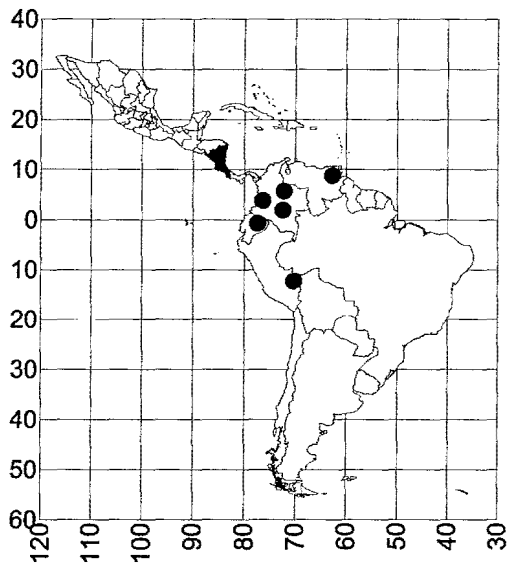
Unknown.

COMPARISON

The worker of *P. curvinodis* is nearly identical to that of the common *P. villosa*. *Pachycondyla curvinodis* can be separated from *P. villosa* by the strongly concave anterior face of the petiole, which is nearly straight in *P. villosa* as well as in most of the other species of *Pachycondyla*.

It is very difficult to distinguish *P. curvinodis* from *P. inversa*. They differ in the shape of the petiole with the petiole of *P. inversa* being narrower (see Fig. 1 in Lucas et al., 2002). Basically *P. curvinodis* has a longer petiole, with a length greater than 1.3 mm when viewed in profile (measured from the anterior edge of the lateral flanges to the posterior margin above the peduncle). The length of the petiole of *P. inversa* is less than 1.3 mm. The petiole of *P. curvinodis* usually has a less concave anterior face, making the angle at the apex less acute. This difference in petiolar shape results in the petiole of *P. inversa* appearing “taller” and the petiole of *P. curvinodis* appearing more robust. There is no consistent difference in the pilosity on the ventral surface of the petiole. The shape of the subpostpetiolar process differs between the two species in both the workers and females. That of *P.*

curvinodis is connected to the remainder of the sternum of the postpetiole by a sharp carina (or at least by a continuously raised area), that of *P. inversa* has the area between the process and the remainder of the sternum interrupted by a constricted region, making the process or tooth appearing isolated from the rest of the sternum.



Map 27. *Pachycondyla curvinodis*.

DISTRIBUTION

NICARAGUA: *Río San Juan* (5.1 mi SE El Castillo [Bartola, CWEM]). **COSTA RICA:** *Limón* (Los Diamantes [LACM]); *Puntarenas* (Dominical [CWEM], 5 k WSW Rincón [Osa, MCZC], Golfito [LACM]); without locality (NHMB). **COLOMBIA:** *Boyacá* (Aguaclara [IAVH]); *Guaviare* (Vichada Orinoco); *Valle del Cauca* (Bajo Calima [El Pital]).

ECUADOR: *Napo* (Río Aguarico [CASC]). **VENEZUELA:** *Delta* (Orinoco Delta [140 k NE Barrancas, LACM]). **PERU:** *Madre de Dios* (30 k [air] SW Puerto Maldonado [12°50'S 69°20'W, MCZC]).

HABITAT

Individuals have been collected in tropical rain forest, 50 - 600 meters elevation.

BIOLOGY

The specimens from Nicaragua were collected behind a *Nasutitermes* termite nest in the rotten area of a living tree. The specimen from near Rincón, Costa Rica was collected in hollow stems of *Cecropia*; the specimen from Perú was collected during the fogging of a tree canopy. Dealate females were collected in May and June (Costa Rica), July (Perú), July and August (Colombia) and December (Costa Rica).

Workers rapidly exit the nest or hide when the nest is disturbed, making specimens difficult to collect. Our limited experience with this species suggests that it is not as aggressive as the closely related *P. villosa*.

ETYMOLOGY

The name is based on two Latin words: *curvus*, meaning bent and *nodus* meaning swelling, referring to the curved anterior face of the petiole of the worker (and female) of this species.

***Pachycondyla dismarginata* new species**

Figures - **Worker**: 111 (clypeus), 256 (side view), 257 (head); **Map** 28

foetida species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *moderately large* (total length 14 mm) black ant with dark legs. The mandible has approximately 18 teeth; the anterior margin of the clypeus is broadly convex. The *malar carina* is *developed*, but does not reach the anterior border of the eye. The eyes are relatively large (maximum diameter 0.69 mm) and are located about one diameter from the anterior margin of the head (side view). The head width is 2.2 mm; the length is 2.9 mm. The *scape* is *relatively long* (3.4 mm) and *extends more than three funicular segments* past the posterior lateral corner. The *pronotal shoulder* forms a *sharp carina*, which extends over the sides of the pronotum. The *mesosoma* is *depressed at the metanotal suture*, which breaks the sculpture on the dorsum of the mesosoma. The dorsal face of the propodeum is approximately twice the length of the posterior face, the *spiracle* is *slit-shaped*. The *anterior face of the petiole* is *vertical* and *meets the broadly rounded posterior*

face near the anterior edge. The posterior lateral edges are swollen, but not noticeably and do not form carinae.

Erect hairs are *abundant* on most surfaces, *including the scapes*, where they are *especially long* (up to 0.75 mm in length) with approximately 60 present (scape viewed in profile). Many of the hairs on the dorsum of the head are nearly as long (up to 0.48 mm in length), the hairs on the mesosoma, petiole and gaster are similar to those on the dorsum of the head. Appressed golden pubescence is abundant on all surfaces of the head, all surfaces of mesosoma, the posterior face of the petiole and the gaster.

The mandibles are covered with striae and are weakly shining. Most of the surface of the *clypeus* is covered with *longitudinal striae*, which are especially obvious in the middle of the clypeus. The dorsum of the head is densely and evenly punctate and dull, the punctures on the mesosoma are finer and some of the surfaces are weakly shining, the side and posterior face of the petiole are finely punctured and weakly shining, the gaster is fin-

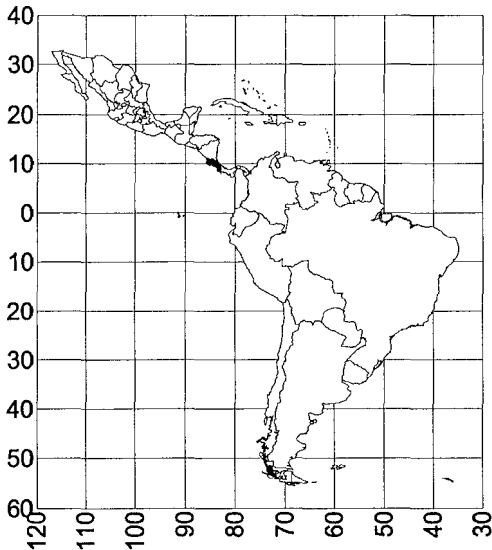
ely punctate and moderately shining.

Female and Male

Unknown.

COMPARISON

Pachycondyla dismarginata can be separated from most of the others in the *foetida* species complex in that the malar carina does not reach the eye. This characteristic places this species with *P. bugabensis* and *P. insignis*, from which it can be separated by the longitudinal striae in the middle of the clypeus.



Map 28. *Pachycondyla dismarginata*.

Longino (website) separates an undescribed species as JTL-012, but it is not apparent from the discussion or photographs how it differs from *P. dismarginata* and is probably conspecific.

DISTRIBUTION

COSTA RICA: *Puntarenas* (Parque Nacional Corcovado [CSTD, CWEM]); *Heredia* (10°20'N 84° 04'W [MCZC], 16 km N Volcán Barba [10°17'N 84°05'W]), 16 k SSE La Virgen [INBio]; *Alajuela*, (Rio Peñas Blancas [10°19'N 84°43'W, MCZC], Peñas Blancas [10°18'N 84°42'W, MCZC], Monteverde Cloud Forest Reserve [CASC, MCZC]. Longino (website) lists Cordillera de Tilarán to Cordillera de Talamanca.

HABITAT

This species occurs in wet forest at 500 - 1050 meters.

BIOLOGY

Pachycondyla dismarginata nests in the ant-plant *Cecropia insignis* and workers are nocturnal, foraging on vegetation.

Longino (website) collected four nests, with no more than two-dozen or so workers. One nest was in a small clearing surrounded by rain forest, the nest was in a thick soft wet dead *Piper* stem near the ground. A second nest was in a live branch with a diameter of 5 - 10 cm of a small shrub with live and dead hollow stems. The third nest was in a soft rotten stump and in chambers left by a large wood-boring beetle larva. The fourth nest was on a forest trail at the Wilson Botanical Gardens in a *Cecropia* trunk that had fallen across the trail. The trunk was mostly still alive with a dead apex. The nest was in the internodes at the live to dead transition zone.

TYPE SERIES

Holotype worker (MCZC), 3 paratype workers (CWEM, MCZC, INBio), CR: Pv. Heredia, 16 k N Vol. Barba, 10°17'N 845'W, 950 m, 4-15Jul1986, J. Longino # 1381-S; wet forest, workers on vegetation/ground; wet forest, nocturnal forager.

ETYMOLOGY

From Latin, *dis* meaning without and *marginata*, meaning enclosed with a border, referring to the poorly developed malar carina. William Brown suggested the name.

***Pachycondyla donosoi* new species**

Figures - **Worker**: 73 (larva), 81 (mandible), 236 (tibia), 428 (side view), 429 (head), 432 (subpetiolar process); **Male**: 308 (tibia), 430 (side and top view), 431 (head), 432 (subpetiolar process); **Map** 29

crenata species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *medium sized* (total length 7 mm) *dark reddish brown* specimen with slightly lighter brown colored appendages. The mandibles have 13 or 14 teeth. The *anterior margin of the clypeus is strongly angulate* and overhangs the anteclypeus medially. The head is 1.6 mm in length and 1.3 mm in width. The posterior lateral region of the head is rounded and posterior border is nearly straight. The sides of the head are narrowed slightly anteriorly and posteriorly to the eyes. The *malar*

carina is well developed and extends nearly to the level of the anterior margin of the eye. The *eyes are relatively large* (maximum diameter 0.46 mm) located less than one diameter from the anterior margin of the head (side view). The *scape* (1.7 mm) *extends more than 1/3 times its length past the posterior lateral corner* of the head. The *pronotal shoulder forms a sharp carina*, which slightly overhangs the side of the pronotum. The *metanotal suture is slightly depressed* on the dorsum of the mesosoma, but barely breaks the sculpture. The *propodeal spiracle is elongated*. The subpetiolar process has

an anterior ventrally directed small angle, followed by slight concave region and another small angle, with the remainder of the process narrowing posteriorly. The anterior face of the petiole forms a broad, curved surface and meets the posterior face near the middle of the apex. The *stridulatory file on the second pretergite is well developed*; the arolia are poorly developed.

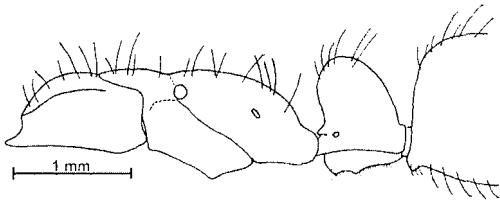


Fig. 428. Mesosoma and petiole of the holotype worker of *P. donosoi*.

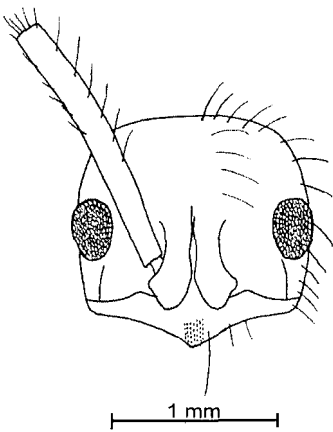


Fig. 429. Head of the holotype worker of *P. donosoi*.

Erect hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin, the dorsum of the mesosoma, dorsum

of the petiole, on the subpetiolar process and all surfaces of the gaster, hairs on the legs are mostly suberect. Appressed golden pubescence is mostly sparse, but obvious on the head, dorsum of the mesosoma, petiole and gaster.

The *mandibles are very finely sculptured* with scattered punctures and are moderately smooth and shining. The medial process on the clypeus has poorly defined longitudinal striae. The dorsum of the head has fine punctures and is mostly glossy, as are the dorsum of the pronotum, the mesonotum and the dorsal face of the propodeum. The *side of the pronotum is smooth and glossy* and the side of the remainder of the mesosoma is mostly smooth and glossy, with scattered very fine punctures. The sculpture on the petiole and gaster is similar with scattered punctures; the surface between the punctures is smooth and glossy.

Female

Unknown.

Male

The male is a *small* (total length 6 millimeters) *dark brown* ant. The head length is 1.0 mm; the head width is 0.8 mm. The eye length (seen from the side) is 0.6 mm, the median ocellus is 0.13 mm in width located slightly more than one diameter from the lateral ocellus. The *malar carina and pronotal carina are poorly developed*. The parapsidal sutures and *Mayrian furrows are well developed*. The *propodeal spiracle is slit-shaped*. The

anterior face of the petiole is nearly straight, the posterior face slightly convex and the two faces meet near the middle of the petiole and form an angle. The region posterior to the spiracular horns forms a sharp carina that is greatly elevated from the remainder of surface. The anterior part the subpetiolar process is swollen into a broad lobe, followed by an elongated, slightly concave region formed from the greatly narrowing of the process posteriorly.

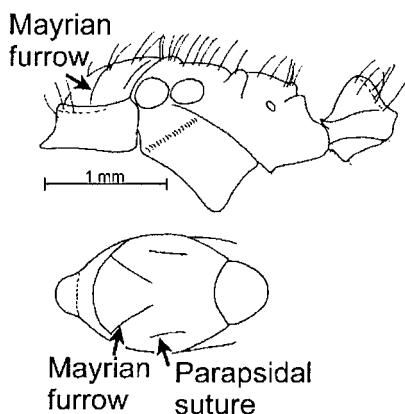


Fig. 430. Mesosoma and petiole of the paratype male of *P. donosoi*, as seen from the side and from above.

Erect hairs are scattered on the dorsum and sides of the head, the malar area, a few hairs on the scape are elevated from the surface, erect hairs are scattered on the dorsum of the mesosoma, dorsum of the petiole, on the subpetiolar lobe and all surfaces of the gaster; the hairs on the legs are mostly suberect.

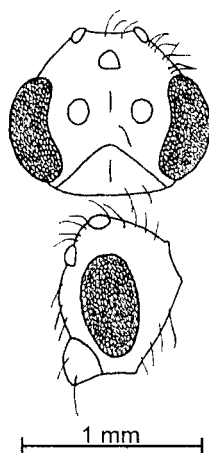


Fig. 431. Head of the paratype male of *P. donosoi*, as seen from the front and from the side.

The head, mesosoma, petiole and gaster are mostly smooth and glossy.

COMPARISON

The worker of *P. donosoi* is nearly identical to that of *P. goeldii*. It can be separated in lacking a strongly concave region on the subpetiolar process (which is present in *P. goeldii*), smooth mandibles (completely striate in *P. goeldii*) and by the sparse erect hairs on the tibiae, which are mostly shorter than the tibiae (very abundant and most greater in length than the diameter of the tibiae in *P. goeldii*). The shape of the petiole would separate *P. donosoi* from most of the other species in *crenata* species complex.

The males of *P. donosoi* are very different from those of *P. goeldii*. They are much smaller than the workers, not approximately the same

size as the workers as in *P. goeldii*. They are dark brown, not yellowish - orange as in *P. goeldii*. Finally the subpetiolar process is only slightly concave, not strongly concave as in males of *P. goeldii*.

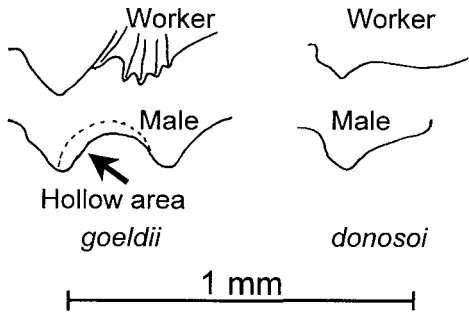


Fig. 432. Subpetiolar process of a worker and male of *P. goeldii* and of *P. donosoi*.

DISTRIBUTION

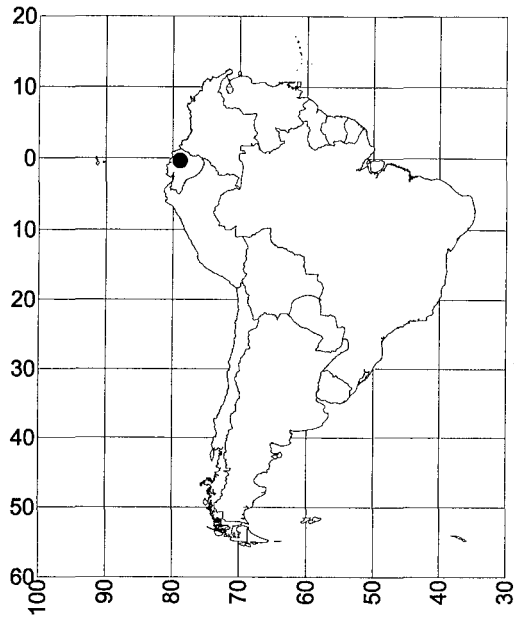
Known only from the type locality in the state of *Pichincha*, ECUADOR.

HABITAT

Pachycondyla donosoi occurs in tropical rain forest at 770 m elevation.

BIOLOGY

These ants were nesting in two hollow twigs (diameter 1 cm and 7 cm) that were lying on the forest floor (composed of a clay loam soil). They were extremely fast and difficult to capture. Most of the specimens of the first nest escaped with most of the brood in less than two seconds. Brood and a male were found in the second twig in July.



Map 29. *Pachycondyla donosoi*.

ETYMOLOGY

This species is named in honor of our friend and colleague, mirmecólogo David Donoso of the Pontificia Universidad Católica del Ecuador, who took us to one of his favorite collecting spots, where we collected two colonies of this new species.

TYPE SERIES

Holotype worker (MCZC), 6 paratype workers (CASC, CWEM, QCAZ, IAVH, MZSP, USNM) and 1 paratype male (CWEM), Ecuador, Pichincha, La Unión del Río Toachi, 15-vii-2005, W&E Mackay #'s 21156, 21179.

Pachycondyla eleonorae (Forel)

Figures - **Worker**: 36 (petiole), 40 (pronotum), 276 (side view), 433 (metasternal process); **Female**: 434 (side view), 435 (head); **Map** 30

aenescens species complex

Mesoponera Eleonorae Forel, 1921:131-132, ♀, Ecuador, Quito [holotype seen, MHNG]; *Pachycondyla eleonorae*: Bolton, 1995:305

DISCUSSION

Worker

The worker is a *moderate sized* (total length 9 mm) *black* ant which *appears to be reddish brown or bronze* due to the abundant golden appressed pubescence. The mandible has approximately 12 teeth. The anterior border of the clypeus is broadly rounded and the head is relatively elongated (length 2.4 mm, head width 1.8 mm). The eyes are *relatively small* (0.4 mm), located slightly more than one diameter from the anterior margin of the head. The *malar carina is absent*. The *scape is long* (3 mm) and extends nearly $\frac{1}{2}$ the length past the posterior lateral corner of the head. The *pronotal shoulder is rounded*; the *mesosoma is depressed at the metanotal suture*, which breaks the sculpture on the dorsum. The *propodeal spiracle is slit-shaped*. The *petiole has a characteristic shape* in which the *anterior and posterior faces are nearly parallel*, but the *anterior*

face is about one half as long as the posterior face and gradually bends into the dorsal face, which is elongate and inclined upwards so that the highest point on the apex is near the posterior edge. The posterior face is broadly rounded and meets the dorsal face at its high point. The posterior lateral edge of the petiole nearly forms

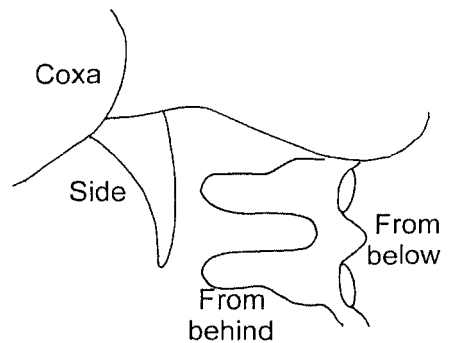


Fig. 433. Metasternal process of a worker of *P. eleonorae* (Baños, Ecuador, CWEM) as seen from the side (left), behind (center) and below (right).

a carina. The subpetiolar process is poorly developed. The *stridulatory file* is present on the second pretergite, but the arolia are poorly developed. The *metasternal process* is very unusual and completely different from the remainder of the species in the *aenescens* species complex. It consists of a pair of elongate parallel *finger-like lobes* (seen from behind) which are flattened and oriented perpendicular to the axis of the body when seen from below.

Erect hairs are present on the clypeus, but are sparse on the ventral and dorsal surfaces of the head and absent on the scapes as well as on the dorsum of the mesosoma, dorsum of the petiole, most surfaces of the gaster have a few scattered erect hairs. The legs, including the tibiae, have a few white (difficult to see) erect or suberect hairs. *Golden appressed pubescence* is abundant on the head, mesosoma and gaster.

The head is densely and evenly but finely punctate, the mesosoma is coriaceous with some fine striae on the dorsum, the petiole is punctate and moderately shining, as is the gaster.

Female

The female (undescribed) is a moderate sized (total length 13 mm) dark reddish brown ant with reddish brown legs. It appears to be golden-bronze in color, due to the abundant appressed golden hairs. The mandible has 11 teeth; the anterior border of the clypeus is broadly rounded. The head length is 2.55 mm, the head width 2.15 mm. The *malar carina* is absent

and the eyes relatively small (maximum diameter 0.53 mm). The scape (2.98 mm) extends $\frac{1}{3}$ of the length past the posterior lateral corner of the head. The pronotal shoulder is swollen but does not form a margin; the propodeal spiracle is slit-shaped. The *petiole* is thick when viewed in profile with the *anterior face* being nearly vertical and the *posterior face* being broadly rounded, the two faces form a poorly defined dorsal face. The subpetiolar process consists of the thick lobe which diminishes in width posteriorly.

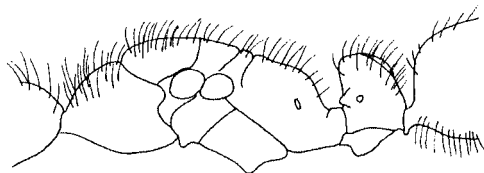


Fig. 434. Mesosoma and petiole of a female of *P. eleonorae* (Baños, Ecuador, MCZC).

Erect hairs are abundant on most surfaces including the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, *erect hairs* are absent on the shaft of the scape (hairs are present at the apex), erect hairs are abundant on the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster, the hairs on the legs are suberect, the length of those on the

tibia are about $\frac{1}{3}$ of the diameter of the tibia. Appressed golden pubescence is abundant on the head, the mesosoma and the gaster, providing a *golden color*.

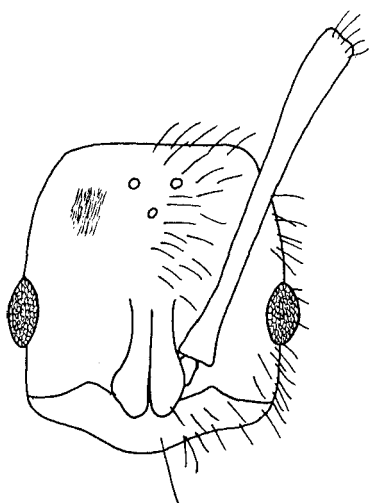


Fig. 435. Head of a female of *P. eleonorae* (Baños, Ecuador, MCZC). Only a small portion of the sculpturing is shown.

The *mandibles* are *striate* and *dull*, the dorsum of the head and dorsum of the mesosoma are dull and punctate, the sides are slightly less coarsely sculptured and weakly shining, the gaster is moderately shining with scattered punctures.

Male

The male is unknown. Two possible males are deposited in the CASC.

COMPARISON

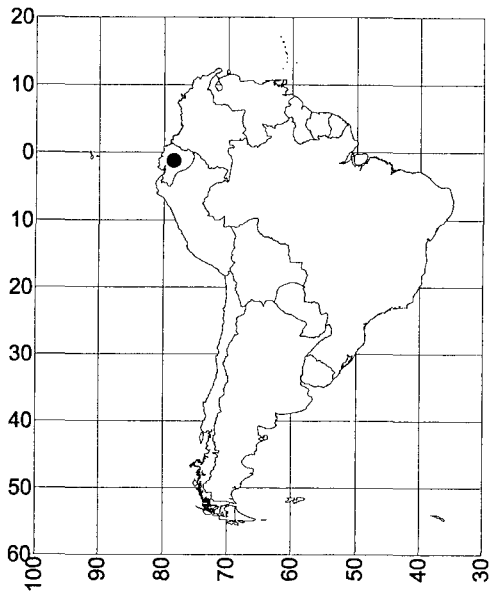
The worker of *P. eleonorae* could be confused with *P. aenescens* but differs in that the petiole of *P. eleonorae* is longer than broad when viewed from above (wider than long in *P. aenescens*). The shape of the metasternal process would also separate *P. eleonorae* from *P. aenescens* in which the process consists of two widely spaced triangular lobes. *Pachycondyla eleonorae* is closely related to *P. carbonaria* (Forel, 1921) but is mostly roughly sculptured, whereas *P. carbonaria* is at least partially smooth and glossy. The metasternal lobes of *P. carbonaria* are small and poorly developed. The extensive golden pubescence of *P. eleonorae* could cause confusion with the worker of *P. schoedli*. The two species can be easily separated as the anterior face of the petiole of *P. eleonorae* is convex and even angulate, whereas the same surface of *P. schoedli* is straight. In addition the lobes of the metasternal process of *P. schoedli* are similar to those of *P. aenescens*, making both of these species easily separated from *P. eleonorae*. The pronotal disc of *P. eleonorae* has more than 10 erect hairs and has few hairs in *P. schoedli*.

The worker of *P. eleonorae* is very similar to that of *P. fusca* from the mountains of Colombia. The worker of *P. fusca* is nearly completely black (the mandibles are dark reddish brown) not golden-bronze colored as in *P. eleonorae*. The anterior and dorsal faces of the petiole of *P. eleonorae* form a broad convexity, whereas in *P. fusca* the

anterior face abruptly bends about half height and forms a concave oblique dorsal face which meets the posterior face near the posterior edge of petiole. The lobes of the metasternal process of *P. fusca* are closely spaced with concave interior margins which nearly meet apically, not finger-like and parallel as in *P. eleonora*. Otherwise the two species are essentially identical. *Pachycondyla eleonora* could be easily confused with *P. fauveli*. They are approximately the same size, but *P. eleonora* has a brassy color, *P. fauveli* is black. The eye of *P. eleonora* is smaller (~0.4 mm), located more than one maximum diameter from the anterior edge of the head (side view), whereas it is larger in *P. fauveli* (~0.5 mm) located about 1 diameter from the anterior edge of the head.

DISTRIBUTION

ECUADOR: *Tungurahua* (Baños [CASC, MCZC], Baños [Sendero de Bellavista [QCAZ]), 2 mi W Baños [CASC, MCZC]). The type locality of "environs de Quito" is probably an error and the specimen was only shipped from Quito to Forel.



Map 30. *Pachycondyla eleonora*.

HABITAT

Unknown, a female was collected between 1600 - 1900 m.

BIOLOGY

Unknown.

ETYMOLOGY

This species was named in honor of Ms. Eléonore Naumann who collected the holotype as well as many other specimens for Forel.

Pachycondyla emiliae (Forel)

Figures - **Worker**: 19 (dorsum of mesosoma), 21 (metasternal process), 90 (clypeus), 192 (postpetiole, dorsal view), 194 (side view), 436 (head), 437 (metasternal process), 438 (side view); **Map** 31

emiliae species complex

Neoponera emiliae Forel, 1901b:349 - 351, ♀, Venezuela: Carabobo: Puerto Cabello [lectotype and 2 paralectotype workers designated, MHNG]; *Neoponera* (*Neoponera*) *emiliae*: Emery, 1911:72; *Pachycondyla emiliae*: Bolton, 1995:305

DISCUSSION

Worker

The worker is a moderate sized (total length 8 mm) dark brown to black ant. The mandibles have approximately 12 teeth and the anterior border of the clypeus is broadly convex, weakly angulate and not indented medially. The malar carina is slightly developed and extends approximately $\frac{1}{2}$ of the length to the eye. The eye is small (maximum diameter 0.35 mm) located approximately one diameter from the anterior edge of the head (side view). The pronotum is swollen at the shoulder and forms a weak carina. The mesosoma is slightly depressed at the metanotal suture which breaks the sculpture. The propodeal spiracle is circular and the posterior lateral edges of the propodeum are formed into carinae. The anterior margin of the petiole is concave and meets the broadly rounded posterior face at the anterior edge of the apex. The

stridulatory file is present on the second pretergite, but the arolia are poorly developed. The metasternal process consists of two blunt triangular lobes.

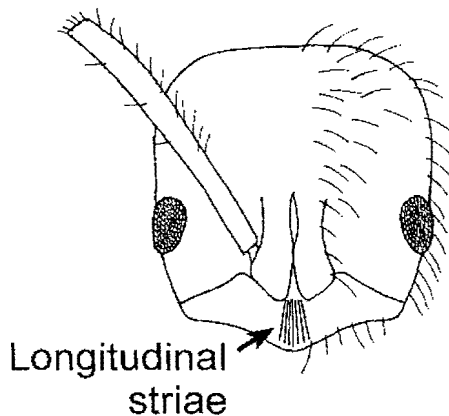


Fig. 436. Head of a worker of *P. emiliae* (Aragua, Venezuela, CWEM).

Erect and suberect hairs are abundant on all surfaces, especially the dorsum of the head, shaft of the

scape, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, most surfaces are covered with golden appressed pubescence.

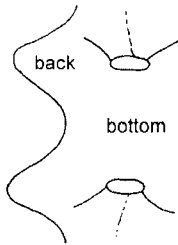


Fig. 437. Metasternal process of a worker of *P. emiliae* (Aragua, Venezuela, CWEM), as seen from behind and from below.

Most surfaces are punctate, except the mandibles, which are finely striate and punctate, the middle of the clypeus is longitudinally striate and the dorsum of the head has the punctures somewhat aligned and they nearly form striae. Some of the surfaces, especially the sides of the mesosoma, all surfaces of the petiole and the gaster, are moderately shining.

Female and Male

Unknown.

COMPARISON

It is difficult to place *P. emiliae* into a species complex. The presence of a malar carina, pronotal carina, the weakly depressed metanotal suture and the stridulatory file on the second pretergite all suggest that it belongs to the *crenata* species complex. The metasternal process of *P. emiliae* is different from members of the *crenata*

species complex, in which the lobes are usually closely spaced, nearly touching medially. It is somewhat similar to only *P. unidentata*.

The general poorly developed nature of the two carina (preocular and pronotal), the circular shape of the propodeal spiracle, the general form of the mesosoma and the shape of the petiole suggest a relationship of *P. emiliae* with the *ferruginea* or *constricta* species complex. It is somewhat intermediate between the two complexes, with the stridulatory file possibly relating it more to the *constricta* complex.

The phylogenetic importance of this species is reinforced below, with the noted similarity of the worker to the female of *P. aenescens*, apparently linking the *aenescens* complex with the *crenata* and *constricta* species complexes. It will be placed in its own species complex, together with some other oddballs that may not be closely related to it, until more specimens and the sexuals of the forms involved have been collected.

Pachycondyla emiliae workers are very similar to workers of *P. metanotalis*. Fortunately the distributions are useful in identification, with *P. emiliae* being from northern South America, *P. metanotalis* from southern South America. The medial part of the clypeus is longitudinally striate in *P. emiliae*, but smooth and glossy in *P. metanotalis*. The petiole is usually slightly narrower (length at level of peduncles disregarding the spiracular horn 0.70 - 0.80 mm) than that of *P. metanotalis*. All surfaces are mostly

dull and sculptured (the side of the head and dorsum of the pronotum are partially smooth and shining in *P. metanotalis*). The middle of the clypeal margin is broadly convex in both species, which would separate them from *P. aenescens* in which the medial section of the clypeus is depressed and slightly concave. The pronotal carina is only moderately developed and does not overhang the side (viewed from the front or behind) in *P. emiliae*.

The female is unknown, but the female of *P. aenescens* is very similar to the worker of *P. emiliae*. The shapes of the petioles are identical and the shape of the petiole of the female of *P. aenescens* is different from that of the corresponding worker. They could possibly be separated in that the unknown female of *P. emiliae* would have the medial area of the clypeus convex (as in the worker), not concave as in the female of *P. aenescens*. It may also have a circular propodeal spiracle, not elongate as in *P. aenescens*.

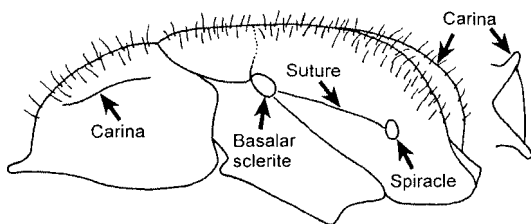


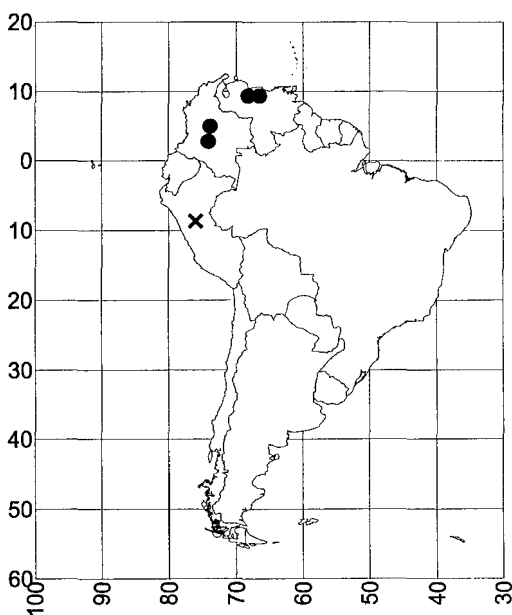
Fig. 438. Mesosoma of a worker of *P. emiliae* showing the propodeal-metapleural suture between the propodeal spiracle and the basalar sclerite (IAVH).

A specimen from Colombia differs from the typical form in having

an elongate propodeal spiracle, as well as a well defined propodeal-metapleural suture extending from the propodeal spiracle to the basalar sclerite, which is absent in the other specimens of *P. emiliae* that we have seen, including the lectotype. It is also slightly larger and may actually be a new species.

DISTRIBUTION

COLOMBIA: *Boyacá* (Villa de Leiva); *Meta* (Parque Nacional Tinigua [3°57'36"N 73°57'36"W, IAVH]). VENEZUELA: *Carabobo* (type locality); *Aragua* (Parque Nacional H. Pittier near Rancho Grande [CWEM]), Rancho Grande (Portachuelo Pass [MCZC]). PERU: (without locality [NHMW]).



Map 31. *Pachycondyla emiliae*. The "X" indicates an unknown locality in Perú.

emiliae Colombia, Venezuela, Perú

HABITAT

The workers from Rancho Grande were collected at 1100 m elevation, in thick cloud forest, on a steep west-facing slope; the worker from Villa de Leiva was collected in an open wet grassy area.

BIOLOGY

Workers forage on the soil sur-

face, two were captured in a pitfall trap. Workers are fast and wary. One worker was collected under a stone. Forel (1901b) collected the type colony in the soil under tangled vegetation.

ETYMOLOGY

This species was named after an unspecified woman named Emilia.

Pachycondyla fauveli Emery

Figures - **Worker**: 33 (petiole, side view), 37(scape), 38 (mandible), 275 (side view), 439 (head), 440 (metasternal process); **Female**: 441 (side view), 442 (head); **Male**: 289 (head), 443 (propodeum and petiole); **Map** 32

aenescens species complex

Pachycondyla fauveli Emery, 1896b:175, ♀, Bolivia (without specific locality); Wheeler, 1925:6, ♀, ♂; *Euponera* (*Mesoponera*) *fauveli*: Forel, 1901b:341; *Mesoponera fauveli*: Wheeler & Wheeler, 1971:1206, larval tubercle, Fig. 15; Wheeler and Wheeler, 1976: 54, Fig. 8 (planidium); *Pachycondyla fauveli*: Bolton, 1995:305

DISCUSSION**Worker**

The worker is a *moderate sized* (total length 12 mm) *black* ant. The mandibles have approximately 12 teeth and the anterior medial border of the clypeus is concave. The sides of the head are broadly rounded but almost parallel. The *eyes are relatively*

large (maximum length 0.5 mm) located approximately 1 diameter from the anterior border of the head (seen from the side). The *malar carina is absent*. The *antennal scapes are long* and extend approximately three funicular segments past the posterior lateral corners of the head. The posterior border of the head is slightly concave. The *pronotal shoulder is*

fauveli Colombia to Bolivia

broadly rounded and the *mesosoma* is *depressed at the metanotal suture*, which breaks the sculpture on the dorsum of the mesosoma. The *propodeal spiracle* is *elongated and slit-shaped*. The anterior and posterior faces of the petiole are convex and rounded and meet at *the highest point slightly posterior to the midpoint of the petiole* (the apex is broadly rounded). The anterior face of the post-petiole is vertical and meets the broadly rounded dorsal face at an angle $> 90^\circ$. The metasternal process consists of two widely spaced triangular lobes, similar to the condition in *P. schoedli* and *P. aenescens*.

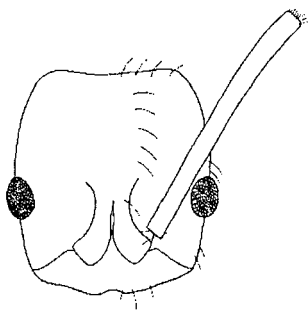


Fig. 439. Head of a worker of *P. fauveli* (Machu Picchu, Perú, CWEM).

Erect hairs are scattered on the mandibles, clypeus, dorsal and ventral surfaces of the head, absent on the scapes (one or two hairs may be suberect near the apex), scattered on the dorsum of the mesosoma, on all three coxae, mostly absent on the remainder of the legs, present on the dorsum of the petiole and all surfaces

of the gaster; appressed fine silver pubescence is present on most surfaces, but only slightly abundant on the dorsum of the gaster.



Fig. 440. Metasternal process of a worker of *P. fauveli* (Machu Picchu, Perú, CWEM), as seen from behind.

The mandibles of the worker are dull and finely striate, the head is finely punctate, the mesosoma is coriaceous and punctate and the gaster is moderately shining with scattered punctures.

Female

The female is a moderate sized (total length 12 mm) dark reddish black specimen with a yellow tipped funiculus (last four segments, at least of specimens seen) and reddish brown appendages and gaster. The anterior border of the clypeus is broadly convex, but *concave medially*. The sides of the head are nearly straight and slightly wider anteriorly; the posterior border is nearly straight or slightly concave. The eyes are relatively large (maximum diameter 0.54 mm) located about one diameter from the anterior margin of the head. The scapes are long (2.9 mm) extending more than $\frac{1}{3}$ length past the posterior lateral corner of the head.

The *ocelli* are small (maximum diameter of the median ocellus 0.07 mm) located about two diameters from the lateral ocellus. The *pronotal shoulder is swollen* and nearly forms a carina. The dorsum of the mesosoma slopes steadily downward from the middle of the scutum to the posterior face of the propodeum, with the scutellum rising above the surface.

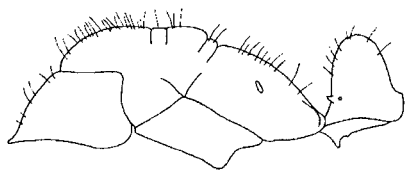


Fig. 441. Mesosoma and petiole of a female of *P. fauveli* (Nariño, Colombia, IAVH).

The *propodeal spiracle is slit-shaped*. The anterior face of the petiole is weakly convex and meets the broadly rounded posterior face near the apex, but the medial part of the posterior face forms a poorly defined dorsal face. The subpetiolar process forms an anterior angle and a concave posterior portion. The anterior face of the postpetiole is broadly rounded into the dorsal face. The *stridulatory file is present* on the second pretergite, the *arolia* are absent between the tarsal claws.

Erect hairs are sparse, those on the clypeus are relatively long (0.4 mm), the remainder of the hairs are relatively short (0.1 mm) and are found on the dorsal and ventral surfaces of the head, sides of the head, posterior border of the head, *erect*

hairs are nearly absent on the scapes except at the apex, erect hairs are present on the dorsum of the mesosoma, dorsum and posterior faces of the petiole and all surfaces of the gaster. Appressed pubescence is sparse and fine on the head, dorsum of the mesosoma, anterior and posterior faces of the petiole and dorsal surface of the gaster.

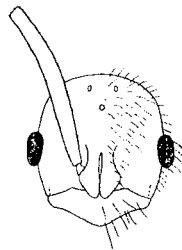


Fig. 442. Head of a female of *P. fauveli* (Nariño, Colombia, IAVH).

The *mandibles are finely striate and weakly shining*, the dorsum of the head is densely and evenly, but finely punctate, as is much of the dorsum of the mesosoma, with poorly defined longitudinal striae on the scutum and transverse striae on the dorsal face of the propodeum, *the sides of the mesosoma are finely striate and only weakly shining*, the petiole is finely punctate, or coriaceous and moderately shining, the gaster is finely punctate and moderately to strongly shining.

Male

The male is a moderate sized (total length approximately 1 cm) dark brownish red specimen. The *middle of the clypeus is strongly swollen*; the *ocelli are large* (maximum diameter

of the median ocellus is 0.3 mm), much greater than the distance between it and the lateral ocellus. The *pronotal shoulder is swollen* but does not form a carina nor overhangs the side of the pronotum. The *propodeal spiracle is slit-shaped*; the *petiole is thick* when viewed in profile, with a broadly rounded node and a broadly rounded ventral lobe.



Fig. 443. Propodeum and petiole of a male of *P. fauveli* (Perú, CASC).

Erect hairs are mostly short (0.2 mm) and are present on the clypeus, dorsal and ventral surfaces of the head, mesosoma, petiole and gaster; fine appressed golden pubescence is present on the head, mesosoma, petiole and gaster.

Most surfaces are coriaceous and at least moderately shining, the side of the propodeum and petiole are slightly rougher sculptured with poorly defined striae.

COMPARISON

The shape of the petiole of the worker of *P. fauveli* would separate it from most of the others in the genus, with the anterior and posterior faces being nearly parallel and the highest point of the petiole located near the

midpoint. *Pachycondyla fauveli* would be most likely confused with *P. chyzeri*. *Pachycondyla fauveli* differs in being smaller (total length of *P. chyzeri* > 12 mm) and generally lacks erect hairs on the scapes (a few may be present in *P. chyzeri*). *Pachycondyla fauveli* is very similar to *P. eleonorae*, but lacks the brassy color that is characteristic of *P. eleonorae* (due to abundant appressed golden hairs). The eye of *P. fauveli* is also larger (diameter ~ 0.5 mm versus 0.4 mm in *P. eleonorae*) located about 1 diameter from the anterior margin of the head (more than 1 diameter in *P. eleonorae*).

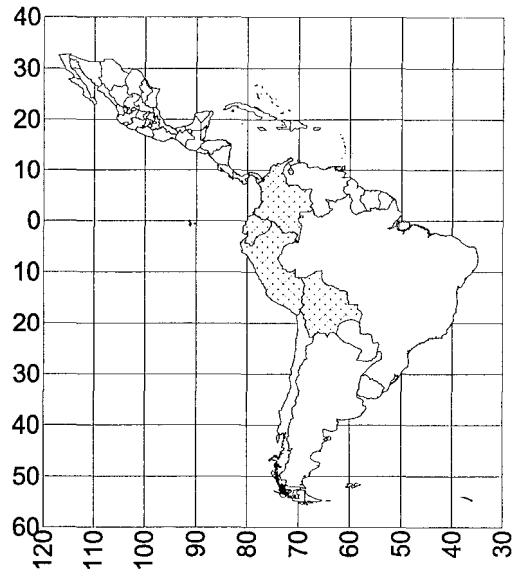
Pachycondyla fauveli is closely related to *P. hispidula* but differs in lacking the tiny bristly hairs found on the scape of *P. hispidula* (the hairs of *P. fauveli* are either approximately as long as the diameter of the scape or absent) and has the dorsum of the mandibles completely sculptured (not smooth and glossy as in *P. hispidula*). Additionally the side of the mesosoma of the female is sculptured and weakly shining, not nearly smooth and glossy as in the female of *P. hispidula*. The workers of both species have the side of the mesosoma sculptured in a similar fashion.

Occasionally specimens of workers and females of *P. fauveli* from Colombia and Ecuador have funiculi with yellow tips similar to those of *P. apicalis*. Such specimens can be easily separated by the moderately abundant erect hairs on the dorsum of the mesosoma of the worker and female, which are sparse

or lacking in both the worker and female of *P. apicalis*. These specimens of *P. fauveli* with a yellow-tipped funiculus could also be confused with *P. cooki*. It can be separated as workers and females of *P. fauveli* lack the striae on the dorsum of the head, which are present on workers and presumably the unknown female of *P. cooki*.

DISTRIBUTION

COLOMBIA: *Magdalena* (Santa Marta [Wheeler, 1925]), Santa Marta Mountains [AMNH]; *Valle del Cauca* (4 k W Queremal [MCZC]); *Caquetá* (San Vicente del Caguán [IAVH], Parque Nacional Los Picachos [IAVH]); *Nariño* (Tumaco Int. Bos. [IAVH], Municipio Barbacoas [IAVH], Ipiales [IAVH], Parque Nacional La Planada Ricaurte [IAVH]). **ECUADOR:** *Pichincha* (Reserva Biológica Maquifucuna [CASC]); *Tungurahua* (Baños [Forel 1901b]); *Napo-Pastaza* (6-8 mi W Mera [CASC], Misahualli [QCAZ]). **PERU:** *Pasco* (3 k N Oxapampa [LACM]); *Huánuco* (Monson Valley [Tingo Maria, CASC, MCZC]); *Ucayali* (Pichita Caluga [MCZC]); *Cuzco* (Machu Picchu [NHMB, MCZC], Huadquina [AMNH, LACM, USNM]); *Junín* (Huacapistana [MCZC], 18 mi NE La Merced [Colonia Perené, CASC]). **BOLIVIA** (without locality [Emery, 1896b]); *La Paz* (Suri [USNM, MCZC]); state unknown (Lagunillas [Wheeler, 1925, locality listed in 7 Bolivian states]).



Map 32. *Pachycondyla fauveli*.

HABITAT

This species is usually collected at high elevations between 2000 - 2800 meters, but has been collected at 700 meters. One series was collected in an abandoned coffee plantation.

BIOLOGY

One worker from Perú was collected under a stone. A colony was collected in the soil at the base of a tree. Winged males and/or females were collected in January (Perú) and October (Perú). A dealate female was collected in October (Ecuador).

ETYMOLOGY

This species was named in honor of an unspecified individual named Mr. Fauvel.

***Pachycondyla ferruginea* (F. Smith)**

Figures - **Worker**: 5 (metasternal process), 25, 27, 95, 202 (petiole), 28, 197 (mesosoma), 100, 202 (mandible), 186 (propodeal spiracle), 197 (side view), 444 (head); **Female**: 445 (side view), 446 (head and mandible); **Map** 33

ferruginea species complex

Ponera ferruginea F. Smith, 1858:100 ♀, México (without locality) [holotype female seen, BMNH]; Mayr, 1863:448; Mayr, 1886:358; Forel, 1899:15; *Euponera* (*Mesoponera*) *ferruginea*: Emery, 1901a: 47; *Mesoponera ferruginea*: Wheeler and Wheeler, 1976: 54-55; *Pachycondyla ferruginea*: Bolton, 1995:305

Ponera ferruginea variety *panamensis* Forel, 1899:15, ♀, Panamá, Bugaba; *Euponera* (*Mesoponera*) *ferruginea panamensis*: Emery, 1911: 82; *Trachymesopus ferruginea* variety *panamensis*: Kempf, 1972:251; *Pachycondyla ferruginea* variety *panamensis*: Bolton, 1995:308 **new synonymy**

DISCUSSION**Worker**

The worker (undescribed) is a *relatively small* (about 6 mm total length) *reddish brown ant* (rarely dark or nearly black) with the appendages nearly as dark as the remainder. The *middle tibia is very short* (0.85 mm), shorter than the maximum width of the pronotum as seen from above (1.1 mm). The *medial area of the clypeus is indented* and is surrounded by two convex areas, the area anterior to the eye is *without a malar carina*, the *eye is very small* (0.13 mm maximum diameter), which is less than the distance between the anterior border of the eye and the anterior margin of the head. The *scape is short* and

barely reaches or slightly surpasses the posterior lateral corner of the head.

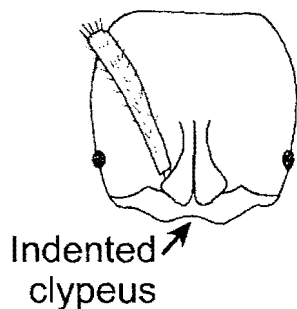


Fig. 444. Head of a worker of *P. ferruginea*.

The *pronotal shoulder is completely rounded*, the *metanotal suture is well marked* on the dorsum of the

mesosoma, but is only slightly depressed and the propodeal spiracle is circular. The petiole is relatively narrow with the anterior and posterior faces meeting and forming a broadly rounded dorsal face. The subpetiolar process is well developed and forms a posteriorly directed spine. The stridulatory file is absent on the dorsum of the gaster.

Erect hairs are abundant on the mandibles, clypeus, shaft of the scape, most of the hairs on the dorsum of the head are erect, but are very short (most less than 0.05 mm), erect hairs are abundant on the ventral surface of the head, the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster, most hairs on the tibiae are appressed, although there are a few scattered erect or suberect hairs present; appressed pubescence is sparse on the head, abundant on the dorsum of the mesosoma, dorsum of the petiole and dorsum of the gaster, golden in color and may even be matted on some surfaces, especially the gaster.

The mandibles are finely striate and shining, the head and the mesosoma are mostly finely punctate and dull, the sides of the mesosoma have poorly defined striae, most surfaces of the petiole are punctate and weakly shining, the posterior face is smooth and glossy, except for a punctate central region, the gaster is finely punctate and shining.

Female

The female is a small (total length 6 mm) ferruginous red specimen. The

mandibles have nine teeth, the anterior border of the clypeus is broadly convex but concave medially, with two poorly developed lateral processes. The sides of the head are narrower anteriorly and the posterior border is weakly concave. The eyes are small (maximum diameter 0.24 mm), located less than one maximum diameter from the anterior margin of the head (side view). The scapes are relatively short and barely reach the posterior lateral margins of the head.

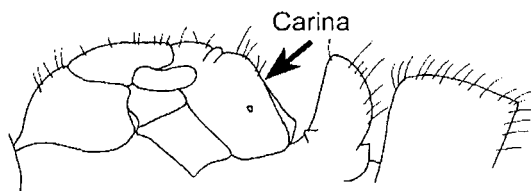


Fig. 445. Mesosoma, petiole and first gastral tergite of a female of *P. ferruginea* (Alta Vera Paz, Guatemala, USNM).

The ocelli are small and the lateral ocelli are separated by more than two diameters from the medial ocellus. The pronotal shoulder is swollen, but does not form a carina. The propodeal spiracle is slightly elongated, but nearly circular and the posterior lateral edges of the propodeum form carinae. The petiole is narrow when viewed in profile (especially in the holotype and specimens from México) with a straight anterior face and a broadly rounded posterior face that meets the anterior face near the anterior edge and forms only a poorly defined dorsal face. The subpetiolar

process is similar to that of the worker with a *posteriorly directed lobe*. The anterior face of the postpetiole is straight and meets the dorsal face at a rounded angle.

Erect hairs are sparse, relatively long on the clypeus and gaster (up to 0.3 mm), the remaining hairs are short (0.1 mm) and present on the clypeus, the mandibles, the dorsal and ventral surfaces of the head, the dorsum of the mesosoma, the dorsum and posterior faces of the petiole and all surfaces of the gaster. Appressed fine golden pubescence is present on the head, mesosoma, petiole and all surfaces of the gaster.

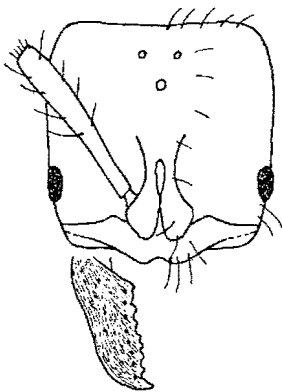


Fig. 446. Head and mandible of a female of *P. ferruginea* (Alta Vera Paz, Guatemala, USNM).

The mandibles are finely striate and shining, the dorsum of the head is finely and densely punctate, as are the scapes, the mesosoma is punctate, with poorly defined, transverse striolae, the sides of the mesosoma are dull and finely striolate. The petiole is coriaceous and moderately shining, to

strongly shining (posterior face), the gaster is punctate and moderately shining.

Male

The male is unknown. A possible male is deposited in the CASC.

COMPARISON

Workers and females of *P. ferruginea* could be confused with those of *P. lunaris*, one of the few species (others are *P. chinensis* and other members of the *ferruginea* species complex) in the New World in which the posterior edge of the subpetiolar process is developed into a posteriorly directed flange, angle or spine. The shape of the petiole can differentiate *P. ferruginea* from others with the posterior face rounded, forming a narrowed apex. The petiole of *P. lunaris* is rectangular shaped (in profile). *Pachycondyla ferruginea* could be confused with the Bolivian *P. lenkoi*, which is similar in size, color and the shape of the petiole and subpetiolar process. *Pachycondyla ferruginea* can be easily separated by the approximately 10 mandibular teeth (7 teeth in *P. lenkoi*). The propodeal spiracle of *P. ferruginea* is circular, not slit-shaped as in *P. lenkoi*.

The female of *P. ferruginea* is very similar to that of *P. minuta* of the *ferruginea* species complex. It differs in having more mandibular teeth (*P. minuta* has only seven well-defined teeth) and in being larger. The two angulate processes on the anterior margin of the clypeus of *P. ferruginea* and the form of the subpetiolar

process are very similar to those of *P. minuta*.

Forel states that the female of *P. ferruginea* var. *panamensis* differs in being larger (total length 6.5 mm) and he does not mention the fine striae on the mandibles (states the mandibles are smooth with scattered punctures). Otherwise it appears identical to the normal female of *P. ferruginea* and is considered a synonym although the types could not be found.

John Longino has concluded that *P. ferruginea* var. *panamensis* is a synonym of *P. lunaris* (pers. comm.). The description actually fits both species about equally well; the females of both *P. ferruginea* and *P. lunaris* are approximately equal in size and somewhat smaller (total length about 5 mm) than the female described by Forel (1899). The smooth mandibles with scattered punctures suggest it is neither of these species which both have striated mandibles. Unfortunately the type could not be found and it is provisionally synonymized with *P. ferruginea*, the name under which it was described.

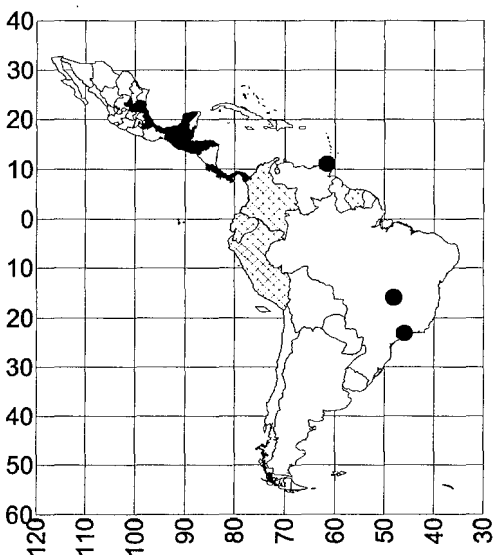
John Longino refers to *P. ferruginea* as JTL-015 on his website (pers. comm.).

DISTRIBUTION

MEXICO: *Tamaulipas* (6 mi NNE Chamal [Cueva de los Vampiros]); *San Luis Potosí* (Sótano de Guadalupe [10 k W Aquismón, Reddell and Cokendolpher, 2001], Cueva de Oxtalja [Tamapatz, Reddell and Cokendolpher, 2001], Ventana

Jabalí [20.5 k NE Ciudad Valles, Reddell and Cokendolpher, 2001], Sótano de Tlamaya, 6.8 mi W Chupaderos, 3 k NE Tlamaya, 4 k N Tlamaya [Cueva de San Pedro, Cueva Tepamet]); *Veracruz*: (Coatepec, 58 k S Xalapa, 2 mi W Fortín [de las Flores], 4.4 mi N Huatusco, 58 k S Xalapa); *Puebla* (17 k NE Teziutlán); *Tabasco* (Cunduacán); *Campeche* (10 k E Campeche); *Yucatán* (Actún Sabacá [6 k S Tekax, Reddell and Cokendolpher, 2001]), Actún Kaua [1 k S Kaua]); *Chiapas* (Ocosingo, 5 mi W Palenque, 10 k S Palenque). GUATEMALA: *Alta Vera Paz* (Trece Aguas). BELIZE: *Cayo* (9 k S Belmopan). EL SALVADOR: *Santa Ana* (Montecristo [16 k N Metapán]). HONDURAS: *Atlántida* (14 k S La Ceiba). COSTA RICA: *Guanacaste* (17 k NE Rincón, Rincón de La Vieja, Maritza Field Station); *Heredia* (9 k N Volcán Barba, 16 k SSE La Virgen, La Selva [Longino, website, Olson, 1991]); *Cartago* (3 - 5 k E Turrialba, Parque Nacional Tapantí); *San José* (19 k N San Isidro, Pan American Highway [Km 117]); *Puntarenas* (5 k SW Estación Biológica Las Cruces, Estación Biológica Las Alturas, Cerro Helado [19k N San Isidro]); Longino (website) lists the Atlantic and Pacific lowlands. PANAMA: *Chiriquí* (5.7 k NE Boquete, Volcán, La Fortuna area, Parque Nacional Volcán Barú Boquete, Finca La Suisse, Hartman's Finca [30.7 k W Volcán]); *Colón* (Bugaba [Forel, 1899]). COLOMBIA: *Magdalena* (El Campaño, Tayrona Park); *Chocó* (10 k SW San José del Palmar); *Valle de Cauca* (Bosque

Yotoco, Cali, near Ponce, Parque Farajones de Cali); *Cauca* (Totoró, Isla Gorgona [Baena, 1993]); *Meta* (Puerto López); *Amazonas* (Fernández, 1990). ECUADOR: *Pichincha* (8 k S Alluriquín, 3 k E Tandapi, 47 k S Santo Domingo). PERU: *Madre de Dios* (15 k NE Puerto Maldonado). TRINIDAD: (without locality). SURINAME: *Saramacca* (Dirkshoop). BRASIL: *São Paulo* (Agu-dos); *Distrito Federal* (Parque Nacional da Brasília).



Map 33. *Pachycondyla ferruginea*.

HABITAT

This common species is found in a variety of habitats, ranging from open disturbed grassy area, coffee plantation, mixed dry oak forest, oak ridge/bamboo forest, upper montane oak forest, second growth rain forest along a road, tropical montane evergreen forest, wet montane forest,

cloud forest, *Clusea rosea* [Clusiaceae] forest, tropical mountain evergreen forest, bamboo forest to wet lowland and cloud forest, gallery forest, wet ravine forest, montane rain forest, swamp forest, along trail in rain forest, tierra firme forest, at elevations ranging from 250 - 2150 m. Longino (website) reports that it is found in wet forest habitats up to 2000 m elevation.

BIOLOGY

This species nests under stones in clay soils and workers have been extracted from lowland forest litter and *Guadua* (bamboo) litter. They have also been collected in rotten wood and under a palm log. This species has been collected in caves near the entrances (Reddell and Cokendolpher, 2001).

Workers have been collected in subterranean traps baited with Vienna sausage; they are attracted to carrion and to clay soil thrown up by a tree fall. They are also collected in pitfall traps.

Longino (website) states that this is a poorly known species that inhabits the leaf litter in rainforests and cloud forests. He collected a dealate queen under a stone and an alate queen was taken at a black light.

It is difficult to explain why the males of this common species have not been collected.

ETYMOLOGY

The name of this species is from Latin, *ferrugineus*, meaning rust-colored, referring to the color.

Pachycondyla fiebrigi (Forel) new status

Figures - **Worker**: 85 (petiole, side view), 230 (petiole, top view), 231 (petiole, side view), 447 (side view), 448 (head); **Female**: 449 (side view), 450 (head); **Map** 34

crenata species complex

Neoponera crenata race *Fiebrigi* Forel, 1912:37-38, ♀, San Bernardino, Paraguay [lectotype worker, 2 paralectotype workers seen, MHNG], (suggested as a possible synonym of *P. crenata* by Brown, 1957:234)

DISCUSSION

Worker

The worker is a *moderate sized* (total length 8.5 mm) *dark reddish brown* species with medium reddish brown mandibles, clypeus, cheeks, antennae and legs. The mandibles have approximately 12 teeth. The anterior medial margin of the clypeus forms a small lobe which overhangs the remainder of the clypeus. The head is narrowed anteriorly and the posterior margin is slightly concave. The *malar carina is well developed* and extends to the region medial of the eye. The *eyes are large* (maximum diameter 0.45 mm) located about $\frac{1}{2}$ diameter from the anterior margin of the head (side view). The scape extends about the first funicular segment past the posterior lateral corner of the head. The *pronotal shoulder is formed into a sharp carina*, which slightly overhangs the side of the pronotum. The promesonotal suture is well marked on

the dorsum of the mesosoma; the *metanotal suture does not break the sculpture* on the dorsum of the mesosoma. The propodeal spiracle is elongated. The *petiole is thickened* when viewed in profile but is higher than long (the length at the peduncles is 0.70 - 0.88 mm, the height from the lower suture to the apex is 1 mm). The subpetiolar process consists of a broad anterior lobe, a concave surface and a broadly rounded posterior lobe. The *stridulatory file is well developed* on the second pretergite and the arolia are present but poorly developed.

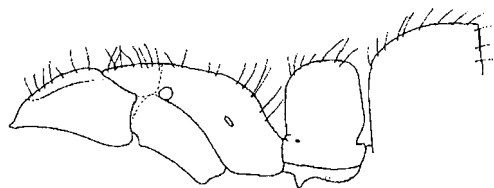


Fig. 447. Mesosoma, petiole and first gastral tergite of the lectotype worker of *P. fiebrigi*.

Long (up to 0.4 mm) erect hairs are present on the clypeus, mandibles, scapes, dorsal and ventral surfaces of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, similar hairs are present on the legs, including the tibiae. Appressed whitish pubescence is moderately abundant on the head, mesosoma, dorsum of the petiole and on the gaster.

The surface of the mandibles is finely striate and dull, the medial lobe of the clypeus is often longitudinally striate, the dorsum of the head is heavily and densely punctate, the dorsum of the mesosoma is punctate, but moderately shining, the side of the pronotum is finely punctate and shining and the remainder of the side of the mesosoma is mostly finely striate and moderately shining. The side of the petiole is finely punctate and moderately shining, the anterior face has similar sculpture, the posterior face is mostly shining. The gaster is covered with punctures, but is moderately shining.

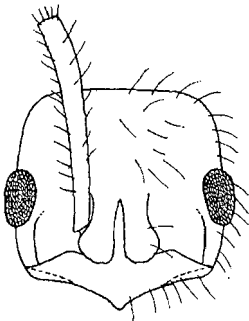


Fig. 448. Head of the lectotype worker of *P. fiebrigi*.

Female

The female (undescribed) is a *moderate sized* (total length 9 mm) dark reddish brown specimen with reddish mandibles, clypeus, cheeks and appendages. The mandibles have *eleven teeth*; the *anterior margin of the clypeus is convex*, especially in the medial area, which is somewhat angulate. The head is 1.96 mm long and 1.66 mm wide. The sides of the head are nearly parallel, but convex and narrowed anteriorly. The posterior margin is slightly convex. The *malar carina is well developed* and extends to the eye. The *eye is large* (maximum diameter 0.60 mm) located about $\frac{1}{2}$ of the maximum diameter from the anterior margin of the head (side view). The scape is moderate in length (1.66 mm) and extends slightly more than the first funicular segment past the posterior lateral corner. The *pronotal carina is sharp*, well developed and slightly overhangs the side of the pronotum. The propodeal spiracle is slit-shaped. The *petiole is thick* when viewed in profile, with the *anterior and posterior faces being nearly parallel* (in profile) and forming a broadly rounded dorsal face. The petiole is wider (1.04 mm) than long (0.72 mm) when viewed from above. The subpetiolar process is well developed and consists of an angulate anterior lobe and a broadly convex posterior lobe, separated by a concave region. The anterior face of the postpetiole is straight and broadly rounded into the dorsal face. The pretergite has a *well-developed stri-*

dulatory file, but the arolium between the tarsal claws is poorly developed.

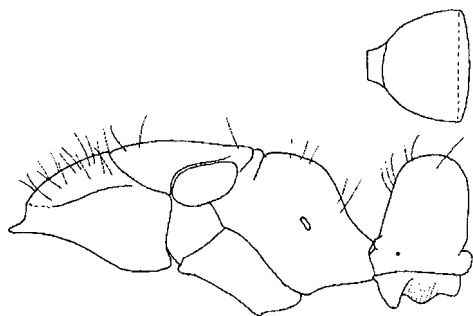


Fig. 449. Mesosoma and petiole of a female of *P. fiebrigi* (Colonia Independencia, Paraguay, USNM). The inset shows the petiole as seen from above.

Erect hairs are mostly long (up to 0.2 mm) and are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, scapes, dorsum of the mesosoma, dorsal and posterior faces of the petiole and all surfaces of the gaster. Appressed golden pubescence is present on the head, dorsum of the mesosoma, anterior and dorsal faces of the petiole and all surfaces of the gaster.

The mandibles are finely punctate mixed with coarse punctures and are dull. The dorsum of the head as well as the surface of the scapes, are finely and densely punctate, the dorsum of the mesosoma and side of the propodeum have similar sculpture, but the punctures are less well-developed, the side of the pronotum, mesopleuron and metapleuron are glossy and finely

coriaceous (pronotum), or finely striolate (metapleuron). The petiole is finely punctate and moderately (sides and front) to strongly (posterior face) glossy and shining. The gaster is finely punctate and moderately shining.

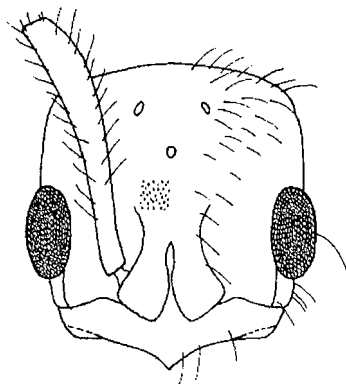


Fig. 450. Head of a female of *P. fiebrigi* (Colonia Independencia, Paraguay, USNM). Only a small portion of the sculpturing is shown.

Male

Unknown.

COMPARISON

Pachycondyla fiebrigi is obviously closely related to *P. crenata* and *P. moesta*, but differs in being much larger (total length of *P. crenata* is about 6 mm) and in having a different shaped petiole. The petioles of workers of *P. crenata* and *P. moesta* (measured using the same boundaries as above) are slightly higher than long (*P. crenata*: approximately 0.55 mm in length and 0.65 mm in height, for *P. moesta* approximately 0.70 mm long, 0.80 mm high). From above the node of the

worker of *P. fiebrigi* is larger (length 0.70 - 0.88 mm, width 0.88 - 1.05 mm), those of *P. crenata* and *P. moesta* are only slightly wider than long (*P. crenata*: approximately 0.55 mm in length, 0.65 mm in width, *P. moesta*: 0.70 mm long, 0.85 mm wide).

Pachycondyla fiebrigi can be easily separated from *P. globularia* as the petiole is not circular or oval-shaped as seen from above.

Pachycondyla fiebrigi is very similar to *P. latinoda*, with the workers and females being large specimens, approximately the same size. They can be separated as the petiole is not as wide in *P. fiebrigi* and it is found in Paraguay, whereas *P. longinoda* is from Brasil. It is likely when these species become well known the distributions will overlap in eastern Brasil.

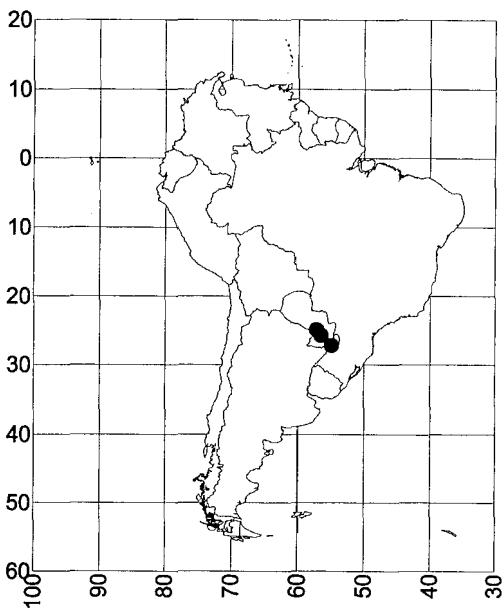
Both Longino (website) and Wild (2005) consider *P. crenata* to be a variable species or possibly a species complex. Once *P. moesta*, *P. globularia*, *P. latinoda* and *P. fiebrigi* are recognized as being different, *P. crenata* becomes much more homogeneous.

Ponera Fiebrigi var. *antoniensis* and var. *famini* are members of *Hypoconera* (Kempf, 1972).

DISTRIBUTION

PARAGUAY: San Bernardino, *Cordillera*, and *Guairá* (Colonia Independencia, USNM). ARGEN-

TINA: *Misiones* (Parque Provincial Cañadón de Profundidad # 22723, CWEM).



Map 34. *Pachycondyla fiebrigi*.

HABITAT

Riparian tropical rain forest at 160 meters.

BIOLOGY

A dealate female was collected in June (Paraguay, USNM). We collected a nest in a log with brood in the nest in December (Argentina).

ETYMOLOGY

This species was named in honor of Mr. Fiebrig, who collected the type series.

***Pachycondyla fisheri* new species**

Figures - **Worker**: 30 (subpostpetiolar process), 32 (larva), 34 (antennal scape), 278 (side view), 279 (head), 451 (metasternal process); **Female**: 452 (side view), 453 (head); **Male**: 293 (head), 454 (side view); **Map** 35

aenescens species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *moderately large* (total length about 13 mm) *black* ant. The mandible has 7 - 8 teeth, the basalmost poorly defined. The anterior border of the clypeus is concave medially and the entire middle of the clypeus is depressed. The head length ranges from 2.7 - 3.1 mm; the head width from 2.4 - 2.6 mm. The *eyes are relatively large* (maximum diameter 0.8 mm, slightly longer than the distance between the anterior border and the anterior edge of the head (side view)). The *scapes are relatively short* (2.0 - 2.1 mm), failing to reach the posterior lateral corner of the head by approximately the first two funicular segments. The *posterior border of the head is strongly concave*. The *malar carina is present* but not completely developed (posterior half missing). The *pronotal shoulder is swollen* and forms a carina anteriorly. The *mesosoma is depressed at the metanotal suture* which breaks the sculpture dorsally. The *propodeal spiracle is elongated*, about twice as long as the width. The *anterior face of*

the petiole is nearly vertical, the *posterior face has sharp lateral edges and forms a broad blunt dorsal face*. The *stridulatory file is present* on the second pretergite and the arolia are moderately well developed.

Erect and suberect hairs are present on most surfaces; appressed pubescence is sparse and obvious on the head and the gaster.

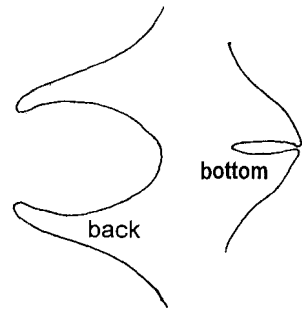


Fig. 451. Metasternal process of a worker of *P. fisheri* (Panamá, Panamá, CWEM), as seen from behind and from below.

Most surfaces are dull and punctate; the mandibles are moderately shining with very fine striae. The posterior face of the petiole is mostly glossy and shining with a few

oblique striae, the dorsum of the gaster is weakly shining.

The worker is black, the mandibles and tips of the last funicular segment are reddish brown or yellowish brown the tarsi and the tip of the gaster are slightly lighter in color.

Female

The female is a *large* (total length 15-17 mm) *black* ant. The mandible has approximately 10 teeth but many are poorly defined. The anterior medial margin of the clypeus is concave. The head length is 3 mm, the width 2.8 mm. The *eye is large* (maximum diameter 0.5 mm) and is located about one diameter from the anterior margin of the head (side view). The *malar carina is present* but only extends about one half of the length to the eye. The *scape is relatively short* (2.25 mm) and barely

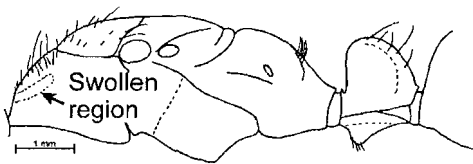


Fig. 452. Mesosoma and petiole of a paratype female of *P. fisheri* (CWEM).

reaches the posterior lateral corner of the head. The *pronotal shoulder is swollen* but does not form a definite carina. The *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with a *vertical straight anterior face, which meets the*

broadly rounded posterior face near the anterior edge of the petiole. The *stridulatory file is present* on the second pretergite and the arolia are moderately well developed.

Erect and suberect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, scapes, dorsum of the mesosoma, legs, dorsum of the petiole and all surfaces of the gaster; fine appressed pubescence is present on the head, mesosoma and gaster.

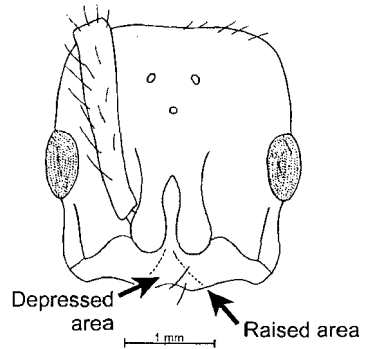


Fig. 453. Head of a paratype female of *P. fisheri* (CWEM).

The dorsum of the head has poorly defined longitudinal striae which diverge posteriorly, the mesosoma is mostly finely punctate, although a few striae are present on the side of the propodeum, all surfaces of the petiole are very finely punctate and moderately shining, the gaster is punctate and moderately shining.

Male

The male is a *large* (total length 14 mm) *black* ant. The head length is 1.98 - 2.1 mm; the head width is 1.8 -

1.9 mm. The anterior margin of the clypeus is broadly rounded, without the medial impressed region that is found in the worker and female. The *eyes are moderately large* (maximum diameter 0.78 mm) and occupy approximately $\frac{1}{2}$ of the side of the head (side view). The *ocelli are moderately sized* (maximum diameter of the median ocellus 0.18 mm). The *pronotal shoulder is swollen* but does not form a carina. The propodeum is angulate between the two faces and the *propodeal spiracle is slit-shaped*. The petiole is broad when viewed in profile, with the node rounded anteriorly and posteriorly. The *sub-petiole process consists of a lobe, which is broadly rounded anteriorly and slightly angulate posteriorly*, followed by a broad concave area. The region between the posterior edge of the postpetiole and the remainder of the gaster is strongly constricted. The *stridulatory file* on the second pretergite is well developed, as are the arolia.

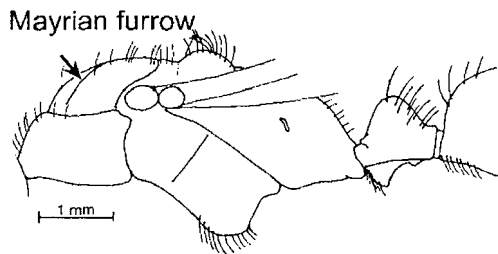


Fig. 454. Mesosoma and petiole of the paratype male of *P. fisheri* (CASC).

length) are present on the clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, mesosoma, petiole and gaster, most hairs on the legs are suberect. Golden appressed pubescence is moderately abundant on the head and mesosoma and dense on the gaster.

Most surfaces are weakly to moderately shining, the head is coriaceous, the mesosoma is mostly coriaceous, the petiole ranges from moderately glossy (front and sides) to strongly glossy (posterior face); the gaster is finely punctate and moderately shining.

COMPARISON

The worker and female of *P. fisheri* can be recognized by the impressed region in the middle of the clypeus, which is surrounded by two converging (posteriorly) swollen elongate areas. This characteristic separates *P. fisheri* from most of the others in the genus. Additionally the petiole is somewhat bulbous and rounded on all sides (the posterior lateral edge may be slightly developed). Most surfaces of the petiole are moderate to strongly smooth and glossy, especially the posterior face.

Pachycondyla fisheri is placed in the *aenescens* species complex, although it may not belong there and may deserve its own complex. It differs from the typical members of the *aenescens* complex in being more coarsely sculptured, having several erect hairs on the scapes and having a petiolar shape unlike any of the other

Erect hairs (up to 0.45 mm in

members of the *aenescens* species complex (but similar to that of the *foetida* species complex). The metasternal process is distinct from the remainder of the members of the *aenescens* species complex (except for *P. fusca*), in that the two lobes are closely spaced, a condition more similar to members of the *crenata* species complex. The wings of the females and males have elongate third

complex and the *foetida* species complex and probably connects the two complexes.

DISTRIBUTION

PANAMA: *Colón* (Santa Rita Ridge, Rd. 4-5 km from Trans-Isthmian Hwy; or Transamerican Hwy); *San Blas* (Nusagandi) (AMNH, BMNH, CASC, CWEM, FSCA, INBio, LACM, MIZA, MCSN, MHNG, MCZC, MZSP, NHMB, NHMW, QCAZ, GBFM, USNM).

HABITAT

This species has been collected in the rainforest and wet forest.

BIOLOGY

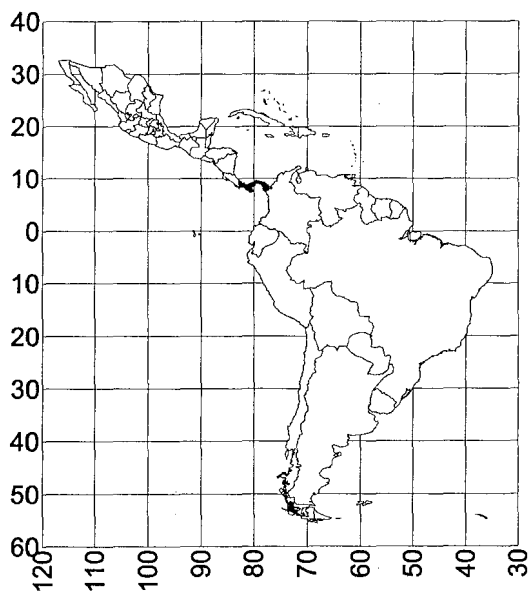
This species nests in *Cecropia insignis* and *C. hispidissima* ant plants. Winged sexuals were collected in March, isolated dealate females in March and August.

ETYMOLOGY

This species is named in honor of Brian Fisher, myrmecologist and close friend, who collected the type series, as well as all of the additional specimens.

TYPE SERIES

Holotype worker (CASC), 9 paratype workers (CASC, CWEM, GBFM, IAVH, USNM), 6 females (CASC, CWEM, MCZC), 2 males (CASC, CWEM), PANAMA: Pr. Colon, Santa Rita Ridge, 9°21'N 79°47'W, 250m, 24-iii-1989, B. L. Fisher.



Map 35. *Pachycondyla fisheri*.

discoidal cells, as do members of the *aenescens* species complex. On the other hand the worker and female have only a partially developed malar carina, have a poorly developed swelling on the pronotum, have a depression at the metanotal suture and have a stridulatory file on the second pretergite. It is somewhat intermediate between the *aenescens* species

Pachycondyla foetida (Linnaeus)

Figures - **Worker**: 5 (metasternal process), 101 (mesosoma), 102, 262 (head), 108, 261 (petiole, posterior face), 455 (side view); **Female**: 456 (side view, petiole posterior face), 457 (head); **Map** 36

foetida species complex

Formica foetida Linnaeus, 1758:582, ♀, America meridionali; *Ponera foetida*: Smith, 1858:95; Roger, 1860:312, ♀; Mayr, 1863:448; *Pachycondyla foetida*: Roger, 1863a:18, Dalla Torre, 1893:33; Forel, 1899:11; Bolton, 1995:305; *Neoponera foetida*: Emery, 1901a:47; *Neoponera (Neoponera) foetida*: Emery, 1911:72

Formica lobata De Geer, 1773:603, Plate 31, figs 6-8, ♀, Surinam (synonymy by Retzius, 1783:75)

DISCUSSION

Worker

The worker is a *moderately large* (total length 12 mm) black ant. The mandible has approximately 15 teeth or denticles, which tend to alternate between large teeth and small denticles. The anterior border of the clypeus is mostly convex, only slightly concave medially. The *eyes are located slightly posteriorly on the head*; the posterior border of the head is concave, with the posterior lateral corners being somewhat angulate. The *malar carina is well developed*, but does not reach the eye. The *eye is large* (maximum diameter 0.8 mm) located about one diameter from the anterior edge of the head (side view). The scape extends approximately the first funicular segment past the

angulate posterior lateral corner. The pronotal shoulder is formed into a *very sharp well-developed carina*, which overhangs the side to the pronotum. The *mesosoma is depressed at the metanotal suture* which is well marked. The lateral edge of the posterior face of the propodeum forms a sharply crenulated carina, the posterior face of the propodeum has horizontal coarse striae. The *anterior face of the petiole is vertical and meets the broadly rounded posterior face at the anterior edge*. The posterior lateral sides of the petiole form a sharp carina. The *stridulatory file is well developed* on the second pretergite. The arolia are also well developed.

Erect hairs are abundant on the mandibles, clypeus, sides of the head, posterior margin of the head, dorsal

and ventral surfaces of the head, shaft of the scape, dorsum of the mesosoma, petiole and all surfaces of the gaster. Suberect hairs are abundant on all parts of the legs. Appressed whitish (mesosoma and gaster) and golden (head) pubescence is abundant.

The worker of this species is easily recognized by the *coarse striae on the anterior face, sides and posterior face of the petiole* (those on the posterior face are somewhat finer). The gaster is finely punctate.

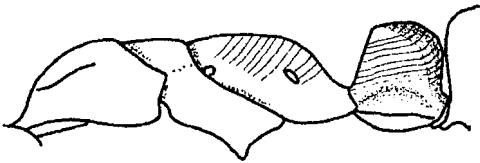


Fig. 455. Mesosoma and petiole of a worker of *P. foetida* (Paracou Experimental Forest, French Guiana, MCZC).

Female

The female is a *large* (total length 15 mm) black ant. The mandible has approximately 12 teeth; the anterior border of the clypeus is convex. The *malar carina is well developed* and sharp, the maximum diameter of the eye is 0.53 mm. The scape extends past the posterior lateral corner of the head by approximately the first funicular segment. The *pronotal shoulder is formed into a sharp carina* which overhangs the side of the mesosoma. The *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with a *vertical straight anterior face* and a *broadly rounded posterior face*, which meets

the anterior face at the anterior edge. The posterior lateral sides of the posterior face of the petiole are outlined by a carina. The subpetiolar process consists of a large rounded anterior lobe, which gradually diminishes in width posteriorly.

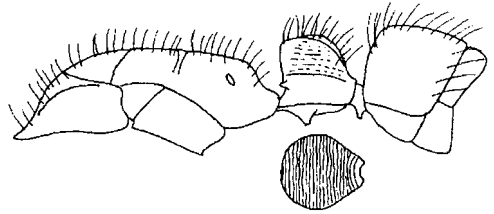


Fig. 456. Mesosoma, petiole and postpetiole of a female of *P. foetida* (Cauca, Colombia, IAVH). The inset shows the posterior face of the petiole.

Long (up to 0.6 mm) erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, scapes, dorsum of the mesosoma, dorsum and posterior faces of the petiole and all surfaces of the gaster, the legs have numerous erect and suberect hairs.

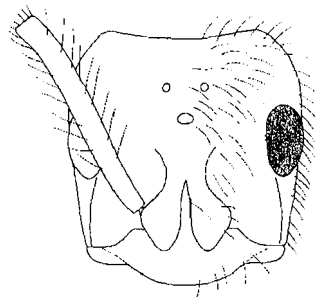


Fig. 457. Head of a female of *P. foetida* (Cauca, Colombia, IAVH).

The mandibles of the female are mostly smooth and glossy with scattered punctures. The dorsum of the head is densely, but finely punctate, with the punctures being somewhat arranged in longitudinal rows, the pronotum is punctate, with the punctures arranged in transverse rows, the remainder of the dorsum of the mesosoma is finely punctate, the side of the pronotum and mesopleuron are finely punctate and moderately shining, as is the metapleuron, the posterior face of the propodeum has well defined transverse striae. The side of the petiole has a few poorly defined horizontal striae, the lower half is mostly smooth and the posterior face has well defined horizontal striae. The gaster is finely punctate and weakly shining.

Male

Unknown.

COMPARISON

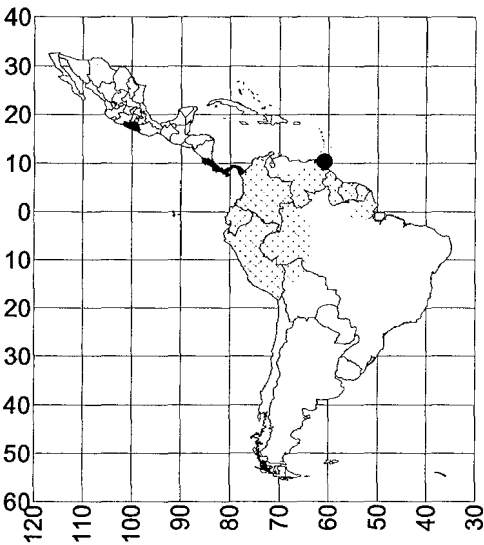
The worker and female of *P. foetida* could be confused with those of *P. bugabensis* and *P. insignis*. *Pachycondyla foetida* can be easily separated as the petioles of the latter two species completely lack striae. *Pachycondyla theresiae* has similar striae on the sides and front of the petiole, but the posterior face of the petiole completely lacks defined striae. *Pachycondyla striatinodis* also has transverse striae on the posterior face of the petiole (also the side). It differs in being smaller (total length < 9 mm) and the legs are usually yellow (dark brown in *P. foetida*). The medial

part of the anterior margin of the clypeus of *P. foetida* is broadly rounded (angulate in *P. striatinodis*). Finally the metanotal suture of *P. foetida* is depressed on the dorsum of the mesosoma (barely indicated in *P. striatinodis*).

DISTRIBUTION

MEXICO: Guerrero (San Jerónimo de Juárez). COSTA RICA: Guanacaste (Santa Rosa, Loma Barbudal, 6 mi S and 6 mi W Las Caña); Puntarenas (road from Pan American Highway to Monteverde); Limón (Tortuguero); Heredia (La Selva Biological Station, 500 m in Braulio Carrillo National Park south of La Selva [Longino, website], 10°20'N 84°4'W); Alajuela (Jiménez [Emery, 1890b, 1894b; Forel, 1899]). PANAMA: Panamá (Canal Zone [Pipeline Road], Barro Colorado Island); state unknown (El Cremenon [Cermeño?]); Veraguas (Las Palmas [6 mi ? Pácora]; Colón (Bugaba [(Forel, 1899)]; Chiriquí (Volcán de Chiriquí [Forel, 1899]). COLOMBIA: Cauca (Parque Nacional Gorgona Mancora); Meta (75 k E Puerto López); Amazonas (Leticia [Sandoval and Zambrano, 2007]); state unknown (Santa Ana). ECUADOR: Napo (14 k E Lago Agrio [via a Tarapoa]), Orellana (Tiputini Biodiversity Station, Yasuni); Los Rios (Pichilingue). PERU: Loreto (53 k SSW Iquitos, Rio Ucayali); Huánuco (Monson Valley [Tingo Maria]); Junín (18 mi NE La Merced [Colonia Perené]); Madre de Dios (Avispas, 15 k NE Puerto Maldonado, 30 k SW Puerto Mal-

donado, Río Tambopata Reserve [30 air k SW Puerto Maldonado]). VENEZUELA: *Delta* (Orinoco Delta). TRINIDAD: *Saint George* (San Rafael, Arima Valley). GUYANA: *Cuyuni-Mazaruni* (Kartabo, Forest Settlement). FRENCH GUIANA: *Cayenne* (Paracou Experimental Forest, Nouveau Chantier).



Map 36. *Pachycondyla foetida*.

SURINAME: without locality. BRASIL: *Amazonas* (Itacoatiara, Ilha de Curari-Várzea); *Abuná* (Rio Madeira); *Amapá* (Pôrto Platon [MCZC]); *Pará* (Santarém [Taperinha]). BOLIVIA: *El Bení* (Rurrenbaque, Covendo); un-

known state (Candelaria, localities in 6 Bolivian states).

HABITAT

Pachycondyla foetida occurs in both wet and dry forest (Longino, website), at elevations ranging from > 100 - 500m. It prefers open sunny areas around 290 m elevation. In Colombia, it occurs in tropical grasslands.

BIOLOGY

Longino (website) found a nest in a recently felled *Hieronyma oblonga* [Euphorbiaceae] tree. The nest had a small entrance hole a little larger than a worker, which led to a large cavity in a knot, where there were abundant workers. Dealate females were collected loose on the ground in February (Brasil), in a malaise trap and August (Colombia) and loose on the ground in October (Bolivia). Specimens have been collected in canopy fumigation samples.

ETYMOLOGY

The name of this species is from the Latin word *foetidus*, meaning having a bad smell and may refer to the smell of the preserved specimens Linnaeus used for the description or possibly to a pheromone produced by this species.

Pachycondyla fusca new species

Figures - **Worker**: 39 (petiole), 40 (pronotum), 277 (side view), 458 (side view), 459 (metasternal process), 460 (head); **Map** 37

aenescens species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *moderately large* (total length 11 mm) *black* ant with reddish brown mandibles and with the remainder of the appendages being nearly black. The mandibles have 13 teeth; the anterior margin of the clypeus is broadly rounded, but slightly concave medially. The head length is 2.5 mm; the head width is 1.85 mm. The *head is narrowed posteriorly* and the posterior margin is slightly concave. The *eyes are small* (maximum diameter 0.45 mm) located slightly more than one diameter from the anterior margin of the head. The *malar carina is not developed*. The *scape* (3.1 mm) *extends 1/3 times its length past the posterior lateral corner* of the head. The *pronotal shoulder is swollen* but does not form a carina. The *mesosoma is slightly impressed at the metanotal suture*, which interrupts the sculpture on the mesosoma as seen from above. The propodeal spiracle is oval-shaped. The *shape of the petiole is characteristic* of this species. It is *very wide* as seen in profile; the length from above the

spiracular horns to the top of the posterior peduncle is nearly 1 mm. *One half of the anterior face of the petiole is nearly vertical, the remainder forms an oblique dorsal face, which is distinctly concave and meets the broadly rounded posterior face near the posterior edge of the petiole.* The petiolar node is noticeably longer than broad when viewed from above. The subpetiolar process consists of an anterior lobe with a blunt ventrally directed angle and becomes slightly concave posteriorly, as it narrow in width towards the posterior edge of the petiole. The anterior face of the postpetiole is broadly rounded into the dorsal face. The *metasternal process consists of two closely spaced wide lobes.*

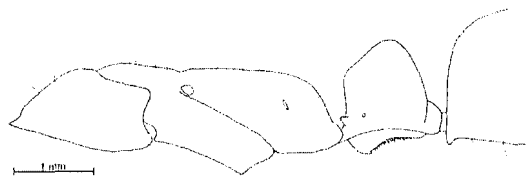


Fig. 458. Mesosoma and petiole of the holotype worker of *P. fusca*.



Fig. 459. Metasternal process of the paratype worker of *P. fusca* as seen from behind.

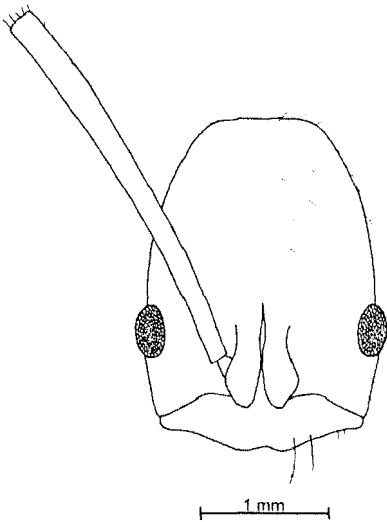


Fig. 460. Head of the holotype worker of *P. fusca*.

Erect hairs are abundant on the mandibles, clypeus, scattered on the dorsum of the head, a few short (0.1 mm) erect hairs are located on the sides of the head, across the posterior margin, a few (< five) short (0.05 mm) erect hairs are present on the scape. Erect inconspicuous hairs are scattered along the dorsum of the mesosoma on

the petiole and on the gaster, a few suberect hairs are present on the coxae and femora, those on the tibiae are mostly appressed, a few are suberect, but are short (0.05 mm). *Appressed golden pubescence is scattered to abundant* on the dorsum of the head, dorsum of mesosoma and especially abundant on the dorsum of the gaster.

The *dorsal surfaces of the mandibles are completely and finely striate*, the remaining surfaces are mostly punctate and dull, with the side of the pronotum being moderately shining, the remainder of the side of the mesosoma is weakly shining, the petiole is finely punctate and shining, the gaster is punctate and moderately shining.

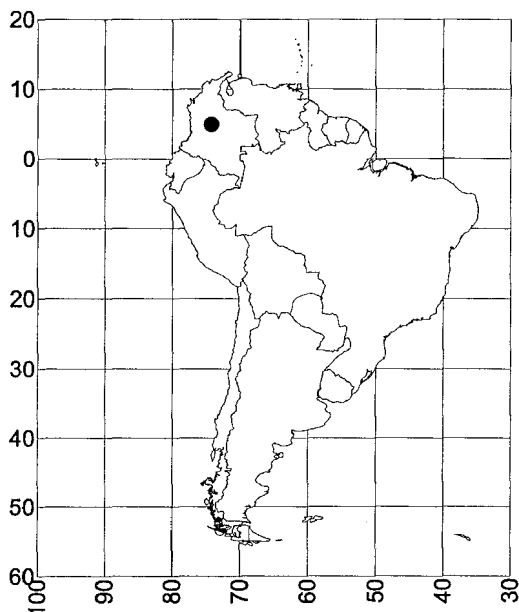
Female and Male

Unknown.

COMPARISON

The worker of *P. fusca* is similar to that of *P. eleonorae* from the mountains of Ecuador. It can be easily separated as *P. fusca* is nearly completely black, not golden brown in color with reddish legs and mandibles as in *P. eleonorae*. The anterior face of the petiole of *P. fusca* abruptly bends and about half height it forms an oblique concave dorsal surface, whereas the entire anterior and dorsal faces form a broadly rounded convexity in *P. eleonorae*. The metasternal processes are completely different, with the lobes of *P. fusca* being closely spaced rounded lobes, whereas they are widely spaced parallel finger-like processes in *P.*

eleonora. Otherwise, the two species are very similar and obviously closely related.



Map 37. *Pachycondyla fusca*.

DISTRIBUTION

Known only from central COLOMBIA: *Cundinamarca* (type locality, Guayabetal).

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

From Latin, *fuscus* meaning dark, referring to the color of this species as compared to the closely related *P. eleonora*.

TYPE SERIES

Holotype worker (IAVH, *Pachycondyla* sp 4) and one paratype worker (MCZC), COLOMBIA. *C/marca*, Laguna Pedro Palo, 2100 m, 28-iii-91, Edgar Palacio leg.

***Pachycondyla fuscoatra* (Roger)**

Figures - **Worker**: 63, 249 (head), 461 (side view); **Female**: 462 (side view), 463 (head and mandible); **Map** 38

crassinoda species complex

Ponera (*Pachycondyla*) *fuscoatra* Roger, 1861a:8, ♀, Colombia (without locality and Venezuela, Puerto Cabello (apparently misspelled as Caballo)); *Pachycondyla fuscoatra*: Mayr, 1863:439, Dalla Torre, 1893:34; Forel, 1899:12; Wheeler and Wheeler, 1952:617; *Pachycondyla* (*Pachycondyla*) *fuscoatra*: Emery, 1901a:45, 48; *Pachycondyla fuscoatra*: Mayr, 1863:439; Kempf, 1961:193-194

DISCUSSION**Worker**

The worker of this species is a large (total length 13 mm) black ant with partially brown appendages. The mandibles are long with 5 or 6 well-developed teeth, as well as 4 or 5 smaller teeth or denticles. The anterior border of the clypeus is broadly rounded and slightly concave medially. The head length is 2.7 mm; the head width is 2.6 mm. The malar carina is absent and the eye is relatively small (maximum diameter 0.35 mm) located slightly more than one eye diameter from the anterior margin of the head. The scape (2.3 mm) extends slightly past the posterior lateral corner of the head. The sides of the head are nearly straight and slightly diverge anteriorly; the posterior border is strongly concave. The pronotal shoulder is

rounded with little evidence of a swelling; the metanotal suture is poorly marked on the dorsum of the mesosoma and does not break the sculpture and the propodeal spiracle is slit-shaped. The anterior and posterior

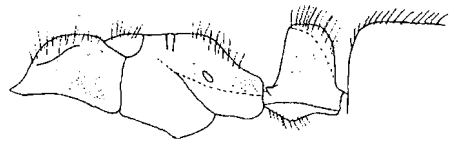


Fig. 461. Mesosoma, petiole and the anterior part of the postpetiole of a worker of *P. fuscoatra* (Valle del Cauca, Colombia, IAVH).

faces of the petiole are nearly parallel and the dorsal face is well developed, the anterior face is slightly concave, the posterior face convex. The subpetiolar process is poorly developed and consists of a swollen region, sometimes with a tiny anterior ven-

trally directed tooth. The anterior face of the postpetiole is slightly concave and meets the dorsal face and nearly a right angle. The *stridulatory file* is absent on the second pretergite, as are the arolia between the tarsal claws.

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, scape, dorsum of the mesosoma, petiole and all surfaces of the gaster; most hairs on the legs are suberect. Appressed pubescence is sparse, but present on the head, the mesosoma and the gaster.

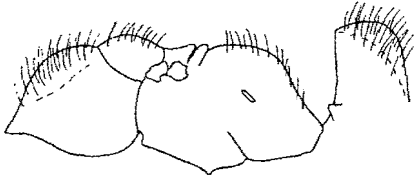


Fig. 462. Mesosoma and petiole of a female of *P. fuscoatra* (Caldas, Colombia, IAVH).

The entire dorsum of the head is covered with coarse striae or rugae, which extend on the sides well past the eyes. The anterior $\frac{1}{2}$ of the pronotum has transverse striate and is partially smooth and glossy, the posterior $\frac{2}{3}$ has longitudinal striae; most of the striae on the dorsum of the mesonotum and propodeum are longitudinal, those on the posterior face of the propodeum are transverse, with much of the surface shining, the sides of the mesosoma have mostly longitudinal striae. The side of the petiole has poorly defined horizontal striae, which partially cover the posterior face of the petiole, at least near the apex, the top of the petiole has transverse striae and

the gaster is smooth and glossy with scattered punctures.

Female

The female (undescribed) is larger than the worker (total length 15 mm) black with partially brown appendages. The mandible has five well-developed teeth with four smaller teeth spaced between them. The clypeus is broadly rounded, the sides of the head converge anteriorly and the posterior border is strongly concave. The head length is 3.3 mm; the head width is 3.4 mm. The eye is moderately large (maximum diameter 0.9 mm) located less than one diameter from the anterior margin of the head (seen from the side). The

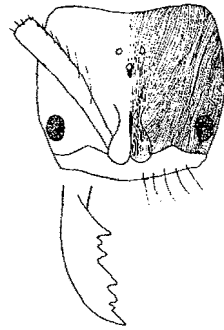


Fig. 463. Head and mandible of a female of *P. fuscoatra* (Caldas, Colombia, IAVH).

scape is relatively short (2.8 mm) and does not reach the posterior lateral corner of the head. The pronotal shoulder is slightly swollen but does not form a carina. The propodeal spiracle is slit-shaped; the petiole and gaster are similar to those of the worker.

The pilosity and sculpture are similar to those of the worker.

Male

Unknown.

COMPARISON

There has been considerable uncertainty in the identity of *P. fuscoatra*, as the types were apparently destroyed in World War II. It is closely related to *P. impressa* (Roger, 1861a). Emery (1890a) separated *P. fuscoatra* from *P. impressa* as having punctate and rugose sculpturing on the head and the mesosoma and the surfaces being opaque. The similar surfaces of *P. impressa* are punctate but are shining. Kempf (1961) criticized Emery for the use of such poor characters when a number of good characters were available to separate the two species. Kempf (1961) separated them on the basis of the fewer mandibular teeth (5 - 6) in *P. fuscoatra*, as compared to numerous teeth (8 - 9) in *P. impressa*. Additionally the pygidium of *P. fuscoatra* is without lateral rugae and without a posterior medial dorsal impression, both of which are present in *P. impressa*. Kempf (1961) further stated that Emery confused his successors with his poor characters, which resulted in the naming of a number of varieties of *P. fuscoatra*, which Kempf considered to be synonyms of *P. impressa*.

The specimens we are considering to be *P. fuscoatra* agree reasonably well with Roger's description and are not any of the other Neotropical

species. They are larger than *P. impressa*, as Roger states. The head and dorsum of the mesosoma are densely rugose or striate with the posterior face transversely striate as stated in Roger's description. The petiole of *P. fuscoatra* is slightly narrower than that of *P. impressa* and the gaster is glossy, all listed in the original description. Roger (1861a) clearly states that the mandibles of *P. fuscoatra* have 5 or 6 teeth. This is true in the specimens we examined, if one disregards the smaller teeth and denticles that are spaced between the larger teeth.

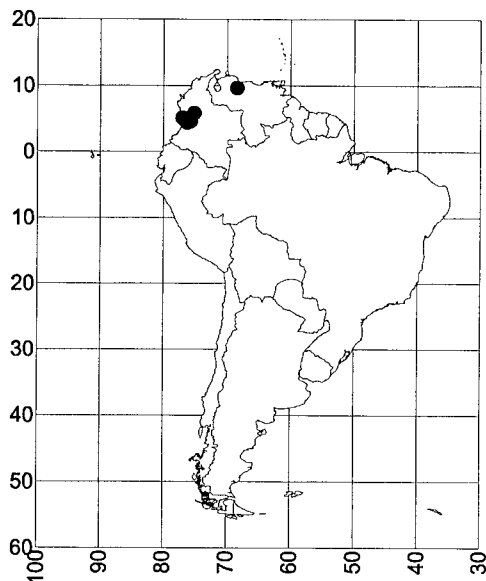
Pachycondyla fuscoatra can be recognized in the field or without a microscope by the glossy gaster, with the remainder of the ant appearing dull. *Pachycondyla fuscoatra* could be easily confused with the widely distributed and common *P. impressa*, but can be separated as the pygidium is not depressed and the sides of the pygidium are smooth and punctate, not striate as in *P. impressa*. *Pachycondyla impressa* also lacks the coarse striae on the dorsum of the head. These striae on *P. fuscoatra* could result in confusion with *P. lineaticeps* (México to Panamá), which has similar striae. *Pachycondyla fuscoatra* is much larger and the striae on the head of *P. lineaticeps* are mostly confined to the middle of the dorsum of the head. *Pachycondyla magnifica* from Brasil also has coarse striae on the dorsum of the head, but the pronotum is coarsely and longitudinally striate, not finely striate as in *P. fuscoatra*.

The striae on the dorsum of the head could cause confusion with *P. striata*. The striae on the head of workers and females of *P. fuscoatra* are coarse, but are fine and difficult to see in *P. striata*. The differences in the distributions would also be useful, with *P. fuscoatra* being rare and found in northern South America, *P. striata* being common and found in the southern half of South America. The shining gaster of the worker and female of *P. fuscoatra* is similar to that of *P. lattkei* from Venezuela. The striae on the head and dorsum of the pronotum of *P. lattkei* are very fine and not obvious. The anterior face of the postpetiole of *P. fuscoatra* is concave and angulate between the anterior and dorsal face, whereas it is not concave and is broadly rounded between the faces of *P. lattkei*.

DISTRIBUTION

All previous records of this species, ranging from Costa Rica south to Bolivia, are apparently misidentifications of *P. impressa*. Except for the locality in Venezuela listed by Roger (1861a), all known valid localities are from the mountains of western Colombia. Specimens that were examined include COLOMBIA: *Caldas* (Mpio. Aranzazu [Vda. Chambery Fca. Maranduba, 5°18' 26.4"N 75°28'17.6"W, IAVH]); *Risaralda* (Mpio. Pereira [Vda. La Suiza Fca. El Amparo de Niños, 4°44' 48.22"N 75°35'58.48"W, IAVH, MCZC]); *Quindío* (Mpio. Filandia [Vda. Cruces Fca. Paraíso, 4°41' 37.53"N 75°38'1.103"W, 12-13-vii-

2002, CWEM]); *Valle del Cauca* (Peñas Blancas [IAVH]). VENEZUELA: *Carabobo* (Puerto Cabello [type locality]).



Map 38. *Pachycondyla fuscoatra*.

HABITAT

Specimens are found in mature and secondary rain forest, 1500 - 2050 meters elevation.

BIOLOGY

Most specimens were collected in pitfall traps, a few from Winkler extractions. Otherwise, nothing is known of this rarely collected species.

ETYMOLOGY

The name of this species is based on two Latin words, *fuscus*, meaning dark and *atra*, meaning black, referring to the color.

Pachycondyla gilberti (Kempf)

Figures - **Worker**: 141 (mandible), 142 (clypeus), 177 (head), 464 (side view); **Female**: 465 (side view), 466 (head); **Male**: 467 (side view), 468 (head); **Map 39**

stigma species complex

Trachymesopus gilberti Kempf, 1960a:423, 425-427, Fig. 6, ♀, ♀, Brasil: São Paulo: Agudos [female paratype seen, MCZC, worker specimen identified by Kempf seen USNM]; *Mesoponera gilberti*: Wheeler and Wheeler, 1971:1206, fig. 16 a, b; *Mesoponera gilberti*: Brandão, 1991:356; *Pachycondyla gilberti*: Bolton, 1995:305

DISCUSSION

Worker

The worker is a *small* (total length 5 mm) dark reddish brown ant. The *mandibles have 6 teeth*. The *transverse carina on the clypeus is well developed* and a longitudinal medial area is swollen, but does not form a carina. The head is narrowed anteriorly and the posterior border is concave. The *eye is small* (maximum diameter 0.07 mm) located slightly more than 1 diameter from the anterior margin of the head. The *scape is short* and barely reaches the posterior lateral corner of the head. The *pronotal shoulder is rounded*, the *promesonotal and metanotal sutures are marked on the dorsum of the mesosoma*, but neither is greatly depressed when the mesosoma is viewed in profile. The *propodeal spiracle is nearly circular*. The *petiole is narrow* when viewed in

profile and constricted toward the apex, forming a rounded surface. The *subpetiolar process is broadly rounded* and lobe-shaped.

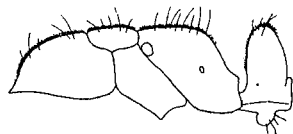


Fig. 464. Mesosoma and petiole of a worker of *P. gilberti* (identified by Kempf, USNM) (Mato Grosso, Brasil).

Erect hairs are mostly short (about 0.1 mm in length, although hairs on the clypeus may be 0.25 mm in length) and are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, antennal scapes, mesosoma, petiole, gaster and legs; appressed whitish pubescence is abundant on the head, mesosoma and gaster.

The *mandibles* are smooth and moderately glossy with scattered punctures, the dorsum of the head is finely punctate and dull, the dorsum of the mesosoma has similar punctures, the sides are finely striate, most surfaces are at most weakly shining, the gaster is finely punctate and moderately shining.

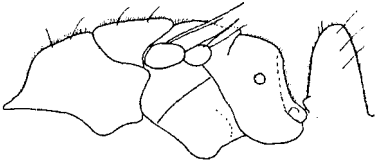


Fig. 465. Mesosoma and petiole of a paratype female of *P. gilberti* (MCZC).

Female

The female is a *small* (total length 4 mm) reddish brown ant with lighter colored appendages. The *mandible* has six teeth with a small swelling near the basal border, which does not form a tooth. The anterior margin of the clypeus is convex and the *clypeus* has a transverse sharp ridge or carina, which is elevated over the anteclypeus. The head is narrowed anteriorly and posteriorly and the posterior border is slightly concave. The eye is large and separated from the anterior margin of the head by less than $\frac{1}{2}$ of the greatest eye diameter (side view). The *scape* reaches or extends slightly past the posterior lateral corner of the head. The *pronotal shoulder* is without a carina; the propodeal spiracle is circular or elliptical. The propodeum is angulate between the dorsal face and the posterior face. The *petiole* is slender

when viewed in profile and the subpetiolar process consists of a large broadly rounded lobe.

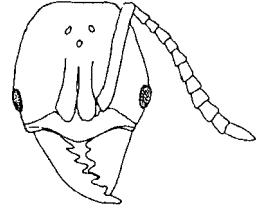


Fig. 466. Head of a paratype female of *P. gilberti* (MCZC).

Erect hairs are present on the mandibles, dorsal and ventral surfaces of the head, the side of the head anterior to the eyes, the shaft of the scape, dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and all surfaces of the gaster. The hairs on the legs are erect or suberect, with several on all surfaces of the tibiae. Most surfaces, except for the mandibles, are covered with an appressed pubescence, which is abundant to very abundant and obscures some of the surfaces, especially the dorsum of the head, dorsum of the mesosoma and dorsum of the gaster.

The mandibles are smooth and shining with scattered punctures, the remainder of the surfaces is dull and punctate; the gaster is weakly shining.

Male

The male (undescribed) is a *small* (total length 3.5 - 5.0 mm) medium brown to dark brown specimen with yellow to medium brown legs and antennae. The head length is 0.78 - 0.83 mm, the head width is 0.76 - 0.85

mm. The anterior margin of the clypeus is broadly concave; the eyes are large (maximum diameter 0.40 - 0.44 mm). The Mayrian furrows are present, but do not meet and the parapsidal sutures are well developed. The petiole is narrow when viewed in profile and the subpetiolar process consists of a broadly rounded lobe. Males apparently come in two forms: smaller medium brown specimen and larger dark brown specimen, but this conclusion is based on only a few specimens.



Fig. 467. Mesosoma and petiole of a male of *P. gilberti* (Pará, Brasil, MCZC).

Erect hairs are sparse with a few on the dorsal surface of the head and clypeus, sides of the head anterior to the eyes, between the lateral ocelli, on the dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and all surfaces of the gaster. Nearly all of the hairs on the legs are appressed. Appressed pubescence is sparse and mostly restricted to the head, dorsum of the mesosoma and all surfaces of the gaster.

Most surfaces are punctate, but the mesosoma and gaster are weakly shining.

COMPARISON

The worker and female of *P. gilberti* are essentially identical to

those of *P. stigma*, as both species have a broadly rounded subpetiolar lobe and six mandibular teeth. The major difference between them is that the transverse carina on the clypeus of *P. gilberti* is well developed, but only poorly developed or nearly absent in *P. stigma*. *Pachycondyla gilberti* is also similar to *P. succedanea*, but can be distinguished as the posterior edge of the subpetiolar process is rounded, not angulate as in *P. succedanea*.

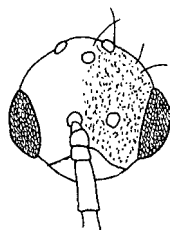


Fig. 468. Head of a male of *P. gilberti* (Pará, Brasil, MCZC). The sculpture is shown only on the left side of the head.

Separation of the males of *P. gilberti* from those of *P. stigma* is difficult. The smaller medium brown specimens can be separated from the larger dark brown males of *P. stigma*. The large dark males of *P. gilberti* appear to be indistinguishable from similar males of *P. stigma*.

DISTRIBUTION

PANAMA: *Colón* (Monte Lirio [AMNH]). COLOMBIA: *Meta* (Villavicencio [MCZC]). ECUADOR: *Napo* (Río Tiputini Yasuní Research Station [CSTD], Tiputini Biodiversity Station [RYDER]). PERU: *Madre de Dios* (Puerto Maldonado, 15 k NE

Puerto Maldonado). TRINIDAD: *Saint Andrew* (Cumuto [MCZC]); *Port of Spain* (Point of Spain [MCZC], Turure River [MCZC]); state unknown (Mount Tucuhrt [MCZC]); *Nariva* (Northern Range [MCZC], Nariva Swamp, MCZC); *Mayaro* (Mayaro Bay [MCZC], Guayaguayare Bay [MCZC], Maracas Valley [MCZC]). GUYANA: *Potaro-Siparuni* (Tukeit, Barama [Hoori Creek, MCZC], state unknown (Dunouo [AMNH]); *Cuyuni-Mazaruni* (Bartica, Kalacoon [MCZC], Kartabo [MCZC], Oko River [Cuyuni tributary, MCZC],

Bahia (Ilhéus [LACM], Una [LACM]); *Pará* (Utinga [near Belém], Icoaraci [MCZC], Ben Fica [MCZC]); *Mato Grosso* (Rio Sacre [MCZC], Rio Papagaio [Utiariti, MCZC, USNM], Municipio Diamantino [Faz Junqueira, MCZC]); *São Paulo* (Agudos [Kempf, 1960a]) and *Rio de Janeiro* (Pôrto das Caixas [Kempf, 1960a]). HAITI: *du Sud* (La Hotte [NE foothills, MCZC]).

HABITAT

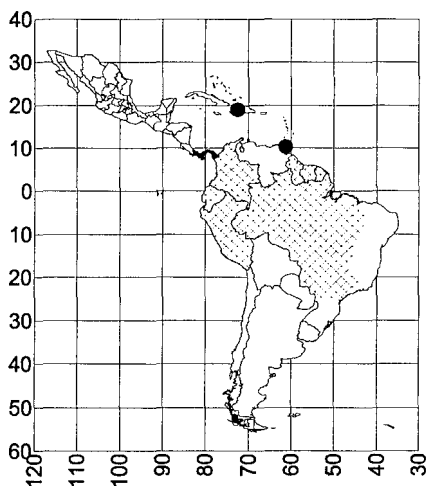
Pachycondyla gilberti was found in the transition between tierra firme and seasonally flooded forest clearing in secondary forest, from 0 to 325 meters.

BIOLOGY

One colony was found in a well-rotted *Nasutitermes* nest on the forest floor, another in the soil under leaf litter. A colony was collected in rotten wood in Perú in a site with sandy soil. A specimen was extracted from a soil sample and a second worker was extracted from palm flower litter. A dealate female was collected in July (Ecuador) in a statry bivouac site of the army ant *Eciton burchelli* just after emigration. Other females were collected in February and December (Kempf, 1960a).

ETYMOLOGY

This species was named in honor of Father Columbano Gilbert, Professor of French and German of the Franciscan Seminary at Agudos, Brasil, 1914 – 2002, an “industrious discover of many myrmecological rarities” (Kempf, 1960a).



Map 39. *Pachycondyla gilberti*.

Orinoque River [MCZC]); *Essequibo* (Essequibo River, Moraballi Creek [MCZC]). FRENCH GUIANA: *Cayenne* (Paracou Experimental Forest, 35 k W Sinnamary). SURINAME: state unknown (Vank [MCZC]). BRASIL: *Amazonas* (Rio Tarumã (High Falls, MCZC], Manaus to Itacoatiara [km. 49, MCZC], Benjamin Constant, Ponta Negra, 66 k N Manaus [MCZC]);

gilberti Panamá to southern Brasil, Caribbean

Pachycondyla gilloglyi new species

Figures - **Worker**: 144, 185 (mandible), 469, (side view), 470 (metasternal process), 471 (head); **Female**: 472 (side view), 473 (head and mandible); **Male**: 474 (side view), 475 (head); **Map** 40

stigma species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *small* (total length 5 mm) dark brown specimen with slightly lighter brown appendages. The *mandible has seven teeth*, the basalmost two or three teeth are noticeably smaller than the others. The anterior margin of the clypeus is broadly rounded and the *transverse carina is relatively well developed* and slightly overhanging the remainder of the anterior part of the clypeus. The *longitudinal carina is developed* on the clypeus. It extends from the region posterior to the transverse carina to the anterior margin of the clypeus. The head is narrowed anteriorly; the posterior border is noticeably concave. The head length is 1.2 mm; the head width is 1.15 mm. The *eyes are small* (maximum diameter 0.13 mm) located slightly more than one maximum diameter from the anterior margin of the head (side view). The *malar carina is absent*. The *scape* (1.0 mm) extends to the posterior lateral corner

of the head. The *frontal carinae are widely spaced* (0.15 mm at the narrowest point). The *pronotal shoulder is swollen* but does not form a carina; the mesosoma is depressed at promesonotal and metanotal sutures.

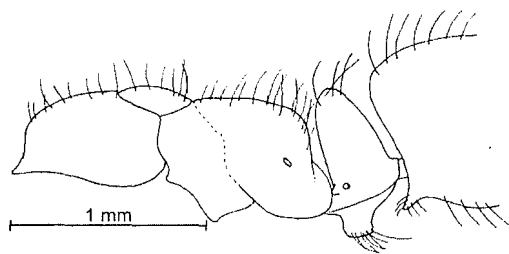


Fig. 469. Mesosoma, petiole and part of the first gastral tergite of the holotype worker of *P. gilloglyi*.

The propodeal spiracle is elongated. The petiole is relatively narrow when viewed in profile and narrowed toward the apex. The subpetiolar process consists of a lobe, which is rounded anteriorly and slightly angulate posteriorly.

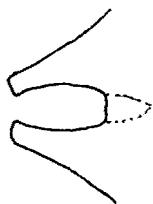


Fig. 470. Metasternal process of a paratype worker of *P. gilloglyi* (CWEM), as seen from behind.

Erect hairs are abundant on the mandibles, dorsal and ventral surfaces of the head, sparse on the sides of the head and posterior margin, scattered on the entire scape, scattered on the dorsum of the mesosoma, apex of the petiole, subpetiolar process and all surfaces of the gaster. The hairs on the legs are mostly erect; those on the tibiae are suberect. Appressed fine golden pubescence is present on the dorsum of the head, dorsum of the mesosoma, dorsum of the petiole and dorsum and ventral surfaces of the gaster.

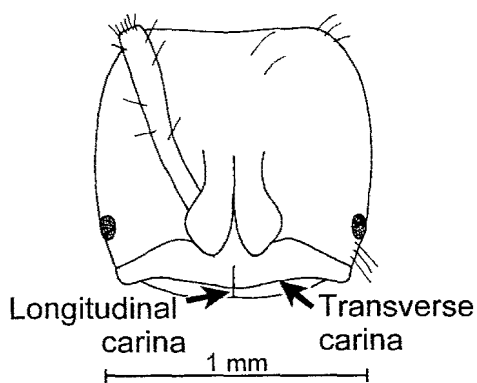


Fig. 471. Head of the holotype worker of *P. gilloglyi*.

The entire dorsal surface of the *mandible is covered with relatively coarse longitudinal striae*; the mandibular groove is also present. Most of the remainder of the ant is very finely punctate and dull, except for the posterior face of the petiole and the gaster, which are shining.

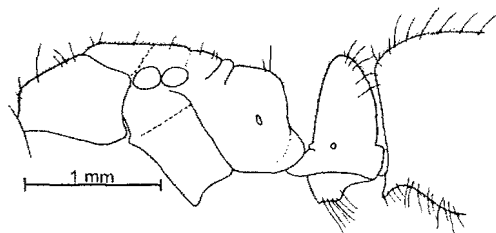


Fig. 472. Mesosoma, petiole and anterior part of the gaster of a paratype female of *P. gilloglyi* (MCZC).

Female.

The female is *larger* (total length 7 mm) than the worker, but of a similar color. The *mandible has seven teeth*; the basalmost three or four teeth are slightly smaller than the apicalmost teeth. The clypeus is similar to that of the worker with *well-developed longitudinal and transverse carinae*. The head length and width are 1.3 mm. The head is slightly narrowed anteriorly and the posterior margin is definitely concave. The *distance between the frontal carinae is relatively wide* (0.2 mm). The *eyes are large* (maximum diameter 0.33 mm) and located approximately $\frac{1}{2}$ - 1 diameter from the anterior margin of

the head (side view). The *ocelli are well developed, but small* (diameter of the median ocellus 0.08 mm, located 0.12 mm from the lateral ocellus, which is approximately equal in diameter). The *scape is short* (0.95 mm) and extends to the posterior lateral margin of the head. The *pronotal margin is swollen* but does not form a carina. The *propodeal spiracle is slit-shaped*. The shapes of the petiole and subpetiolar processes are similar to those of the worker.

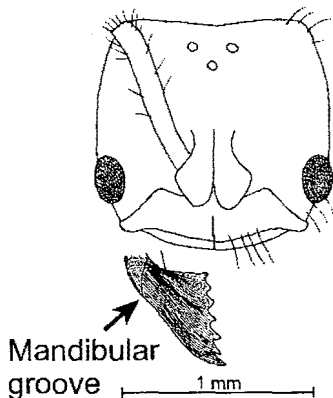


Fig. 473. Head and mandible of a paratype female of *P. gilloglyi* (MCZC).

The pilosity and sculpture are similar to those of the worker, including the *relatively coarse striae covering nearly the entire dorsal surface of the mandibles*.

Male

The male is a *small* (total length 5 mm) dark brown specimen with brown

appendages. The anterior margin of the clypeus is nearly straight and the clypeus is slightly swollen when viewed in profile. The *longitudinal and transverse clypeal carinae are absent*. The head length is 0.73 mm, the head width 0.75 mm. The head is narrowed anteriorly and the posterior margin is slightly concave. The *eyes are relatively small* (maximum length

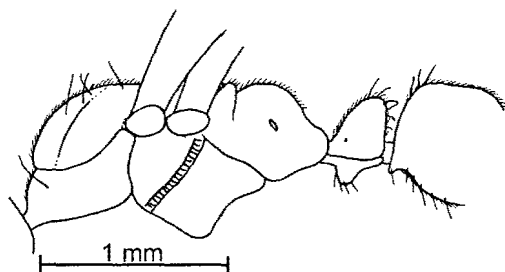


Fig. 474. Mesosoma, petiole and part of the gaster of a male of *P. gilloglyi* (Heredia, Costa Rica, MCZC).

in lateral view 0.36 mm), located approximately one diameter from the lateral ocellus (oblique side view). The *ocelli are small* (diameter of the median ocellus is 0.1 mm) located slightly more than one diameter from the lateral ocellus (as seen obliquely from above and from the side). The *pronotal shoulder is swollen* but does not form a carina; the *Mayrian furrows and parapsidal sutures are well developed*. The *propodeal spiracle is elongated*; the *petiole is wide* when compared to that of the

worker and the female with a sloping anterior face and a nearly vertical posterior face, which meet at an angle near the posterior margin of the apex. The *subpetiolar process* forms a *broadly rounded lobe*.

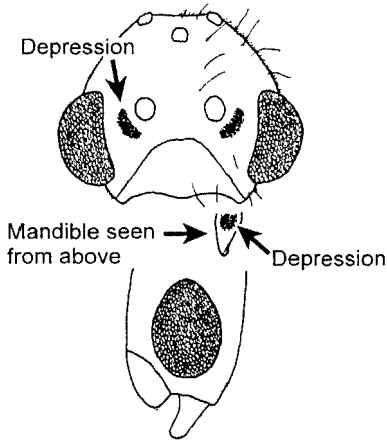


Fig. 475. Head of a male of *P. gilloglyi* (Heredia, Costa Rica, MCZC), as seen from the front and from the side.

Erect hairs are scattered on the dorsal and ventral surfaces the head, absent from the scape, scattered on the dorsum of the mesosoma, petiole, subpetiolar process and all surfaces of the gaster. The hairs on the legs are sparse and mostly suberect.

The mandible has a well-developed depression basally, but the *outer surface is smooth and glossy*. The remainder of the head is finely punctate and dull.

COMPARISON

The worker and female of *P. gilloglyi* would be most easily

confused with those of *P. succedanea*, but can be easily separated by the form of the mandible. The mandibles of *P. gilloglyi* have 7 relatively small teeth, not six large teeth (and possibly a small tooth between the 2 basalmost teeth) as in *P. succedanea*. The coarse striae on the entire dorsal surfaces of the mandibles of *P. gilloglyi* would separate it from *P. succedanea*, in which the mandibles are nearly always smooth and glossy.

The ocelli of the females of *P. succedanea* are even smaller in diameter (maximum diameter of median ocellus 0.06 mm) than those of *P. gilloglyi*, located approximately 2 diameters from the lateral ocellus. Some females of *P. succedanea* are larger than those of *P. gilloglyi* (similar in size to females of *P. gilloglyi* from Costa Rica and Ecuador).

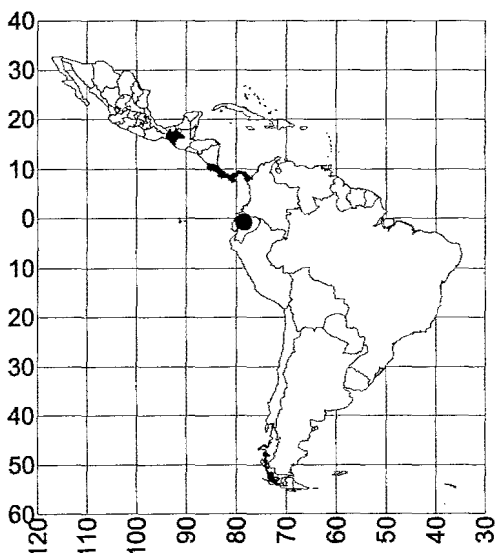
The male of *P. gilloglyi* can be separated from that of *P. succedanea* by the rounded subpetiolar process, which is angulate posteriorly in *P. succedanea*. The *P. gilloglyi* male has deep depressions on the head located laterally and anteriorly to the insertion of the antenna, which are poorly developed in males of *P. succedanea*. The male of *P. gilloglyi* has the depression on the mandible extending approximately $\frac{1}{2}$ length; in *P. succedanea* the depression on the mandibles is more elongated, extending nearly the entire length of the mandible.

The subpetiolar process of *P. gilloglyi* is somewhat rounded posteriorly, which could cause

confusion with *P. stigma*, which has a 5 - 6 toothed mandible. The transverse and longitudinal carinae on the clypeus are well developed in *P. gilloglyi*, but are poorly developed in the female and worker of *P. stigma*. The apex of the petiole of the male of *P. stigma* is rounded and not angulate as in that of *P. gilloglyi*.

The specimens from Cecilia, Honduras and Hamburg Farm, Costa Rica differ from the typical form in being reddish brown with slightly smaller eyes (diameter 0.08 mm) and with a broadly rounded (especially posteriorly) subpetiolar process.

John Longino lists this species on his website as JTL-011 (cf. *cognata*).



Map 40. *Pachycondyla gilloglyi*.

DISTRIBUTION

MEXICO: *Chiapas* (type series).

COSTA RICA: *Heredia* (10°20'N

84°04'W [MCZC]); *Guanacaste* (Cecilia [USNM]); *Puntarenas* (Reserva Biológica Carara [MCZC], Finca Las Cruces [MCZC]); *Alajuela* (Hamburg Farm [USNM]. PANAMA: *Bocas del Toro* (Continental Divide [1 k W road to Chiriquí Grande, COOK]). ECUADOR: *Pichincha* (27.9 k W Machachi [CWEM]).

HABITAT

This species occurs in rainforest, 500 to 1200 meters elevation.

BIOLOGY

Workers have been extracted from sifted litter and collected under rotten wood. A winged male was collected in March (Costa Rica). Four females were collected together without brood, suggesting colony founding by pleometrosis (Ecuador). Dr. Longino has informed us that this is a canopy specialist, found under epiphytes.

ETYMOLOGY

Named in honor of the collector, Al R. Gillogly who collected the type series as well as abundant ants in Neotropical areas. Al was a medical entomologist in the army and is interested in passalid beetles.

TYPE SERIES

Holotype worker (MCZC), 10 paratype workers (CASC, COOK, CWEM, GBFM, LACM, IAVH, INBio, MZSP, USNM), 2 paratype females (CWEM, MCZC), Mexico, Chiapas, 1.5 mi. S. Union Juarez, 18 X 1997 1030m, A. R. Gillogly.

Pachycondyla gilva (Roger)

Figures - **Worker**: 3 (palps), 5 (metasternal process), 24 (tibia), 117 (larva), 162 (mesosoma), 178 (head), 476 (side view), 477 (petiole, ventral view), 478 (tibia); **Female**: 8 (wing), 479 (side view), 480 (head); **Male**: 300 (mesosoma, top view), 302 (side view), 481 (head and mandible), 482 (forewing); **Map** 41

ochracea species complex

Ponera gilva Roger, 1863b:170-171; ♀, North America (without specific locality); Mayr, 1863:448; *Pachycondyla* (*Pseudoponera*) *gilva*: Emery, 1901a:46; *Euponera* (*Trachymesopus*) *gilva*: Emery, 1911:86; Creighton and Tulloch, 1930:73-79, ♀, ♂, Figs. 1 - 3; Smith, 1934:561-563; Wheeler and Wheeler, 1952:625-627, 1964:452, larva; *Trachymesopus gilva*: Kempf, 1960a:424; *Cryptopone gilva*: Brown, 1963:4, 6; Longino, 2006:135

Ponera ochracea race *guatemalensis* Forel, 1899:16 ♀, Guatemala, Aceituno, Nicaragua, Chontales [lectotype designated, MHNG]; *Pachycondyla* (*Pseudoponera*) *ochracea guatemalensis*: Emery, 1901a:46; *Euponera* (*Trachymesopus*) *ochracea* race *guatemalensis*: Emery, 1911:86; *Trachymesopus ochracea guatemalensis*: Kempf 1960a:424; *Cryptopone guatemalensis*: Brown, 1963:6 **new synonymy**

Euponera (*Trachymesopus*) *gilva harnedi* Smith, 1929:543 - 545, ♀, USA Columbus, Mississippi (synonymy by Creighton and Tulloch, 1930:72-74)

Euponera (*Trachymesopus*) *obsoleta* Menozzi, 1931:196-197, Fig. 5, ♀, Costa Rica, Vara Blanca, between Barba Volcano and Poás [lectotype designated, NHMB]; *Trachymesopus obsoleta*: Kempf, 1960a:424; *Pachycondyla obsoleta*: Bolton, 1995:308 (synonymy by Longino, 2006:135)

DISCUSSION

Worker

The worker is a *small* (total length 2.8 - 4 mm) *ferruginous red to yellowish brown* ant with *tiny eyes* (maximum diameter 0.04 mm, *may be*

absent). The mandible is elongate and shining, and has *at least five teeth* (*usually 6*), which are approximately the same size (the apical tooth is slightly larger and a small bump may be present on the basal mandibular border). The anterior border of the

gilva eastern USA to Panamá

clypeus is broadly convex, the central part of the clypeus has a swollen region, which nearly forms a carina and is surrounded by concave areas, which give it the appearance of having been "pinched" from the two sides. The distance between the anterior border of the eye and the border of the head is at least three times the maximum eye length (side view). The antennal scapes are relatively short and fail to reach the posterior lateral corner by one to three funicular segments. The dorsum of the mesosoma is broadly rounded or somewhat flattened. The pronotal shoulder is only slightly swollen, the mesosoma is moderately depressed at the metanotal suture and the dorsal face of propodeum is nearly straight, meeting the posterior face at an angle.

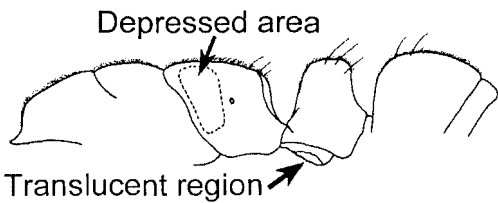


Fig. 476. Mesosoma, petiole and postpetiole of a worker of *P. gilva* (cotype worker of *P. obsoleta*, Río Negro, Panamá). The depressed area on the side of the propodeum is indicated.

The anterior part of the side of the propodeum is deeply impressed, apparently for the reception of the middle femur. The propodeal spiracle is circular. The petiole is somewhat thickened when viewed in profile and

is narrowed toward the apex, but still somewhat rectangular shaped. The subpetiolar process is broadly rounded anteriorly, developed into a translucent region anteriorly and a broad thickened lobe posteriorly. The lobe forms a sharp edge when viewed from below. The dorsum of the gaster is without a stridulatory file.

Most surfaces are dull and punctate, the top of the mesosoma, the pronotum, the mesopleuron, the side of the propodeum and petiole and the dorsum of the gaster are weakly shining.

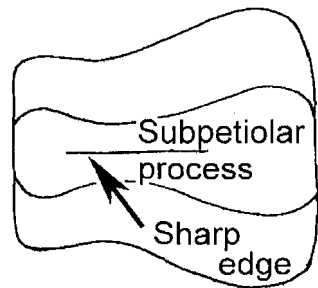


Fig. 477. Ventral surface of the petiole of a worker of *P. gilva* (Matagalpa, Nicaragua, CWEM), showing the sharp edge on the lower margin of the subpetiolar process.

Erect hairs are scattered, but sparse on the mandibles, clypeus, the dorsal and ventral surfaces of the head, on the scapes, on the dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster. Appressed golden or silver erect pubescence (0.02 mm) is abundant on most surfaces. The tibia of the middle

leg has a number of very coarse hairs (conical setae) on the extensor surface, which are much thicker than other hairs and are lacking on the anterior and the posterior tibiae.

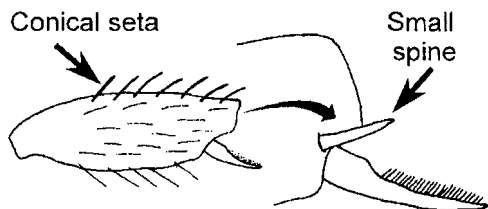


Fig. 478. Middle right tibia of a worker of *P. gilva* (cotype worker of *P. obsoleta*), as seen from behind. The inset shows an enlargement of the spines.

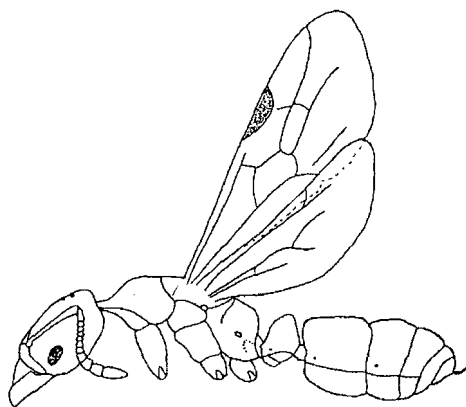


Fig. 479. Side view of a female of *P. gilva* (from Creighton, 1950, redrawn from Creighton and Tulloch, 1930).

Female

The female is *similar to the worker except larger* (total length slightly over 4 mm) and has *larger eyes* (maximum diameter 0.17 mm),

ocelli and the mesosoma is winged and adapted for flight. The mandibles, clypeus and petiole are similar to those of the worker. The translucent area is also present on the subpetiolar process.

The pilosity and sculpture are similar to that of the worker. The *conical setae on the middle tibia are slightly more developed than in the worker*.

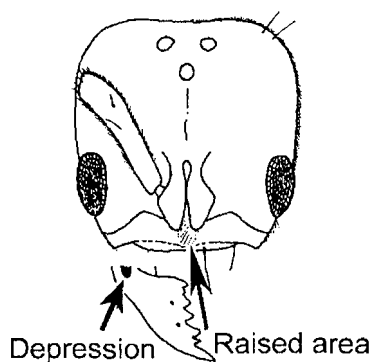


Fig. 480. Head of a female of *P. gilva* (Matagalpa, Nicaragua, CWEM).

Male

The male is a *small* (total length about 4 mm) ant. The male has a 13-segmented antenna in which the antennae (3.5 mm) are nearly as long as the remainder of the ant. The mandibles are tiny edentate and fail to touch by distance equal to at least their length. They have depressions near the bases. The *eyes are relatively small* but occupy about $\frac{1}{2}$ of the side of the head. The scape is short, about twice the length of the first funicular segment. The mesosoma is also enlarged. The parapsidal sutures are present but the *Mayrian furrows are*

not developed. The petiole is small and rounded dorsally; the subpetiolar process is little developed. The *middle tibia does not have the conical setae* that are found in the worker and female. The translucent area is not present on the subpetiolar process.

Short (mostly less than 0.02 mm in length) erect bristly hairs are present on nearly all surfaces including the eyes.

Most surfaces are punctate and weakly shining; the side of the petiole is slightly glossy.



Fig. 481. Head of a male of *P. gilva* (Veracruz México, CWEM).

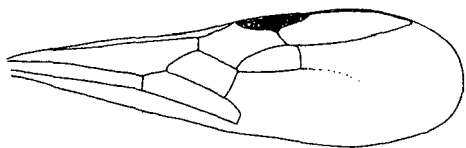


Fig. 482. Left forewing of a male of *P. gilva* (Veracruz México, CWEM).

COMPARISON

The conical setae on the middle tibia would separate workers and females of *P. gilva* from most of the others in the genus. This species could be most easily confused with *Pachycondyla stigma* based on the

number of mandibular teeth and the shape of the subpetiolar process. *Pachycondyla gilva* can be easily separated as the medial part of the clypeus is not pinched in *P. stigma*, as it is in *P. gilva*. The worker and female are easily separated from the other members of the *ochracea* species complex. They are dull, not shining like the worker of *P. mirabilis* and it has 7 mandibular teeth, usually not 5 (reduced to 4 in some specimens) as in *P. guianensis*.

The worker of *P. gilva* is nearly identical to that of *P. holmgreni*. It can be distinguished by lacking a tooth on the medial border of the clypeus, having a slightly depressed dorsal face of the propodeum, as compared to the level of the mesonotum and in having a translucent anterior half of the subpetiolar process.

The worker of *P. gilva* is easily confused with members of the genus *Hypoponera*. The mandibles of *P. gilva* are similar to those in the *stigma* species complex (with distinct teeth and not with a series of small teeth or denticles as is common in *Hypoponera*), but otherwise many of the other characteristics of *P. gilva* could show a close resemblance to *Hypoponera*. The medial part of the clypeus of *P. gilva* is pinched laterally, similar to that in some of the Neotropical species of *Hypoponera*. The mesosoma, petiole and subpetiolar process of *P. gilva* are similar to those in the genus *Hypoponera*. It is difficult to see the smallest tibial spurs on the middle and posterior tibiae of *P. gilva*. It may be difficult to maintain

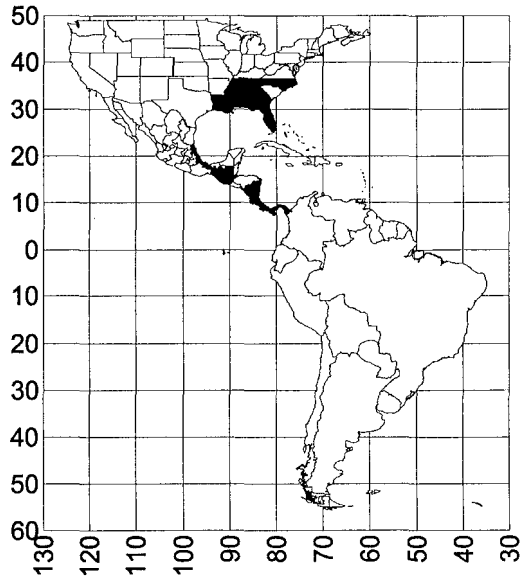
Pachycondyla as a separate genus from *Hypoponera* when the species of *Hypoponera* become better known.

We compared the lectotype female of *P. guatemalensis* and the lectotype worker *P. obsoleta* with similar specimens of *P. gilva* from the United States and all are identical. Males, females and workers from Nicaragua are identical to those from the United States. Thus there is no doubt that all three are conspecific. Longino (2006) independently concluded that *P. obsoleta* was a synonym of *P. gilva*.

DISTRIBUTION:

UNITED STATES: *Tennessee* (Camden [Smith, 1934], Montvale Springs near Maryville [Smith, 1934]); *North Carolina* (Clemson [CWEM, MCZC]); *Florida* (Gainesville, Point Clear Bay Shore [CWEM], Ichetuchnee Springs State Park [CASC], Palatka [CASC], Tallahassee [CASC]); Deyrup et al. (1989) lists additional counties of Alachua, Jackson, Jefferson, Leon, Levy, Marion and Santa Rosa; *Georgia* (Camden); *Alabama* (Point Clear [CASC, Creighton and Tulloch, 1930], Montgomery [LACM], Spring Hill [Smith, 1934], Butler Co. [MacGown and Forster, 2005]), Florence (Creighton and Tulloch, 1930); *Mississippi* (Columbus [AMNH], Corinth, Longview, Starkville, Ripley and Aberdeen [Smith, 1934]), Tombigbee National Forest (MacGown and Brown, 2006); *Louisiana* (New Orleans [CASC]). MEXICO: *Veracruz* (Coatepec [CWEM]); *Chiapas* (Lagos de Montebello SE Comitán [CASC]). GUATEMALA:

Jutiapa or *Guatemala* (Aceituno). NICARAGUA: *Chontales* (Forel, 1899); *Matagalpa* (Hotel Selva Negra [CWEM]). COSTA RICA: *Puntarenas* (Vara Blanca, between Volcán Barba and Poás [type locality], Monteverde [CASC]). Longino (2006) also lists the Monteverde area, head of the Peñas Blancas Valley and the Braulio Carrillo National Park. PANAMA: *Chiriquí* (1 k N Jurutungo [COOK]).



Map 41. *Pachycondyla gilva*.

HABITAT

Pachycondyla gilva is a common ant found in forests and disturbed urban sites, tropical rain forests and cloud forests, from sea level up to 2000 meters elevation.

BIOLOGY

This species nests in rotten logs or under bark on the forest floor in areas with rocky loam soils. In the United

States they are found in woody frass just beneath the bark of pine logs and stumps (Smith, 1934). It is usually in logs that are still solid but with loose bark and with a thin layer of decayed humus between the bark and the wood (Longino, 2006). Often the log is clear of the ground for at least part of its length on the under side of the log (Creighton and Tulloch, 1930). Longino (2006) reported it occurring under epiphytes mats in the low arboreal zone. Colonies are small with a few dozen to about 100 individuals (Smith, 1944). Males and winged females are generally produced in May and June in Florida (Smith, 1944). Brood and females were present in a nest in Nicaragua in July and sexuals were in a nest in November (Florida). Sexuals are produced during May and June in Mississippi. A nuptial flight probably occurs (Haskins, 1931). Longino (2006) mentions that lone founding queens are common. Nests include one to several hundred workers and often a many as 10 dealate queens (Haskins, 1931; Smith, 1934). The ants are slow and feign death (Smith, 1929). The males are very active and difficult to capture. Specimens can be extracted in Winkler samples (Longino, 2006).

Workers are predaceous (Maes, 1989) but accept meat, fruit and honey in artificial nests (Haskins, 1931).

Haskins (1931) provided detailed notes on the behavior and biology of an artificial colony of this species. Among the many observations he noted that eggs hatch after about 30

days (23°C). The newly hatched larvae are immediately moved to a separate chamber away from the eggs (to avoid cannibalism?) and are fed pieces of solid food. The workers lick the secretions from the larvae and bite the larvae apparently to hasten the flow of exudates. The larval stage requires about 25 days. The workers cover the mature larvae with soil and after the larvae spin a cocoon (19 hours) they are uncovered and cleaned. The pupal stage of workers requires about 32 days and a male 36 days. If a larva is not covered with soil it transforms into a semipupa and is then usually destroyed by the workers. The cocoon is surrounded by workers during eclosion (½ hour), which bite and tear the anterior end, but usually the callow actually opens the cocoon. The workers lick and pinch the callow with their mandibles and treat them similar to the larvae. The callows remain helpless for a day and then participate on the duties inside the nest. After this period they forage when they are still light in color (for up to 21 days). The workers cannot see well, but will place the brood under an area of red light (occasionally blue or green) when exposed to a spectrum. Workers and females respond aggressively to sudden sounds.

ETYMOLOGY

The species name is from the Latin word *gilvus*, meaning pale yellow. Creighton and Tulloch (1930) pointed out the name is a misnomer as the specimens are dark brown.

Pachycondyla globularia new species

Figures - **Worker**: 69 (subpostpetiolar process), 83 (mandible), 84, 229, 483 (side view), 484 (head), 487 (petiole, top view); **Female**: 485 (side view, top view of petiole), 486 (head, base of scape); **Map** 42

crenata species complex

Pachycondyla crenata: Wild, 2002:8-9, Figs. 11, 22, 23

DISCUSSION & DESCRIPT.

Worker

The worker is a *relatively large* (total length 12 mm) *reddish brown* specimen. The mandible has approximately 14 teeth; the anterior border of the clypeus is broadly convex with a medial rounded lobe. The head length is 2.3 mm, the head width 2.1 mm. The *malar carina* is *well developed* and sharp, the *eyes* are *large*, (maximum diameter 0.55 mm) located about one diameter from the anterior margin of the head (side view). The *scape* is *long* (2.25 mm) and extends about $\frac{1}{3}$ of its length past the posterior lateral corner of the head. The neck of the basal condyle of the scape is noticeably elongated and broadly rounded when viewed from above. The *pronotal shoulder* is *formed into a sharp carina* which overhangs the side of the pronotum. The promesonotal suture breaks the sculpture but the *metanotal suture* is *barely marked* on the dorsum of the

mesosoma. The *propodeal spiracle* is *slit-shaped*. The *petiole* is *very thick* with parallel anterior and posterior faces and a well defined dorsal face. The *petiole* is *nearly circular* when viewed from above. The subpetiolar process is poorly developed.

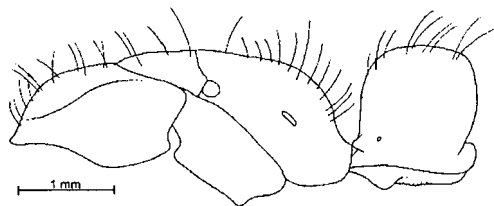


Fig. 483. Mesosoma and petiole of the holotype worker of *P. globularia*.

Erect hairs (0.10 - 0.35 mm) are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, the hairs on the legs are mostly suberect. The scape has several

erect hairs. Appressed pubescence is abundant on the dorsum of the head, the mesosoma, the dorsum of the petiole and all surfaces of the gaster.

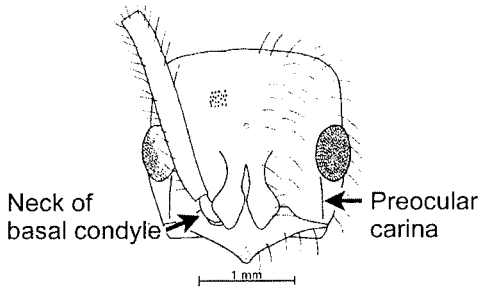


Fig. 484. Head of the holotype worker of *P. globularia*. Only a small portion of the sculpture is shown.

The *mandibles* are finely striate with scattered punctures and weakly shining; the medial part of the clypeus has fine longitudinal striae; the head is densely and coarsely punctate. The dorsum of the mesosoma, especially the pronotum, is densely and coarsely punctate although the punctures are noticeably finer than those on the head. The side of the pronotum is nearly smooth and glossy; the remainder of the side of the mesosoma has fine striae and is moderately glossy. The petiole is coriaceous and moderately shining, especially the posterior face. The gaster is finely punctate or coriaceous.

Female

The female is *slightly larger* (total length 14.5 mm) *than the worker*. The mandibles and the clypeus are similar to those of the worker. The head

length is 2.35 mm; the head width is 2.04 mm. The *malar carina* is well developed and the eyes large (maximum diameter 0.6 mm) located less than 1 diameter from the anterior margin of the head (side view). The *ocelli* are small (maximum diameter of the medial ocellus 0.1 mm, located nearly three diameters from the lateral ocellus). The *pronotal carina* is well developed and sharp and overhangs the side of the pronotum. The *propodeal spiracle* is slit-shaped. The shape of the *petiole* is similar to that of the worker and *nearly circular* in shape when seen from above.

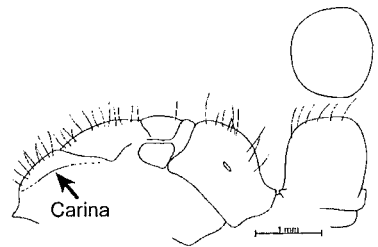


Fig. 485. Mesosoma and petiole of the paratype female of *P. globularia*. The inset shows the petiole as seen from above.

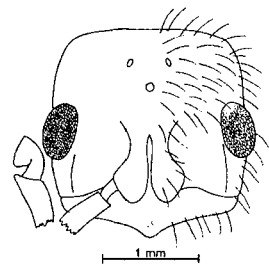


Fig. 486. Head of the paratype female of *P. globularia*. The inset shows the base of the scape as seen from above.

The pilosity and sculpture are similar to those of the worker.

Male

Unknown.

COMPARISON

Pachycondyla globularia is clearly a member of the *crenata* species complex, with the characteristic well-developed malar carina, pronotal carina and heavily and densely punctate head and dorsal surface of the pronotum. *Pachycondyla globularia* would be confused with *P. fiebrigi* but can be separated from it and all of the other members of the *crenata* species complex by the circular petiolar node (when viewed from above).

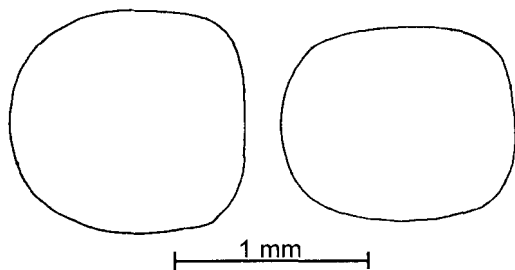


Fig. 487. Petioles of workers of *P. globularia* from above, showing the variation in shape of specimens from Trinidad (left: Saint Augustine, right: Arima Valley, both specimens in MCZC).

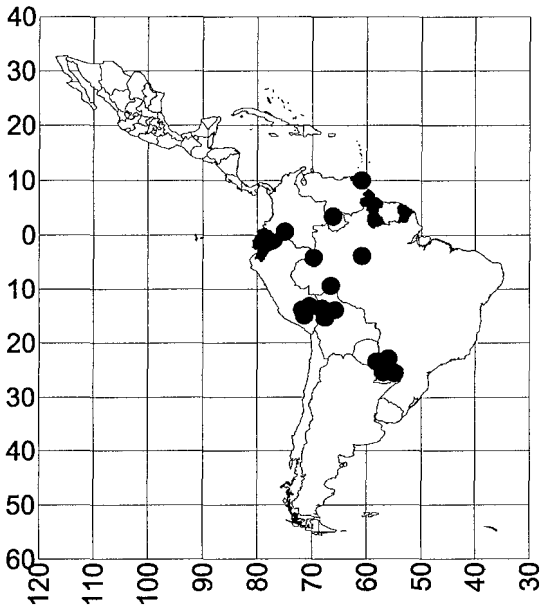
Jack Longino has referred to this species as JTL-013 (pers. comm.).

DISTRIBUTION

COLOMBIA: *Amazonas* (Parque Nacional Amacayacú [3°23'S 70°6'W, IAVH]); *Putumayo* (Parque Nacional La Paya Cabaña [La Paya Chagra, 0°7'S 74°56'W, IAVH]); (locality unknown [USNM]). ECUADOR: *Pichincha* (4 k E Alluriquin [Río Toachi, USNM]); *Oriente* (Limón Cocha [MCZC]); *Napo* (Tiputini Biodiversity Station [RYDER, CWEM]); locality unknown (intercepted at New Orleans [USNM], intercepted at Galveston [USNM]). PERU: *Madre de Dios* (Avispas [MCZC], Iberia [AMNH], 15 k NE Puerto Maldonado [MCZC], near Pto. Maldonado [STDC]). VENEZUELA: *Amazonas* (Marawake Tepui [Macizo Central, MCZC]); without locality (intercepted at Hoboken, USNM). TRINIDAD: *Saint George* (North Range [El Tucuche, MCZC], Arima Valley [MCZC]); *Nariva* (San Augustine [MCZC]). GUYANA: *Cuyuni-Mazaruni* (Kartabo [MCZC, USNM], Forest Settlement [MCZC]); *Demerara-Mahaica* (Kaieteur [AMNH]). FRENCH GUIANA: (Conamani [W of Sinnamarie, Forest Patagaei, MCZC]). SURINAME: *Sipaliwini* (Witi Creek [Wittie Kreek, Brownsberg Natuur Park, LACM]). BRASIL: *Amazonas* (Manaus to Itacoatiara highway [km. 34, MCZC], Benjamin Constant [MCZC]); *Rondônia* (Abuná - Rio Madeira [USNM]); *Pará* (Belém [CASC]). BOLIVIA: *El Bení* (Huachi [USNM], Ivón [USNM]); *La Paz* (Tumupasa [USNM]). PARAGUAY: *Cordillera* (San Bernardino [Forel, 1906]). Wild (2002) lists *Alto Paraná*

globularia Colombia to French Guiana south to Paraguay

(Ciudad del Este); *Amambay* (Parque Nacional Cerro Corá); *Canindeyú* (Reserva Natural del Bosque Mbaracayú; *Guairá* (Roque González); *Paraguari* (Parque Nacional Ybycuí); *San Pedro* (Jaguarete Forest Río Verde).



Map 42. *Pachycondyla globularia*.

HABITAT

This species is found in primary and secondary rainforest and on windblown ridges at elevations ranging from 320 - 1040 m. Wild (2002) reports it from gallery forest, riparian forest and inundated low forest.

BIOLOGY

A nest in Trinidad was collected in a rotten stick on the forest floor. The specimens from near Manaus were collected on a new tree-fall. Specimens have been intercepted by the USDA on unspecified orchids (Colombia), on *Cattleya* [Orchidaceae] (Venezuela) and on bananas (3 collections, Ecuador). A winged female was collected in July (Venezuela), two dealate females were collected in July and August in Guyana. Specimens are occasionally collected foraging on vegetation and in malaise traps.

A specimen in the AMNH is infected with a *Cordyceps unilateralis* fungus. The type series is pinned with a specimen of *P. apicalis*. The specimens from Ecuador were collected with the army ant *Eciton rapax*.

ETYMOLOGY

From Latin, *globosus*, meaning spherical, referring to the shape of the petiolar node when viewed from above.

TYPE SERIES

Holotype worker (USNM), 6 paratype workers (CASC, CWEM, IAVH, MCZC, MZSP, USNM), 1 paratype dealate female (USNM), HuachiBeni, Bolivia, WmMMann; Aug.

Pachycondyla goeldii (Forel)

Figures - **Worker**: 79 (tibia), 81 (mandible), 233 (side view), 432 (subpetiolar process), 488 (metasternal process); **Female**: 78 (petiole), 235 (tibia), 489 (head and mandible); **Male**: 70 (forewing), 71 (head), 301 (mesosoma, top view), 304 (side view), 306 (petiole), 307 (tibia), 432 (subpetiolar process), 490 (side view), 491 (head and side view of clypeus), 492 (tibia); **Map** 43

crenata species complex

Neoponera goeldii Forel, 1912:36-37, ♀, Brasil: Amazonas: Vitória [1 lectotype, 1 paralectotype here designated, MHNG]; *Pachycondyla goeldii*: Bolton, 1995:305

Neoponera lydiae Santschi, 1920:361, ♀, French Guiana: Nouveaux Chantiers [holotype seen, NHMB], **new synonym**

DISCUSSION

Worker

The worker is a *moderate sized* (total length 7 - 8 millimeters) *yellowish brown to brown ant.* The mandibles are moderately elongated and have about 13 teeth. The anterior medial border of the clypeus is angulate. The sides of the head are nearly parallel but noticeably narrowed anterior to the eyes. The *eyes are relatively large*, occupying about $\frac{1}{3}$ of the side of the head. The *malar carina is well developed* and extends to the anterior margin of the eye. The *scape is long* and extends about three funicular segments past the posterior lateral corner of the head. The posterior margin is nearly straight. The *pronotal shoulder is formed into a sharp carina* which slightly overhangs

the side of the propodeum. The *metanotal suture is barely marked* on the dorsum of the mesosoma and is only slightly depressed below the outline. The propodeal spiracle is



Fig. 488. Metasternal process of a worker of *P. goeldii* (Pichincha, Ecuador, CWEM) as seen from behind.

elongated. Both the *anterior and posterior faces of the petiole are convex* (at least the upper half of the

goeldii Ecuador to Venezuela south to central Brasil

anterior face) and meet at the *highest point in the middle of the apex*. The subpetiolar process is poorly developed. The anterior face of the postpetiole is slightly concave and meets the broadly rounded dorsal face at slightly more than a 90 degree angle. The metasternal process consists of two closely spaced lobes with the surface between them crenulated.

Erect hairs are abundant and long on most surfaces, including the mandibles, the clypeus (up to 0.6 mm), on the scapes (0.3 mm, length > diameter of scape), dorsum of the mesosoma (up to 0.5 mm), petiole and gaster, the *hairs on the legs are long*, especially those on the middle and posterior tibiae (up to 0.4 mm), most longer than the diameter of the tibiae; appressed silver hairs are scattered on most surfaces and moderately dense on the dorsum of the gaster.

The mandibles are finely striate and dull, the clypeus is depressed medially with poorly developed striate on both sides of the depression. The head, mesosoma, petiole and gaster are covered with poorly defined punctures and moderately smooth and glossy.

Female

The female (*P. lydiae*) is similar in most aspects, including the *presence of long hairs, mostly longer than the diameter of the appendages*, differing from the worker only significantly in the shape of the petiole, in which the *anterior face of the petiole is nearly straight and the posterior face is broadly rounded and*

meets near the anterior edge of the apex.

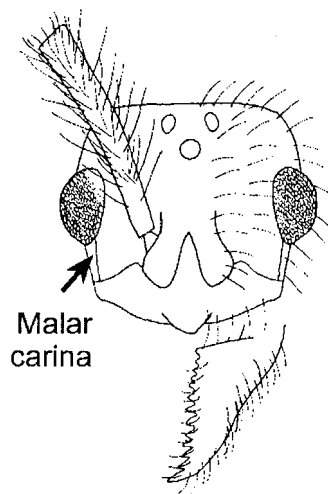


Fig. 489. Head and mandible of a female of *P. goeldii* (lectotype female of *P. lydiae*).

The pronotum has a sharp carina on the shoulder and the propodeal spiracle is slit-shaped.

The pilosity and sculpture are similar to that of the worker.

Male

The male (undescribed) is a *small* (total length 6 mm) *dark brown* specimen with *yellowish brown* appendages, clypeus and genitalia. The head length is 0.96 mm; head width 0.79 mm. The *eye is large* (maximum diameter 0.60 mm) located less than $\frac{1}{2}$ diameter from the lateral ocellus. The median ocellus (0.13 mm) is located approximately one diameter from the lateral ocellus (0.14 mm). The *pronotal shoulder is only slightly swollen*; the *Mayrian furrows are well developed* on the scutum, as are the parapsidal sutures. The

scutellum is only weakly convex. The *propodeal spiracle* is *slit-shaped*. The *petiole* is *triangular-shaped* with the anterior and posterior faces being very similar shaped. The subpetiolar process consists of a rounded anterior lobe followed by a concave region and a small angle. The anterior face of the postpetiole is broadly rounded; the subpostpetiolar process is poorly developed. The specimen is a callow and the wing venation is difficult to see. The genitalia were not dissected on the single available specimen.

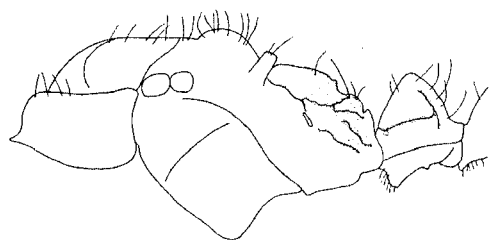


Fig. 490. Mesosoma and petiole of a male of *P. goeldii* (Pichincha, Ecuador, CWEM).

Erect hairs are sparse and range from 0.1 - 0.2 mm in length. These hairs are present on the clypeus, dorsal and ventral surfaces of the head, posterior margin of the head, mesosoma, petiole and subpetiolar process and all surfaces of the gaster. The legs, including the tibiae, have similar erect and suberect hairs. *Erect hairs on the tibiae* are approximately as long as the diameter of the tibiae.

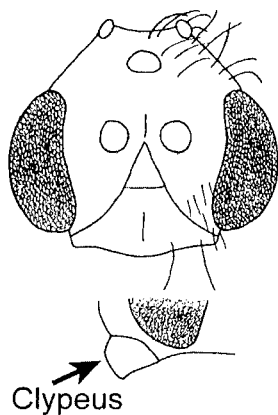


Fig. 491. Head of a male of *P. goeldii* (Pichincha, Ecuador, CWEM) seen from the front and the clypeus as seen from the side.

The head is finely sculptured and moderately shining, the sculpture on the mesosoma is similar and most surfaces are shining and nearly smooth and glossy (the mesopleuron), the side of the propodeum has poorly defined rugae. The petiole has a single longitudinal ruga; the gaster is mostly smooth and shining.

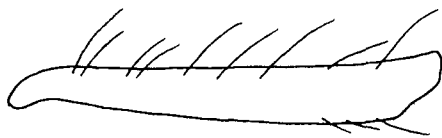


Fig. 492. Posterior left tibia of a male of *P. goeldii* (Pichincha, Ecuador, CWEM).

COMPARISON

The shape of the petiole of the worker of *P. goeldii* would separate it from most of the others in the *crenata*

species complex (anterior and posterior faces are convex with the highest point near the middle of the apex). Only four species have a petiole with a similar shape: *P. cavinodis*, *P. donosoi*, *P. oberthueri* and *P. carinulata*. *Pachycondyla cavinodis* and *P. oberthueri* are easily separated from *P. goeldii* as the highest point is closer to the posterior end the dorsum of the petiole and the posterior face of the petiole is weakly to strongly concave. The anterior face of the petiole of *P. goeldii* forms a continuously sloping curve and is not angulate about half way up the node as it is *P. carinulata*.

The workers of *P. goeldii* are similar to those of *P. donosoi*. They can be separated on the basis of three well-defined characters: the dorsal surfaces of the mandibles of *P. goeldii* are completely striate, whereas they are mostly smooth and glossy in *P. donosoi*. The subpetiolar process is strongly concave in *P. goeldii*, not weakly concave as in *P. donosoi* and the tibiae of *P. goeldii* have abundant erect hairs that are at least as long as the diameter tibia, often twice or more as long as compared with the sparse hairs in *P. donosoi* in which the hairs are approximately as long as the diameter of the tibiae.

The female of *P. goeldii* could be easily confused with that of *P. unidentata*, but the long hairs on the middle and posterior tibiae (most longer than the diameter of the tibiae) would separate it from *P. unidentata*, in which the length of these hairs is approximately equal to the diameter of the tibiae.

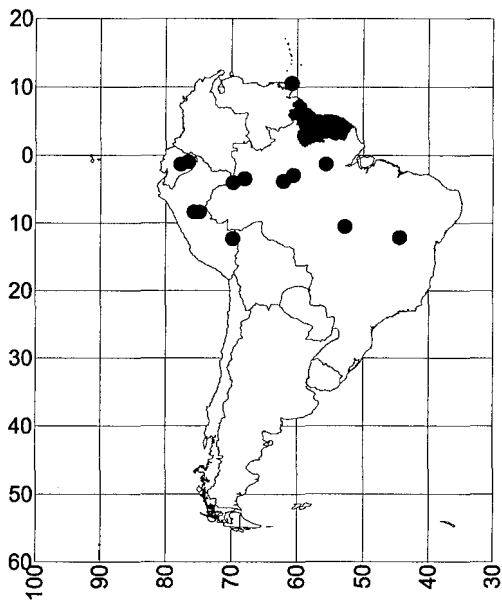
It would not be possible to confuse males of *P. goeldii* with those of *P. donosoi*. The males of *P. goeldii* are very distinct in that they are about as large as the workers, not approximately $\frac{1}{2}$ the size the workers as in *P. donosoi*. The subpetiolar process is strongly concave in *P. goeldii*, but barely can be described as concave in males of *P. donosoi*.

Santschi (1920) states that *P. lydiae* differs from *P. goeldii* in lacking the dorsal face of the petiole. Comparison of females associated with workers of *P. goeldii*, with the lectotype of *P. lydiae*, shows them to be identical. Both forms have the extremely long erect hairs on the scapes and tibiae.

DISTRIBUTION

ECUADOR: *Napo* (Sucumbíos [0°51'33"S, 76°15'43"W, QCAZ], Limón Cocha [MCZC]). GUYANA: *Essequibo* (Essequibo River [Moraballi Creek, MCZC]). FRENCH GUIANA: *Cayenne* (Paracou Experimental Forest [45 k W Karou, MCZC], 35 k W Sinnamary [LACM]), Nouveaux Chantier, 3 k E Cacao). SURINAME: *Marowijne* (Moengo [Boven Cottica River, MCZC]). PERU: *Madre de Dios* (15 k NE Puerto Maldonado [MCZC], Cocha Totorá [LACM], Estación Biológica Cocha Cashu [LACM]); *Huánuco* (43 mi E Tingo María [MCZC]; 67 mi E Tingo María [CASC]). TRINIDAD: *Saint Andrew* (Cumuto [MCZC], $\frac{1}{4}$ mi from Oropuche Cave); *Mayaro* (Guayaguayare [MCZC]). BRASIL: *Amazonas* (Vitória [type locality], Benjamin Constant [MCZC], Manaus

[LACM], 61 k N Manaus [MCZC], Rio Purus [MCZC]); *Pará* (Santarém [Taperinha, MCZC], Mun. Benevides [PA-408, km 06, MPEG]); *Bahia* (Água Preta [MCZC]).



Map 43. *Pachycondyla goeldii*.

HABITAT

Pachycondyla goeldii is found in a number of habitats ranging from caatinga [scrub vegetation], riparian rain forest, wet forest, second growth rain forest, a clearing in second growth rain forest and in an urban habitat (garden), at elevations ranging from 250 - 770 m. Nests are located in open sunny areas (Belin-Depoux, 1991).

BIOLOGY

Nests are usually found in hollow

twigs or branches (1 - 7 cm in diameter), often those found on the forest floor. It also constructs carton nests (Corbara and Dejean, 1996; Orivel, et al., 1998). The nest described by Weber (1944) in Trinidad is probably that of *P. goeldii*. The specimens from near Oropuche Cave were on a pomerac [*Syzygium*] tree at a roadside. Brood and a male were collected in a nest in July (Ecuador). Alate females were collected in May (Ecuador and Suriname); alate males were collected in October and November (Perú). Dealate females were collected in April (French Guiana), June (Trinidad) and July (Perú). Workers are extremely fast and difficult to capture.

The specimens from near Manaus were in an epiphyte (*Anthurium* cf. *gracile* [Araceae]). The ants integrate epiphyte seeds in their nests (*Aechmea mertensii* [Bromeliaceae], *Clusia* sp. [Clusiaceae], *Codonanthe calcarata* [Gesneriaceae], *Peperomia macrostachya* [Piperaceae] and *Anthurium gracile* [Araceae]), which germinate, develop and reinforce the nest (Orivel et al., 1998).

Caterpillars of *Vettius tertianus* (Hesperiidae) live in the nests in the bromeliad *Aechmea mertensii*. *Pachycondyla goeldii* nests together with the ponerine ant *Odontomachus mayi* (Corbara et al., 1999).

ETYMOLOGY

This species was named in honor of Mr. Göldi who collected the type series.

Pachycondyla guianensis (Weber)

Figures - **Worker**: 158 (tibia), 159 (head), 160 (side view), 493 (mandible), 494 (metasternal process); **Female**: 495 (side view), 496 (head and mandible), 497 (tibia), 498 (forewing); **Male**: 499 (side view), 500 (head), 501 (tibia), 502 (forewing), 503 (genitalia); **Map** 44

ochracea species complex

Wadeura guianensis Weber, 1939:102-104, Figs. 5, 6, ♀, Guiana, Oronoque River [holotype worker seen, MCZC]; *Pachycondyla guianensis*: Bolton, 1995:305

Wadeura haskinsi Weber, 1939:104, Fig. 7b, ♀, Panama: Barro Colorado Island [holotype worker seen, MCZC]; Kempf, 1958:176-179, ♀, Figs 1-5; **new synonymy**

DISCUSSION

Worker

The workers are *relatively small* (total length about 5.5 - 6 mm) *orange-brown to ferruginous red* ants. The *mandible is slender and elongated, with a large acute apical tooth and a relatively large tooth in the middle of the masticatory border*. There is one tiny tooth anterior to this large medial tooth and two smaller teeth posterior to it (total of 5 teeth). The pit at the base of the mandible is apparently absent. The *eyes are apparently absent* although there is a slightly darker spot where the eyes would be located. The anterior medial border of the clypeus is convex and has a tiny tooth. The *antennal scape fails to reach the posterior lateral corner* by about the length of the first funicular segment. The *malar carina*

and the pronotal carinae are completely absent. The *mesosoma is broadly depressed at the metanotal suture* and the anterior part of the side of the propodeum is depressed,



Fig. 493. Mandible of a worker of *P. guianensis* (*P. haskinsi*, from Weber, 1939).

apparently for the reception of the middle femur. The dorsum of the propodeum is depressed in this region when viewed from the side. The *petiole is thick and triangular-shaped* (in profile), distinctly narrowed dorsally with the top of the petiole

being broadly rounded. The anterior face is nearly straight and the posterior face broadly rounded, the subpetiolar processes well developed and broadly rounded ventrally.

There are *few erect hairs* on the dorsum of the head, but hairs are present on the scape, ventral surface of the head, scattered on the dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster. Coarse erect hairs are present on the tibiae but are generally lacking on the remainder of the legs; appressed silver hairs are present on the dorsum of the head, dorsum of the mesosoma and dorsum of the gaster. The *middle tibia has several conical setae on the extensor surface*; the anterior and posterior tibiae are without these coarse setae. The metasternal process is poorly developed and consists of two angulate lobes.

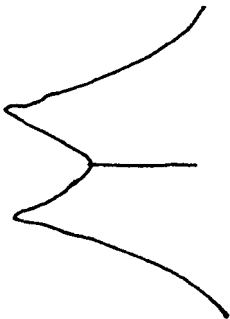


Fig. 494. Metasternal process of a worker of *P. guianensis* (Heredia, Costa Rica, CWEM) as seen from behind.

Erect hairs are abundant on the mandibles, clypeus, ventral surface of the head, shaft of the scape, dorsum of

the mesosoma, dorsum of the petiole and all surfaces of the gaster, the setae on the legs are mostly suberect or appressed.

Most surfaces are dull and punctate, especially the head and dorsum of the mesosoma, the side of the mesosoma is weakly shining and the side of the petiole and gaster are moderately shining.

Female

The female is a *small* (total length 5 mm) *reddish brown* specimen. The *mandible has five teeth*, the apical is very long, the subapical is tiny, the third tooth is very large and the fourth and fifth teeth are moderate sized. The *medial part of the clypeus has a sharp angle* which overhangs the anteclypeus and is part of a poorly defined transverse carina, which passes across the clypeus. The *eye is small* (maximum diameter 0.14 mm) located less than one diameter from the anterior margin of the head (side view). The *scape is narrow in the proximal half and widened in the distal half*. It does not reach the posterior lateral corner of the head. The *ocelli are small* (maximum diameter of the medial ocellus 0.07 mm) and are located near each other (distance about 0.12 mm). The *pronotal shoulder is swollen* but does not form a carina. The *propodeal spiracle is circular* in shape; the petiole is narrow when viewed in profile, with a nearly straight anterior face, a slightly convex posterior face and a rounded apex. The subpetiolar process forms a broad rounded lobe

which gradually become smaller posteriorly.

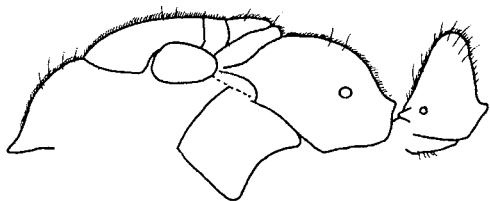


Fig. 495. Mesosoma and petiole of a female of *P. guianensis* (Heredia, Costa Rica, INBio).

Erect hairs are sparse fine and relatively short (0.1 mm) although a few hairs on the mandibles, clypeus and ventral surface of the head are longer (up to 0.35 mm). The scapes have a few fine erect hairs. *All surfaces are covered by a fine golden pubescence. Coarse setae are present on the extensor surface of the middle tibia.*

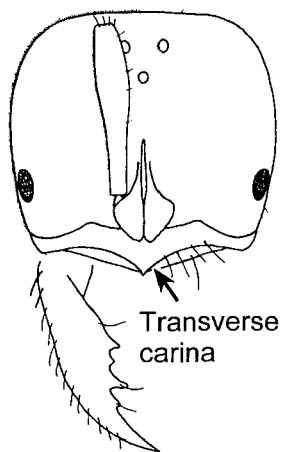


Fig. 496. Head and mandible of a female of *P. guianensis* (INBio) (Heredia, Costa Rica).

The *mandibles are smooth and glossy* with scattered punctures, the head is densely, but finely punctate and dull, the dorsum of the mesosoma is covered with fine punctures or with coriaceous sculpture and is mostly dull, the sides of the mesosoma have poorly defined striae and are weakly shining. The sculpture on the petiole is fine and the petiole is moderately to strongly shining. The gaster is covered with fine punctures but is moderately shining. The third discoidal cell is elongated, similar to that of members of the *stigma* species complex.

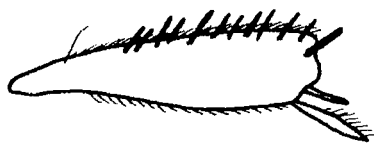


Fig. 497. Right middle tibia (seen from behind) of a female of *P. guianensis* (Heredia, Costa Rica, INBio) showing the coarse setae on the extensor surface.

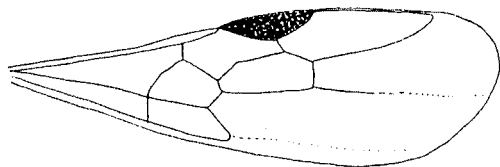


Fig. 498. Left forewing of a female of *P. guianensis* (Amapá, Brasil, CASC).

Male

The male (undescribed) is a *small* (total length 5 mm) *ferrugineous - yellow* specimen. The *mandibles are*

tiny, without teeth and with a *large depression at the base*. The anterior margin of the clypeus is nearly straight and the surface of the clypeus is moderately swollen (viewed from side). The head length and the head width are 0.79 mm. The eyes are moderate sized (maximum diameter 0.43 mm) located nearly one diameter from the lateral ocellus. The medial ocellus (diameter 0.12 mm) is located less than one diameter from the lateral ocellus (0.10 mm) (oblique view from above and from the side). The *pronotum is slightly swollen at the shoulder*, the *Mayrian furrows are absent* on the scutum, the entire surface is convex and the parapsidal sutures are weakly developed. The *propodeal spiracle is circular-shaped*.

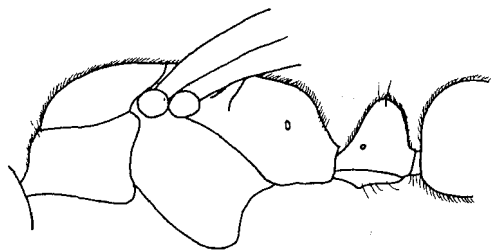


Fig. 499. Mesosoma and petiole of a male of *P. guianensis* (Amapá, Brasil, CASC).

The *petiole is thick* (viewed in profile) with the front face sloping at approximately 45° angle, the posterior face is broadly convex and two faces meeting slightly posterior to the midline and form a rounded surface. The *subpetiolar process is poorly developed* and consists of a tiny

anterior angle followed by a lobe, which gradually diminishes in width posteriorly. The parameres curve inward (viewed from above or from below) the volsella is curved outwardly at the apex and the lobes of the aedeagus are without teeth and are bluntly rounded posteriorly. The subgenital plate is well developed. The wing is similar to that of the female, except the third discoidal cell is even more elongated.

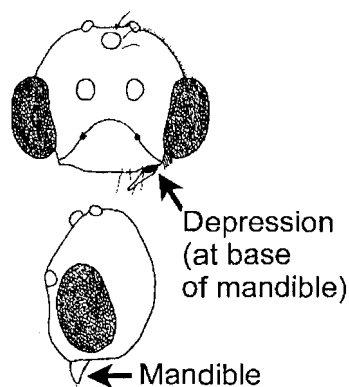


Fig. 500. Head of a male of *P. guianensis* (Amapá, Brasil, CASC) as seen in full face and from the side.

Erect hairs are sparse on all surfaces, a few small hairs are located on the posterior border of the head, on the anterior margin of the clypeus, very few erect hairs on the mesosoma are separated from the thick pubescence, a few hairs are present on the apex of the petiole, as well as the subpetiolar process, some of the hairs on the ventral surface of the gaster are erect, the hairs on the legs are all appressed or slightly raised from the

surface, the middle tibia is without conical setae. A fine suberect plush of pubescence is present on nearly all surfaces.

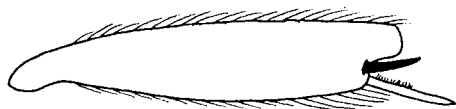


Fig. 501. Middle left tibia of a male of *P. guianensis* (Amapá, Brasil, CASC).

All surfaces are weakly sculptured and moderately shining.

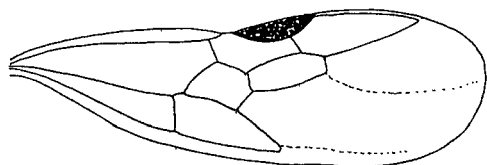


Fig. 502. Left forewing of a male of *P. guianensis* (Amapá, Brasil, CASC).

COMPARISON

Pachycondyla guianensis is apparently a member of the *ochracea* species complex, with the conical setae on the middle tibia and the lateral depressed region on the side of the propodeum. The worker of *P. guianensis* could be confused with those of the other New World members of the *ochracea* species complex, including *P. mirabilis* and *P. gilva*, which all have conical setae on the extensor surface of the middle tibia. *Pachycondyla guianensis* can be separated from these species by the

elongate mandibles with the unusual mandibular teeth.

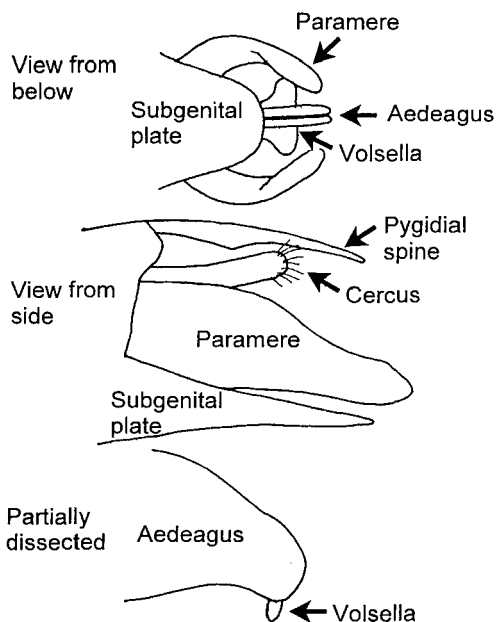


Fig. 503. Genitalia of a male of *P. guianensis* (Amapá, Brasil, CASC, based on two males).

The male of *P. guianensis* could be confused with that of *P. oberthueri*. They are approximately the same size and color, the Mayrian furrows are absent in both and the wing venation is nearly identical. *Pachycondyla guianensis* males differ in that the propodeal spiracle of *P. oberthueri* is oval-shaped (circular-shaped in *P. guianensis*), the anterior and posterior faces of the petiole are equal in length and shape, resulting in the petiole being triangular-shaped (the apex is blunt and rounded in *P. guianensis*) and the subpetiolar process is well-developed with an anterior ventrally

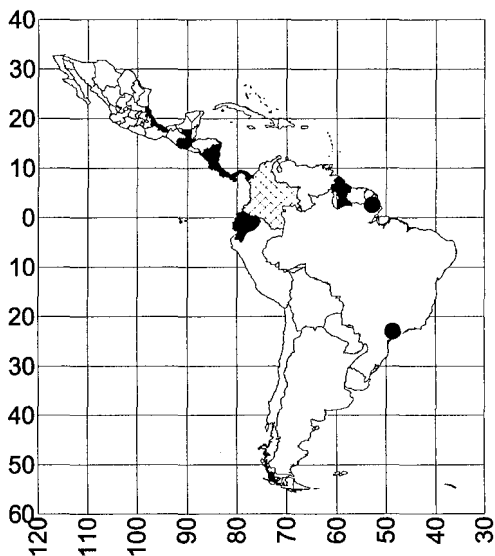
directed angle, followed by a concave region in *P. oberthueri* (poorly developed or a tiny angle in *P. guianensis*). *Pachycondyla guianensis* males could be separated from most of the other small males, which have well developed Mayrian furrows and are generally dark brown in color.

Weber (1939) separated *P. haskinsi* from *P. guianensis* on the basis of having the second funicular segment longer than the third. The differences are so slight (second segment of left funiculus of the holotype of *P. guianensis* is 0.013 mm, third segment is 0.012 mm, the second segment of left funiculus of the paratype is 0.012, the third segment is 0.013, versus 0.012 mm for both segments in the left funiculus of a syntype of *P. haskinsi*). Thus *P. haskinsi* is considered to be a synonym. Direct comparison of the types of the two species suggests that there are no other characteristics that will separate them.

DISTRIBUTION

MEXICO: *Veracruz* (Coatepec). GUATEMALA and NICARAGUA (Kempf, 1972). COSTA RICA: *Heredia* (Estación Biológica La Selva [CWEM, LACM, MCZC, Olson, 1991]); *Limón* (Bataán [MCZC]; *Heredia* (vicinity of Guápiles [MCZC]). PANAMA: *Panamá* (Barro Colorado Island [LACM, MCZC]). COLOMBIA: *Guajira* (Río Don Diego [MCZC]); *Meta* (2 k N Villavicencio [MCZC]); *Cauca* (Isla Gorgona [Baena, 1993]); *Amazonas* (Fernández, 1990). ECUADOR: *Los*

Ríos (Río Palenque [LACM]). FRENCH GUYANA: *Cuyuni-Mazaruni* (Oronoque River [MCZC]). GUIANA: (Orinoco River). BRASIL: *Amapá* (Vila Amazonas [CASC]); *São Paulo* (Agudos [MCZC]).



Map 44. *Pachycondyla guianensis*.

HABITAT

This species is found in tropical rain forest, at elevations of 5 - 150 m and in a cacao plantation. Weber (1939) reports it from high rain forest.

BIOLOGY

Weber (1939) found a nest a few centimeters deep, which consisted of a gyne, half a dozen workers and larvae, in sandy soil. The nest was in the form of irregular chambers. Baena (1993) found a worker in a rotten log; this may possibly be the normal nesting site. Alate females were collected in March (Brasil) and July (Panamá) and a dealate female was collected in

March (Costa Rica). Kempf (1958) reported that a worker and female were collected under bricks in sandy soil in disturbed sites (in front of the Franciscan Seminary and under scaffolding at a construction site), as well as on the mound of a *Pheidole* sp. ant nest. They have been collected in a pitfall traps between 5:00 and 10:00 and in leaf litter.

Longino (website) states that the distinct bright orange alate queens are fairly common in Costa Rica and are

collected in malaise traps, by sweeping etc. They are preyed upon by robber flies (Asilidae). The distinctive workers are only rarely collected in Berlese or Winkler samples. Longino suggests that the workers are probably largely subterranean, difficult to sample and more common than collections suggest.

ETYMOLOGY

The name of this species means from Guiana.

Pachycondyla harpax (Fabricius)

Figures - **Worker**: 1 (mesosoma), 2 (head), 3 (palps), 13 (larva, side view), 18 (head, side view), 54 (metasternal process), 58 (pronotal shoulder), 61 (mandible), 186 (propodeal spiracle), 221 (tarsal claws), 241 (side view), 504 (head); **Female**: 6 (side view), 7 (forewing with cells), 505 (forewing), 506 (head); **Male**: 9, 316 (tibia), 318 (side view), 507 (head), 508 (petioles); **Map** 45

crassinoda species complex

Formica harpax Fabricius, 1804:401-402, ♀, South America; Roger, 1862:258; *Pachycondyla harpax*: Mayr, 1863:439; Roger, 1863a:18; Forel, 1899:12; Wheeler, 1900:4-6, Figs. 2, 3, ♀, ♂; Wheeler and Wheeler, 1952: 617-618, larvae; Kempf, 1961:194; male reproductive system, Hung and Vinson, 1975:192-194; *Pachycondyla (Pachycondyla) harpax*: Emery, 1901a:45

Pachycondyla montezumia Smith, 1858: 108, ♀, ♂, México, without locality; Forel, 1899:12, ♀; Wheeler and Wheeler, 1952: 618, larvae; junior synonym of *P. harpax*: Roger, 1862:288, revived from synonym as subspecies of *P. harpax*: Forel, 1899:12; Emery, 1911:75; senior synonym of *P. amplinoda* and *P. orizabana*: Emery, 1911:75 (junior synonym of *P. harpax*: Brown, 1950:247)

Ponera amplinoda Buckley, 1866:171: ♀ central Texas (synonymy by Emery, 1895b:266; Pergande, 1895:873)

Pachycondyla orizabana Norton, 1868:8, ♀, México, locality not specified, presumably Orizaba (synonymy by Emery, 1892a:9)

Pachycondyla harpax variety *dibullana* Forel, 1901b:347, ♀, Colombia, *Dibulla* [lectotype worker, 3 paralectotype workers, 3 paralectotype females here designated, MHNG]; Forel, 1912:39 ♀ (synonymy by Brown, 1950:247)

Pachycondyla harpax var. *concinna*: Wheeler, 1925:5, ♀, ♀, Brasil: Rio Madeira, Abuná [3 syntypes seen, MCZC] (synonymy by Brown, 1950:247)

Pachycondyla harpax variety *irina* Wheeler, 1925:5, ♀, Guatemala, Escuintla [also type specimens from Zacapa and Agua Caliente in various museums] [two syntype workers seen, USNM, 3 syntypes workers, MCZC, 6 worker syntypes AMNH, 5 worker cotypes, 1 female cotype LACM] (mixed series of *P. impressa* and *P. harpax*, synonymized with *P. harpax* by Brown, 1950: 247)

DISCUSSION

Worker

The workers are *moderately large* (total length up to 10 mm) *black* ants with dark brown appendages. The mandibles have 9 or 10 teeth; the anterior border of the clypeus is usually convex, although it may be nearly straight or even slightly concave medially. The central region of the clypeus is swollen and may even form a longitudinal carina posteriorly. The region anterior to the eye is *without a malar carina*, although it may be slightly raised. The *eyes are relatively large* (0.34 mm maximum diameter) and are separated from the insertion of the mandibles by less than one maximum diameter (side view). The scape extends only slightly past the posterior lateral corner of the

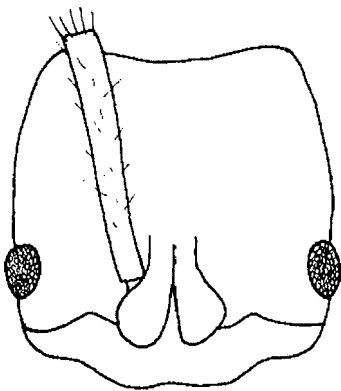


Fig. 504. Head of a worker of *P. harpax* (Puntarenas, Costa Rica).

head. The *pronotal shoulder is nearly always formed into a definite carina*, which passes forward on the anterior

lateral surface of the pronotum. The *metanotal suture is absent* on the dorsum of the mesosoma or is only slightly developed. The *petiole is rectangular-shaped* with the anterior and posterior faces being nearly parallel, the posterior surface forming definite bend with the dorsal surface. Posteriorly the petiole has sharp lateral borders which define the posterior face. The *anterior face of the post-petiole may be slightly concave*.

Erect hairs are abundant on most surfaces, including the mandibles, clypeus, scapes, dorsum of the head, region near the eyes, ventral surface of the head, dorsum of the mesosoma, petiole and all surfaces of the gaster, the hairs on the tibiae are mostly suberect. Appressed golden pubescence is abundant on most surfaces.

The *mandibles are smooth and glossy* with scattered punctures, most of the dorsum of the head is covered with dense punctures, as is the mesosoma and petiole, the punctures on the dorsum of the gaster are more scattered and much of the gaster is smooth and glossy.

Female

The *female is slightly larger* (total length over 10 mm) and is similar to the worker except the mesosoma is more massive and some structures, especially the side of the pronotum, mesopleuron and the side of the propodeum, are striate. The metanotal suture is well developed, forming a definite metanotum. The wing has the typical venation of members of the genus.

Erect hairs are abundant on essentially all of the surfaces, including the mandibles, dorsal and ventral surfaces of the head, sides of the head, clypeus, scapes (often longer than the diameter of the scape),

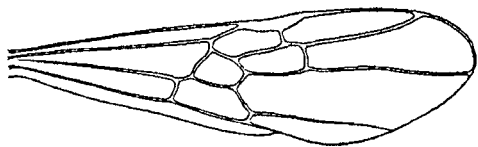


Fig. 505. Forewing of a female of *P. harpax* (from Creighton, 1950).

mesosoma, petiole and gaster. Fine golden appressed pubescence is present on all surfaces except the mandibles and is especially obvious on the head and gaster.

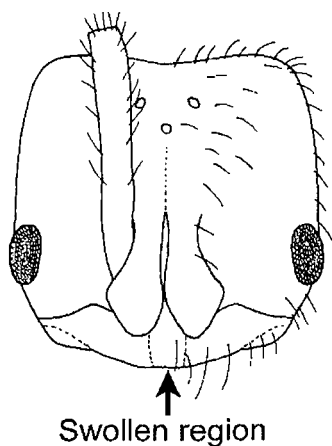


Fig. 506. Head of a female of *P. harpax* (Petén, Guatemala, CWEM).

The mandibles are finely sculptured and mostly smooth and glossy, the head and mesosoma are densely punctured and weakly shining, the gaster is finely punctured and moderately smooth and glossy.

Male

The male is also a *moderate sized* specimen (total length about 9 mm) *black* with brown legs. The *eye is large*, covering more than half of the side of the head. The *pronotal carina*, which is well developed in both the worker and female, *is lacking*. The metanotal suture is well developed, as is the metanotum. The petiole is somewhat rectangular shaped but is definitely narrowed toward the apex, with a rounded node (not developed into a definite dorsal surface). The posterior face of the petiole is not defined by a carina. There is considerable variability in the shape of the subpetiolar process.

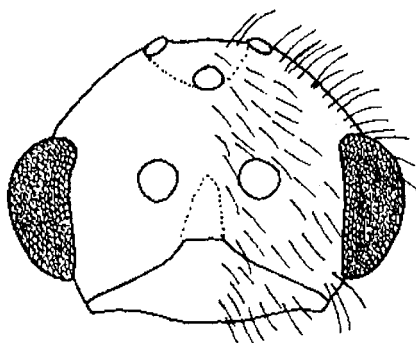


Fig. 507. Head of a male of *P. harpax* (Baños, Ecuador, CWEM).



Fig. 508. Petioles of males of *P. harpax* (Nayarit, México, Jalisco, México and Los Planes, El Salvador, CASC) showing the variation in the subpetiolar processes.

Erect hairs are abundant and scattered on most surfaces; the hairs on the tibiae are mostly suberect.

Most surfaces are coriaceous and at least weakly shining, although most of the surface is hidden by appressed golden pubescence.

COMPARISON

Pachycondyla harpax is the most common species in the New World and is also widely distributed. The worker can be separated from most other species in the genus as it lacks the malar carina and the eye is small but is located less than one maximum diameter from the anterior edge of the head (side view). The pronotal carina is poorly developed but forms a shiny raised line (usually), the metanotal suture is absent on the dorsum of the mesosoma and the petiole is rectangular shaped with a distinct dorsal face and the posterior lateral margin forms a sharp carina, which is barely evident as it passes to the anterior edge of the petiole. The anterior face of the postpetiole forms a right angle with the dorsal face, which

may be slightly concave.

The sharply angulate anterior face of the postpetiole of *P. harpax* could cause confusion with *P. procidua*, but they can be easily separated as the metanotal suture of *P. procidua* breaks the sculpture and the petiole of *P. procidua* has a vertical anterior face and broadly rounded posterior face, which meet near the anterior edge of the apex of the petiole in a sharp angle. The basically rectangular-shaped petiole of *P. harpax* could cause confusion with *P. crassinoda*, *P. striata*, and *P. impressa*. *Pachycondyla harpax* can be easily separated from all three of these species by its much smaller size (the workers of the other three species are usually at least 10 mm in total length). *Pachycondyla harpax* can be separated from smaller specimens of *P. impressa*, as the pronotal carina is present, at least as a shiny raised line, not nearly rounded as in *P. impressa*. It lacks the clypeal carina found in *P. lenis* of Brasil and although the pronotal carina is poorly developed, it is still obvious (nearly always) at least as a shiny raised line against the dull sculpture, not completely absent as in *P. lenis*.

John Longino refers to specimens which lack the pronotal carina as JTL-003. All specimens from the southern Pacific lowlands (Osa Peninsula) lack the carina, everywhere else in Costa Rica they have it (Longino, pers. comm.). They are not sympatric with the "normal" *P. harpax* and may represent a separate species. Longino also has a collection of this phenotype

from the state of Barinas, Venezuela. We will recognize them as only a minor geographic variant in this revision.

DISTRIBUTION

UNITED STATES: *Louisiana* (Naomi, Sam Houston Jones State Park, Westwego, White Castle, DeRidder, Provencal, Vernon Leesville-Fort Polk); *Texas* (Austin, Houston, Bastrop State Park, Camp Swift, College Station, 10 k N Kurten, 13 k S Falfurrias, Harlingen [a specimen was collected in quarantine in San Bernardino, CA, LACM], W of Harlingen, San Antonio, Fort Sam Houston, Steven F. Austin State Park, 2 mi W Wimberley, 15 mi E Rio Hondo, Barksdale, La Grange, Fredericksburg, 9 mi SE Fredericksburg, Garner State Park, Helotes, Anzalduas County Park, Mission, 12 mi N Mission, Alice, 4 k N Alice, Kenedy, 5 k SW Junction, Weynand Cave [Reddell and Cokendolpher, 2001], 4 mi W Caldwell, Brownsville, Big Creek Scenic Area, Sam Houston National Forest, 0.5 mi S Fronton, Welder Wildlife Refuge, Long Hollow Creek, 13 mi NE Minneola, Texas Anderson Engling WMA, Del Rio, New Braunfels, Waco, Huntsville, Brownsville, San Marcos, Brazos Co. (White Creek Road), Beeville [Pergande, 1895]). MEXICO: *Nuevo León* (Monterrey); *Tamaulipas* (Los Cedros @ Gómez Farias, 4.5 k W Gómez Farias, Ciudad Valles, Gómez Farias, Antigua Morelos, Sótano del Molino [Reddell and Cokendolpher, 2001], Sótano de la Joya de Salas [Reddell and Cokendolpher, 2001]),

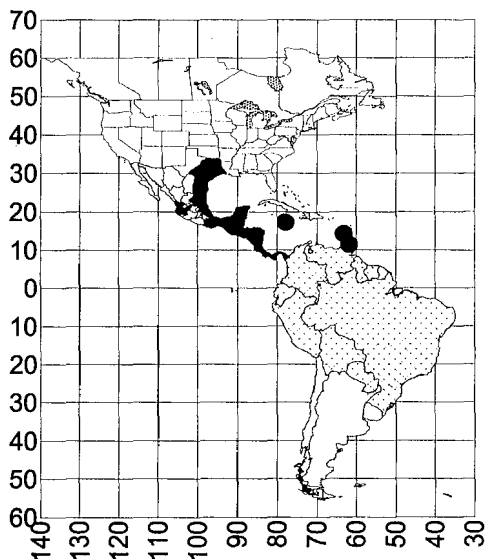
Sótano de el Molina); *San Luis Potosí* (Tamazunchale, 7 mi SE Tamazunchale, Ciudad Valles, 7 mi NE Valles, Sótano del Arroyo [Reddell and Cokendolpher, 2001], Cueva Chica [Reddell and Cokendolpher, 2001], Sótano de Yerbaniz [Reddell and Cokendolpher, 2001]); *Jalisco* (Puerto Vallarta); *Veracruz* (Tlapacoyán, 6.5 k N Tierra Blanca, 2 k NE Orizaba, 6 k N Cárdenas, 10 k N Cárdenas, Uxpanapa, Cañon SW Río Metlac, Pueblo Nuevo [near Tezonapa], Zapoapán, Cruz Paraje Nuevo Nacimiento, Fortín de las Flores, 2 mi W Fortín, 1 mi N Mina Titlán, Citlaltepētī, Córdoba, Orizaba, near Tezonapa; Los Tuxtlas [Horvitz and Schemske, 1986b; Quiroz and Valenzuela, 2003], 17 k N Santiago Tuxtlas, Río Atoyac [near Córdoba]); *Nayarit* (Tepic [Pergande, 1895], 35.7 k SE Tepic, 48 k SE Tepic, 54 k S Rosamorada, 6 mi E San Blas, 48 k SE Tepic); *Hidalgo* (6 mi SW Chapulhuacán); *Oaxaca* (Grutas de Monteflor [Reddell and Cokendolpher, 2001], Sótano Sin Hondo [Reddell and Cokendolpher, 2001], 5 k S Acatlán); *Chiapas* (Tuxtla Chica, 5 mi W Palenque, 10 k S Palenque, Volcán Tacaná, Agua Azul, La Victoria, 4 mi N Tierra Blanca); *Tabasco* (10 k N Cárdenas, 3 k SE Teapa, Agua Blanca, Batancán, 6 k W Flores); *Campeche* (10 E Campeche, Actún Halmensura [Reddell and Cokendolpher, 2001]); *Yucatán* (Chichén Itzá, Góngara Cave, Cueva de Orizaba [Reddell and Cokendolpher, 2001], Actún Sabacá [Reddell and Cokendolpher, 2001], Grutas de Tzab-Nah [Reddell and Cokendolpher, 2001], Actún Xpujil

[Reddell and Cokendolpher, 2001], Actún Ziz [Reddell and Cokendolpher, 2001], Oxcutzcab, 6 k S Tekax); *Quintana Roo* (Reserva Ecológica El Edén, Puerto Morelos, Vallarta). BELIZE: *Cayo* (Pine Mountain Ridge, San Ignacio); state unknown (Cockscomb Basin [Jaguar Preserve]); *Belize* (Manatee), *Yoro* (Subirana); *Stann Creek* (Hummingbird Gap, 5 k NW Stann Creek). GUATEMALA: *Petén* (Tikal, Estación Biológica Las Guacamayas); *Chiquimula* (Los Amantes); *Zacapa* (without locality); *Sololá* (Patulul); *Alta Vera Paz* (Secanquim, Estación Biológica Lechua); *Izabal* (Biotipo Chocón Machaca, Parque Arqueológico Quiriguá); *Suchitpéquez* (Cocales); *Escuintla* (Escuintla, Finca Montijo); *Guatemala* (Guatemala City); *Zacapa* (Zacapa); *Izabal* (Quiriguá); *Quiché* (16.5 k NE Uspantán); *Sololá* (Patulul). EL SALVADOR: *Libertad* (Quezaltepeque, Mount San Salvador, 4 k N Quezaltepeque); *Santa Ana* (Los Chorros); *Usulután* (Los Planes [Puerto del Diablo]). HONDURAS: *Santa Barbara* (El Sauce); *Atlántida* (near Tela), *Francisco Morazán* (Augustine); *Gracias a Dios* (Patuca Bar). NICARAGUA: *Matagalpa* (Hotel Selva Negra); state unknown (Santa Maria de Osuma); *León* (La Trinidad); *Granada* (Volcán Mombacho); *Rio San Juan* (5.1 mi SE El Castillo [Bartola]). COSTA RICA: *Guanacaste* (Miravalles E of Bagaces, 8.5 k WNW Bages, 4.5 k W Bagaces, 9.5 k NW Bagaces, 7 k WNW Bagaces, 13.5 k E Bagaces, Lomas Barbudal Reserve, Maritza Field

Station, Cacao Field Station, Santa Rosa National Park, Agua Caliente, Finca La Pacífica); *Alajuela* (Hamburg Farm); *Puntarenas* (Parque Nacional Corcovado, Sirena, Golfito, Fundación Neotrópica, Cerro Helado, Reserva Biológica Carara, Parque Nacional Manuel Antonio); *Cartago* (Cartago [Wheeler, 1925]), Turrialba, 3 k S Turrialba); state unknown (Green Turtle); *Limón* (Tortuguero, Marta de Siquirrez); *Heredia* (Estación Biológica La Selva, vicinity of Guápiles, Puerto Viejo, 3 k S Puerto Viejo, 17 k S Puerto Viejo, 5 k SW Puerto Viejo, 8 k SW Puerto Viejo, 13 k SSW Puerto Viejo). PANAMA: *Coclé*: (Cerro Gaital, La Mesa above El Valle); *Panamá* (El Valle de Antón, Ancón, Barro Colorado Island, Cerro Trinidad, Frijolito, El Lano - Cartí Road, Paraíso, Parque Soberanía, Miraflores, Mandingo, Gamboa, Los Sabana, Cerro Campana, Caña); *San Blas* (Nusagandi); *Darién* (Estación Peresinico, Serrania de Pino). COLOMBIA: *Guajira* (Don Diego, Dibulla [Forel, 1912]); *Magdalena* (Santa Marta [Wheeler, 1925]), Santa Marta Mountains, 4 k N San Pedro, San Antonio [Forel, 1912], Cañaverál); *Cauca* (Isla Gorgona [Baena, 1993], Popayán [Sandoval and Zambrano, 2007]); *Tolima* (Ibagué, Mariquita [Sandoval and Zambrano, 2007]); *Meta* (San Juan de Arama, border with Cundinamarca, San Juan); *Huila* (Neiva, 8 k S Neiva, Colombia, 52 k S Colombia, 1 k N Villavieja, 3 k N Rivera, 2 k E Rivera, 3 k E Rivera, 8 k W La Plata, 10k W

Palermo, 10 k SE Hobo, 6 k W La Plata); *Valle del Cauca* (Medio Calima); Fernandez (1990) lists *Cundinamarca*, *Sucre* and *Amazonas*, in addition to the some of the states listed above. ECUADOR: State unknown (Aquamo); *Imbabura* (Apuelo); *Tungurahua* (Baños, 2 mi W Baños); *Esmeraldas* (31.7 k NW Lita); *Pichincha* (Endesa Forest Reserve, 13.5 k NW Santo Domingo de los Colorados, La Unión del Río Toachi); *Guayas* (20 mi NE Santa Elena); *Napo* (Tiputini Biodiversity Station, Yasuni National Park); *Napo-Pastaza* (6-8 mi W Mera); *Zamora-Chinchipe* (Zamora, Cumbaratza); *Los Rios* (Río Palenque, Río Palenque Biological Station, C. C. R. Palenque); *Morona-Santiago* (Sucúa). PERU: *Cuzco* (Machu Picchu, Pueblo Cuzco, Vilcanota, La Convención [Escalante, 1993]); *Pazco* (Chontilla [22 k SE Iscozazin]; *Madre de Dios* (Los Amigos Research Center, 30 k SW Puerto Maldonado); *Junín* (Perené [El Campamiento, Wheeler, 1925]); *Huánuco* (Río Charape [Wheeler, 1925]); *Puno* (Llínquipata [= Llinquipata, Wheeler, 1925]); state unknown (Chaquimayo [Wheeler, 1925, possibly Chaupimayo, state of Cuzco?], Cocha Cashu, Reserva Tambopata). VENEZUELA: *Distrito Federal* (Parque Avila, Instituto de Estudios Avanzados, Caracas); *Carabobo* (San Esteban); *Bolívar* (Canaima). TRINIDAD: *Saint George* (Saint Augustine); *Port of Spain* (Port of Spain). GUYANA: *Demerara-Mahaiica* (Dunoon); *Cuyuni-Mazaruni* (Camaria near Kartabo [Wheeler, 1925], Forest Settlement [Río

Mazaruni], Kartaba Point); *Berbice-Courantyne* (Oronoque River); *Bari-ma-Waini* (Wauna & Tokomaru). FRENCH GUIANA: *Cayenne* (35 k W Sinnamary). BRASIL: *Amapá* (Serra do Navio [Kempf (1961)]; *Amazonas* (Belém [Overal, 1987], Tio Taruma [Mirim-Igapó]); *Rondônia* (Mann [1916] lists Porto Velho, Abuná and Camp 41 [Madeira-Mamoré Railroad]); *Pernambuco* (Tapera); *Pará* (Manaus [Mann, 1916], Tucurul); *Espírito Santo* (Santa Teresa); *Minas Gerais* (Dr. Lund, Pirapora, Viçosa [Campos et al., 2003]); *Goiás* (Campinas); *Mato Grosso* (Chapada dos Guimarães); *Distrito Federal* (Campus UnB, NE Lago Paranoá [Sandoval and Zambrano, 2007]); *São Paulo*



Map 45. *Pachycondyla harpax*.

(Agudos, São Paulo, I. do Cardoso-Mata); *Rio de Janeiro* (Petrópolis, Rio de Janeiro); *Raíz da Serra* (Salto

Grande); *Santa Catarina* (Ibirama, Novo Teutônia, Iguasou); *Rio Grande do Sul* (Erechim). BOLIVIA: *El Bení* (C Esperanza, Huachi Bení, Covendo, Rurrenbaque, Riberalta); *Santa Cruz* (Santa Elena, 26 k W Santa Cruz, 3.7 k SSE Buena Vista Hotel, San Fernando Rapida); *Cochabamba* (109 k E Cochabamba, 117 k E Cochabamba); *La Paz* (Mapiri, Caña-mira, Tumupasa, Lower Río Madidi); *Santa Cruz* (San Fermin [Wheeler, 1925]). Wild (2002) reports it from the following localities in PARAGUAY: *Amambay* (Parque Nacional Cerro Corá); *Canindeyú* (Tendal, Ita Poty); *Cordillera* (Caacupé). ARGENTINA: *Misiones* (8 k NE San Androvito). JAMAICA: *Elizabeth Parish* (Balacava). GRENADA: (Grand Etang).

HABITAT

These ants are found in a wide variety of habitats, ranging from dry forest, late dry season gap forest, urban environments, parks, grassy areas, coffee, cacao and banana plantations, cypress swamps, to oak forests, oak riparian forests, rocky wet quebradas [streams], arid scrub, palm thorn forests, tropical deciduous forests, tropical evergreen forests, second growth tropical forests, transitional bamboo/cloud forest, old growth dry tropical forest, steep rocky forest slopes, ridge forest, wet mountain forests, riparian rain forest, montane evergreen forest, lowland forests, cloud forest and riparian tropical rain forests. This species has been collected in caves near the entrances (Reddell and Cokendolpher,

2001). They occur from sea level to 2000 meters.

BIOLOGY

Nests are found in the soil often under stones (Buckley, 1866) or pieces of wood, or in rotten logs, in organic matter on top of rotten logs and under cow dung (Pergande, 1895). Logs may be very large (1+ meter diameter, 2+ meters long); stones may be very heavy (200+ kg). Soils vary from clays to sandy gravel. A nest gyne was found at a soil depth of 50 cms. One nest was found in the abandoned nest of the native fire ant *Solenopsis geminata*. They can nest in a wide variety of soils ranging from clay to sand. Workers are commonly collected in Winkler extractions and in pitfall traps. Brood was found in nests in July (Guatemala), August (USA) and November (Colombia). Sexu- als were found in nests in February (Bolivia), March to June (Texas, Mexico, Ecuador), April (México) and November (Colombia). Alate females have been collected in February (Perú) and April (Texas, Costa Rica). Dealate females have been collected in May (Mexico), June (Mexico, Costa Rica, Colombia), July to September (Mexico, Colombia), August (USA, Ecuador), October (USA, Venezuela, Bolivia) and December (México, Colombia). Loose males have been collected in January (México), February (Ecuador), April (USA), July (México, El Salvador), between January and July (Ecuador, canopy fogging), August (México), October (Panamá) and November (México)

and December (México, Costa Rica). The nests have multiple ergatomorphic females (Wheeler, 1900).

Workers are predaceous (Maes, 1989) and forage primarily on the ground. They can be collected in surface traps baited with mealworms or tuna and pitfall traps. A few workers have been collected in baits hanging in the vegetation, especially trees. This species preys on worker termites (*Gnathamitermes tubiformans*) in northern México (García-Pérez et al., 1977). Workers are alert and fast and normally not very aggressive when the nest is disturbed. Wheeler (1900) describes interesting worker behavior: they fold their antennae and “peep out” of holes and crevices in the soil “like a rat”. Workers produce foam from the tip of the gaster (Maschwitz et al., 1981; Overal, 1987), similar to workers of *P. striata*.

These ants are found in the same areas as *P. apicalis* and one nest was in the refuse of an *Atta mexicana* nest. Baena (1993) reported that *P. harpax* nests together with ants of the genus *Leptogenys*.

Foragers disperse the seeds of *Calathea ovandensis* (Marantaceae) approximately 75 cm from where they are collected (Horvitz and Schemske, 1986b).

This species is parasitized by a phorid fly *Metopina pachycondylae* (see Wheeler and Wheeler, 1952 for a survey of the literature) as well as *Apocephalus* sp.

Hung and Vinson (1975) describe the male reproductive system.

ETYMOLOGY

The name of this species may be based on the Latin word *harpe*, meaning sword and possibly referring to the sting.

***Pachycondyla hispida* new species**

Figures - **Worker**: 38 (mandible), 509 (side view), 510 (head and mandible);
Female: 511 (side view), 512 (head); **Map** 46

aenescens species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is an *intermediate sized* (total length 8-9 millimeters) *black* ant with dark reddish brown appendages. The mandibles have about 11 – 14 teeth, the basalmost teeth are poorly defined. The anterior margin of the clypeus is broadly convex. The head length is 2.35 mm; the head width is 1.9 mm. The sides of the head are rounded, but only slightly narrowed anteriorly and posteriorly. The posterior margin is slightly concave. The *malar carina* is *absent*. The eye (maximum diameter 0.5 mm) is located about one diameter from the anterior edge of the head (side view). The *scape* (2.5 mm) *extends about 1/3 length past the posterior lateral corner* of the head. The *pronotal shoulder* is *slightly swollen* but does not form a carina. The *promesonotal* and *metanotal sutures* are *deeply impressed* on the dorsum of the mesosoma and break the surfaces. The *propodeal spiracle* is *slit-shaped*. The apex of the petiole is broadly rounded with a convex posteriorly sloping anterior face and a nearly vertical posterior face. The dorsal face is

poorly defined. The subpetiolar process consists of an anterior or downwardly directed angle and then gradually diminishes in thickness posteriorly. The anterior face of the postpetiole is broadly rounded.

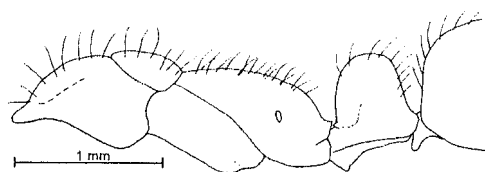


Fig. 509. Mesosoma and petiole of the holotype worker of *P. hispida*.

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin, *antennal scapes*, dorsum of the mesosoma, dorsum of the petiole, on the subpetiolar process and all surfaces of the gaster. Erect or suberect hairs are present on the legs, but are sparse. Appressed golden pubescence is fine but abundant on the head, especially on the regions posterior to the eyes, on the dorsum of

the mesosoma, the dorsum of the petiole and all surfaces of the gaster.

The *mandibles are smooth and glossy* with scattered punctures, most of the remainder of the ant, including the head and mesosoma, are punctate and dull with fine striae present on the mesopleuron and the side of the propodeum. The petiole and gaster are mostly smooth and glossy with fine insignificant punctures.

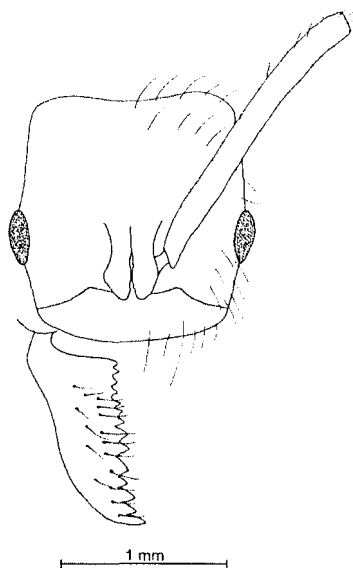


Fig. 510. Head and mandible of the holotype worker of *P. hispida*.

Female

The female is a *moderate sized* (total length 9 mm) mostly shining black ant. The mandible has approximately 12 teeth, the apicalmost teeth are well defined, the basalmost teeth are poorly defined with many

reduced to denticles. The anterior margin of the clypeus is broadly convex (slightly concave medially). The head length is 2.1 mm; the head width 1.9 mm. The *malar carina is completely absent*; the eye (maximum diameter 0.75 mm) is located approximately one diameter from the anterior margin of the head (side view). The *eyes are strongly protruding* from the sides of the head. The *scape (3.7 mm) extends more than 1/3 length* past the posterior lateral corner of the head. The head is widest at the point of the eyes and narrowed both anteriorly and posteriorly, the posterior margin is nearly straight or slightly convex. The *pronotal shoulder is swollen* but does not form a carina. The *propodeal spiracle is slit-shaped*. The petiole is moderately thickened when viewed in profile with a broadly rounded apex. The subpetiolar process consists of a ventrally directed tooth followed by a region which gradually diminishes in width posteriorly. The second pretergite is hidden and the arolia are poorly developed.

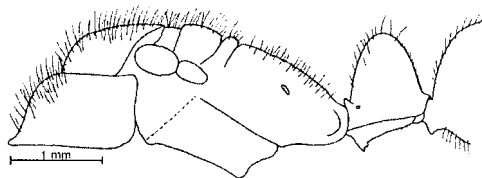


Fig. 511. Mesosoma and petiole of a female of *P. hispida* (Nariño, Colombia, IAVH).

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head and sides of the head. The shaft of the scape has numerous fine erect hairs in addition to scattered longer (longest hairs 0.1 mm) erect hairs. Erect hairs are abundant on the mesosoma and legs (including the tibiae), dorsum of the petiole and all surfaces of the gaster. Golden appressed hairs are present on most surfaces, but are not abundant and do not hide the surface.

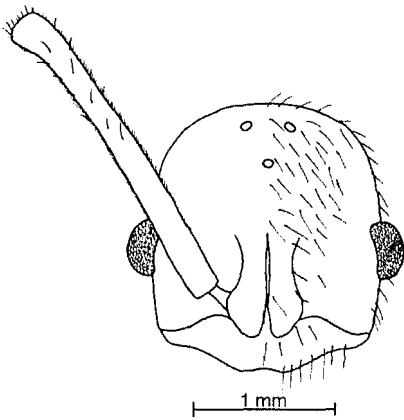


Fig. 512. Head of a female of *P. hispida* (Nariño, Colombia, IAVH).

The dorsal surface of the mandible is smooth and glossy with scattered punctures. The head is punctate with the punctures arranged somewhat in longitudinal rows. The mesosoma, petiole and gaster are mostly smooth and glossy with scattered punctures.

Male

Unknown.

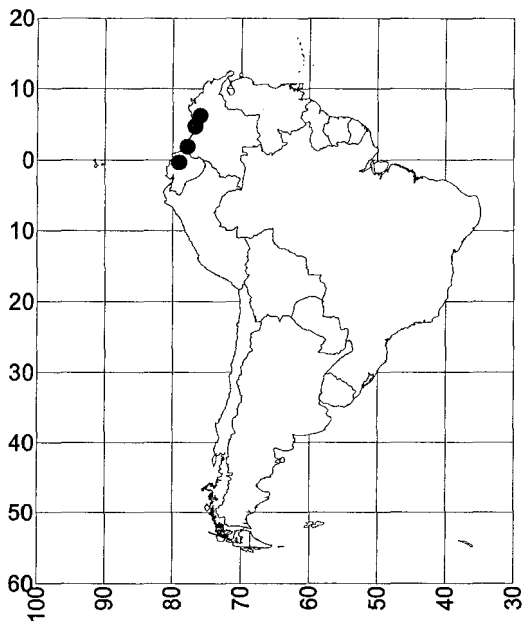
COMPARISON

The worker of *P. hispida* is nearly identical to that of *P. fauveli*, differing only in having shiny mandibles and erect bristly hairs on the shaft of the scape. *Pachycondyla hispida* could be confused with the similar *P. holcotyle*, but can be separated as *P. hispida* lacks the striae on the side of the petiole that are present in *P. holcotyle*.

The female of *P. hispida* is nearly identical to that of *P. fauveli*, but can be separated by the short erect hairs, the fine erect hairs on the scapes and by the smooth and glossy mandibles of *P. hispida*. The hairs are absent or if present are longer (> 0.1 mm) in the female of *P. fauveli*, the fine erect hairs are absent or very tiny and the mandibles are striate. The smooth and shiny mesosoma of the female of *P. hispida* would further separate the two, as it is striate or otherwise sculptured in *P. fauveli*.

DISTRIBUTION

COLOMBIA: *Valle del Cauca* (Farallones [Reserva Hato Viejo, MCZC], Municipio La Cumbre $3^{\circ}33'56''N$ $76^{\circ}35'3''W$, IAVH)]; *Nariño* (Municipio Ricaurte [$1^{\circ}6'42''N$ $75^{\circ}1'37''W$, IAVH], Reserva Natural La Planada [$1^{\circ}15'N$, $78^{\circ}15'W$, IAVH])). ECUADOR: *Cotopaxi* (Otonga [QCAZ, $00^{\circ}19'11''S$, $78^{\circ}57'00''W$]).

Map 46. *Pachycondyla hispida*.**HABITAT**

Pachycondyla hispida is found in primary rain forest and cloud forest at

1800 - 2020 meters, as well as in a pasture.

BIOLOGY

The holotype and one paratype were collected in a pitfall traps, the second paratype was in a nest under a stone. A dealate female was collected in a pitfall trap in September (Colombia).

ETYMOLOGY

From Latin, *hispidus*, meaning bristly or prickly, referring to the hairs on the antennal scape.

TYPE SERIES

Holotype worker (MCZC) and two paratype workers (CWEM, MCZC), COLUMBIA: Farallones: Reserva Hato Viejo m. 1.vii.1991 Leg. Javier Bustos.

Pachycondyla holcotyle new species

Figures - **Worker**: 30 (subpostpetiolar process), 39 (petiole), 272 (side view), 513 (metasternal process), 514 (head); **Map** 47

aenescens species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *large* (total length about 13 mm) *black* ant. The mandible has 12 or 13 teeth. The head is 2.16 mm in length, the width 1.68 mm. The anterior border of the clypeus is broadly convex and slightly indented medially. The *malar carina is not developed*. The eye (maximum diameter 0.4 mm) is located slightly more than one maximum diameter from the anterior edge of the head (side view). The scape (length 2.18 mm) extends approximately the first funicular segment past the posterior lateral corner of the head. The sides of the head are broadly rounded, the posterior border is convex. The *pronotal shoulder is swollen but does not form a well-developed carina*. The *metanotal suture is developed* and well depressed below the level of the remainder of the mesosoma. The *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with a *broadly rounded dorsal face*. The anterior face of the postpetiole is vertical and rounded into the dorsal face. The *stridulatory file is well*

developed on the second pretergite. The lobes of the metasternal process are widely separated and less developed than the other species in the *aenescens* complex.



Fig. 513. Metasternal process of a worker of *P. holcotyle* (paratype, CWEM), as seen from behind.

Erect hairs are abundant on most surfaces, including the mandibles, the clypeus, *scapes*, the dorsal and ventral surfaces of the head, the posterior margin of the head, the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster. The

hairs on the legs are erect or nearly erect. *Golden appressed pubescence is found on most surfaces*, especially the head, the mesosoma, the petiole and the postpetiole.

The dorsal surface of the mandible is smooth and moderately polished and the dorsum of the head is densely punctate with punctures forming striae, the dorsum of the mesosoma is mostly punctate, with the region between the punctures being smooth and glossy, the side of the pronotum and mesopleuron are finely punctate and shining, the side of the propodeum is striate and moderately shining. *The sides of the petiole are covered with coarse striae.* The gaster is mostly finely punctate and smooth between the punctures.

Female and Male

Unknown.

COMPARISON

Pachycondyla holcotyle is apparently a member of the *aenescens* species complex, as it lacks the malar carina and the pronotal carina, the mesosoma is depressed at the metanotal suture, the anterior and posterior faces of the petiole are nearly parallel and the stridulatory file is well developed. *Pachycondyla holcotyle* can be separated from the other members of the *aenescens* species complex by the presence of striae on the side of the petiole. The overall shape and the glossy surface of the mandibles of *P. holcotyle* could cause confusion with *P. hispidia* from Colombia and Ecuador. *Pachycondyla*

holcotyle can be distinguished by the striae on the side of the petiole, which are absent in *P. hispidia*.

The shape of the petiole of *P. holcotyle* is similar to that of members of the *apicalis* complex, which may show a relationship between the two complexes. *Pachycondyla holcotyle* can be easily separated from the *apicalis* species complex by the lack of the malar carina. *Pachycondyla holcotyle* can be easily separated from *P. apicalis* by the abundant erect hairs on the dorsum of the mesosoma.

Pachycondyla holcotyle is similar to the widespread *P. harpax*, but can be recognized by the coarse striae on nearly all surfaces of the petiole, except for the lower half of the side. These striae are lacking in *P. harpax*.

Pachycondyla holcotyle could be confused with members of the *foetida* species complex by the presence of the stridulatory file on the second pretergite. The striae on the side of the petiole of *P. holcotyle* are similar to those in Central and South American *P. foetida*. It can be easily separated by the lack of the malar carina.

The form of the petiole of *P. holcotyle* is similar to that of members of the *crenata* species complex, especially *P. crenata* and its close relatives. It can be distinguished by the presence of striae on the side of the petiole, by the lack of the pronotal carina and the depression at the metanotal suture. *Pachycondyla striatinodis* of the *crenata* species complex has striae on the side of the petiole, but the shape of the petiole is entirely different than that of *P.*

holcotyle, with a vertical anterior face and a broadly rounded posterior face. It is widely distributed in Central and South America.

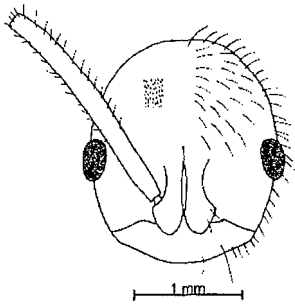


Fig. 514. Head of the holotype worker of *P. holcotyle*. Only a small portion of the sculpture is shown.

DISTRIBUTION

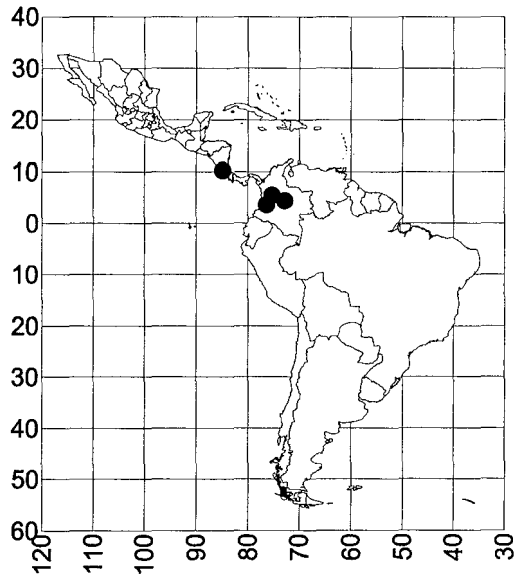
COSTA RICA: *Guanacaste* (Loma Barbudal [CWEM]). **COLOMBIA:** *Antioquia* (Palmitas [MCZC]); *Meta* (75 k E Puerto López [CWEM]); *Valle del Cauca* (holotype).

HABITAT

This ant is found in seasonal dry forests and grasslands

BIOLOGY

Unknown, specimens have been collected loose on the ground.



Map 47. *Pachycondyla holcotyle*.

ETYMOLOGY

From Greek, *holkos*, meaning attractive and *tylos*, meaning knot or lump, referring to the attractive sculpturing on the petiole of this species. The name was suggested by William Brown.

TYPE SERIES

Holotype worker (MCZC), 1 paratype worker (CWEM), **COLOMBIA:** 6 mi. W of Cali, Valle, III-20-55, 1630m; E. I. Schlinger & E. S. Ross collectors.

***Pachycondyla holmgreni* (Wheeler)**

Figures - **Worker**: 515 (side view), 516 (head and mandible), 517 (leg); **Map**

48

ochracea species complex

Euponera (*Trachymesopus*) *holmgreni* Wheeler, 1925:6-9, ♀, Perú: without locality [holotype worker seen, designator unknown, MCZC, 2 specimens were listed in description]; *Trachymesopus holmgreni*: Kempf, 1960a:424; *Pachycondyla holmgreni*: Bolton, 1995:306

DISCUSSION**Worker**

The worker is a *small* (4.5 mm total length) *pale brown* specimen. The *mandible apparently has seven teeth* (four basalmost teeth and an apical tooth well defined, the other two located between the four basal teeth and apical tooth and are poorly defined). The *mandible has a depressed region near the base* followed by a short (0.1 mm) furrow. The anterior border of the clypeus is slightly concave medially with a *small raised medial tooth* along a poorly defined longitudinal carina. The head length is 0.92 mm; the head width is 0.89 mm. The head is narrowed anteriorly and the posterior margin is concave. The *eye is apparently absent*. The scape (0.58 mm) extends to within the first two funicular segments of the posterior lateral corner of the

head. The *dorsum of the mesosoma is nearly straight* and the *metanotal suture is poorly developed*. The *pronotal shoulder is without a carina*.

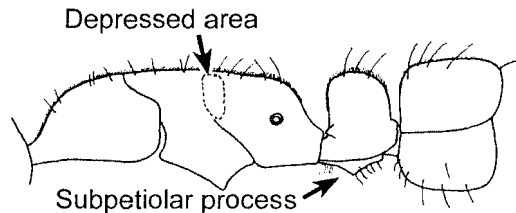


Fig. 515. Mesosoma, petiole and postpetiole of the holotype worker of *P. holmgreni* (MCZC).

The *propodeal spiracle is circular-shaped*. The *petiole is thickened* when viewed in profile. The anterior face is 0.28 mm in length, the dorsal face is

holmgreni Perú, Trinidad, Guianas, southeastern Brasil

0.23 mm in length and the posterior face is 0.16 mm in length. The anterior face is nearly vertical, the dorsal and posterior faces form a broadly rounded surface. The subpetiolar process consists of a swollen nearly angulate anterior process, which gradually diminishes in width posteriorly. The second pretergite is not visible.

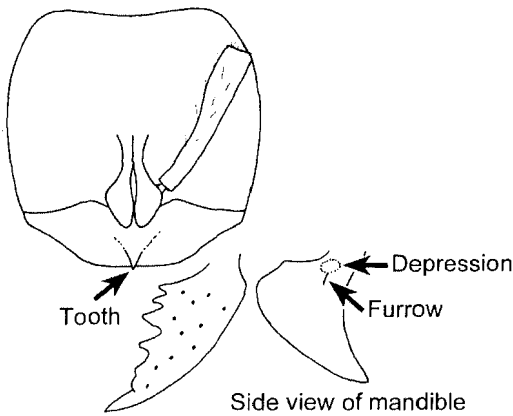


Fig. 516. Head and mandible of the holotype worker of *P. holmgreni* (MCZC). The insets show the mandible in frontal and side view.

The clypeus has several moderately long (up to 0.24 mm in length) erect hairs. The dorsal surface of the head is covered by an abundance of bristly short (0.06 mm in length) erect hairs. The ventral surface of the head has a few long (0.08 - 0.28 mm) erect hairs. The dorsum of the mesosoma has several erect hairs

(0.06 - 0.12 mm). The hairs on the dorsum of the petiole, on the subpetiolar process and all surfaces of the gaster are similar to those on the mesosoma. The legs have a few erect hairs. The middle tibia has a number of coarse setae on the extensor surface.

The mandibles are smooth and glossy with scattered punctures. The head and mesosoma are very finely but densely punctate and dull. The sculpture on the petiole and gaster is finer and the surfaces are moderately smooth and shining.



Fig. 517. Middle left tibia and tarsus of the holotype worker of *P. holmgreni* (MCZC) as seen from the front.

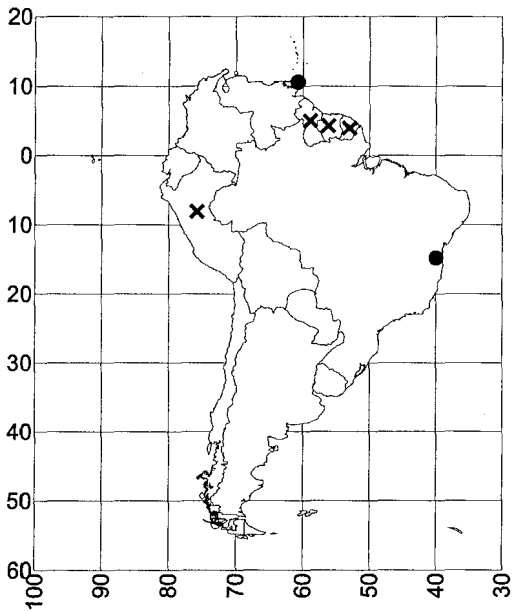
Female and Male

Unknown.

COMPARISON

The worker of *P. holmgreni* is nearly identical to that of *P. gilva*. It differs in having larger mandibles with more teeth, having a tooth on the medial border of the clypeus, not having a slightly depressed dorsal propodeal face as compared to the level of the mesonotum and lacking the translucent anterior half the

subpetiolar process. *Pachycondyla holmgreni* can be separated from *P. mirabilis* by having most surfaces dull or only weakly shining, not smooth and glossy as in *P. holmgreni*.



Map 48. *Pachycondyla holmgreni*. The X's indicate unspecified localities.

DISTRIBUTION

PERÚ: (Wheeler, 1925). TRINIDAD: *Saint George* (Arima Valley [Aripo Ridge, MCZC]). GUIANAS (Kempf, 1972). BRASIL: *Bahia* (CEPEC [Ilhéus, MCZC]).

HABITAT

This species has been collected in mature montane rainforest, between 550 - 650 meters.

BIOLOGY

One worker was collected under a stone.

ETYMOLOGY

This species is named in honor of Mr. N. Holmgren, who collected the type series.

holmgreni Perú, Trinidad, Guianas, southeastern Brasil

***Pachycondyla impressa* (Roger)**

Figures - **Worker**: 56 (larva), 64, 65 (clypeus), 244 (pronotum, side view), 246 (pygidium), 248 (mandible), 250 (clypeus), 518 (side view), 519 (metasternal process), 520 (head and mandibles); **Female**: 255 (petiole), 521 (side view), 522 (head); **Male**: 55 (fore wing), 297 (head), 523 (side view); **Map** 49

crassinoda species complex

Ponera (*Pachycondyla*) *impressa* Roger, 1861a:6-8, ♀, Colombia: without locality; *Pachycondyla impressa*: Mayr, 1863:439; Roger, 1863a:18; Dalla Torre, 1893:34, Kempf, 1961:195-197 *Pachycondyla* (*Pachycondyla*) *impressa*: Emery, 1901a:45

Pachycondyla fuscoatra race *trans-versa* Emery, 1890a:58, ♀ 1890b:42, 1894b:48 [described three times], ♀, Costa Rica, Alajuela, Juan Viñas [lectotype worker and 2 paralectotype workers here designated, MCSN]; *Pachycondyla fuscoatra transversa*: Forel, 1899:12; Forel, 1908:38, ♀; *Pachycondyla transversa*: Dalla Torre, 1893:35 (synonymy by Kempf, 1961:195)

Pachycondyla fuscoatra variety *montana* Forel, 1912:39, ♀, Colombia, Sierra Nevada de Santa Marta, San Antonio [lectotype worker, 1 paralectotype worker labeled, others labeled as syntypes from Suerre and El Aragua, Costa Rica and Río Frio, Colombia, MHNG] (synonymy by Kempf, 1961:195)

Pachycondyla fuscoatra var. *andicola* Santschi, 1913:34, ♀, Ecuador, Santo Domingo de los Colorados (synonymy by Kempf, 1961:195)

Pachycondyla harpax variety *irina* Wheeler, 1925:5, ♀, Guatemala, Quirigua [lectotype worker and 1 paralectotype worker seen, USNM, 3 syntypes workers, MCZC, 6 worker syntypes AMNH] (mixed series of *P. impressa* and *P. harpax*, synonymized with *P. harpax* by Brown, 1950:247)

DISCUSSION**Worker**

The workers are *usually large* (total length about 11 mm) *black* ants

with reddish brown appendages. Most surfaces are dull and punctate; the *mandibles are relatively smooth and glossy*. The *eyes are relatively small* (maximum diameter 0.5 mm) and

impressa México to Bolivia and southern Brasil

separated from the anterior edge of the head (side view) by less than one diameter. The *malar carina* is not developed anterior to the eye. The *pronotal shoulder* is swollen but usually does not form a carina, the dorsum of the mesosoma is broadly convex and the *metanotal suture* is poorly marked or absent on the dorsal surface of the mesosoma. The *pro-*

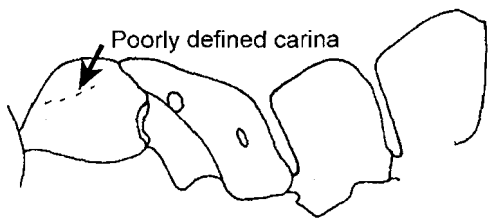


Fig. 518. Mesosoma, petiole and first gastral tergite of a worker of *P. impressa* (Guanacaste, Costa Rica, CWEM)

pedal spiracle is slit-shaped. The *petiole* is large and thick when viewed in profile, *rectangular-shaped* with the apex sometimes being slightly broader than the region near the base of the peduncle. The anterior face of the postpetiole is slightly concave and forms a relatively sharp angle with the dorsal surface. The metasternal process consists of two triangular lobes with small teeth on the interior surfaces.

Erect hairs are moderately abundant, including on the malar area, the *shaft of the scape*, the dorsal and ventral surfaces of the head, the dorsum of the mesosoma, the legs (many hairs are suberect), the dorsum

of the petiole and all surfaces of the gaster.



Fig. 519. Metasternal process of a worker of *P. impressa* (Puntarenas, Costa Rica, CWEM), as seen from behind.

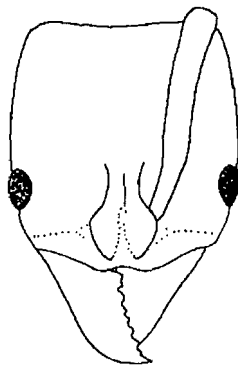


Fig. 520. Head and mandibles of a worker of *P. impressa* (from Kempf, 1961). The erect hairs are not shown.

The mandibles are finely sculptured and moderately to strongly shining, the head and mesosoma are dull and punctate with some of the punctures in rows that appear as

poorly defined striae, especially on the dorsum of the mesosoma and the mesopleuron. The petiole is roughly punctate; the gaster has scattered punctures and is moderately smooth and glossy.

Female

The female is similar to the worker, but is somewhat *larger* (total length 16 mm). The *remainder of the ant* is nearly identical to that of the worker, except ocelli are present, the mesosoma is swollen and the metanotum is well developed.

The pilosity and sculpture are similar to those of the workers.

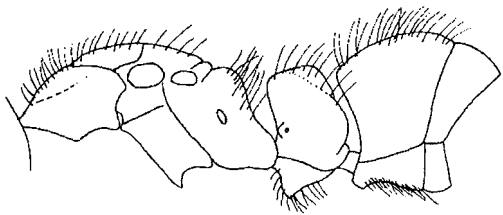


Fig. 521. Mesosoma, petiole and first gastral tergite of a female of *P. impressa* (Colombia, CWEM).

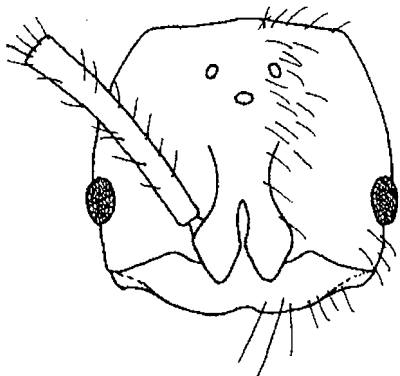


Fig. 522. Head of a female of *P. impressa* (Colombia, CWEM).

Male (not associated with workers or females.) The male (undescribed) is a *large* (total length 15 mm) *black* specimen. The mandibles are tiny with well-developed depressions near the bases. The medial anterior margin of the clypeus is strongly concave, the surface of the clypeus is convex, but it does not overhang the anterior half when the head is seen from side. The head length is 1.80 mm, the head width is 1.84 mm. The *eye is moderate in size* (maximum diameter 0.83 mm) located less than one diameter from the lateral ocellus (oblique side view). The medial ocellus (diameter 0.15 mm) is located more than one diameter (distance of 0.24 mm) from the lateral ocellus (0.16 mm).

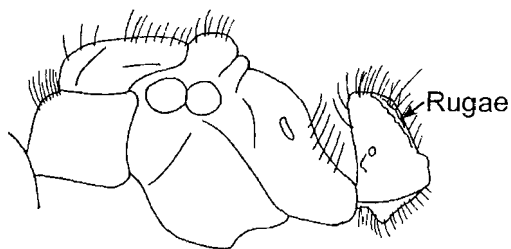


Fig. 523. Mesosoma and petiole of a male of *P. impressa* (Tungurahua, Ecuador, CASC).

The *pronotum is barely swollen at the shoulder*. The *Mayrian furrows are well developed* as are the parapsidal sutures. The scutellum is swollen and rounded when viewed from side. The *spiracle is slit-shaped*. The *petiole is wide* when viewed in profile with sloping (not parallel) anterior and posterior faces, which

narrow dorsally and form a broadly rounded dorsal face. The *subpetiolar process* is poorly developed and consists of a rounded lobe anteriorly with the remainder of the process gradually diminishing in width posteriorly. The anterior face of the postpetiole is broadly rounded; the postpetiolar process is not developed. The *pygidium* is not depressed or concave as in the worker and female.

Erect hairs are mostly short (0.1 - 0.35 mm) and are present on the clypeus, dorsal surface of the head (ventral surface cannot be seen), dorsum of the mesosoma, dorsum of the petiole, ventral surface of the petiole and all surfaces of the gaster. The hairs on the legs are mostly appressed, especially on the tibiae, a few hairs on the coxae are erect and suberect. *Appressed golden pubescence* is scattered on all surfaces.

The head is very finely punctate and weakly shining, the mesosoma is similar, but some of the surfaces, especially the mesopleuron, are moderately shiny. The side of the propodeum and the side of the petiole have poorly developed rugae with well-developed rugae near the posterior lateral edges and on the apex. The gaster is finely punctate and moderately shining.

COMPARISON

The large size of *P. impressa* would separate it from most of the other species of *Pachycondyla*. *Pachycondyla impressa* could be easily separated from other large species such as *P. commutata* and *P. laevigata*

by the dull surfaces (*P. commutata* and *P. laevigata* are mostly shiny), from *P. crassinoda* by the lack of the two sharp lateral processes on the pygidium (which are present in *P. crassinoda*) and from *P. villosa* and *P. striata* by the relatively rounded pronotal shoulders (formed into distinct sharp carinae in *P. villosa* and *P. striata*). The lack of a metanotal suture in the smaller workers of *P. impressa* could cause confusion with the smaller *P. harpax* (total length of worker less than 10 mm). It can be separated as the carina on the pronotal shoulder of *P. harpax* is relatively sharp, but not greatly raised from the surface (absent in *P. impressa*). Additionally the middle of the pygidium is concave in *P. impressa*, not rounded as in *P. harpax*. Some small isolated specimens are essentially impossible to separate into one species or the other. *Pachycondyla impressa* is superficially similar to the rare Colombian *P. fuscoatra*; it can be easily separated by the depressed pygidium and the striae on the side of the pygidium, both of which are absent in *P. fuscoatra*. It is also slightly smaller and the posterior lateral edges of the petiole are rounded, not sharply marginate as in *P. fuscoatra*.

Pachycondyla impressa workers are nearly identical to those of *P. lattkei*. It differs in that the dorsum of the gaster is dull and sculptured, not smooth and glossy as in *P. lattkei*. There are exceptions, especially in specimens from Ecuador, which have a smooth gaster, but are otherwise

identical to *P. impressa*. The pygidium is strongly depressed in *P. impressa*, but rounded and not depressed in *P. lattkei*. The lobes on the metasternal process of *P. impressa* are often relatively close (usually less than 0.3 mm between the tips) and a pair of internal teeth is nearly always present and if the teeth are poorly developed, at least a swollen region is present, both of which are absent in *P. lattkei*.

The workers and females of *P. purpurascens* from Costa Rica and *P. inca* from Perú and Bolivia are nearly identical to *P. impressa*, except the clypeuses are slightly longer and less emarginate along the medial border. The male of *P. impressa* is also very similar to those of *P. inca* and *P. striata*.

The relatively small ocelli, the large size and coarse rugae along the posterior lateral edge of the petiole would separate the males of *P. impressa* from most of the others. The concave anterior margin of clypeus will separate *P. impressa* from the very similar *P. lattkei*. The single examined male of *P. impressa* was not associated with workers, but a process of elimination and the similarity of this species with the closely related *P. lattkei*, are strong evidence that this male is a member of *P. impressa*.

An unidentified male near *P. impressa* was collected in Quincemil (Cuzco), Peru (MCZC). It differs from the male of *P. impressa* in having rugae on the side of the petiole (similar to *P. lattkei*) and in having a wide petiole (width 1.4 mm). The

anterior border of the clypeus is concave as in *P. lattkei*.

Pachycondyla harpax variety *irina* is a smaller *P. impressa*, but the sides of the pronotum are nearly rounded and the pygidium is concave, indicating that it is actually *P. impressa*.

Pachycondyla fuscoatra montana differs from the typical *P. impressa* in having a slightly more developed pronotal carina. Kempf (1961) synonymized *P. fuscoatra* var. *andicola* (which was not seen) and *P. fuscoatra* variety *cearensis*, which is actually a synonym of *P. inca*.

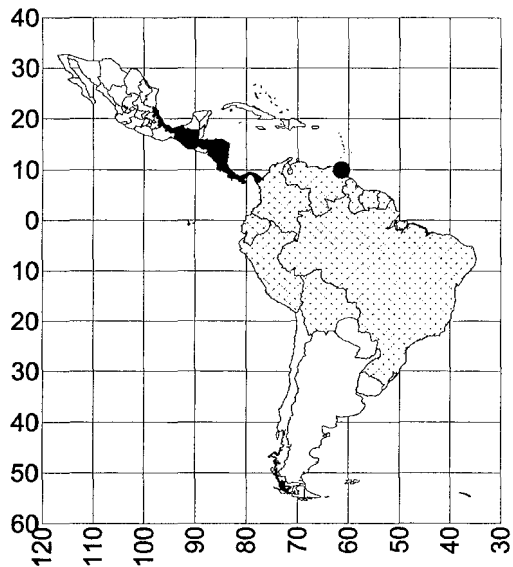
Pachycondyla fuscoatra transversa has transverse striae on the dorsum of the pygidium, which are usually lacking in *P. impressa*. There is considerable variation in this character and we follow Kempf (1961) in considering this to be a synonym of *P. impressa*.

DISTRIBUTION

MEXICO: *Veracruz* (Los Tuxtlas [Quiroz and Valenzuela, 2003], 17 mi N Santiago Tuxtlas, 10 K N Cárdenas); *Tabasco* (6 mi N Cárdenas); *Chiapas* (Laguna Ocotol Grande, La Victoria, Ocosingo, Cueva del Salto de Agua [15 k SE Palenque]). GUATEMALA: *Alta Vera Paz* (Secanquim, Trece Aguas); several states (San Marcos [Finca Santa Julia]). HONDURAS: *Atlántida* (14 k S La Ceiba). NICARAGUA: *Río San Juan* (Sarapiquí River). COSTA RICA: *San José* (San José); *Heredia* (Estación Biológica La Selva, near La

Virgin, 16 k SSE La Virgen, vicinity of Guápiles, Don Arturo, Santo Domingo de Heredia, San Pedro de Barba); *Cartago* (2 k N Cervantes); *Puntarenas* (Estación Biológica Alturas, Las Cruces, 2 mi NE Corredor, 5 k W Rincón, Monte Verde, Sirena, Osa Peninsula [Corcovado]); *Guanacaste* (Parque Nacional Santa Rosa, Pitilla Field Station, Cacao Field Station, Maritza Field Station). PANAMA: *Bocas del Toro* (Fortuna Road); *Chiriquí* (15 k N Fortuna, Cerro Hornito, Ojo, Reserva La Fortuna); *Panamá* (Ancón, Summit, Canal Zone, Barro Colorado Island, El Valle de Antón, 8 k N El Llano, Cerro Piñon [Las Cumbres], Chilibrillo Cave, Pearl Islands [San José], Taboga Island); *San Blas* (Nusagandi); *Darién* (Serranía de Pirie, without locality). COLOMBIA: *Boyacá* (Puerto Boyacá); *Guajira* (Don Diego, San Antonio [Forel, 1912]); *Magdalena* (Río Frio, Sierra Nevada de Santa Marta [Forel, 1912]); *Santander* (2 mi N Barrancabermeja, Norcacia); *Antioquia* (Río Porce); *Chocó* (10 k SW San José del Palmar, Río Sucio); *Cundinamarca* (Fusagasugá); border of *Cundinamarca* and *Tolima*; *Valle del Cauca* (Bosque Yotoco, Buga, Anchicayá, Bajo Calima, 3.2 k E Río Agua Clara, San Cipriano, Trocha Carbón, Parque Nacional Farallones de Cali, Puerto Merizalde [Baena, 1993]); *Cauca* (INZA [Tierras Blancas], Puracé [Sandoval and Zambrano, 2007]); *Huila* (Neiva, 12 W Belén, 3 k E Rivera). ECUADOR: *Esmeraldas* (31.7 k NW Lita);

Pichincha (Muipucuna [5 k ESE Nanegal], 6 k W Alluriquin, 4 k E Santo Domingo de los Colorados, 25.9 k N Divino Verde, Maquifucuna [specimens with shiny gaster]); *Napo* (12.9 k W Baeza, Tiputini Biodiversity Station, Mondayocu, Cosanga); *Cotopaxi* (Otonga); *Guayas* (Guayaquil, Balao Chico [60 k S Guayaquil], 3 k SW Bucay); *Los Rios* (Pichilingue, Río Palenque Biological Station); *Tungurahua* (Baños). PERU: *Huánuco* (Tingo Maria, Monson Valley); *Cuzco* (Machu Picchu, Cuzco, Huadquina, Vilcanota); *Cajamarca*



Map 49. *Pachycondyla impressa*.

(San Miguel). VENEZUELA: *Aragua* (Rancho Grande, Portachuelo); *Tachira* (San Cristóbal la Florida); *Amazonas* (Marawaka Tepui); state unknown (La Guaira [Emery, 1890a, present in 4 Venezuelan states]); *Guárico* Hato Guárico [Masaguaral];

Distrito Federal (Parque Vinicio Adames); *Carabobo* (San Esteban). TRINIDAD state unknown (Marabal Valley); *Saint George* (foothills north of Tunapuna, Arima Valley). GUYANA: *Cuyuni-Mazaruni* (Forest settlement). FRENCH GUIANA (Kempf, 1972). BRASIL: *Mato Grosso* (Diamantino, Organ Mt.); *Bahia* (Rio Pardo Speleological Province [Trajano, 2000]); *Pará* (Tucuru); *Distrito Federal* (Brasilia [Sandoval and Zambrano, 2007]). Kempf (1961) lists *Rio de Janeiro* (Pôrto das Caixas, Corcovado); *São Paulo* (Pindamonhangaba). Kempf (1972) lists the Brazilian states of *Amazonas*, *Pará* and *Ceará*. BOLIVIA: *El Beni* (Rurrenbaque); *Cochabamba* (117 k E Cochabamba); *La Paz* (Mapiri).

HABITAT

This common species is found in a variety of habitats, ranging from lowland rain forest, at a pasture edge, dry tropical forest, the edge of second growth rain forest, cloud forest, thick wet cloud forest, low montane rain forest, upper montane cloud forest, tropical evergreen forest, a forest slope, montane hardwood forest, cloud forest, a roadside in a sunny spot, a cacao plantation, montane tropical forest, to a guano cave; at elevations ranging from 10 - 2350 meters.

BIOLOGY

Pachycondyla impressa nests in and under rotten logs and under stones. Brood was present in nests in July (Colombia) and August (Costa Rica). Females were collected in nests in January (Panamá) and April (Brasil). Dealate females have been collected in February and March (Costa Rica), April (Panamá), May (Panamá, Perú), June (Panamá), July (Perú) and August (Venezuela). Kempf (1961) mentions isolated females from Brasil were collected in March, May and October.

Individuals have been collected in intercept traps, pitfall traps and foraging on the ground. Workers were extracted from cacao leaf litter and other similar materials. Foragers are attracted to peanut butter baits (Kaspari and Weiser, 2000). One series was collected in the stomach of a *Bufo* toad. Workers are alert and fast. Sexuals are attracted to lights. They are parasitized by the head decapitating phorid fly *Apocephalus* (Brown and Feener, 1991).

ETYMOLOGY

The name of this species is from the Latin word *impressio*, meaning a pressing into, referring to the impressed pygidium.

Pachycondyla inca Emery new status

Figures - **Worker**: 252 (mandible), 524 (side view), 525 (head); **Female**: 526 (side view), 527 (head and mandible); **Male**: 299 (tibia), 528 (side view), 529 (head and clypeus from the side); **Map** 50

crassinoda species complex

Pachycondyla fuscoatra inca Emery, 1901a [7-iii-1901, Bolton, 1995]: 48, ♀ ♀, Perú, Ocobamba: Bolivia [labeled as *Pachycondyla purpurascens* var. *inca*] [lectotype and paralectotype female designated, 1 additional syntype from Bolivia, MCSN, 1 syntype seen, MCZC]; Bolivia; *Pachycondyla* (*Pachycondyla*) *fuscoatra inca*: Emery, 1901a:45; (incorrectly considered to be a synonym of *P. impressa* by Kempf, 1961:195)

Pachycondyla fuscoatra variety *cearensis* Forel, 1901a:336 [5-xii-1901, Bolton, 1995], ♀, ♀, Brasil, Ceará, Baturité [lectotype worker, 2 paralectotype workers seen, MHNG, 1 syntype seen MCZC] (incorrectly synonymized with *P. impressa* by Kempf, 1961:195) **new synonymy**

DISCUSSION

Worker

The worker is a *large* (total length 16 mm) *dark reddish brown* specimen with *reddish brown appendages*. The mandible has approximately 9 - 10 poorly defined teeth. Most of the anterior margin of the clypeus is straight or slightly concave medially. The region anterior to the frontal lobes is approximately 0.2 mm in length. The head length is 3.1 mm; the head width is 2.8 mm. The head is narrowed both anteriorly and posteriorly to the eyes, the posterior margin is concave and the posterior lateral corners are angulate. The eyes

are relatively small (maximum diameter 0.55 mm) located approximately one diameter from the anterior margin of the head (side view). The *malar carina is absent*. The scape (2.75 mm) extends approximately the first funicular segment past the posterior lateral corner of the head. The *pronotal shoulder is slightly swollen*, but does not form a carina. The promesonotal suture is well developed and depressed and the *metanotal suture is barely visible*. The *propodeal spiracle is slit-shaped*. The *petiolar node is nearly rectangular* with the anterior and posterior faces being almost parallel and a well-developed dorsal face is present. The

inca Perú to Bolivia to east central Brasil

subpetiolar process consists of a thickened lobe with a slight ventral angle anteriorly. The anterior face of the postpetiole is nearly vertical and abruptly rounds into the dorsal face. The *stridulatory file* is absent on the second pretergite, as are the arolia between the tarsal claws.

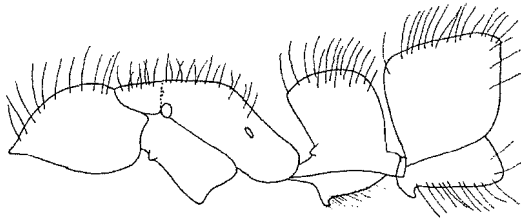


Fig. 524. Mesosoma, petiole and postpetiole of the lectotype worker of *P. inca*.

Erect hairs are abundant on most surfaces, including all surfaces of the head, mesosoma, petiole and gaster, most hairs on the legs are suberect, especially those on the tibiae. Appressed pubescence is sparse and present on the dorsum of the head, dorsum of the mesosoma and dorsum and ventral surfaces of the gaster.

The mandibles are *smooth and glossy near the bases*, with *striae and scattered punctures on most of the remainder of the surface*. Most of the head is punctate with punctures being arranged in poorly defined rows; fine concentric striae are present on the dorsum of the pronotum, longitudinal on the mesonotum and mostly transverse on the dorsal face of the

propodeum. The fine striae on the side of the pronotum are nearly vertical,

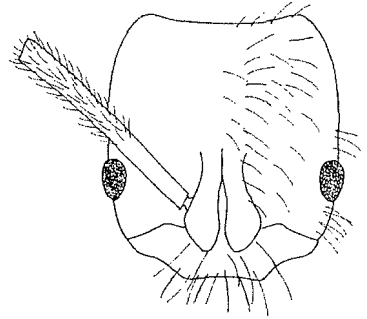


Fig. 525. Head of the lectotype worker of *P. inca*.

those on the mesopleuron and the side of the propodeum are obliquely elevated posteriorly. The dorsum of the petiole has transverse fine striae; the sides have poorly defined horizontal striae. The gaster is punctate, but also with transverse very fine striae. All surfaces except for the mandibles and the legs are dull.

Female

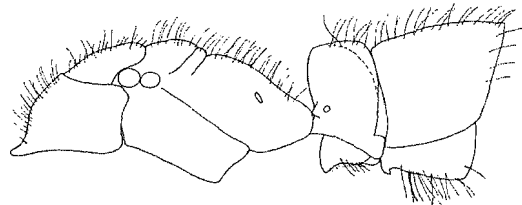


Fig. 526. Mesosoma, petiole and postpetiole of the paralectotype female of *P. inca*.

The female is a *large* (total length 18 mm) *dark reddish brown* specimen with reddish brown legs. The mandible has 9 teeth, the anterior medial margin of the clypeus is concave. The head length is 3.6 mm; the head width is 3.26 mm. The sides of the head are slightly narrowed anteriorly and posteriorly of the eye, the posterior margin is strongly concave. The *eye is relatively small* (maximum diameter 0.75 mm) located less than one diameter from the anterior margin of the head (side

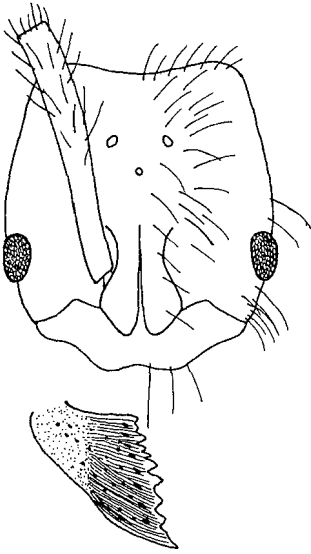


Fig. 527. Head and mandible of the paralectotype female of *P. inca*.

view). The *malar carina is absent*. The scape (3.1 mm) extends the first funicular segment past the posterior

lateral corner of the head. The *pronotal shoulder is swollen* but does not form a carina, the *propodeal spiracle is slit-shaped*. The petiole, subpetiolar process and postpetiole are similar to those of the worker.

The pilosity and sculpture are similar to those of the worker.

Male

The male (undescribed) is a *relatively large* (total length 12 mm) *dark reddish black* specimen with dark brown legs. The depressions are well-developed at the base of the mandible, the anterior margin of the clypeus is straight, the *clypeus is swollen* when viewed from the side. The head length is 1.8 mm; the head width is 1.65 mm. The *eye is moderate in size* (maximum diameter as seen in lateral view 0.85 mm) located less than $\frac{1}{2}$ diameter from the anterior margin of the head and is slightly less than one diameter from the lateral ocellus (frontal view).

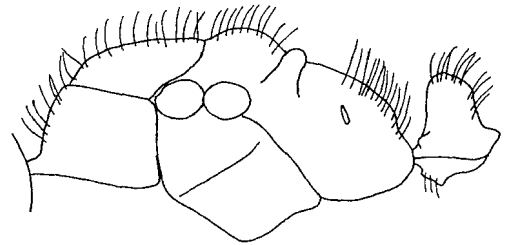


Fig. 528. Mesosoma and petiole of a male of *P. inca* (Chaco, Bolivia, MCSN).

The *ocelli are relatively small*

(maximum diameter of the median ocellus is 0.18 mm) located more than one diameter from the lateral ocellus. The *pronotal shoulder is swollen* but does not form a carina, the *propodeal spiracle is slit-shaped*. The *petiole is nearly triangular-shaped* with the anterior and posterior faces meeting in a bluntly rounded apex near the posterior edge, the dorsal face is not developed. The subpetiolar process is poorly developed.

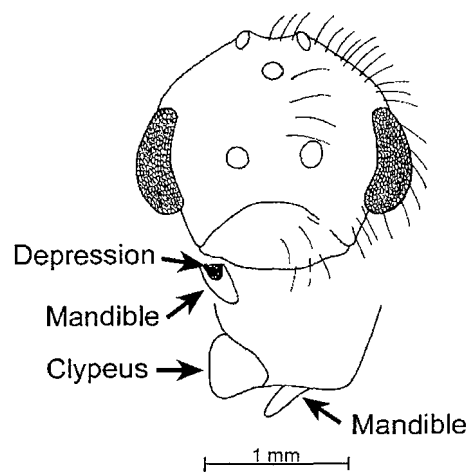


Fig. 529. Head of a male of *P. inca* (Chaco, Bolivia, MCSN). The inset shows the clypeus as seen from the side.

Erect hairs are abundant on the dorsal and ventral surfaces of the head, absent on the scape, present posterior to the eyes and on the posterior margin of the head, abundant

on the dorsum of the mesosoma, dorsum of the petiole, on the subpetiolar process and all surfaces of the gaster, erect hairs are present on the coxae, but are absent on the remainder of the legs. Appressed pubescence is present on the mesosoma, petiole and all surfaces of the gaster.

All of the surfaces are finely punctate and weakly shining.

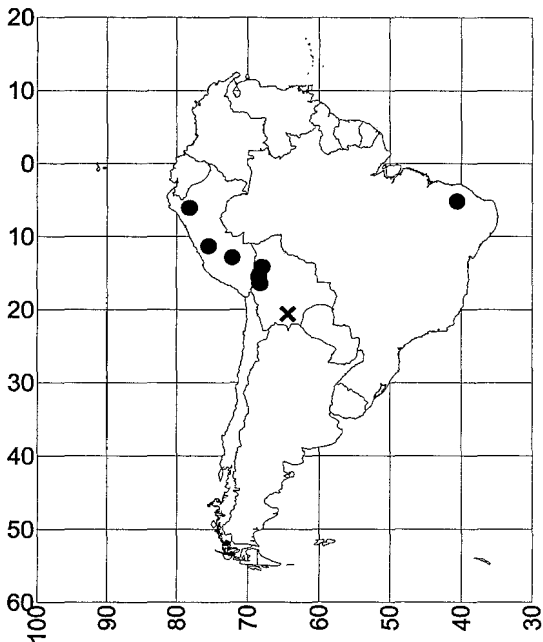
COMPARISON

The worker and female of *P. inca* are nearly identical to those of *P. impressa*, differing only in having a longer clypeus. The shape of the clypeus of *P. inca* is very similar to that of *P. purpurascens*. The two species can be separated as the mandible of *P. purpurascens* has definite striae; the surface of the mandible of *P. inca* is smooth. The two species are poorly known and when more material becomes available it is possible that *P. inca* will be shown to be a synonym of *P. purpurascens*.

The male of *P. inca* is similar to that of *P. striata*, but can easily be separated by the lack of erect and suberect hairs on the anterior tibia. Additionally the petiole is narrower with a sharper apex. The male of *P. purpurascens* is unknown.

Emery recognized the similarity of this species to *P. purpurascens*, as the female paralectotype was labeled as a variety of *P. purpurascens* and he compared this taxon to *P. purpurascens* in the description. Two workers of *P. purpurascens* were found in his collection.

Pachycondyla fuscoatra var. *cearensis* is identical with the worker lectotype of *P. fuscoatra inca* differing only in having the mandibles less striate, having a slightly more emarginate medial border of the clypeus and in having fewer erect hairs on the side of the head.



Map 50. *Pachycondyla inca*. The "x" indicates an unknown locality in Bolivia.

DISTRIBUTION

PERU: *Cuzco* (Ocobamba [type series], Huadquina [Wheeler, 1925]); *Junín* (Oreja de Capelo); *Huánuco* (Río Charape [Wheeler, 1925]); *Cajamarca* (San Miguel [Wheeler, 1925]). BRASIL: *Ceará* (Baturité). BOLIVIA: *La Paz* (Espía Río Bopi & Tumupasa & Suri [USNM]); *Santa Cruz*, *Tarija* or *Chuquisaca* (Chaco Boliviano [MCSN]); without locality (Staudinger, MCSN, labeled as syntype).

HABITAT

Unknown. A dealate female was collected at 1525 meters (Wheeler, 1925) and specimens were collected at 1600m in Perú [USNM].

BIOLOGY

Unknown. Workers [USNM] were collected from July and August and December in Bolivia. A dealate female was collected in May (Perú, [USNM]).

ETYMOLOGY

The name is meant to honor the Inca Indians, who inhabit much of the region where these ants occur.

Pachycondyla insignis new species

Figures - **Worker**: 112 (clypeus), 269 (head), 530 (side view); **Female**: 531 (mesosoma), 532 (head); **Map** 51

foetida species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *moderate sized* (total length 11 mm) *dark reddish black* specimen. The mandible has 12 teeth. The anterior border of the clypeus is broadly convex. The head length is 2.34 - 2.38 mm, the head width is 2.16 - 2.24 mm. The *malar carina* is *well-developed*, extending $\frac{2}{3}$ of the distance to the eye. The maximum diameter of the eye is 0.59 - 0.60 mm, located slightly more than one maximum diameter from the anterior margin of the head (side view). The *center of the eyes* is *located slightly posteriorly to the midpoint of the length of the head*. The antennal scape (2.10 - 2.14 mm) extends nearly the first two funicular segments past the posterior lateral corner of the head. The *carina on the pronotal shoulder* is *sharp* and well developed and overhangs the side of pronotum. The *mesosoma* is *depressed at the metanotal suture*, which is well developed and breaks the sculpturing on the dorsum of the mesosoma.

The *propodeal spiracle* is *slit-shaped*. The anterior face of the petiole is nearly vertical and meets the broadly rounded posterior face near the anterior face. The posterior lateral edges of the petiole are developed into sharp carinae, which extend to the apex. The subpetiolar process consists of an angulate anterior lobe and a posterior process, which gradually diminishes in width. The *stridulatory file on the second pretergite* is *well developed*; the arolia are moderately well developed.

Long (0.65 mm) erect hairs are present on the mandibles, the clypeus and the gaster. Shorter (0.3 mm) erect hairs are also present on the mandibles, dorsal and ventral surfaces of the head, sides of the head, posterior margin, scapes, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster and on the legs. Appressed whitish yellow hairs are present on the head, mesosoma, petiole and gaster.

The medial part of the clypeus has *conspicuous horizontal striae*. The *mandibles* are *smooth and glossy*, the

head is densely punctate, the mesosoma and petiole are finely punctate, without striae on any surfaces and the gaster is finely punctate.

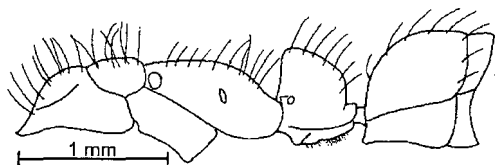


Fig. 530. Mesosoma, petiole and first gastral tergite of the holotype worker of *P. insignis*.

Female

The female is a *large* (total length 18 mm) black ant. The anterior margin of the clypeus is similar to that of the worker. The head length is 2.58 mm; the head width is 2.42 mm. The sides of the head are broadly convex and the head is narrowed anteriorly, the posterior border is nearly straight. The *malar carina* is well developed, extending about $\frac{3}{4}$ of the distance to the eye and the *eyes* are large (maximum diameter 0.69 mm) located slightly more than one diameter from the anterior margin of the head (side view). The midpoint of the eye is located slightly posteriorly on the head. The scape (2.24 mm) extends about the length of the first funicular segment past the posterior lateral corner. The *ocelli* are relatively small (maximum diameter of the median ocellus is 0.1 mm) located approxi-

mately two diameters from the lateral ocellus. The *pronotal carina* is well developed sharp and overhangs the sides of the pronotum. The *propodeal spiracle* is slit-shaped and the posterior lateral edges of the propodeum form a carina. The petiole is similar to that of the worker.

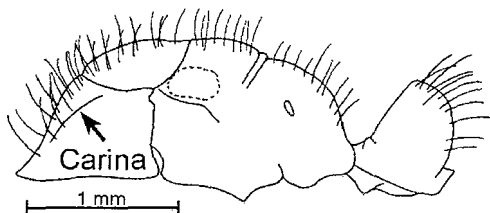


Fig. 531. Mesosoma and petiole of the paratype female of *P. insignis*.

Erect hairs and appressed pubescence is similar to that of the worker.

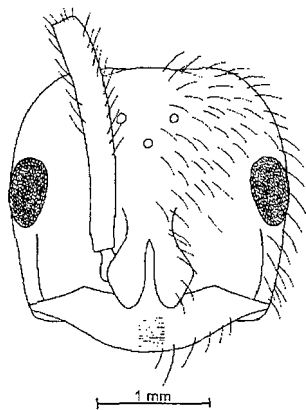


Fig. 532. Head of the paratype female of *P. insignis*.

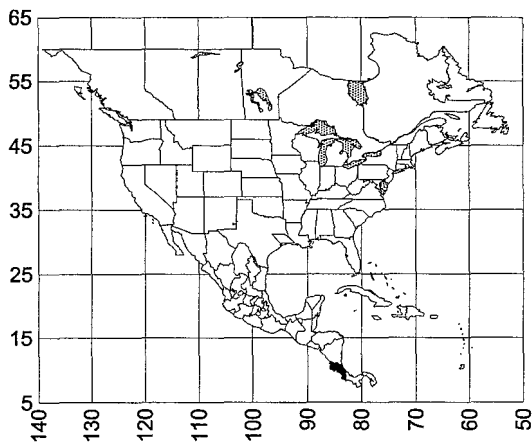
The mandibles are finely striate with scattered punctures and dull, the *medial part of the clypeus has conspicuous horizontal striae*, the dorsum of the head is finely punctate, as is the dorsum of the mesosoma, the sides are coriaceous, the petiole is punctate and coriaceous, the gaster is finely punctate. All surfaces are dull or only weakly shining.

Male

Unknown.

COMPARISON

The workers and females of *P. insignis* are essentially identical to those of *P. bugabensis*, differing in having transverse striae in the middle of the clypeus. These striae are usually absent in *P. bugabensis*, or poorly defined longitudinal striae may be present. *Pachycondyla insignis* is smaller than *P. villosa*, which also lacks the transverse striae on the clypeus, or longitudinal striae are present.



Map 51. *Pachycondyla insignis*.

DISTRIBUTION

Known only from COSTA RICA in the states of *Alajuela* (type series) and *Guanacaste* (9 k S Santa Cecilia [INBio]). Longino (website) lists the Cordillera de Tilarán (Monteverde, Peñas Blancas Valle, Laguna Arenal), Cordillera Volcánica Central (north of Volcán Barba) and the Cordillera de Talamanca (Hitoy Cere Biological Reserve).

HABITAT

These ants occur in wet forest, at 700 - 800 meters

BIOLOGY

The type series was collected in the plant *Cecropia insignis*. Longino (website) states that it is relatively common in *Cecropia* saplings in the mature forest gaps. He concludes that it is an obligate ant on *Cecropia*, as it has never been collected away from *Cecropia*. He has collected founding queens in *Cecropia* internodes and all nests he has observed have been inside *Cecropia* stems. He has seen workers harvesting the Müllerian bodies, he has found Müllerian body caches inside the nests. Workers and queens use the prostomata rather than some other parts of the stem wall to gain entrance to the internodes. Longino (website) states that *Cecropia* occupied by *P. insignis* are fairly easy to find in the field, because the entrance hole is very large and circular, much larger than entrance holes made by *Azteca* ants. Other non-specialized species of *Pachycondyla* may be found nesting opportunist-

ically in *Cecropia* stems, such as *P. crenata* and *P. striatinodis*, but their entrance holes are often more irregularly shaped and the ants often enter through a wound in the plant rather than through the prostoma.

Colonies are small and the workers are timid and run inside or flee when the plant is disturbed (Longino, website). Presumably the colonies are short-lived, as Longino has never seen a large colony in a mature *Cecropia* tree. The interaction of *P. insignis* with *Cecropia* apparently represents an independent evolutionary colonization (Longino, website). It is apparently closely related to *P. villosa* and *P. bugabensis*, species that are generalized foragers and opportunistic cavity nesters. The transverse rugae on the clypeus may function in the excavation of the prostoma, or be involved in the gripping of the Müllerian bodies (Longino, website). It is apparently a

local endemic (Longino, website), which may have evolved through a sympatric speciation mechanism from *P. villosa*, *P. bugabensis*, or some ancestral version of both of them. Longino (website) includes much more biological information on this species.

ETYMOLOGY

From Latin, *insignis* meaning remarkable, referring to the horizontal striae on the clypeus, as well as referring to the species of *Cecropia* from which they were collected.

TYPE SERIES

Holotype worker (# 108, MCZC), 1 paratype worker (# 86, CWEM), 1 paratype female (# 114, MCZC), COSTA RICA, Alajuela, Monteverde Cloud Forest Reserve, Esperanza, 800m; 10°19'N 84°43'W [sic], 29.IX.1989, wet forest ex *Cecropia insignis*, B.L. Fisher.

***Pachycondyla inversa* (F. Smith)**

Figures - **Worker**: 110, 268 (petiole, side view), 266 (side view), 533 (head), 534 (metasternal process); **Female**: 535 (side view), 536 (head); **Map** 52

foetida species complex

Ponera inversa F. Smith, 1858:96-97, ♀, Ecuador: Napo [1 syntype worker seen, BMNH, second syntype worker is *P. villosa*]; Mayr, 1863:448; *Pachycondyla inversa*: Mayr, 1886:358, Dalla Torre, 1893:34; *Pachycondyla* (*Pachycondyla*) *inversa*: Emery, 1901a:45; *Neoponera villosa inversa*: Emery, 1904:597-599, Fig. D (a-d); larvae, Wheeler and Wheeler, 1952: 615; *Neoponera* (*Neoponera*) *villosa inversa*: Eidmann, 1936:34; *Pachycondyla inversa*: Bolton, 1995:306

DISCUSSION**Worker**

The worker is a *large* (total length 13 mm) *black* ant with slightly lighter colored appendages. The mandible has approximately 15 teeth; the anterior border of the clypeus is indented in middle. The *malar carina* is *well developed* and extends from the anterior part of the head to the edge of the eye, which is relatively large (maximum diameter 0.75 mm) and located slightly more than one diameter from the anterior edge of the head (side view). The scapes extend about the first two funicular segments past the posterior lateral corner of the head. The *carina on the pronotal shoulder* is *very sharp* and overhangs the side of the pronotum. The *mesosoma* is *depressed at the metanotal suture*, which breaks the sculpture on

the dorsum. The dorsal face of the propodeum is approximately 1½ times the length of the posterior face, the propodeal spiracle is slit-shaped. The *anterior face of the petiole* is *strongly concave* and meets the broadly rounded posterior face at the anterior edge. The petiole is relatively narrow when seen in profile (1.15 mm in the

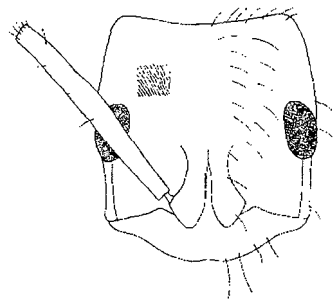


Fig. 533. Head of a worker of *P. inversa* (Pará, Brasil, USNM). Only a small section the sculpturing is shown.

syntype). The posterior lateral edges of the petiole are sharp and nearly form carinae. The metasternal process consists of two large rounded somewhat triangular lobes.

Erect hairs are abundant on all surfaces including the *scapes*, the dorsum of the head, the dorsum of the mesosoma, the legs, the petiole and the gaster. *Fine golden appressed pubescence is present on all surfaces* and is especially obvious on the head, dorsum and side of the mesosoma, posterior face of the petiole and dorsum of the gaster. The syntype nearly lacks the pubescence on the posterior face of the petiole, which is smooth and shining.

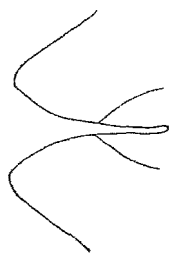


Fig. 534. Metasternal process of a worker of *P. inversa* (Panamá, Panamá, CWEM), as seen from behind.

The dorsum of the head is densely and coarsely punctate, the dorsum of the mesosoma is finely punctate and somewhat glossy and shiny, the side of the mesosoma is finely punctate and somewhat glossy, the side of the petiole is finely punctate and glossy, the posterior face is punctate and

moderately glossy, the gaster is finely punctate and weakly shining.

Female

The female (undescribed) is a large (total length 14 mm) black ant. The mandible has 9 large teeth with smaller teeth present between each of the large teeth. The anterior margin of the clypeus, including the medial region, is convex and rounded. The head length is 3.26 mm; the head width is 2.92 mm. The *malar carina is well developed* and sharp. The maximum eye diameter is 0.85 mm, which is located approximately one diameter of the anterior edge of the head. The *ocelli are small*, the maximum diameter of the median ocellus is 0.18 mm, located more than two diameters from the lateral ocellus (maximum diameter 0.12 mm). The *scape* (3.16 mm) *extends approximately the first two funicular segments* past the posterior lateral corner of the head. The *pronotal carina is well developed* and slightly overhangs the side of the pronotum. The *propodeal spiracle is slit-shaped*. The *petiole is relatively narrow* (width from above the spiracular horn to the top of the posterior peduncle is 1.40 mm). The *anterior face of the petiole is strongly concave* and meets the broadly rounded posterior face at a sharp anterior angle. The subpetiolar process consists of a broad lobe with a tiny angle anteriorly, the process gradually diminishing in thickness posteriorly. The anterior face of the postpetiole is slightly concave and meets the dorsal face and nearly a

right angle. The *stridulatory file* is well developed and the arolia are present between the tarsal claws.

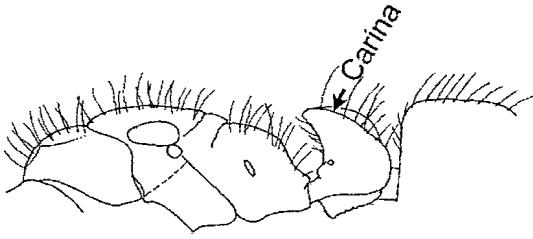


Fig. 535. Mesosoma, petiole and part of the postpetiole of a female of *P. inversa* (Zulia, Venezuela, USNM).

Erect hairs are present on most surfaces, including the mandibles, clypeus, sides of the head, posterior margin, dorsal and ventral surfaces of the head, shaft of the scape, dorsum of the mesosoma, dorsum of the petiole, all surfaces of the gaster and all parts of the legs. Appressed golden pubescence is present on all surfaces and is especially noticeable on the head, dorsum of the mesosoma, the petiole and the gaster.

The mandibles are finely striate and weakly shining. The head and mesosoma are finely punctate with most surfaces weakly shining, the side of the pronotum and the mesopleuron are moderately shining, the posterior face of the petiole is moderately shining and the gaster is shining but the surface is difficult to see due to the abundant appressed golden pubescence.

inversa México to Paraguay and southern Brasil

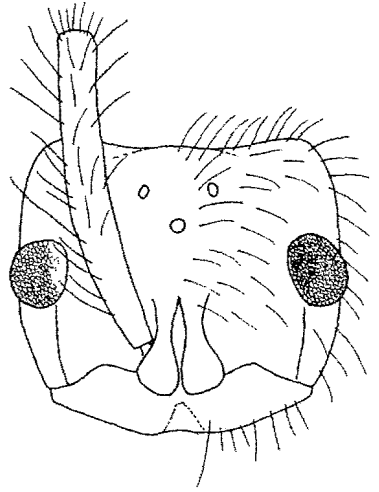


Fig. 536. Head of a female of *P. inversa* (Zulia, Venezuela, USNM).

Male

Unknown.

COMPARISON

The strongly concave anterior face of the petiole of the worker and female of *P. inversa* would separate this species from the closely related *P. villosa*, as well as from most of the other species in the genus. Mariano et al. (2000) compare the cytogenetics of *P. villosa* and *P. inversa*, and Kolmer and Heinze (2000a) recognize them as two separate species.

Pachycondyla curvinodis was recognized as a distinct species by Lucas et al., (2002, as Pvi2). Although we were unable to locate the type, measurement of the node in Plate 1, Figure 12 of Forel (1899), after an 8X enlargement, shows that the height of

the anterior face is less than the length (0.97X), more closely matching the details of Pvi2 (Lucas et al., 2002:251). The anterior face of the petiole is also only moderately concave, characteristic of most Pvi2 (Lucas et al., 2002:251). The cuticular hydrocarbons of *P. inversa* and *P. curvinodis* are distinct (Lucas et al., 2002). Thus the two taxa with the strongly concave anterior face of the petiole are apparently distinct species, although it is nearly impossible to distinguish them.

Separation of *P. inversa* from *P. curvinodis* is difficult and the shape of the petiole is apparently one of the only morphological characteristic that will separate them. Basically *P. curvinodis* has a longer petiole, with a length greater than 1.3 mm when viewed in profile (measured from the anterior edge of the lateral flanges to the posterior margin, above the peduncle). The length of the petiole of *P. inversa* is less than 1.3 mm. The petiole of *P. inversa* has a more concave anterior face, making the angle at the apex strongly acute. That of *P. curvinodis* is generally less concave and the apex forms a less acute angle. This difference in petiolar shape results in the petiole of *P. inversa* appearing "taller" and the petiole of *P. curvinodis* appearing more robust. There is no consistent difference in the pilosity on the ventral surface of the petiole. The shape of the subpostpetiolar process differs between the two species in both the workers and females. *Pachycondyla inversa* has the area between the

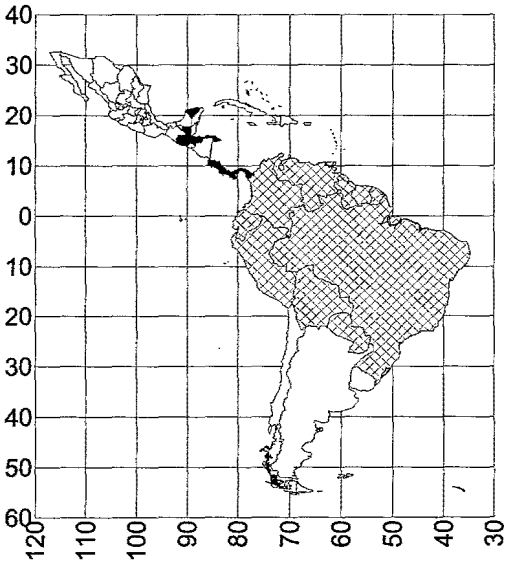
process and the remainder of the sternum interrupted by a constricted region, making the process or tooth appear isolated from the rest of the sternum. That of *P. curvinodis* is connected to the remainder of the sternum of the postpetiole by a sharp carina (or at least by a continuously raised area).

The females can be also separated by the width of the petiole; those with a wide petiole (greater than 1.5 mm) are *P. curvinodis*, those with a narrower petiole (less than 1.5 mm) being *P. inversa*.

DISTRIBUTION

Kempf (1972) lists MEXICO: *Yucatán*. GUATEMALA: *Quezaltenango* (Las Mercedes [Forel, 1899]); *Escuintla* (Torola [Forel, 1899]); Kempf (1972) lists HONDURAS. COSTA RICA: *Heredia* (La Selva). PANAMA: *Colón* (Fort Sherman, Bugaba [Forel, 1899]); *Panamá* (Barro Colorado Island, El Llano – Cartí Road, km 7.5, Parque Soberanía, km. 4, Plantation Trail); *San Blas* (Nusagandi); *Chiriquí* (Volcán de Chiriquí [Forel, 1899]). COLOMBIA: *Meta* (Carimagua); *Amazonas* (Leticia). ECUADOR: *Napo* (11 k W Paño, Tena, 2.8 mi N Puyo, Tiputini Biodiversity Station, Coca, Via Hollín-Loreto; *Los Rios* (Río Palenque [47 k S Santo Domingo]). PERU: *Huánuco* (Tingo Maria); *Junín* (18 mi NE La Merced [Río Perené, Colonia Perené]; *Loreto* (Pucallpa, 50 k S Iquitos); *Pasco* (Pan de Azúcar). VENEZUELA: *Zulia* (Los Angeles

del Tucuco); state unknown (Anyantepui Ontygralls); *Delta* (Orinoco Delta). GUYANA: *Cuyuni-Mazaruni* (Kartabo, Bartica); *Bartica* (Penal Settlement [Wheeler, 1918b]).



Map 52. *Pachycondyla inversa*.

FRENCH GUIANA: (Kempf, 1972). BOLIVIA: *Santa Cruz* (Rio Mamoré); *La Paz* (Tumupasa); state unknown (Tuiche [Wheeler, 1925]). BRASIL: *Pará* (Monte Alegre, without locality [USNM]); *Goiás* (Veadeiros); *Rio de Janeiro* (Paineras, Mendes); *Santa Catarina* (Corupá): *Bahia* (Itabuna [(Heinze et al., 2001; Kolmer and Heinze, 2000b)]. Kempf lists the Brazilian states of *Amazonas* and *Espirito Santo*. PARAGUAY: *Central* (San Lorenzo). Wild (2002) lists *Central* (Areguá) and *Cordillera* (Caacupé).

HABITAT

Unknown, specimens have been collected from between 175 – 1830 meters.

BIOLOGY

This species nests in rotten cocoa pods (Heinze et al., 2001) and knot holes in cocoa trees (Kolmer and Heinze, 2000b). Dealate females were collected in May and June. Specimens in Costa Rica were collected at 9:00 am on the foliage of *Byttneria aculeata* [Sterculiaceae]. Queens may cooperate during colony founding (Kolmer and Heinze, 2000b, Tentschert et al., 2004), and may form polygynous mature nests (Heinze et al., 2001, 2004). The queens mate with two or more males and the queens that cooperatively form new nests are not closely related (Kellner et al., 2007). Workers will become reproductive when the nest female is removed and aggressively form dominance hierarchies (Heinze et al., 2002).

Trindl et al. (1994) isolated and characterized 5 microsatellite loci, which are also present in the closely related *P. villosa*.

ETYMOLOGY

The name of this species is based on the Latin word *inversus*, meaning turned upside down, referring to the shape of the anterior face of the petiole.

Pachycondyla laevigata (F. Smith)

Figures - **Worker**: 5 (metasternal process), 213 (side view), 216 (head), 537 (side view), 538 (petiole, top view); **Female**: 539 (side view), 540 (head and mandible); **Male**: 287 (head), 541 (side view); **Map** 53

laevigata species complex

Ponera laevigata F. Smith, 1858:98, ♀, Brasil: Amazonas: Ega (Kempf, 1972) [2 syntype workers seen, BMNH]; Mayr, 1863:448; Wheeler, 1936:162, ♀, ♂; *Pachycondyla laevigata*: Mayr, 1886:358; Forel, 1899:13; *Pachycondyla levigata* [sic]: Dalla Torre, 1893:34; *Euponera (Mesoponera) levigata* [sic]: Emery, 1901a:47; *Termitopone laevigata*: Wheeler, 1936:159-166, Fig. 1a-g; Borgmeier, 1959:314-315; *Pachycondyla laevigata*: Bolton, 1995: 306

Pachycondyla gagatina Emery, 1890a:75, ♀, Costa Rica; Emery 1892:9; Emery, 1894b:48 (described twice)

Euponera (Mesoponera) laevigata variety *whelpleyi* Wheeler, 1922:3, ♀, Trinidad, Capara (syntype seen, MCZC) (synonymy by Wheeler, 1936:164)

DISCUSSION

Worker

The worker is usually a moderately sized (total length 5 - 10 mm) shiny black ant with dark brown appendages. The eye is relatively large (0.5 mm maximum diameter) with a diameter about twice as long as the distance between the anterior border of the eye and the anterior border of the head (side view). There is no malar carina. The scape extends slightly past the posterior lateral corner of the head. The pronotal shoulder is swollen, but does not form a carina. The dorsum of the mesosoma is nearly straight, the metanotal suture is poorly developed, but present on the

dorsum of the mesosoma. The propodeal spiracle is slit-shaped and the posterior face of the propodeum is separated from the sides of the propodeum by a sharp edge. The petiole is thick when viewed in profile, with the anterior face being slightly concave, the posterior face being convex and the dorsal face being well defined. The dorsal face of the petiole is much broader posteriorly than anteriorly (seen from above). The posterior lateral edges of the petiole are sharp between the sides of the petiole and the posterior face. The anterior face of the postpetiole is slightly concave and meets the dorsal face at an angle.

laevigata Costa Rica to southern Brasil



Fig. 537. Side view of a worker of *P. laevigata* (from Wheeler, 1936).

Erect hairs are abundant on most surfaces, including the sides of the head, the shaft of the scape, the dorsal and ventral surfaces of the head, the dorsum of the mesosoma, the legs (most of the hairs on the tibiae and many on the remainder of the legs are suberect), the dorsum of the petiole and all surfaces of the gaster.

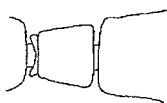


Fig. 538. Top view of the petiole of a worker of *P. laevigata* (from Wheeler, 1936).

Most of the head is smooth and glossy, but distinct poorly defined striae are present on the dorsum, the mesosoma is mostly smooth and glossy, but the upper half of the mesopleuron and the side of the propodeum have well-developed coarse striae. The dorsal face of the propodeum has a few short (0.3 mm in length) poorly developed striae, the

laevigata Costa Rica to southern Brasil

posterior face of the propodeum is smooth and glossy. *Most of the petiole and gaster are smooth and glossy.*

The workers of this species are polymorphic. They may be as small as 5 mm total length, with all sizes up to the length of the largest worker (total length 10 mm). The smaller workers are less sculptured and the entire head may be smooth and glossy.

Female

The female is a *large* (total length 13 mm) *mostly shiny black ant*. The mandible has approximately 11 teeth (basalmost teeth are small and poorly defined) that alternate in size. The anterior margin of the clypeus is broadly convex. The *eye is moderately sized* (maximum diameter 0.6 mm) located about $\frac{2}{3}$ diameter from the anterior margin of the head. The *scapes barely reach the posterior lateral corner* of the head. The *pronotal shoulder is swollen* but does not form a well-developed carina. The *propodeal spiracle is slit-shaped*. The petiole is shaped like that of the

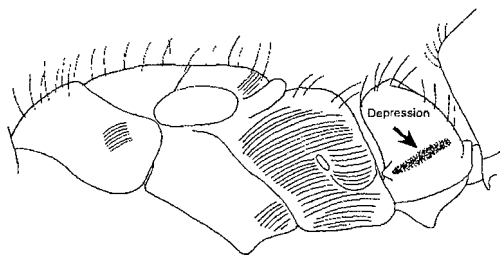


Fig. 539. Mesosoma, petiole and anterior part of the first gastral tergite of a female of *P. laevigata* (Guanacaste, Costa Rica, INBio).

worker, moderately thickened when viewed in profile with a slightly concave anterior face and a slightly convex posterior face, which converge dorsally and form a moderately well-developed dorsal face. The subpetiolar process is a lobe, which is angulate ventrally.

Erect hairs (up to 0.4 mm in length) are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, posterior margin, scapes, mesosoma, petiole and all surfaces of the gaster, the hairs on the legs are suberect to erect only; appressed pubescence is sparse and only noticeable on the gaster.

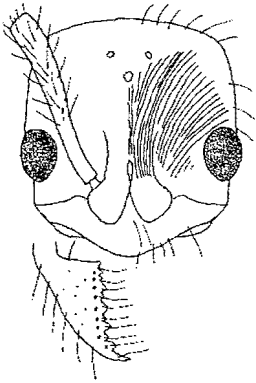


Fig. 540. Head and mandible of a female of *P. laevigata* (Guanacaste, Costa Rica, INBio).

The *dorsum of the head* has *longitudinal striae*, which diverge posteriorly, the *dorsum of the mesosoma* is *mostly smooth and glossy*, as are the side of the pronotum and the

anepisternum, the katepisternum and side of the propodeum are striate. The side of the petiole has a little evidence of horizontal striae and is mostly smooth and glossy as is the posterior face. The *gaster* is *nearly completely smooth and glossy*.

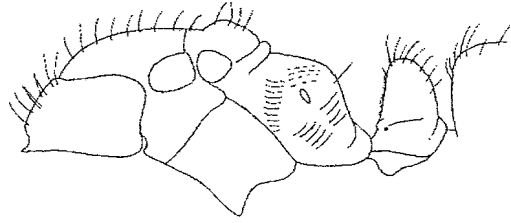


Fig. 541. Mesosoma, petiole and part of the first gastral tergite of a male of *P. laevigata* (Guanacaste, Costa Rica, INBio).

Male

The male is a *moderately sized* (total length 11 mm) *shiny black* specimen. The mandibles are tiny and have the oval-shaped depression near the base. The anterior margin of the clypeus is convex with the middle of the clypeus being swollen. The *eyes are large* (maximum diameter 0.74 mm) occupying more than $\frac{1}{2}$ of the side of the head. The *ocelli are relatively small* (maximum diameter of the medial ocellus is 0.14 mm). The *pronotal shoulder is slightly swollen*, the *propodeal spiracle is elongated*. The shape of the petiole is similar to that of the worker, with the anterior face being nearly straight and the posterior face being convex and converging dorsally, forming a broadly

rounded dorsal face. The subpetiolar process is similar to that of the female and only slightly less developed.

Erect hairs (up to 0.3 mm in length) are present on the mandibles, clypeus, all surfaces of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster, most hairs on the legs are nearly erect.

Most surfaces are smooth and glossy as in the worker and female.

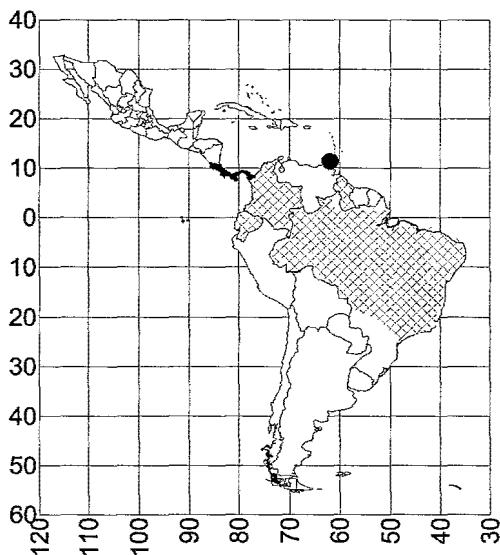
COMPARISON

Pachycondyla laevigata workers and females could be confused with those of three other shiny species: *P. commutata*, *P. marginata* and *P. carbonaria*. *Pachycondyla laevigata* can be easily separated from *P. commutata* and the moderately shiny *P. carbonaria* by the coarse striae on the side of the propodeum, which are very fine on both of the latter species. The mandibles of *P. laevigata* are smooth and shining, not dull and striate as in *P. commutata* and without the longitudinal fold as in *P. marginata*. The shape of the petiole is very different in *P. carbonaria* with the anterior face being nearly vertical and the posterior face being convex and meeting the anterior face at an angle and thus not forming a distinct dorsal face. *Pachycondyla laevigata* can be separated from *P. marginata* as the mandible lacks the carina or fold, which separates the inner part of the mandible from the outer part in *P. marginata*. The mostly shining black surfaces would separate this species from all of the other North American

Pachycondyla.

DISTRIBUTION

COSTA RICA: *Puntarenas* (Osa Peninsula, Corcovado [LACM], San Pedrillo, Rincón [LACM] 8 mi SE Rincón [LACM]); *Heredia* (10°20'N 84°4'W [LACM]); *Guanacaste* (Estación Pitilla [9 k S Santa Cecilia, INBio]); *Alajuela* (Jiménez [Forel, 1899]). PANAMA: *Panamá* (Canal Zone, El Llano-Cartí Road, Barro Colorado Island [LACM]; *San Blas*



Map 53. *Pachycondyla laevigata*.

(Nusagandi [CASC]). COLOMBIA: *Chocó* (10 k SE San José); *Antioquia* (Salgar [UNCM]); *Valle del Cauca* (Bajo Calima). ECUADOR: state unknown (on route to Río Barea Bai); *Morona-Santiago* (Gualaquiza and vicinity Benedict); *Napo* (Tiputini Biodiversity Station). TRINIDAD: state unknown (Capara [Wheeler,

1936]); *Tunapuna* (Mount Saint Benedict [Wheeler, 1936]). GUYANA: *Cuyuni-Mazaruni* (Kartabo); *Dememera-Mahaica* (Kaieteur [Wheeler, 1936]). BRASIL: *Amazonas* (Ega [Forel, 1899]); *Pará* (Tucurul [LACM], Belém [LACM]); *Espírito Santo* (Linhares); *São Paulo* (Piracicabo [LACM]).

HABITAT

Specimens have been collected between 350 and 700 meters in wet forest.

BIOLOGY

This species nests in the soil under logs or under heavy leaf litter and sometimes occurs within the log. A male was collected in a nest in September (Panamá). A loose male was collected in March (Costa Rica) and winged females in March and October (Brasil) and December (Costa Rica).

Wheeler (1936) provided details on the biology of this species. He reports that C. Haskins found a column moving to a new nest site on Barro Colorado Island. The column was about 1.5 m in length and about 10 cm wide, containing males and females (August). Emerson found raids three times on Barro Colorado Island at midday during July and

September (Wheeler, 1936). The columns were about 6 meters long and a single worker wide. The organized columns contain between 500 - 1700 workers (Downing, 1978). The ants were carrying workers and soldiers of the termites *Amitermes beaumonti* Banks and *Heterotermes tenuis* (Hagen), both common in dead wood on the forest floor (Wheeler, 1936). *Pachycondyla laevigata* is an important predator on the termites *Nasutitermes costalis* (Traniello, 1981); and prey on termites in the genera *Neocapritermes*, *Microtermes* and *Coptotermes* (Hölldobler and Traniello, 1980) and *Speculitermes* sp. (Borgmeier, 1959), in addition to the genera mentioned above. Workers are very aggressive and are able to sting.

Workers use a recruitment trail pheromone, which originates from the pygidial gland (Hölldobler and Traniello, 1980) and not, as previously assumed, from the hindgut (Blum, 1966). Baroni Urbani (1993) discussed the evolution of recruitment behavior in *P. laevigata*.

ETYMOLOGY

The name of this species is from the Latin word *laevigatus*, meaning smooth, referring to the sculpturing of this species.

***Pachycondyla latinoda* new species**

Figures - **Worker**: 84 (petiole, top view), 85, 231 (petiole, side view), 542 (mesosoma and petiole, side and top view), 543 (head), 544 (tibia); **Ergatogyne**: 545 (side view), 546 (head); **Male**: 294 (petiole, side view), 518 (head and clypeus), 547 (mesosoma and petiole, side and top view); **Map** 54

crenata species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *moderate sized* (total length 10 mm) *reddish brown* specimen. The mandibles have 14 teeth; the anterior medial margin of the clypeus is angulate. The sides of the head are nearly straight and parallel, the posterior margin is nearly straight. The *malar carina is well developed*; the *eye is moderately large* (maximum diameter 0.53 mm). The *scape (2.08 mm) extends about 1/3 of its length past the posterior lateral corner of the head*. The *pronotal shoulder forms a strong sharp carina*, which slightly overhangs the side of the pronotum. The *metanotal suture is barely evident on the dorsum of the mesosoma*. The *propodeal spiracle is slit-shaped*. The petiole is thickened when viewed in profile with the *highest point slightly posterior to the middle of the apex*. The subpetiolar process consists of an anterior angle followed by a slightly concave region; the remainder of the process is slightly

diminished in thickness posteriorly. The *stridulatory file is well developed* on the second pretergite, the arolia are poorly developed between the tarsal claws.

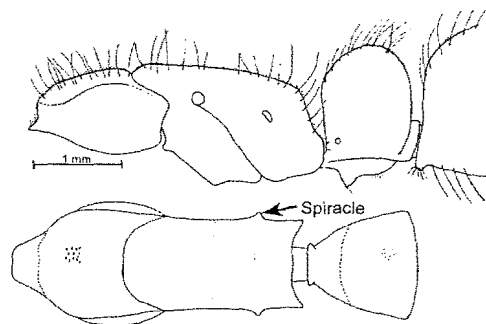


Fig. 542. Mesosoma and petiole of the holotype worker of *P. latinoda*, as seen from the side and from above. Only a small part of the sculpture is shown.

Erect hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, along the posterior margin, along the

entire shaft of the scape, the dorsum of the mesosoma, the dorsum of the petiole and on the subpetiolar process and on all surfaces of the gaster, the hairs on the legs are nearly erect. *Appressed pubescence is abundant* on the head, dorsum of the mesosoma, dorsum of the petiole and dorsum of the gaster, the ventral surface of the gaster has a few scattered appressed hairs.

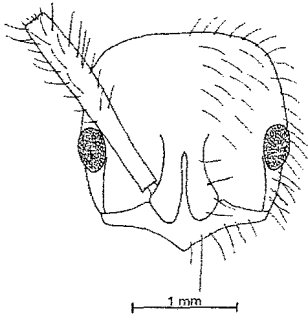


Fig. 543. Head of the holotype worker of *P. latinoda*.

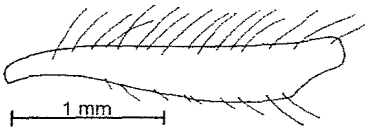


Fig. 544. Posterior left tibia of the holotype worker of *P. latinoda*.

The *mandibles are dull and finely striate* with scattered punctures, the dorsum of the head is densely and evenly punctate. The punctures on the dorsum of the mesosoma are sparse with the surface between the punctures being smooth and shiny, the side of the pronotum is finely coriaceous, as

is the mesopleuron and the side of the propodeum has fine striae. The petiole is mostly smooth and glossy with fine coriaceous sculpture; the dorsum of the gaster is finely punctate and shiny.

Female (ergatogyne)

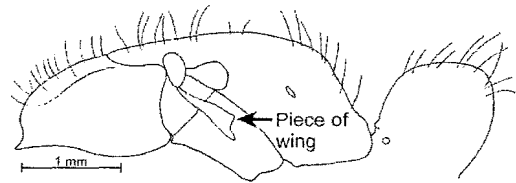


Fig. 545. Mesosoma and petiole of the paratype ergatogyne of *P. latinoda*.

The ergatogyne is very similar to the worker with the head essentially identical, lacking ocelli. The only significant differences of the mesosoma are that the *pronotal carina on the shoulder is less well developed* and

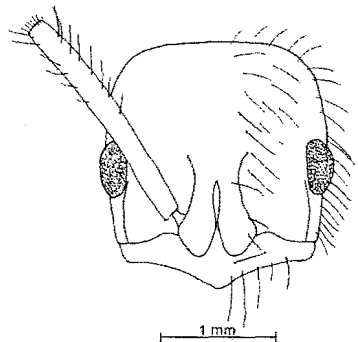


Fig. 546. Head of the paratype ergatogyne of *P. latinoda*.

a piece of the forewing and the point of attachment are present. Apparently the posterior wing is completely

missing. The remainder of the specimen is very similar to the worker. This individual is an ergatogyne, an apparently reproductive form anatomically intermediate between a worker and a female.

Female

An apparent female (CASC) is similar to the ergatogyne, except that the ocelli are present but small. The total length is 14 mm; and the ant is entirely dark brownish black in color. The mandibles have approximately 14 teeth; the anterior medial margin of the clypeus is broadly convex and overhangs the remainder of the clypeus. The head length is 2.36 mm; the head width is 2.14 mm. The scape (2.2 mm) extends approximately the first funicular segment past the posterior lateral corner of the head. The eye (0.63 mm greatest diameter) is located approximately one diameter from the anterior edge of the head; the malar carina is well developed. The ocelli are small (0.08 mm); the medial ocellus is located approximately six diameters from the lateral ocellus. The sides of the head are convex and the posterior border is weakly concave. The carina on the pronotal shoulder is well developed and slightly overhangs the side of the pronotum. The propodeal spiracle is slit-shaped. The anterior and posterior faces of the petiole are nearly parallel, although the width diminishes dorsally and the dorsal face is broadly rounded and higher posteriorly. The anterior face of the postpetiole broadly rounds into the dorsal face.

Erect hairs are abundant on the clypeus, dorsal and ventral surfaces of the head, sides of the head, scape, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster.

The dorsum of the mandible is finely striate with scattered punctures with the surface being completely dull. The head is finely but densely punctate and completely dull. The mesosoma is finely punctate and many surfaces are shiny, although not smooth, especially the dorsum of the pronotum, the scutum and mesopleuron and the side of propodeum. The petiole is densely punctate, but most surfaces are moderately shiny. The dorsum of the gaster is finely punctate but weakly shining.

Male

The male is a *moderate sized* (total length 1.1 mm) *medium brown* specimen with *yellowish brown appendages*. The mandibles are tiny and have small cavities near the basal margin. The anterior margin of the clypeus is convex and the *surface of the clypeus bulges* when viewed from the side. The head length is 1.42 mm, the head width 1.26 mm. The *eye is large*, occupying most of the side of the head, its diameter as seen from the front (0.76 mm) is greater than distance between the dorsal margin and the lateral ocellus (0.36 mm) (oblique side view). The *malar carina is not developed* although the region is slightly swollen. The ocelli are approximately equal in size with the diameter of the median ocellus being

0.16 mm. The *carina* is not developed on the pronotal shoulder; the propodeal spiracle is slit-shaped. The parapsidal sutures and Mayrian furrows are well developed on the dorsum of the mesosoma. The petiole is thick when viewed in profile with the anterior and posterior faces converging to form the highest point on the posterior half of the apex. The subpetiolar process consists of an anterior angle followed by a concave region with the remainder gradually diminishing in thickness posteriorly. The gaster is strongly constricted posterior to the postpetiole.

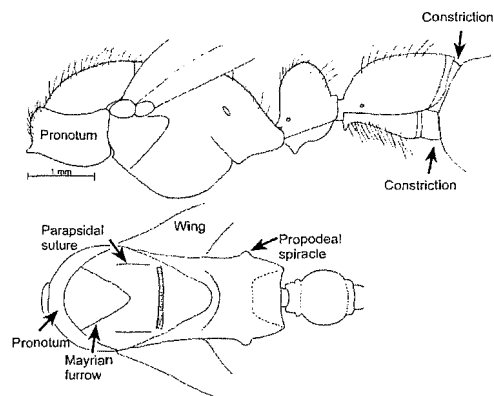


Fig. 547. Mesosoma, petiole and postpetiole of a paratype male of *P. latinoda*, as seen from behind and from above.

Erect hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, along the posterior margin, on the anterior surface of the scape, on the

dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster; most of the hairs on the tibiae are suberect. Appressed pubescence is scattered on the head, mesosoma, petiole and all surfaces of the gaster.

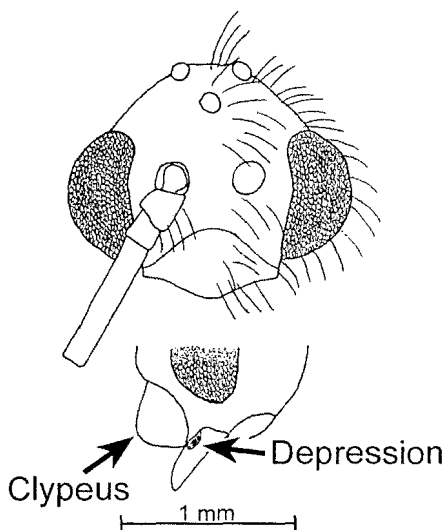


Fig. 548. Head of the paratype male of *P. latinoda*. The lower insert shows the anterior part of the head as seen from the side.

The head is roughened and coriaceous but moderately shining, the dorsum of the mesosoma is glossy with scattered punctures, most of the side of the mesosoma has scattered punctures and is moderately shining, the petiole and gaster are moderately shining with scattered punctures.

COMPARISON

Pachycondyla latinoda is clearly

a member of the *crenata* species complex with the characteristic well-developed malar carina, pronotal carina and heavily and densely punctate head and dorsal surface of the pronotum. *Pachycondyla latinoda* is larger than most of the species in the *crenata* species complex, including *P. crenata* and *P. moesta*. *Pachycondyla latinoda* could be confused with other larger species in the complex, including *P. globularia* and *P. fiebrigi*. It can be separated from *P. globularia* as the petiole is not globular in shape. The petiole is wider in *P. latinoda* as compared to *P. fiebrigi* from Paraguay.

DISTRIBUTION

BRASIL: *Mato Grosso* (Serra Caraca [MCZC]); *Espírito Santo* (Santa Tereza [type series]); *São Paulo* (Ilha São Sebastião [USNM]). A possible male was collected in Guyana (Kamakusa, MCZC) a probable female was collected in *Santa Catarina* (Nova Teutônia, CASC).

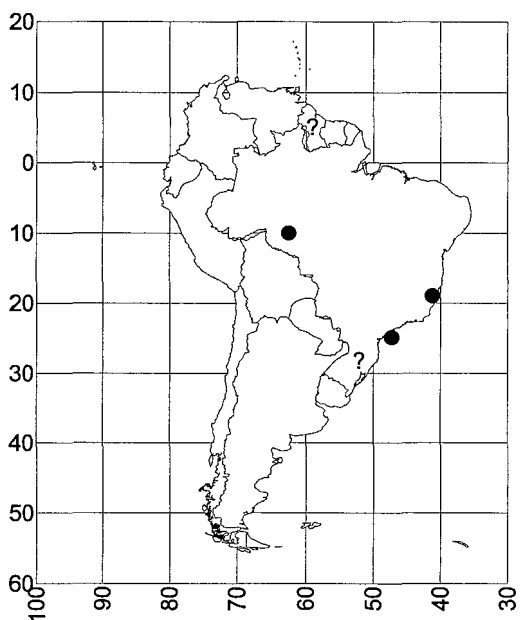
HABITAT

Specimens were collected in mountain forest, at 700 m.

BIOLOGY

Males were collected in a nest in February (Brasil). A possible male was collected in January (Guyana), a

dealate female in April (southern Brasil).



Map 54. *Pachycondyla latinoda*. The “?”s indicates a possible male and a possible female.

ETYMOLOGY

From Latin, *latus* meaning broad and *nodus*, meaning knot, referring to the wide petiolar node of the worker and female of this species.

TYPE SERIES

Holotype worker (MCZC), 2 paratype workers (CWEM, MZSP), 1 paratype female (MCZC) and 2 paratype males (CWEM, MCZC), Santa Tereza, Esp. Santo, BRAZ., 23Feb.67, WL Brown.

Pachycondyla lattkei new species

Figures - **Worker**: 17 (second pretergite), 58 (pronotal shoulder), 63, 551 (head), 251 (pygidium), 549 (side view), 550 (metasternal process); **Male**: 296 (side view), 552 (head); **Map** 55

crassinoda species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *moderately large* (total length 11-12 mm) ant with a *shiny gaster*. The mandible has ten teeth. The anterior margin of the clypeus is concave medially. The head is 2.9 mm in length and 2.9 mm in width. The *malar carina is absent*, the *eye is relatively small* (maximum diameter 0.44 mm) and is located approximately one diameter from the anterior edge of the head (side view). The sides of the head are nearly parallel but are narrowed anteriorly, the posterior margin is concave. The scape (2.45 mm in length) extends to the posterior margin of the head. The *pronotal shoulder lacks a carina* but is slightly swollen, the promesonotal suture is depressed on the dorsum of the mesosoma, but the *metanotal suture is barely evident*. The *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with the anterior and posterior faces being nearly parallel (side view) and with a well formed horizontal dorsal

face. The subpetiolar process is well developed and consists of a swollen lobe, which is slightly angulate anteriorly. The *stridulatory file is absent* on the second tergum and the arolia are absent between the tibial claws.

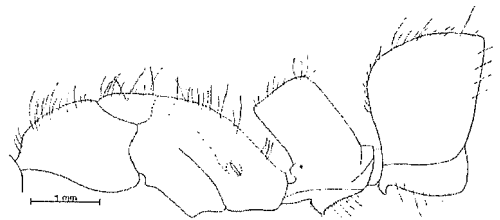


Fig. 549. Mesosoma, petiole and postpetiole of the holotype worker of *P. lattkei*.

Erect hairs are abundant on most surfaces, including the mandibles, dorsal and ventral surfaces of the head, the *antennal scape*, posterior margin of the head, the dorsum of the mesosoma, the hairs on the legs are mostly suberect, erect hairs are present on the dorsal and ventral surfaces of the petiole and all surfaces of the

gaster. Appressed pubescence is sparse with a few hairs noticeable on the head, dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster.



Fig. 550. Metasternal process of a paratype worker of *P. lattkei* (CWEM), as seen from behind.

The *mandibles* are mostly smooth with scattered punctures and with some evidence of fine striae, the dorsum of the head is punctate with the *punctures in rows and forming poorly defined striae*, most of the striae on the pronotum are longitudinal, although those on the neck are transverse and extend posteriorly along the side of the pronotum, the mesopleuron and propodeum have oblique longitudinal striae, longitudinal striae on the mesonotum and dorsum of the propodeum are mostly longitudinal, but those on the posterior face of the propodeum are horizontal joining with the striae on the side of the propodeum. The side of the petiole has horizontal striae, those on the

posterior face of the node are finer and mostly transverse and forming concentric arches, the striae on the dorsum of the petiole are mostly transverse. *All surfaces of the gaster are smooth and glossy* with a little evidence of scattered very fine punctures.

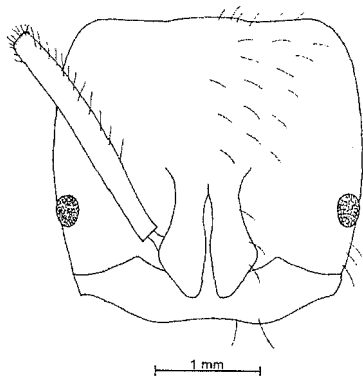


Fig. 551. Head of the holotype worker of *P. lattkei*.

Female

Unknown.

Male

The male is also *large* (total length 16 mm). The surface of the clypeus is convex but does not form a rounded lobe (side view). The head is 1.76 mm in length; the head width is 1.80 mm. The *scape is short* (0.36 mm). The *eye is relatively small* (maximum diameter 0.94 mm) the diameter is approximately equal to the distance from the top of the eye to the medial point of the head (side view).

The *ocelli* are relatively small (maximum diameter 0.18) located more than one diameter from the adjacent ocelli. The *propodeal spiracle* is slit-shaped. The petiole is narrowed toward the apex, not rectangular-shaped as in the worker. The subpetiolar process is similar to that of the worker, but the sides are concave and the sharp anterior tooth is absent.

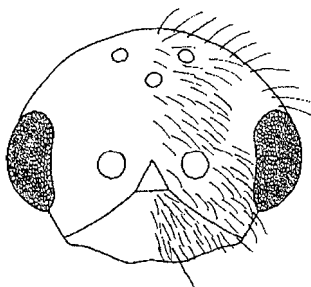


Fig. 552. Head of a paratype male of *P. lattkei* (CWEM).

Erect hairs are abundant on most surfaces as in the worker; those on the petiole are slightly curled. Appressed golden hairs are thick (and matted on specimens that had been in alcohol) and are present on the head, mesosoma, petiole and gaster.

The head is finely punctate and weakly shining; the mesosoma and petiole are covered with coarse irregular reticulate rugae, which gives the surface a hammered appearance. The gaster is as smooth and glossy as that of the worker.

The specimen is concolorous black.

COMPARISON

Pachycondyla lattkei is nearly identical to *P. impressa*. The workers can be easily distinguished by the glossy gaster, a character that can be seen in the field or on pinned specimens without the aid of a microscope. Additionally the pygidium of *P. lattkei* is not depressed (as in *P. impressa*) and the striae on the dorsum of the pronotum are predominantly longitudinal, not predominantly transverse as in *P. impressa*. The metasternal process of *P. lattkei* has widely spaced lobes (generally the tips are more than 0.3 mm apart, generally less than 0.3 mm in *P. impressa*) and the inner tooth is absent (present in *P. impressa*).

The shiny gaster of *P. lattkei* could cause confusion with the Colombian (and presumably Venezuelan) *P. fuscoatra*, which also has a shiny gaster. They can be easily separated as *P. lattkei* lacks the coarse striae on the head and the anterior face of the petiole is not concave as it is in *P. fuscoatra*.

The relatively short clypeus of *P. lattkei* suggests a close relationship with *P. impressa* and will allow it to be distinguished from the other members of the *crassinoda* species complex (especially *P. inca* and *P. purpurascens*).

The males of three species are very similar: *P. lattkei*, *P. villosa* and *P. striata*. *Pachycondyla lattkei* can be separated from the other two by the presence of the irregular rugae on the petiole (lacking in the other two species). The subpetiolar process of *P.*

lattkei is broadly rounded, not angulate as in the other two species. The erect hairs are sparse in *P. lattkei* as compared to those of *P. striata*. The male of *P. impressa* has a more sculptured gaster. The clypeus of *P. lattkei* lacks the concave anterior margin, which is found in *P. impressa*.



Map 55. *Pachycondyla lattkei*.

An unidentified male near *P. lattkei*, possibly the unknown male of *P. crassinoda*, was collected in Quincemil, Peru. It differs from *P. lattkei* in lacking the rugae on the side of the propodeum but has similar rugae on the side of the petiole. The subpetiolar process is concave, differing from *P. lattkei*, but similar to that found in males of the *crenata* species complex. The anterior margin

of the clypeus is concave, similar to that of *P. lattkei*, but is concave across the entire border and not just medially as in the male of *P. lattkei*.

DISTRIBUTION

VENEZUELA: *Aragua* (Henri Pittier National Park, Rancho Grande [CWEM]); *Distrito Federal* (type series).

HABITAT

Pachycondyla lattkei was collected in second growth rain forest to thick cloud forest.

BIOLOGY

The nest of the type series was collected under a log. The soil was red and yellow clay. Two males (October), but no females were collected. The specimens from Aragua, Venezuela were collected in pitfall traps.

ETYMOLOGY

Named in honor of our close friend and fellow "mirmecólogo", John Lattke, headquartered in Venezuela and authority on ants, especially those of the Neotropics.

TYPE SERIES

Holotype worker (MCZC), 18 paratype workers (AMNH, CASC, LACM, MIZA, IAVH, MCZC, MZSP, QCAZ, USNM), 2 paratype males (CWEM, MCZC), VENEZUELA, D. F., Parque Vinicio Adames, 8-x-1988, W. Mackay # 11113.

Pachycondyla lenis Kempf

Figures - **Worker**: 243 (head), 553 (side view); **Map** 56

crassinoda species complex

Pachycondyla lenis Kempf, 1961:197-198, Figs. 4, 6, ♂, ♀, Brasil: Rio de Janeiro: Petrópolis

DISCUSSION

Worker

(Based on Kempf, 1961): The worker is a *medium sized* (total length 8.7 - 10.3 mm) *black* ant with dark brown mandibles, antennae and legs. The mandibles have 9 teeth. The anterior border of the clypeus is uniformly convex with a *medial longitudinal carina* that is well developed and sharp. The sides of the head are slightly convex. The posterior lateral areas of the head are rounded and the posterior border of the head is slightly concave. The *eyes are moderate in size* and located approximately one diameter from the anterior margin of the head (side view). The *pronotal shoulder forms a weak carina*; the *metanotal suture is obsolete* and not depressed. The *petiole is rectangular shaped* when viewed in profile; the dorsal face is emarginate anteriorly and laterally. The *dorsal face of the pygidium is not impressed medially*, but it is smooth and shining.

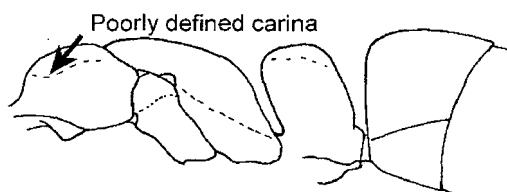


Fig. 553. Mesosoma, petiole and first gastral segment of a worker of *P. lenis* (from Kempf, 1961).

The pilosity is similar to that of *P. harpax*.

The *mandibles are smooth and shining* with sparse piligerous punctures. The frontal lobes are smooth and brilliant. The integument is subopaque punctate and reticulo-rugose with distinct longitudinal rugae or striae confined to the space between the clypeus, antennal fossa and from the compound eye to the dorsum and completely lacking on the sides of the head. The dorsum of the mesosoma is smooth and shining with more coarse and sparse punctures; and reticulated rugae are vestigial. The posterior face of the propodeum has fine transverse rugae. The sides of the mesosoma are

subopaque with fine horizontal rugae. The dorsal face of the petiole is practically smooth but with sparse and fine piligerous punctures. The sides have horizontal rugae. The posterior face has fine and superficial reticulated rugae and is moderately smooth. The gaster is nearly completely smooth and shiny with very fine piligerous punctures, which become coarser on the posterior terga.

Female

The female is *similar to the worker*, but with a total length ranging from 11.4 - 11.6 mm.

Male

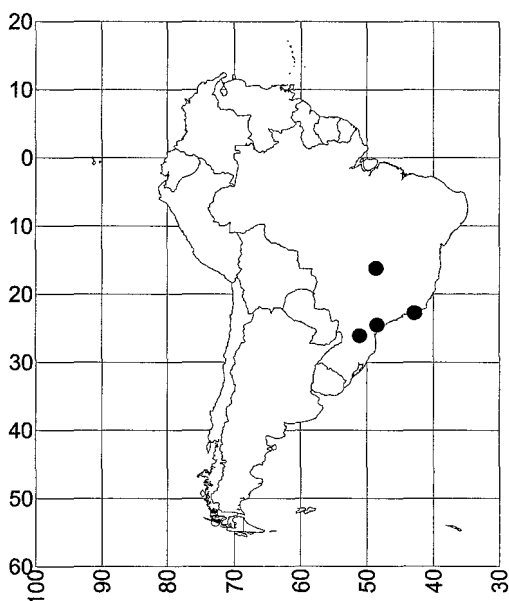
Unknown.

COMPARISON

Kempf (1961) compares *P. lenis* to *P. harpax*, based on its relatively small size and the general configuration of the body. The two species are easily confused. *Pachycondyla lenis* can be distinguished by the presence of the medial longitudinal carina on the clypeus, by the absence of sharp margins in the form of carina on the shoulders of the pronotum, by the sculpture of the head, by the dorsum of the mesosoma, which nearly lacks the longitudinal striae and rugae and by the configuration of the petiole, which has the dorsal face less marginate and less separated from the lateral face. This species occurs in the same sites with *P. harpax*, which supports them being separate species.

DISTRIBUTION

Kempf (1961) lists southern BRASIL, including the states of *Distrito Federal* (Brasilia [Campus UnB, MCZ]); *Rio de Janeiro* (Petrópolis); *São Paulo* (Alto de Serra, Guapiara); and *Paraná* (Rio Azul).



Map 56. *Pachycondyla lenis*.

HABITAT

All of the specimens have been collected between 700 - 1,000 m.

BIOLOGY

Unknown. It occurs together with *P. harpax* in Petrópolis (Kempf, 1961).

ETYMOLOGY

This species is named the Latin word *lenis*, meaning soft, referring to the lack of a hard integument.

Pachycondyla lenkoi Kempf

Figures - **Worker**: 61, 140 (mandible), 132 (subpostpetiolar process), 183, 242 (side view, top view of petiole), 184, 554 (head); **Map** 57

stigma species complex

Pachycondyla lenkoi Kempf, 1962:4-6, Figs 1 - 4, ♀, Brasil, Mato Grosso: Rio Sacre

DISCUSSION

Worker

(based partially on Kempf, 1962.)

The worker is a *moderate sized* (total length 6.5 - 8 mm) *ferruginous red to black* ant with the mandibles, clypeus, frontal lobes, legs, sides of the petiole node, sides and apex of the gaster ferruginous or fuscous ferruginous. The head is subquadrate with the sides slightly convex and with the posterior border slightly concave. The *mandibles have seven unequal sized teeth*. The *anterior half of the clypeus is separated from the posterior half by a well-developed transverse crest, forming a blunt tooth in the middle* and with an elongate tumulus behind the tooth, which turns into a *keel that extends back between the frontal lobes*. The head length is 1.56 mm; the head width is 1.48 mm. The sides of the head are nearly straight and only slightly narrowed anteriorly, the posterior border is slightly concave. The *eyes are small* (maximum dia-

meter 0.19 mm) located about 1 diameter from the anterior margin of the head (side view), but *relatively large* for a member of the *stigma* species complex, and separated from the anterior edge of head by approximately two diameters (side view). The *scapes* (1.05 mm) *extend to the posterior lateral corners of the head*. The *pronotal shoulder has a poorly defined carina* and the *metanotal suture is barely marked* and not depressed on the dorsum of the mesosoma. The *propodeal spiracle is slit-shaped*. The *petiole is thickened* when viewed in profile; with a vertical slightly concave anterior face and broadly rounded posterior face, which meet near the anterior edge of the petiole. The node of the petiole, viewed from above, is half-moon shaped; the sides of the posterior face are slightly marginate on the lower half. The subpetiolar process is large and angulate posteriorly. The pretergite of the second gastral segment *lacks a stridulatory file*. The posterior

lenkoi Bolivia and Brasil

medial surface of the pygidium has an ill-defined highly polished and hairless area, surrounded by a fringe of long hairs.

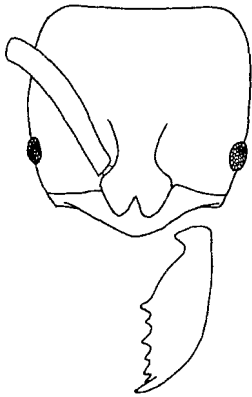


Fig. 554. Head and mandible of the holotype worker of *P. lenkoi* (from Kempf, 1962).

The body and appendages have erect or suberect brownish golden hairs (up to 0.45 mm). Shorter (0.2 - 0.3 mm) hairs are present on the dorsum and ventral surfaces of the head, sides and posterior border of the head, *scapes*, dorsum of the mesosoma, dorsum of the petiole and gaster. The appressed golden pubescence is rather long dense and conspicuous on the dorsum of the head, thorax, petiole and gaster, but never masking the integument and the tarsi, especially of the mid and hind legs, have short oblique stout setae.

The *mandible is smooth and shining* with sparse piligerous punctures. The dorsum of the head is

densely and coarsely punctate with the intervals smooth and shining. Coarse punctures become sparse on the sides of the head and are extremely rare on the nearly smooth and highly polished ventral surface of the head. The clypeus and frontal lobes are rather smooth and shining. The mesosoma is feebly sculptured throughout and quite shining. The neck of the pronotum has a few irregular, but rather longitudinal rugosities. The pronotum is sparsely and rather coarsely punctate above and more shallowly on the sides. The mesonotum is sparsely and feebly punctured, the dorsal and posterior faces of the propodeum are nearly smooth and shining, the sides of the mesosoma have horizontal rugae above and are smooth and shining below. The petiole is smooth and glossy with scattered punctures. The gaster is moderately smooth and glossy with scattered punctures.

Female and male

Unknown.

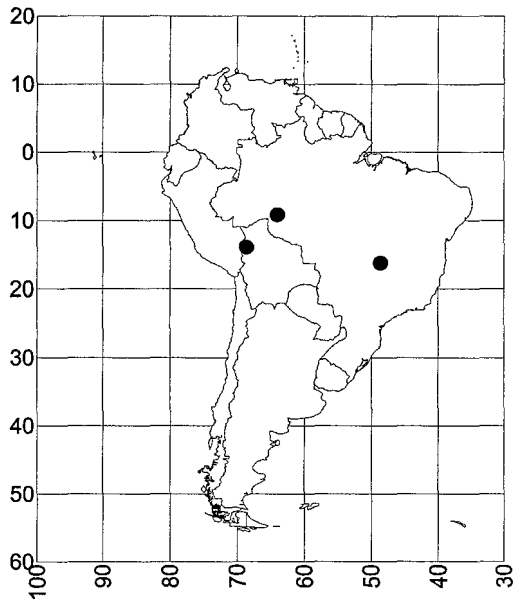
COMPARISON

Kempf (1962) compares *P. lenkoi* with *P. harpax* and *P. lenis*, but states that it is readily recognized by its much smoother and shinier integument and by the completely different petiolar node. In Kempf (1961) it would key with *P. metanotalis*, but differs in its smaller size with smoother and shinier integument and by the less compressed petiolar node, the shorter funicular segments (3 - 4), the weaker lateral margination of the pronotum

and especially in the lack of the stridulatory file on the second pretergite of the gaster. The elongate mandibles with the reduced number of teeth (seven) distinguishes *P. lenkoi* from most of the other known species in the genus, but is similar to that of members of the *stigma* species complex. *Pachycondyla lenkoi* can be separated from most of the members of the *stigma* species complex by the slit-shaped propodeal spiracle. It can also be easily distinguished from the other members of the *stigma* species complex by the subpostpetiolar process, which is completely different from the other members in which the process consists of a collar-like flange. In *P. lenkoi* the process is formed into a relatively sharp tooth, which is followed posteriorly by a longitudinal carina which is positioned on the ventral anterior surface of the postpetiole. The process is similar to that found in *P. tarsata*, but *P. lenkoi* and *P. tarsata* are very different and do not appear to be closely related. It is likely that *P. lenkoi* is not a member of the *stigma* species complex, but if removed, would have to be placed in its own species complex. It will be left here until it can become better known.

Pachycondyla lenkoi somewhat bridges between the *stigma* complex and the *ferruginea* complex, having the mandible and strongly developed transverse clypeal carina of the first complex and the most of the remainder, especially the subpetiolar process of the *ferruginea* species complex. Surprisingly the propodeal spiracle of *P. lenkoi* is slit-shaped,

unlike either complex. *Pachycondyla lenkoi* is arbitrarily placed in the *stigma* complex based on the form of the mandible and clypeus. It is most similar to *P. succedanea* in the *stigma* complex, but can be easily separated by the lack of a depressed metanotal suture on the dorsum of the mesosoma and the slit-shaped propodeal spiracle.



Map 57. *Pachycondyla lenkoi*.

The polished mandibular surface could cause confusion with the smaller *P. minuta* (total length of the worker 4.5 mm, of the female ~ 4 mm), but is larger and lacks the round propodeal spiracle of *P. minuta*. *Pachycondyla lenkoi* is similar to the Central and South American *P. ferruginea* in size, color and shape of the petiole and subpetiolar process. *Pachycondyla lenkoi* can easily be separated by the 7-toothed mandible (about 10 in *P.*

ferruginea) and the slit-shaped propodeal spiracle (circular in *P. ferruginea*).

DISTRIBUTION

BRASIL: *Mato Grosso*, (NW part of state [Rio Sacre, Kempf, 1962]); *Distrito Federal* (Brasilia [MCZC], Campus UnB [Sandoval and Zambrano, 2007]). BOLIVIA: *La Paz* (Tumupasa [USNM]).

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

This species is named to honor the well known Brazilian myrmecologist, Karol Lenko, who collected the holotype.

Pachycondyla leveillei (Emery)

Figures - **Worker**: 26, 139 (tibia), 116 (larva), 555 (side view, top view of petiole), 556 (head), 557 (mandible and antenna), 558 (Metasternal process); **Map** 58

leveillei species complex

Ponera leveillei Emery, 1890a:61, ♀, Venezuela, Mérida: Colonia Tovar; *Euponera (Mesoponera) leveillei*: Emery, 1901a:46; Forel, 1912:40; Eidmann, 1936:35-36, larva; Wheeler and Wheeler, 1952:624; *Mesoponera leveillei*: Kempf, 1972:141; *Pachycondyla leveillei*: Bolton, 1995:306

DISCUSSION

Worker

The worker is a *small* (total length less than 5 mm) *medium brown mostly shiny* specimen. The mandible has about 7 - 12 defined teeth with

basalmost teeth poorly defined (possibly more than 12 teeth and tiny denticles, if they are all counted). Most are poorly defined, except for the long apical tooth and possibly the next two teeth. The head is nearly heart-shaped, narrowed anteriorly and

leveillei Panamá to southern Brasil

with the posterior border concave. The clypeus is indented medially along the anterior border; the *eye is small* (maximum diameter 0.07 mm) located nearly three diameters from the anterior edge of the head (side view). It has approximately ten ommatidia. The *malar carina is absent*. The antennal scape barely reaches the posterior lateral corner of the head. The *pronotal shoulder is rounded*, the mesonotum is convex dorsally and the *metanotal suture is deeply depressed*. The dorsal face of the propodeum is approximately equal in length to the posterior face. The *pronotal spiracle is circular to slightly elongate*. The *petiole is narrow* when seen in profile

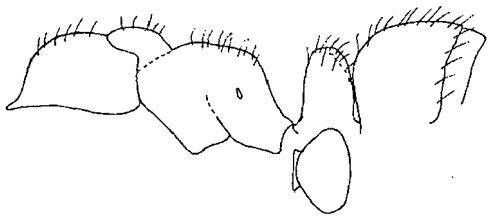


Fig. 555. Mesosoma, petiole and first gastral tergite of a worker of *P. leveillei* (Río Negro, Panamá, USNM). The inset shows the petiole as seen from above.

with a straight anterior face and a weakly convex posterior face. The subpetiolar process is broadly rounded and thickened. The anterior face of the postpetiole is rounded into the dorsal face. The stridulatory file is absent from the second pretergite of the

gaster. The *middle and posterior tibia have a single spine* (noted by Forel, 1912). The *metasternal process is long slender and fang-like* in side view, as in members of the *stigma* complex.

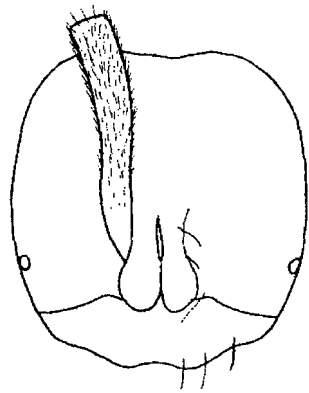


Fig. 556. Head of a worker of *P. leveillei* (Río Negro, Panamá, USNM).

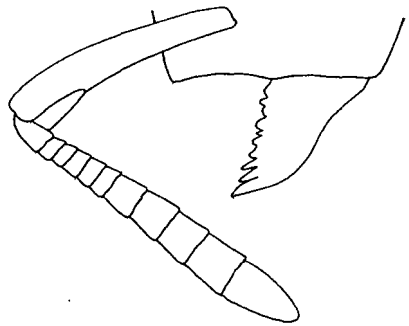


Fig. 557. Mandible and antenna of a worker of *P. leveillei* (Río Negro, Panamá, USNM).

Erect hairs are abundant on most surfaces and are mostly short (0.1 mm), although the hairs on the clypeus and gaster are longer (0.25 mm). The hairs on the legs are mostly appressed, those on the coxae are suberect and those on the flexor surface of the mid and hind tibiae are suberect. *Appressed pubescence is abundant* on most surfaces, including the head, dorsum of mesosoma and gaster and is whitish in color.

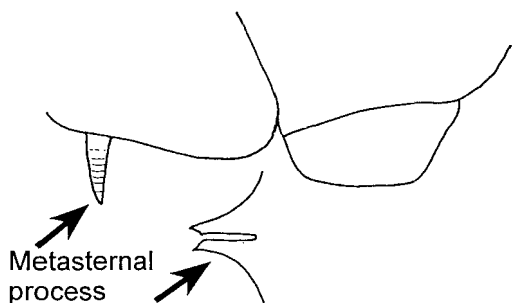


Fig. 558. Metasternal process of a worker of *P. leveillei* (Río Negro, Panamá, USNM), as seen from the side and from behind.

Most surfaces are at least moderately shining. The mandibles are shiny but with scattered moderately coarse punctures. The head is densely and evenly but finely punctate. The dorsum of the mesosoma is very finely but densely punctate and smooth and glossy, the sides of the pronotum are similar, the mesopleuron has faint indications of striae, as does the propodeum. The anterior face of the

petiole is densely punctate, the side is weakly punctate, the posterior face is mostly smooth and glossy. The gaster is covered with scattered coarse dense punctures, but is moderately shining.

Female and Male

Unknown.

COMPARISON

The presence of a single spur on each of the middle and posterior tibiae would separate *P. leveillei* from all of the other New World *Pachycondyla* and suggests that this species actually belongs in *Hypoponera*. It shares characteristics with *Pachycondyla*, especially the elongate slender well-developed appendages on the metasternal process, a condition similar to other members of the *stigma* species complex. The mandibular teeth are poorly developed or exist as only denticles, similar to the mandibles of apparently all New World species of *Hypoponera*, except for *H. iheringi*, in which the mandibular teeth are often developed apically. *Hypoponera iheringi* has the other characteristics of *Hypoponera*, including single apical spurs on the middle and posterior tibia and a poorly developed metasternal process. The presence of actual teeth on the basal half of the mandible and the well-developed metasternal process would place this species in the *stigma* species complex of *Pachycondyla*. It links *Pachycondyla* and *Hypoponera* and is closely related to *Hypoponera* cf. *iheringi* from Panamá

(CWEM # 17840). This latter species of *Hypoponera* has a poorly developed metasternal process, but the two lobes of the process can be seen and it is thus more developed than in other species of *Hypoponera*. *Hypoponera* is currently in revision by Shawn Dash (University of Texas, El Paso) and the relationships of these species will become clearer.

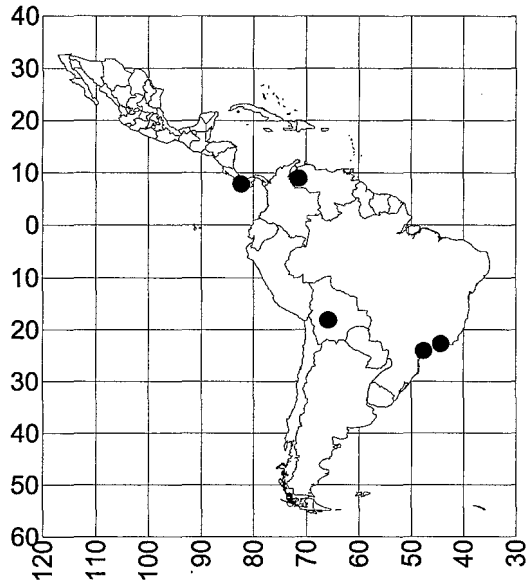
Pachycondyla leveillei appears to be similar to *P. conicula*, but can be easily separated by its brown color (*P. conicula* is black). Additionally the metasternal process of *P. conicula* consists of broad triangles.

The specimen from Bolivia differs from the specimens from Mendes, Brasil in being smaller (total length slightly over 4 mm), has fewer (7) and more developed mandibular teeth and the dorsum of the mandibles is smooth and shiny, not with scattered dense punctures as is found in the specimens from Brasil. They are probably not conspecific, but we will consider them to be *P. leveillei* until more specimens are available.

DISTRIBUTION

PANAMÁ: *Veraguas* (Río Negro [NHMB, USNM]). VENEZUELA: *Mérida* (Tovar). BRASIL: *Rio de Janeiro* (Mendes, [NHMB, USNM]); *São Paulo* (Botucatú [Forel, 1912]).

BOLIVIA: *Cochabamba* (105 k E Cochabamba [Río Carmen, CWEM]).



Map 58. *Pachycondyla leveillei*.

HABITAT

These ants have been collected in cloud forest.

BIOLOGY

The worker from Bolivia was collected from the extraction of a litter sample.

ETYMOLOGY

This species was named to honor Mr. Albert Leveille.

Pachycondyla lineaticeps Mayr

Figures - **Worker**: 106, 258 (petiole, side view), 107, 259 (head), 218 (side view), 260 (petiole, posterior face), 559 (metasternal process); **Female**: 560 (side view), 561 (head); **Male**: 305 (side view), 314 (head); **Map** 59

foetida species complex

Pachycondyla lineaticeps Mayr, 1866b:502, ♀, México: without locality [lectotype worker, 2 paralectotype workers and 1 paralectotype female, here designated, NHMW]; Forel, 1899:13; Bolton, 1995: 306 *Neoponera lineaticeps*: Emery, 1901a:47; *Neoponera (Neoponera) lineaticeps*: Emery, 1911:72

DISCUSSION

Worker

This is a *moderately large* (total length 10 mm) *black* species with brown mandibles and antennae and reddish brown legs. The *eye is relatively large* (maximum diameter about 0.5 mm) located about one maximum diameter from the anterior margin of the head (side view). The *malar carina is sharp* and well developed. The *pronotal shoulder is developed into a sharp carina*, which overhangs the side of the pronotum, the *metanotal suture is depressed* on the dorsum of the mesosoma, where it breaks the sculpture. The posterior lateral edges of the propodeum form a carina, as does the posterior lateral edges of petiole. The anterior face of the petiole is vertical, the posterior face is broadly rounded and meets the anterior face of the node.

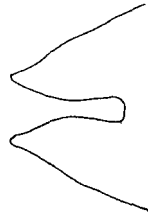


Fig. 559. Metasternal process of a worker of *P. lineaticeps* (Matagalpa, Nicaragua, CWEM), as seen from behind.

Most surfaces are covered with erect hairs, including the dorsum of the head, the ventral surface of the head, the scapes, the dorsum and sides of the mesosoma, the legs (the hairs on the tibiae are mostly suberect), the petiole and all surfaces of the gaster. *Appressed pubescence is also abundant and dense* on the dorsum of the head, the dorsum of the meso-soma, the side of the mesosoma, the petiole and the dorsum of the gaster.

Much of the dorsal surface of the head is covered with punctures, some of which are in rows and form striae. The head is slightly swollen on the vertex, with that area covered with coarse longitudinal striae that diverge posteriorly, which is the characteristic that defines this species. The striae cover only the central part of the dorsum of the head, the sides and the parts anterior and posterior to the eye are finely punctate. The dorsum of the mesosoma is finely punctate but the sculpture is covered with golden pubescence that hides much of sculpture. The side of the pronotum is punctate but moderately shining, the entire mesopleuron is punctate but moderately shining. The side of the propodeum is covered with coarse longitudinal rugae. The anterior face and side of the petiole are punctate and moderately shining, the posterior face of the petiole is punctate and moderately shining, usually with vertical rugae in the central region. The side of the petiole is striate in a specimen from Querétaro, México. The gaster is punctate and moderately shining.

Female

The female (undescribed paralectotype) is a medium sized specimen (total length 11 mm) black ant with reddish brown appendages. The mandibles have approximately 12 teeth, the anterior margin of the clypeus is convex. The malar carina is well developed and the eye is large (maximum diameter 0.59 mm) and the scape extends to the posterior lateral

corner of the head. The pronotal shoulder is formed into a sharp carina, which overhangs the side of the pronotum. The propodeal spiracle is oval-shaped. The petiole is shaped



Fig. 560. Mesosoma and petiole of the paralectotype female of *P. lineaticeps*.

like that of the worker with a straight vertical anterior face and a broadly rounded posterior face, which meets the anterior face near the anterior edge. The anterior face of the postpetiole is vertical, but broadly rounded into the dorsal face.

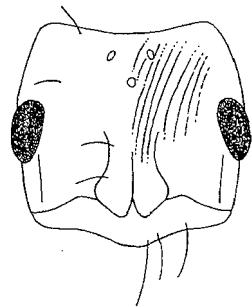


Fig. 561. Head of the paralectotype female of *P. lineaticeps*.

Long (up to 0.6 mm in length) erect hairs are present on the

mandibles, clypeus, dorsal surface of the head, mesosoma, petiole and gaster, as well as on the legs.

The *dorsum of the head has abundant coarse striae*, which are restricted to the central part of the head, with the region around the eye being finely punctate. The remainder of the ant is dull and finely punctate.

Male

The male (undescribed) is a moderate sized (total length 9 mm) yellowish brown specimen. The anterior margin of the clypeus is nearly straight. The *clypeus is swollen medially* and the *anterior medial process forms a tiny bump*. The head is 1.2 mm long and 1.08 mm wide (posterior to the eyes). The *ocelli are large* (maximum diameter of the medial ocellus 0.25 mm) located less than one diameter from the lateral ocellus. The *pronotal shoulder is slightly swollen* but does not form a carina. The node of the petiole is rounded dorsally and relatively thickened; the subpetiolar process forms a ventrally directed lobe.

Erect hairs are sparse on most surfaces, most less than 0.3 mm in length, present on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior border of the head, mesosoma, petiole, gaster and legs.

Most surfaces of the male are coriaceous and feebly to moderately shining.

COMPARISON

The sculpture of the head of the worker and female would separate *P.*

lineaticeps from most of the other species in the genus *Pachycondyla*. Others with striae on the dorsum of the head include the Colombian *P. fuscoatra* and the Brazilian *P. magnifica*.

Pachycondyla lineaticeps can be distinguished from *P. fuscoatra* as the striae are mostly confined to the central region of the dorsum of the head and do not extend past the eyes on the side of the head, as they do in *P. fuscoatra*. The dorsum of the pronotum of *P. lineaticeps* is punctate, not coarsely striate as in *P. magnifica*.

The entire funiculus of *P. lineaticeps* is brown, which would separate *P. lineaticeps* from *P. apicalis* and *P. cooki*. The well-marked posterior lateral margins of petiole would distinguish *P. lineaticeps* from the Costa Rican *P. dismarginata*. The vertical striae or rugae (often poorly developed) on the posterior face of the petiole separate *P. lineaticeps* from *P. foetida* (in which the striae are horizontal) and from *P. theresiae*, *P. villosa* and *P. bugabensis*, which lack striae or rugae on the posterior face. The smaller size and the sculpture of the head would separate *P. lineaticeps* from the common *P. villosa*.

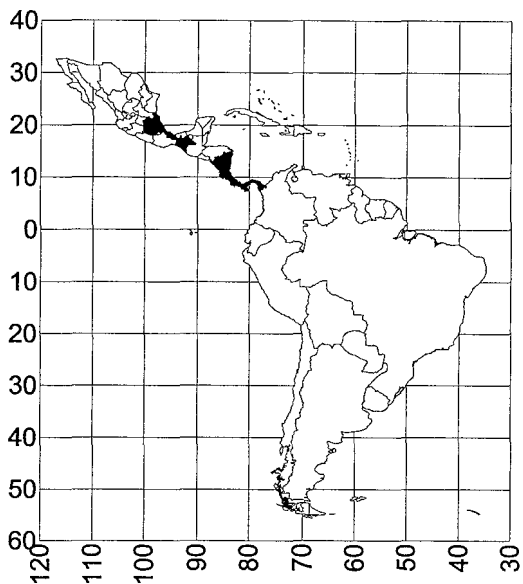
The striae on the dorsum of the head of *P. lineaticeps* could cause confusion with the southern South American *P. striata*. The distributions of the taxa are separated, which will reduce the possibility of confusing the two species. *Pachycondyla striata* is much larger with a total length of about 12 mm. The entire dorsum of the head is covered with fine striae in

P. striata, not just the middle portion covered with coarse striae with the surrounding sculpture being total different (punctate), as it is in *P. lineaticeps*. Finally the dorsum of the pronotum is not covered with striae in *P. lineaticeps*, as it is in *P. striata*.

Pachycondyla lineaticeps is similar to *P. solisi*, but can be easily separated as the posterior face of the petiole is rugulose, not smooth and glossy as in *P. solisi*.

DISTRIBUTION

MEXICO: *Querétaro* (El Pilón [Mpio. Jalpan de Serra, Jones Collection]); *Distrito Federal* (México [intercepted at Brownsville]); *Veracruz* (Omealca, Mirador, Las Hamacas, Los Tuxtlas, 17 km N Santiago Tuxtla, Córdoba [Forel, 1899]); *Chiapas* (Laguna Ocotol Grande). NICARAGUA: *Matagalpa* (Hotel Selva Negra); without locality (intercepted at Mobile [AL]). COSTA RICA: *Alajuela* (Jiménez [Emery, 1890b, 1894b; Forel, 1899]); *Puntarenas* (Osa Peninsula, Corcovado, Sirena, Santa Clara, Estación Biológica Las Alturas, Santa Elena); *Guanaacaste* (Volcán Cacao); *Limón* (Matina); *Heredia* (16 k SSE La Virgen, near Guápiles, Parque Nacional Braulio Carrillo, 10°20'N 84°4'W, 15 k N Volcán Barba, 16 k N Volcán Barba). PANAMA: *Bocas del Toro* (1 k W Continental Divide [road to Chiriquí Grande], 3 k W Fortuna Highway); *Coclé* (La Mesa north of El Valle); *Panamá* (Cerro Jefe, Cerro Campana); *Veraguas* (Cerro Tute [4 k W Santa Fé]); *Colón* (Bugaba [Forel, 1899]).



Map 59. *Pachycondyla lineaticeps*.

HABITAT

Pachycondyla lineaticeps has been collected in tropical rain forest and cloud forest, as well as canopy forest, from 50 – 1300 meters elevation.

BIOLOGY

This species nests in *Tillandsia* sp. [Bromeliaceae] in Costa Rica. Workers have been collected on the forest floor, as well as a male in Nicaragua (July). A worker (USNM) was intercepted on banana debris from Nicaragua.

ETYMOLOGY

Pachycondyla lineaticeps of this species is based on two words from Latin, *linea*, meaning line and *caput*, meaning head, referring to the striae on the dorsum of the head.

***Pachycondyla longidentata* new species**

Figures - **Worker**: 48, 99 (petiole), 49 (mandible), 98 (head, side view), 201 (mandible and petiole), 562 (side view), 563 (head, frontal view); **Map** 60

arhuaca species complex

DISCUSSION & DESCRIPT.**Worker**

The worker is a *small* (total length 6.5 mm) *ferruginous red* ant. The *apical tooth of the mandible is extremely long*, approximately three times the length of the next longest tooth, which is located about half way along the masticatory border. The *anterior medial border of the clypeus forms a sharp angle*, but is not extended into a spine. The transverse clypeal carina is nearly absent, represented only by the sharp angle. The head is nearly as wide (1.54 mm) as long (1.56 mm). The *eye is tiny* (0.07 mm maximum diameter) and located slightly more than 1 diameter from the anterior margin of the head (side view). The *scape is short* (1.09 mm) and does not reach the posterior lateral corner of the head. The *pronotal shoulder is rounded*; both the *promesonotal and metanotal sutures break the sculpture and are depressed* on the dorsum of the mesosoma. The *propodeal spiracle is circular*. The *petiole is thick* when viewed in profile, with the anterior and posterior faces

being nearly parallel and meeting to form a well-defined dorsal face. The anterior edge of the subpetiolar process forms a ventrally directed tooth and lacks a posteriorly directed tooth on the posterior edge. The anterior face of the postpetiole is vertical and nearly forms an angle with the dorsal face. The *stridulatory file and arolia are absent*.

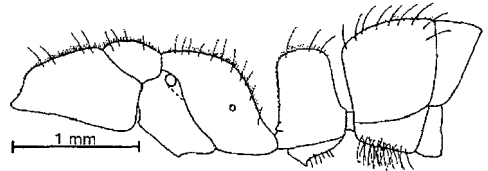


Fig. 562. Mesosoma, petiole and first gastral tergite of the holotype worker of *P. longidentata*.

Erect hairs are abundant, but mostly short (up to 0.1 mm) and present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides and posterior margin of the

head, antennal scapes, mesosoma, petiole, gaster and legs; appressed whitish pubescence is abundant on all surfaces.

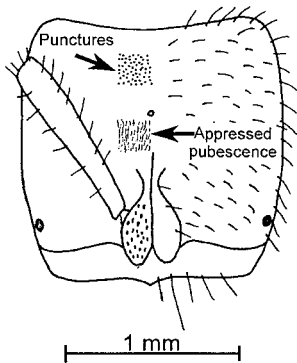


Fig. 563. Head, of the holotype worker of *P. longidentata*. Only portions of the sculpturing and fine appressed pubescence are shown.

The mandibles are smooth and moderately shining with little evidence of striae and with scattered punctures. The dorsum of the head is completely and densely punctate as is the dorsum of the frontal lobes and the surface of the scapes. The punctures on the dorsum of the pronotum are coarser and not as dense, those on the mesonotum and dorsum of the propodeum are similar to those on the head, the punctures on the side of the pronotum are poorly defined, leaving the surface shining, the mesopleuron and propodeum have poorly defined

striae. The dorsum of the petiole is glossy and shiny, the sides have poorly defined punctures and are moderately shining. The gaster is glossy and shining with a few scattered punctures.

Female and Male

Unknown.

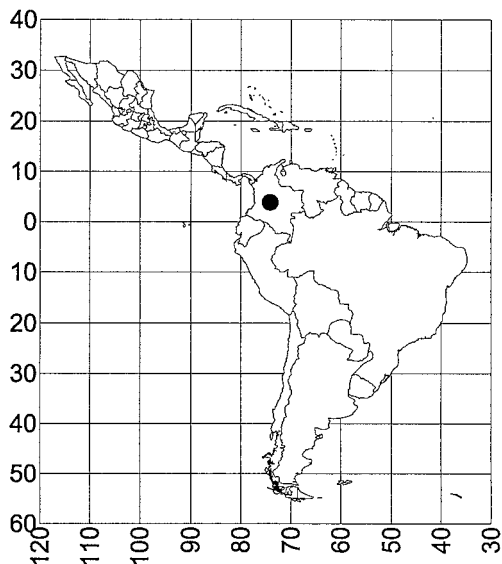
COMPARISON

It is impossible to place *P. longidentata* into a species complex with any degree of confidence. Superficially *P. longidentata* appears to be a member of the *ferruginea* species complex, based on the size, color and shape of the petiole. Unfortunately the clypeus is structurally similar to that of members of the *arhuaca* species complex and *P. longidentata* even has an angle on the clypeus, which is probably homologous to the spine found on *P. becculata*. This would suggest that it is a member of the *arhuaca* species complex. *Pachycondyla longidentata* lacks the well-developed transverse clypeal carina found in members of the *ferruginea* species complex. Furthermore the subpetiolar process of *P. longidentata* lacks the posteriorly directed spine or lobe found in members of the *ferruginea* species complex. These latter two characters would seem to exclude it from the *ferruginea* species complex. Unfortunately it also lacks a deeply depressed metanotal suture, similar to members of the *ferruginea* species complex. It is probably a species that forms a link between the two species complexes.

The worker of *P. longidentata* could be confused with those of *P. ferruginea* and *P. lunaris*. *Pachycondyla longidentata* can be easily separated by four characteristics: 1) the apical mandibular tooth is much longer than any of the others (only slightly longer in the latter two species); 2) the mandibles are nearly smooth with scattered punctures (striate in *P. ferruginea* and *P. lunaris*); 3) the eye is tiny (larger in *P. ferruginea* and *P. lunaris*, maximum diameter more than 0.1 mm); and 4) a posteriorly directed flange or lobe is absent on the subpetiolar process (present in both of the other two species). Both *P. ferruginea* and *P. lunaris* have well developed transverse clypeal carinae, which is nearly lacking in *P. longidentata*. It can be separated from all of the other members of the *arhuaca* species complex by the unusual shape of the mandible with a reduced number of teeth and an exceptionally elongated apical tooth. It may be related to some of the Old World species, such as the African *P. soror*, which has a similar petiole and subpetiolar process as well as a somewhat larger apical mandibular tooth.

DISTRIBUTION

Known only from the type locality, La Macarena National Park in the state of *Meta*, COLOMBIA.



Map 60. *Pachycondyla longidentata*.

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

From Latin, *longus* meaning long and *dentatus*, meaning toothed, referring to the long apical tooth of the worker of this species.

TYPE SERIES

Holotype worker (IAVH), COLOMBIA *Meta*, PNN La Macarena 2°45'W 73°55'W 580m 14.vii.1991, F. Fernández Leg, # IAVH 49951.

Pachycondyla lunaris (Emery)

Figures - **Worker**: 92 (clypeus), 93 (metasternal process), 95 (petiole), 203 (side view), 564 (head and mandible); **Female**: 565 (mesosoma), 566 (head); **Map** 61

ferruginea species complex

Ponera lunaris Emery, 1896a:55-56, Plate 1, Fig. 12 a, b, ♀, Paraguay: without locality; *Pachycondyla (Pachycondyla) lunaris*: Emery, 1901a:45; *Euponera (Trachymesopus) lunaris*: Emery, 1911:85; *Trachymesopus lunaris*: Kempf, 1960a:424, 427; *Pachycondyla lunaris*: Bolton, 1995:307

DISCUSSION

Worker

The worker is *small* (total length 4 - 5.5 mm) *dark reddish brown* with reddish brown appendages. The *mandibles are finely striate and shiny*, the *remainder of the ant is dull*. The head length is 1.3 mm; the head width 1.1 mm. The anterior border of the clypeus is broadly convex with the medial part being straight or even slightly concave. The *eyes are relatively small* (maximum diameter 0.15 mm) and are located less than one maximum diameter from the anterior edge of the head (side view) and contain approximately 40 ommatidia. The *scapes are relatively short* and fail to reach the posterior lateral corner of the head by at least one maximum diameter of the scape. The posterior border of the head is broadly concave. The mesosoma is short and robust, the *pronotal shoul-*

der lacks any sign of a carina, the *mesosoma is weakly depressed at the metanotal suture*, which is poorly marked dorsally and the *propodeal spiracle is circular*. The *petiole is rectangular-shaped* with the anterior and posterior faces being nearly

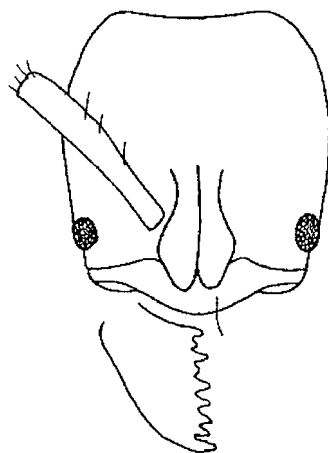


Fig. 564. Head and mandible of a worker of *P. lunaris* (Puntarenas, Costa Rica, CWEM).

parallel, forming a rounded blunt apex. The gaster is angulate anteriorly with the anterior face and the posterior face of the postpetiole meeting at nearly a right angle. The *stridulatory file is absent* on the second pretergite, as are the arolia between the tarsal claws.

Erect hairs are sparse with a few present on the clypeus and shaft of the scape, very few are present on the dorsum of the head or posterior margin, a few are present on the dorsum of the mesosoma, dorsum of the petiole, on the subpetiolar process and all surfaces of the gaster. Very few erect and suberect hairs are present on the legs. Fine golden appressed pubescence is present on nearly all surfaces, but is only obvious on the dorsum and sides of the head, dorsum of the mesosoma and all surfaces of the gaster.

The *mandibles are dull and completely striate*, a furrow is present near the base, the head is punctate, the mesosoma, front of the petiole and sides are punctate and dull, the posterior face is somewhat shining, the gaster is finely punctate and glossy.

Female

The *female* (undescribed) is approximately the same size as the worker and differs in having three ocelli and a larger eye, which is separated from the anterior edge of the head (side view) by less than one half of the maximum diameter and contains over 100 ommatidia. The

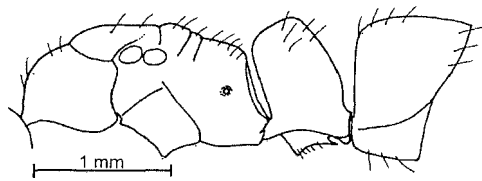


Fig. 565. Mesosoma and petiole of a female of *P. lunaris* (Puntarenas, Costa Rica, CWEM).

mesosoma is also robust and short and contains vestiges of the wings, the *propodeal spiracle is circular* in shape. The anterior and posterior faces of the petiole are nearly parallel and the apex is formed into a blunt rounded surface. The remainder is as in the worker.

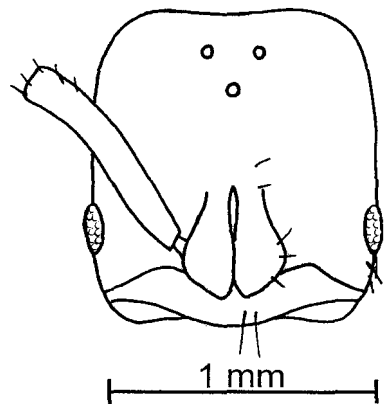


Fig. 566. Head of a female of *P. lunaris* (Puntarenas, Costa Rica, CWEM).

Male

Unknown.

COMPARISON

Pachycondyla lunaris is nearly identical to *P. ferruginea*. It differs in having a rectangular-shaped petiole (as seen from the side) with the anterior and posterior faces being nearly parallel (the petiole of the worker and female of *P. ferruginea* is narrowed towards the apex).

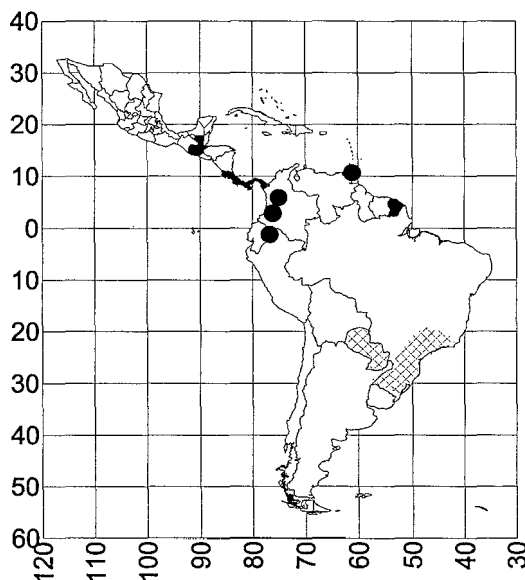
Pachycondyla lunaris is similar to *P. rupinicola*, differing in being smaller (total length of *P. rupinicola* is about 7 mm) and in having a shorter scape (the scape of *P. rupinicola* extends significantly past the posterior lateral corner of the head). The color and the circular shaped propodeal spiracle would separate *P. lunaris* from all of the others in the genus.

Pachycondyla lunaris could be confused with *P. longidentata*. The form of the mandible can easily separate it, the dorsum of which is striate (smooth in *P. longidentata*) and the apical mandibular tooth is only slightly longer than the subapical tooth (apical tooth much longer in *P. longidentata*). Additionally the eye of *P. lunaris* is relatively large (> 0.1 mm maximum diameter) as compared to the tiny eye of *P. longidentata*; and the subpetiolar process has a posteriorly directed flange or lobe (absent in *P. longidentata*).

DISTRIBUTION

GUATEMALA: *Suchitepéquez* (12.3 k N Patulul [Finca Tarrales, CWEM]). COSTA RICA: *Puntarenas* (Osa Peninsula, 5 kW Rincon de Osa, 8°42'N 83°31'W, [MCZC], Fundación Neotrópica [CWEM], Cerro

Helado [17k NE Rincón, CWEM]). PANAMA: *Chiriquí*: (Cerro Hornito [24 k W El Hato del Volcán, MCZC], 12 k NE Santa Clara). COLOMBIA: *Antioquia* (Zona Buenos Aires [MCZC]); *Valle del Cauca* (Bosque Yotoco [CWEM]). ECUADOR: *Napo* (Tiptuni Biodiversity Station [MCZC]). TRINIDAD: (without locality [MCZC]). FRENCH GUIANA: *Cayenne* (Paracou Experimental Station, [45kW Karou, 5°16'51"N 52°56'47"W, MCZC]). BRASIL: *Rio de Janeiro* (Jussarai near Agra dos Reis [Kempf, 1960a]); *São Paulo* (Agudos & Barueri [Kempf, 1960a]); *Santa Catarina* (Ibirama [Kempf, 1960a]); *Rio grande do Sul* (Pareci Novo [Kempf, 1960a]). PARAGUAY: *Canindeyú* (Reserva Natural del Bosque Mbaracayú [Wild, 2002]); without locality (Emery, 1896a).



Map 61. *Pachycondyla lunaris*.

lunaris Guatemala to southern Brasil

HABITAT

Pachycondyla lunaris occurs in lowland rain forest, primary wet forest, second growth rain forest, a clearing in a secondary forest, cloud forest, ridge forest and oak forest; between 40 and 1850 meters elevation.

BIOLOGY

Most specimens have been collec-

ted from extractions of leaf litter or from a laminate fungus. Specimens have also been collected in pitfall traps. Dealate females were collected in June (Costa Rica).

ETYMOLOGY

The name of this species is from the Latin word *luna* and refers to the moon-shaped petiole as seen from above.

Pachycondyla luteola (Roger)

Figures - **Worker**: 83 (mandible), 280 (head), 567 (side view), 568 (metasternal process); **Female**: 569 (side view), 570 (head); **Map** 62

crenata species complex

Ponera luteola Roger, 1861b:166-167, ♀, Perú: Pampa del Sacramento, Misión Sareyacu (Kempf, 1972), Brasil (Bolton, 1994) [one "type" seen, MCZC]; Mayr, 1863:449; *Pachycondyla luteola*: Roger, 1863a:18, Dalla Torre, 1893:34; *Neoponera luteola*: Emery, 1901a:47; *Neoponera (Neoponera) luteola*: Emery, 1911:73; *Pachycondyla luteola*: Bolton, 1995: 307

DISCUSSION**Worker**

The worker is a *moderate sized* (total length 8 millimeters) *ferruginous red* ant. The *mandibles have approximately 15 small teeth*. The anterior border of the clypeus is

broadly convex, the medial lobe is present but poorly developed. The head length is 1.8 mm; the head width 1.5 mm. The *malar carina is poorly developed* and only evident in about the first 1/3 of its length and does not extend to the eye. The *eye is relatively small* (maximum diameter 0.37 mm,

luteola Peru

located slightly more than one diameter from the anterior margin of the head. The *scape* is relatively short (total length 1.6 mm) and extends slightly past the posterior lateral corner of the head. The sides of the head are weakly convex, the *posterior margin is concave*. The *pronotal shoulder is swollen* and barely forms a carina. The *mesosoma is depressed at the metanotal suture*, but the sculpture is barely interrupted. The *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with the subpetiolar process well developed, consisting of a blunt ventrally projecting lobe anteriorly followed by a concave region and a broad posterior swollen region. The *petiole is narrowed anteriorly* when viewed from above, similar in shape to that of *P. crenata*.

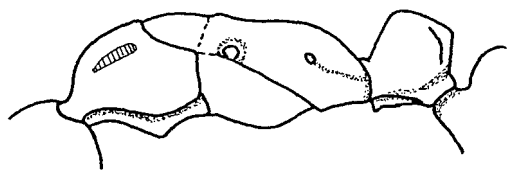


Fig. 567. Mesosoma and petiole of a "type" worker of *P. luteola*. The hatched area on the pronotum indicates a swollen region (Madre de Dios, Perú, MCZC).

Erect hairs are mostly long (0.6 mm) and abundant on the mandibles, clypeus, dorsal and ventral surfaces of head, scape, mesosoma, petiole and all surfaces of the gaster, the hairs on the

legs are similar, but are mostly suberect. *Appressed yellow or golden pubescence is abundant* on all surfaces. The metasternal process consists of a pair of long slender lobes, unlike those of any other species in the New World.

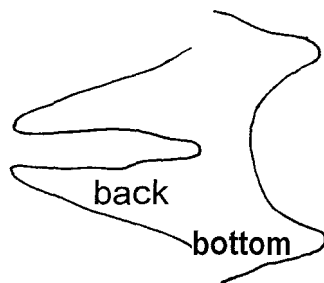


Fig. 568. Metasternal process of a worker of *P. luteola* (Madre de Dios, Perú, CWEM), as seen from behind and from below.

Most surfaces are moderately to strongly shining and weakly coriaceous.

Female

The female (undescribed) is a *medium-sized* (total length 12 mm) *chestnut brown* specimen. The head length is 2.3 mm; the head width is 2.15 mm. There are about *ten mandibular teeth*, most are poorly developed. The anterior border of the clypeus is weakly convex; the head is narrowed anteriorly and the posterior margin is concave. The *malar carina is present* and extends to the anterior border of the eye; the maximum eye diameter is 0.68 mm. The *scape* (1.98

mm) extends only slightly past the posterior lateral corner of the head. The pronotal shoulder is swollen but does not form a margin or carina; the propodeal spiracle is slit-shaped. The petiole is thick when viewed in profile; the subpetiolar process has an anterior lobe and a gradually diminishing posterior portion.

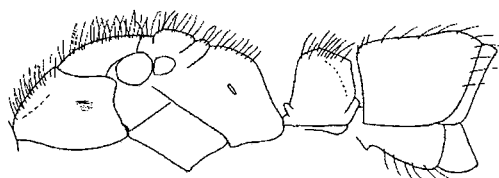


Fig. 569. Mesosoma, petiole and first gastral tergite of a female of *P. luteola* (Madre de Dios, Perú, MCZC).

Erect hairs are abundant on nearly all surfaces, including the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin, sides of the head, *scapes*, mesosoma, petiole, gaster, the hairs on the legs are mostly suberect, but are abundant and are about as long as the width of the leg. Appressed golden pubescence is present on the head, dorsum and side of the mesosoma, dorsum and side of the petiole and all surfaces of the gaster.

The *mandibles are very finely striate and shining*, the dorsum of the head is finely punctate and dull, as is the dorsum of the mesosoma and the

side of the mesosoma is mostly finely punctate and moderately shining, the side of the petiole is punctate and weakly shining, the posterior face is polished and shining, the gaster is punctate and moderately shining.

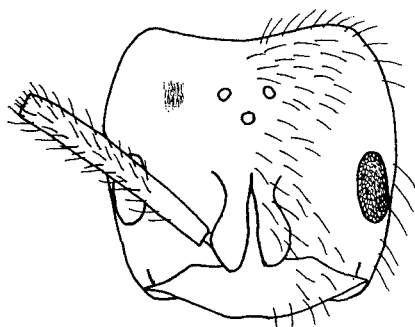


Fig. 570. Head of a female of *P. luteola* (Madre de Dios, Perú, MCZC). Only a small portion of the sculpture is shown.

Male

Unknown.

COMPARISON

The shape of the petiole of *P. luteola* (thickened as viewed from the side and narrowed anteriorly as in *P. crenata* as viewed from above) together with the presence of at least a partial malar carina and the form of the subpetiolar process would place *P. luteola* in the *crenata* complex. It is easily separated from all of the others in the complex, as the malar carina is only partially formed in the worker (completely formed in the female) and

the pronotal margin is weakly developed. The relatively widely separated frontal carinae in the worker and female of *P. luteola* would separate it from most of the other species of *Pachycondyla*. The workers are ferruginous red and the females are a dark chestnut brown, rare colors in *Pachycondyla*.

Mann (1916) considered *P. luteola* to be near *P. cavinodis*. Actually they are very different and would not be confused (see *P. cavinodis* discussion).

DISTRIBUTION

PERU: *Loreto* (Pampas del Sacramento [Roger, 1861b]); *Cuzco* (Quincemil [LACM, MCZC]); *Madre de Dios* (15 k NE Puerto Maldonado [CASC, MCZC], 30 k SW Puerto Maldonado [CASC], Estación Biológica Cocha Cashu [LACM, MCZC], Tayacome [LACM], Colpa Quebrada [near Cocha Cachu, LACM]).

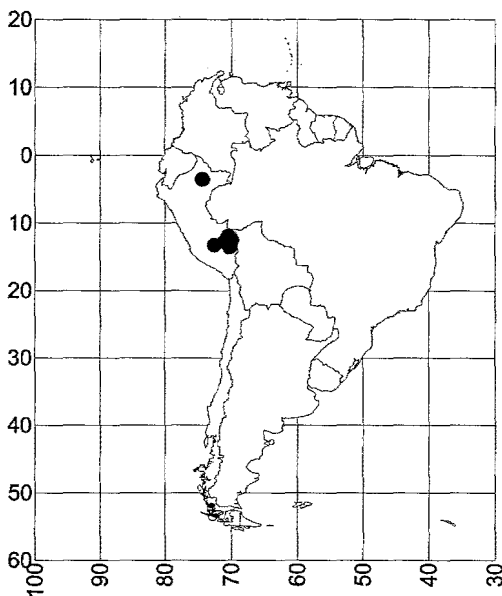
HABITAT

This ant occurs in rainforest, riparian forest and tropical wet forest from 200 - 750 meters elevation.

BIOLOGY

The specimens from Perú were collected in the "ant plant" *Cecropia tesmannii* [Cecropiaceae]. They are reported to nest in an undescribed

species of *Cecropia* in Perú (Davidson et al., 1989), where workers of the ant *Camponotus balzani* pursue and attack alate females. *Pachycondyla luteola* workers will attack and kill encroaching vines, if the vines have workers of the ant genus *Crematogaster* (Davidson et al., 1989). Dealate females were collected loose in September (Perú).



Map 62. *Pachycondyla luteola*.

ETYMOLOGY

This species gets its name from the Latin word *luteolus*, meaning yellowish, referring to the color of the worker.

Pachycondyla magnifica Borgmeier

Figures - **Worker**: 86, 165 (head), 571 (side view), 572 (frontal lobes and clypeus), 573 (pronotum); **Map** 63

emiliae species complex

Pachycondyla magnifica Borgmeier, 1929: 196-198, ♀, Brasil: Goiás, Goiânia, Campinas [1 paratype worker seen, MCZC]

DISCUSSION

Worker

The worker is a *moderately large* (total length 13 - 15 mm) *black* ant with black appendages and reddish brown mandibles. The mandibles have about ten teeth; the first (apicalmost) three or four are much larger than the remainder. The head is narrowed anteriorly and the posterior border is slightly concave. The *eyes are large* (maximum diameter 0.6 mm) located about 1 diameter from the anterior margin of the head-(side view). The *scapes are short* and extend only to the posterior lateral margins of the head. The *malar carina is not developed*. The *pronotal shoulder forms a carina*, which slightly overhangs the sides of the pronotum. The *metanotal suture is poorly marked*, but the sculpture changes from fine longitudinal striae on the mesonotum, to fine punctures, which are slightly aligned transversely across the dorsal face of the propodeum. The *propodeal spiracle is slit-shaped*; the

posterior lateral margins of the propodeum are marked with carinae. The petiole is relatively narrow when viewed in profile with a nearly straight anterior face and a broadly rounded posterior face, which meets the anterior face at the highest point on the petiole. The posterior lateral margins are formed into carinae. The subpetiolar process is moderately developed and angulate posteriorly. The anterior face of the postpetiole is straight and meets the dorsal face at nearly a right angle. *The second pretergite of the gaster has a stridulatory file* (Kempf, 1961). The metasternal process cannot be seen in the available specimens.

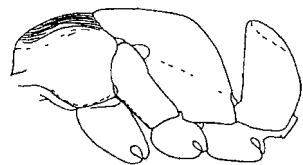


Fig. 571. Mesosoma and petiole of a worker of *P. magnifica* (from Kempf, 1961).

Erect hairs are sparse on most surfaces, with a few long (up to 0.6 mm) hairs located on the clypeus, mandibles and ventral surface of the head and ventral surface of the gaster, the erect hairs on the remainder of the head are relatively short (up to 0.2 mm) with a few scattered on the dorsum of the head, erect hairs are very sparse on the dorsum of the mesosoma and absent on the dorsum of the petiole and dorsum of the gaster, the tibiae lack erect hairs. *Appressed golden pubescence is dense* on the region posterior to and lateral to the eyes, where it hides the sculpture; the remainder of the ant has very sparse appressed hairs, which are not noticeable.

The *mandibles are dull* with elongate punctures, the medial lobe of clypeus has obvious longitudinal striae and the *entire dorsum of head has coarse striae*, which diverge posteriorly. The *dorsum of pronotum has very coarse striae*, transverse on anterior part of pronotum, longitudinal on posterior $\frac{2}{3}$ of the pronotum. The mesonotum is with fine longitudinal striae, the dorsum of propodeum has very fine transverse striae formed from punctures. The side of the pronotum is covered with horizontal striae on the upper half, the ventral half has very fine longitudinal striae, the entire mesopleuron is covered with very fine horizontal striae. The side of propodeum has similar sculpture. The anterior face and side of the petiole are with very fine striae and are moderately shining, the posterior face is

nearly smooth and glossy, the gaster is very finely punctate smooth and shiny.

Female and male

Unknown.

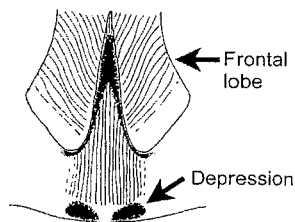


Fig. 572. Frontal lobes and clypeus of a worker of *P. magnifica* (Campinas, Brasil, USNM).

COMPARISON

Pachycondyla magnifica could be confused with the Mexican and Central American *P. lineaticeps*, the Colombian (and Venezuelan?) *P. fuscoatra* and the Brazilian to the Argentinean *P. striata*. The shiny patches of dense golden pubescence medial and lateral to the eyes make this species easily recognized, but this patch of hairs is not always present. The coarse striae on the dorsum of the pronotum of *P. magnifica* are unlike nearly all of the other species of *Pachycondyla* (which separate it from *P. lineaticeps* and *P. fuscoatra*) and are only approached by workers of *P. striata*. It can be easily separated from *P. striata* as it lacks or nearly lacks erect hairs on the shaft of the scape, whereas *P. striata* has numerous erect and suberect hairs on the shaft. The striae of *P. magnifica* are much

coarser: the center of the pronotum has 2 - 3 striae per 0.1 mm, versus 3 - 4 striae per 0.1 mm in *P. striata*. *Pachycondyla magnifica* has a total of about 35 sharply defined striae across the widest point of the disc of the pronotum, whereas there are about 50 (mostly poorly defined) striae in *P. striata*.

The striae on the pronotum are very similar to those of the Brazilian *P. tarsata* (and the Old World *P. tarsata*). It is undoubtedly due to convergence, as the two species are otherwise very distinct. *Pachycondyla magnifica* can be easily separated as it lacks the extra pair of teeth on the inner border of the tarsal claws (present in *P. tarsata*) and the angles on the upper anterior corners of the gaster (present in *P. tarsata*).

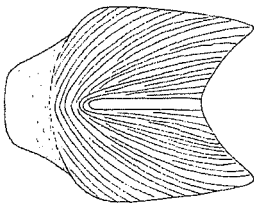
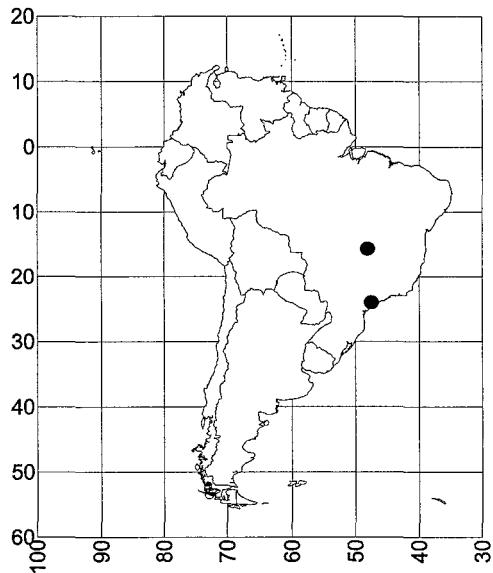


Fig. 573. Dorsum of the pronotum of a worker of *P. magnifica* (Campinas, Brasil, USNM).

It is difficult to place this unusual species in a complex, but the presence of the stridulatory file and the sharp pronotal carina suggest that it is related to the *crenata* species complex. On the other hand the shape of the petiole and the form of the

subpetiolar process are similar to members of the *constricta* species complex. The coarse striae on the dorsum of the pronotum would easily separate *P. magnifica* from all of the other members of the *crenata* species complex, as well as from *P. constricta* and *P. metanotalis* (*emiliae* species complex).

Both Borgmeier (1929) and Kempf (1961) considered *P. magnifica* to be closely related to *P. procidua*. This does not appear to be the case, as *P. procidua* lacks the stridulatory file on the second pretergite, although the pronotal carina of *P. procidua* is even sharper than it



Map 63. *Pachycondyla magnifica*.

is in *P. magnifica*. The shape of the petioles of the workers of the two species are essentially identical, as is

the anterior face of the postpetiole (first gastral tergum), although it is much more angulate in *P. procidua*. It would probably be justified to place *P. magnifica* in its own complex, but then essentially all of the members of the complex would have to be placed in separate complexes. It will be placed in the *emiliae* species complex, until the members of the complex are better known.

DISTRIBUTION

BRASIL: *Goiás* (Goiânia [Borgmeier, 1929]); *São Paulo* (Campinas

[USNM]).

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

The name of this species is derived from the Latin word *magnificus*, which means splendid, referring to the unusual form of this species.

Pachycondyla marginata (Roger)

Figures - **Worker**: 215 (head with mandible), 574 (side view), 575 (petiole, top view), 576 (metasternal process), 577 (mandible); **Female**: 578 (side view), 579 (head); **Male**: 10, 581 (head), 286 (clypeus and mandible), 580 (side view); **Map** 64

laevigata species complex

Ponera marginata Roger, 1861a:8-10, ♀, ♀, ♂, Brasil: Minas Gerais: São João d'El-Rey; Mayr, 1863:449; *Pachycondyla marginata*: Roger, 1863a:18, Dalla Torre, 1893:34; *Euponera* (*Mesoponera*) *marginata*: Emery, 1901a:47; *Termitopone marginata*: Wheeler, 1936:166-168, Fig. 2, a-h; Borgmeier, 1959:315; *Pachycondyla marginata*: Bolton, 1995:307

DISCUSSION

Worker

Workers are *dimorphic* (Wheeler, 1936). The *mandible* has *approximately 10 teeth or denticles* and is peculiar in that the *surface is divided longitudinally into an external and internal area by a longitudinal fold or carina*. The anterior medial margin of the clypeus is angulate, the *eyes are relatively large* (maximum diameter 0.4 mm) located about $\frac{1}{2}$ diameter from the anterior edge of the head (side view). The *malar carina is absent*. The scape extends slightly past the posterior lateral corner of the head, the posterior border is straight. The *pronotum is without a carina*, although it is slightly swollen in that

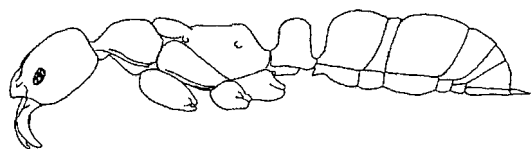


Fig. 574. Side view of a worker of *P. marginata* (from Wheeler, 1936).

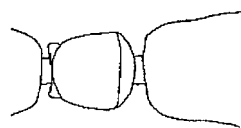


Fig. 575. Dorsal view of the petiole of a worker of *P. marginata* (from Wheeler, 1936).

region. The *metanotal suture breaks the sculpture* on the dorsum of the

mesosoma and the metanotum is moderately developed. The *propodeal spiracle is slit shaped*. The *petiole is thickened* when viewed in profile with the anterior and posterior faces being nearly parallel and the dorsal face being broadly rounded. The subpetiolar process consists of a swollen region, not very well differentiated from the remainder of the petiole. The *stridulatory file may be absent or present* on the second pretergite and the arolia are poorly developed. The metasternal process consists of two inwardly curved slender lobes.

Erect hairs are scattered on the mandibles, clypeus, dorsal and ventral surfaces of the head, dorsum of the mesosoma, legs (mostly suberect), dorsum of the petiole and all surfaces of the gaster; appressed pubescence is essentially absent.

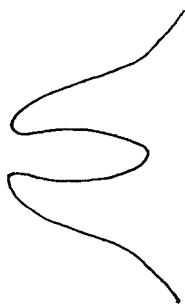


Fig. 576. Metasternal process of a worker of *P. marginata* (São Paulo, Brasil, CWEM), as seen from behind.

Most surfaces are smooth and glossy, a few striae are present on the mesopleuron and the side of the propodeum.

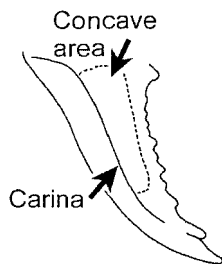


Fig. 577. Mandible of a worker of *P. marginata* (São Paulo, Brasil, CWEM).

Female

The female is a *large* (total length 13 mm) *shiny black ant* with reddish brown appendages. The mandibles have a large sharp apical tooth followed by a series of small denticles. *The mandible is divided longitudinally as in the worker* with the inner half being strongly concave. The anterior margin of the clypeus is convex, the sides of the head are narrowed anteriorly and the posterior margin is nearly straight. *The malar carina is poorly developed* and is represented by a depression surrounded on both sides by slightly swollen areas. *The eye is moderate sized* (maximum diameter 0.75 mm) and is less than one maximum diameter from the anterior edge of the head (side view). *The pronotal shoulder is swollen* but does not form a distinct margin; *the propodeal spiracle is slit-shaped*. *The petiole is nearly rectangular-shaped* with the anterior and posterior faces being nearly parallel, but is noticeably narrowed dorsally.

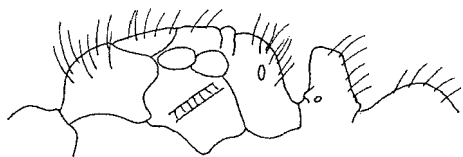


Fig. 578. Mesosoma and petiole of a female of *P. marginata* (São Paulo, Brasil, MCZC).

Erect hairs are present on most surfaces, including the mandibles, clypeus, dorsal and ventral surfaces of the head, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster. The hairs on the tibiae are mostly suberect and the length of most is approximately $\frac{1}{2}$ the diameter of the tibia.

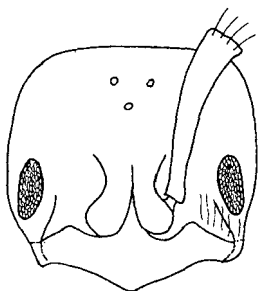


Fig. 579. Head of a female of *P. marginata* (São Paulo, Brasil, MCZC).

The dorsum of the head and mesosoma are smooth and glossy, the side of the pronotum and mesopleuron are both smooth and glossy, the side of the propodeum has horizontal striae, the petiole and gaster are smooth and glossy.

Male

The male is a *moderate sized* (total length 11 mm) *shiny black* ant with brown appendages. The mandibles are tiny. The anterior margin of the clypeus is slightly concave and the *clypeus is swollen* when viewed in profile. The head is narrowed anteriorly and the posterior border is broadly rounded. The *eye is large* (maximum diameter 0.73 mm). The *median ocellus is about one diameter from the lateral ocellus* (seen obliquely from above and from the side). The pronotum is broadly rounded at the shoulder; the *propodeal spiracle is slit-shaped*. The *petiole has the general shape of that of the worker* and the female, except that it is more narrowed toward the apex. The *stridulatory file is present* on the second pretergite.

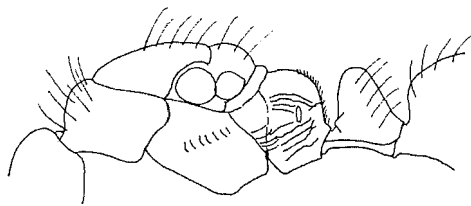


Fig. 580. Mesosoma and petiole of a male of *P. marginata* (São Paulo, Brasil, MCZC).

Erect hairs are abundant on most surfaces, including the clypeus, all surfaces of the head, the scape nearly lacks erect and suberect hairs, erect hairs are present on the dorsum of the mesosoma, dorsum of the petiole and

all surfaces of the gaster. The hairs on the legs are mostly suberect. Appressed pubescence is sparse, but is present on the pronotum, middle of the scutum, the scutellum and the dorsal face of the propodeum. The appressed hairs on the dorsum of gaster are sparse.

Most surfaces are moderately to strongly shining, especially the head, the mesosoma and the posterior face of the petiole. There is *little sculpture*, except for the side of the propodeum, which is covered with coarse rugae.

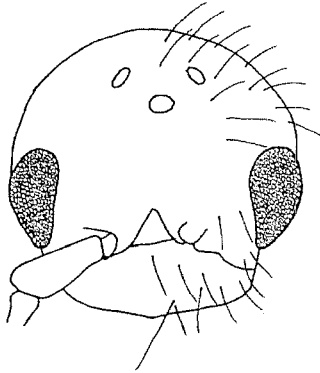


Fig. 581. Head of a male of *P. marginata* (São Paulo, Brasil, MCZC).

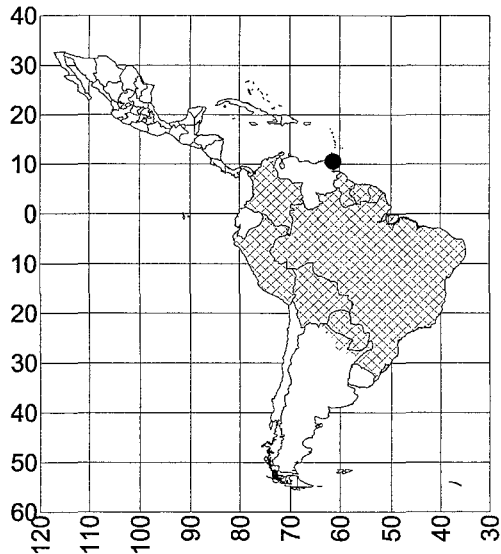
COMPARISON

The worker and female of *P. marginata* are easily separated from all of the other species of *Pachycondyla* by the longitudinal fold or carina on the dorsal surface of the mandible, which none of the other species has. Additionally the worker, female and male are mostly smooth and glossy, which is uncommon in *Pachycondyla*.

The specimens from Trinidad do not have the strong separation of the two surfaces of the mandibles, atypical of this species.

DISTRIBUTION

TRINIDAD: *Saint Andrew* (Arima Forest Reserve [AMNH]). BRAZIL: *Minas Gerais* (São João d'El-Rey, Poços de Caldas, Pirapora [Wheeler, 1936]); *Goiás* (Chapada [Wheeler, 1936]); *Mato Grosso* (Serra Caraca [MCZC], Buriti [LACM], Corumba [Wheeler, 1936]); *Paraná*



Map 64. *Pachycondyla marginata*.

(Castro, Guayra [Wheeler, 1936]); *Rio de Janeiro* (Petrópolis); *São Paulo* (Agudos [MCZC], São Paulo [MCZC, AMNH], Piracicabo [LACM], Cidade Universitaria [MCZC], Geraldo [Campinas, MCZC], Upiranga, Franca, Ituverava [Wheeler, 1936]); *Rio*

Grande do Sul (San Lourenço [Emery, 1894a]). BOLIVIA: *La Paz* (Charubamba [MCZC]); *Santa Cruz* (Las Gammas [Parque Nacional Noel Kempff Mercado, MCZC]; *La Paz* (Ixiamas [USNM], Charubamba [Wheeler, 1925], Mojos [Wheeler, 1925]). PARAGUAY: without locality [MCZC]; unknown state (Paraná River [AMNH, Wheeler, 1936]). Wild (2002) lists *Cordillera* (Caacupé [LACM], Campamento Jack Norment [LACM]); *Misiones* (Est. Ñu Porá); *Paraguari* (Parque Nacional Ybycuí). ARGENTINA: *Salta* (Río Salado, Chaco Occidental [Los Colorados, LACM]); *Misiones* (Posadas [Wheeler, 1936]) and *Chaco* (Kempf, 1972).

HABITAT

Pachycondyla marginata is found in secondary lowland rainforest and urban habitats, from 30 to 700 meters elevation.

BIOLOGY

One colony was nesting under a house. Winged sexuals were collected in December (Brasil). Workers are occasionally collected in pitfall traps. This species preys exclusively on the termite *Neocapritermes*, especially *N. opacus* (Mill, 1982a; Wajnberg et al., 2004), using a trail pheromone from the pygidial gland (Hölldobler et al., 1996a). Research by Wajnberg et al. (2004) suggests that they have a magnetic sensory organ in the antenna, although Acosta et al. (2001) concluded the ability to orientate to geomagnetic fields may be due to magnetic iron oxides in the head and abdomen.

ETYMOLOGY

The name of this species is from Latin, *marginatus*, meaning “enclosed with a border”, referring to the peculiar form of the mandible of the worker and female.

Pachycondyla metanotalis Luederwaldt

Figures - **Worker**: 87 (pronotum), 89 (petiole), 90 (clypeus), 193 (side view), 582 (head), 583 (metasternal process), 584 (posterior face of petiole); **Map** 65

emiliae species complex

Pachycondyla metanotalis Luederwaldt, 1918:54, ♀, Brasil Minas Gerais: Cristina, Kempf, 1961: 200-201

DISCUSSION

Worker

The worker is a *moderate sized* (total length 1 cm) *black ant with reddish brown appendages and mandibles*. The 3 - 5 apicalmost teeth on the mandible are more developed and wide, the remaining eight or nine teeth consist of simple denticles. The head is narrowed anteriorly, especially anterior to the eyes; the posterior border is weakly concave. The anterior border of the clypeus is broadly convex; the *eyes are small* (maximum diameter 0.4 mm) located less than one diameter from the anterior margin of the head (side view). The *malar carina is poorly developed* but present. The *scapes are short* and barely reach the posterior lateral corner of the head. The *pronotal shoulder is developed into a sharp carina*, which slightly overhangs the side of the pronotum. The *metanotal suture* interrupts the sculpture on the dorsum of the mesosoma but is *not notably*

impressed, when the mesosoma is viewed in profile. The posterior lateral edges of the propodeum are raised into blunt carinae. The *propodeal spiracle is circular*. The *anterior petiolar face is concave*, the posterior face is convex and broadly rounded (in profile) and marked posterior and laterally (on both sides) by a carina.

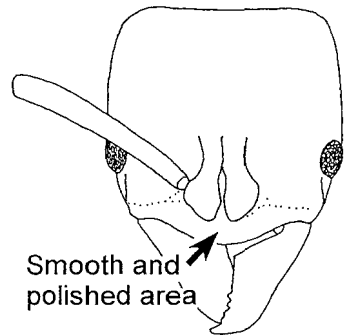


Fig. 582. Head of a worker of *P. metanotalis* (from Kempf, 1961).

The posterior face of the petiole appears nearly concave, when viewed

from behind. The subpetiolar process is weakly developed and forms a broadly rounded thickened process. The anterior face of the post-petiole forms a sharp, nearly right angle between the two faces. The *stridulatory file* is well developed on the second pretergite.

Long (up to 0.5 mm) erect hairs are found on the mandibles, clypeus and ventral surface of the head, shorter (0.1 - 0.2 mm) hairs are scattered on the dorsal surface of the head, the mesosoma, the dorsum of the petiole and all surfaces of the gaster. Fine semierect short (up to 0.05 mm) hairs are found on the posterior face of the propodeum and the anterior face of the petiole. Fine appressed golden pubescence is present on most surfaces, but is not dense on any of them.



Fig. 583. Metasternal process of a worker of *P. metanotalis* (São Paulo, Brasil), as seen from the front.

The medial section of the clypeus is smooth and glossy; the head is densely and finely punctate with the punctures being aligned in longitudinal rows, which form fine striae that diverge posteriorly. The sides and ventral surface of the head have poorly defined longitudinal striae in addition to punctures, but are mod-

erately smooth and shining. The dorsum of the mesosoma is finely punctate and shining, the sides are coriaceous, covered with striae and moderately shining. The petiole, including the posterior face, is very finely punctate glossy and shining. The gaster is finely punctate and shining.

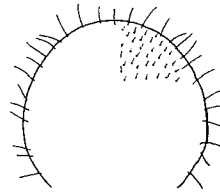


Fig. 584. Posterior face of the petiole of a worker of *P. metanotalis* (Campinas, Brasil, USNM). Only a portion of the punctures and pubescence is shown.

Female and Male
Unknown.

COMPARISON

The worker of *P. metanotalis* could be confused with that of *P. emiliae*. They can be separated as *P. metanotalis* is known from only southern South America, *P. emiliae* from northern South America. The middle of the clypeus of *P. metanotalis* is smooth and glossy, not longitudinally striate as in *P. emiliae*. The middle of the clypeal margin is broadly convex in both species, which would separate them from *P. aenescens*. The pronotal carina of *P. metanotalis* is sharp and definitely

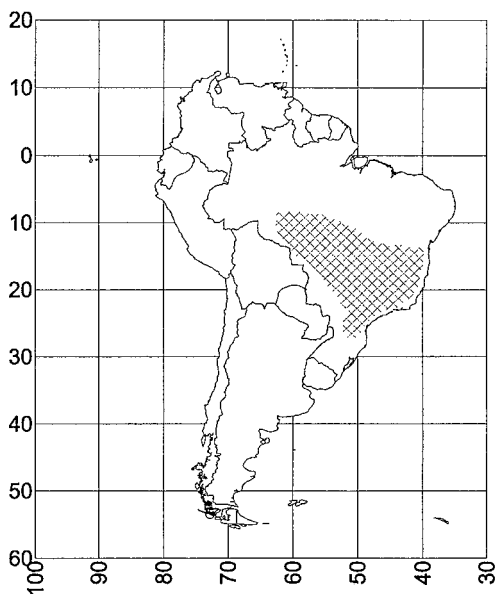
overhangs the side of the pronotum (viewed from the front or behind). The petiole of *P. metanotalis* is usually slightly longer (length at level of peduncles, disregarding the spiracular horn, is 0.79 mm) than that of *P. emiliae*. Some of the surfaces are nearly smooth and glossy, especially the side of the head and the dorsum of the pronotum.

Kempf (1961) compares this species with *P. magnifica* and *P. procidua*, which he states forms an aberrant group related to the previous members of *Neoponera*. *Pachycondyla metanotalis* is the most transitional form of the three and links the *emiliae* species complex to the *crenata* species complex. The malar carina of *P. metanotalis* is poorly developed, the pronotal shoulder has a sharp carina and the stridulatory file on the second pretergite is well developed, all suggesting that it could be related to the *crenata* species complex. These characters would separate this species from the superficially similar *P. procidua*. The medial part of the clypeus of *P. metanotalis* is slightly depressed, not raised and covered with longitudinal striae, as in members of the *crenata* species complex. The poorly developed malar carina and the relatively slender petiole (side view) would further separate it from members of the *crenata* species complex.

DISTRIBUTION

BRASIL: *Minas Gerais* (Cristina [Luederwaldt, 1918]); *São Paulo*

(Campos do Jordão, Boracéia Biological Station [Município de Salesópolis, USNM]). Kempf (1972) lists *Mato Grosso*.



Map 65. *Pachycondyla metanotalis*.

HABITAT

Specimens were collected in wet mountain forest at 850 meters elevation.

BIOLOGY

Unknown.

ETYMOLOGY

The name of this species is derived from the Greek words *meta*, meaning behind and *notos* meaning back, presumably referring to the interruption in the dorsum of the mesosoma made by the metanotal suture.

Pachycondyla minuta new species

Figures - **Worker**: 91 (mesosoma and petiole), 97 (front and side view of head), 100 (mandible); **Female**: 181 (head), 585 (side view); **Map** 66

ferruginea species complex

Cryptopone sp PA-1 Mackay et al., 1989

DISCUSSION & DESCRIPT.

Worker

Unknown. A possible worker was collected in Guatemala, which has 7 mandibular teeth and otherwise appears similar to the holotype female, but the petiole is rectangular-shaped, not narrowed dorsally as in the female. It is 4.5 mm long, larger than the female. The anterior border of the clypeus lacks the two lateral angulate processes. These latter two characteristics suggest they are not conspecific.

Female

The female is a *tiny* (total length 4 millimeters) *ferruginous red* specimen. The *mandible has 7 teeth*. The anterior border of the clypeus is broadly convex, but the medial region is concave and *surrounded by two angulate processes*. The head length is 0.98 mm; the head width is 0.85 mm. The sides of the head are nearly straight and nearly parallel, the posterior border is slightly concave. The *eye is large* (maximum diameter

0.16 mm) located less than 1 diameter from the anterior margin of the head (side view). The *antennal scapes are short* (0.65 mm) and fail to reach the posterior lateral corners by nearly the first funicular segment. The *ocelli are small* (maximum diameter 0.04 mm) located about four diameters from the lateral ocellus. The *pronotum is swollen at the shoulder* but does not form a carina. The *propodeal spiracle is circular* and the lateral edge of the propodeum forms a carina. The *anterior face of the petiole is nearly straight and meets the broadly rounded posterior face near the anterior edge*, but the medial portion of the posterior face forms a poorly defined dorsal face. The subpetiolar process is well developed and consists of a broad elongated lobe, which forms a pointed flange posteriorly. The *anterior face of the postpetiole is slightly concave* and is strongly angulate where it meets the dorsal face. The *stridulatory file is absent* on the second pretergite, as are the arolia between the tarsal claws.

minuta México, Guatemala, Venezuela

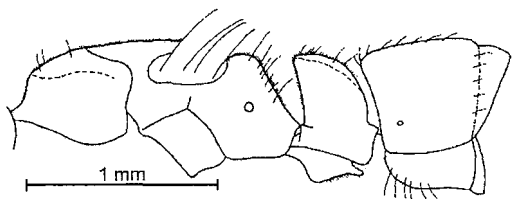


Fig. 585. Mesosoma, petiole and postpetiole of the holotype female of *P. minuta*.

Erect hairs (0.25 mm) are present on the clypeus and the gaster; shorter erect hairs (0.05 - 0.10) are present on the mandibles, dorsal and ventral surfaces of the head, dorsum of the mesosoma, posterior face of the propodeum, dorsum of the petiole and all surfaces of the gaster. Golden appressed to suberect pubescence is present on the head, mesosoma, anterior and posterior faces of the petiole, subpetiolar process and all faces of the gaster.

The mandibles are moderately smooth and glossy with scattered punctures and weak evidence of striae, the head is densely and evenly, but finely punctate, as are the antennal scapes, the dorsum of the mesosoma has similar sculpture, the sides of the mesosoma, including the mesopleuron, are dull, with poorly defined striae, the petiole is dull with poorly defined striae, the posterior face is smooth and polished, the gaster is finely punctate and weakly shining.

Male

Unknown.

COMPARISON

The female of *P. minuta* can be separated from that of the Costa Rican *P. cognata* by the widely separated frontal carina (minimum width 0.1 mm), as well as by the lack of distinct striae on the mandibles. The circular propodeal spiracle distinguishes *P. minuta* from the similar *P. lenkoi* from Bolivia and Brasil. The lack of a longitudinal carina on the clypeus separates *P. minuta* from *P. succedanea*, which is found from Costa Rica south to Brasil. The form of the subpetiolar process of *P. minuta* is identical to that of *P. ferruginea* and *P. lunaris* and suggests that this species is intermediate between the *stigma* and *ferruginea* species complexes. The seven well-defined mandibular teeth can easily separate *P. minuta*; the latter two species (*P. ferruginea* and *P. lunaris*) have at least nine teeth which are poorly defined.

The workers of John Longino's JTL-016 matches this new species, but the queens of his species are larger, with 8 - 9 mandibular teeth (pers. comm.).

DISTRIBUTION

MEXICO: *Chiapas* (type locality). A possible worker was collected in GUATEMALA: *Suchitupéquez* (12.3 k N Patulul [Finca Tarrales, 740m, 14°31'21.2"N 91°8'11.1" W,

CWEM]). VENEZUELA: *Aragua* (Vía la Cumbre de Rancho Grande [Parque Nacional Henri Pittier, 101°21'N 67°40'57"W, 1225 m, 11-ix-2007, C. Rodríguez, J. Lattke, M. Riera #81, MIZA, photographs examined, courtesy of M. Riera].

HABITAT

The female was collected in a tropical forest. The possible worker was collected in disturbed tropical rain forest at 740 meters elevation. Specimens from Venezuela were collected in a cloud forest habitat.

BIOLOGY

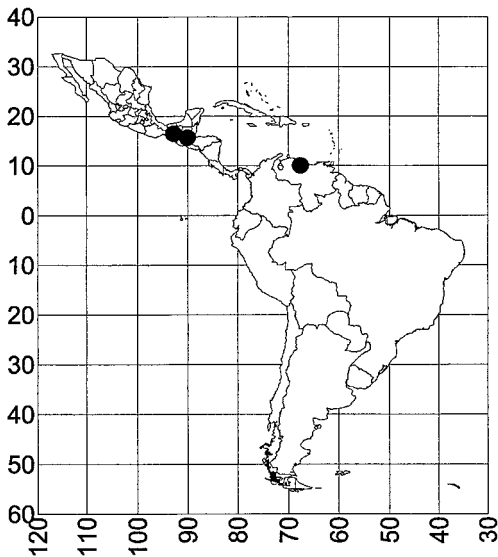
Unknown, the holotype was collected in a pitfall trap (12 hours in site). The possible worker was collected along a dirt road in disturbed tropical forest. It was collected under a stone in clay soil. The worker from Venezuela was foraging on the ground during the day (Riera, pers. comm.) .

ETYMOLOGY

From Latin, *minuta* meaning small, referring to the size of the possible worker and the female.

TYPE SERIES

Holotype female (MCZC), Mex, Chis. 10kW Palenque, 30Mayo1988, W. Mackay #10600.



Map 66. *Pachycondyla minuta*.

Pachycondyla mirabilis new species

Figures - **Worker**: 5 (metasternal process), 161 (side view), 586 (head and mandible), 587 (leg), 588 (ventral surface of petiole); **Map** 67

ochracea species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *relatively small* (total length 7 mm) *yellow shiny* ant. The masticatory border of the mandible has approximately *15 small teeth*. The *eye is completely absent* or is indicated only by a small depressed area. The *scapes are short* and fail to reach the posterior border by approximately the first two funicular segments. The scape is noticeably widened toward the apex. The posterior border of the head is distinctly concave. The *malar carinae and pronotal carinae are completely absent*. The *mesosoma is constricted in the region near the metanotal suture* and slightly depressed in this region, but the *metanotal suture is barely marked on the dorsum* of the mesosoma. All of the *femora are swollen*, especially that of the middle leg. The *petiole is broad* when viewed in profile, with the anterior and posterior faces being nearly parallel, the posterior face is rounded into the dorsal face, which is approximately

the same length as that of the anterior face. The subpetiolar process is angulate and well developed. The ventral surface of the petiole has a sharp process anteriorly, which broadens posteriorly. The petiole is elongated when viewed from below.

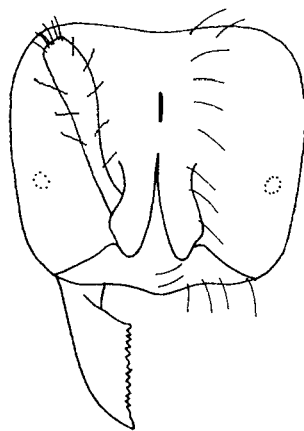


Fig. 586. Head and mandible of the holotype worker of *P. mirabilis* (Rosario, Bolivia, LACM).

Erect hairs are present, but short on the mandibles, long on the clypeus and dorsal and ventral surfaces of the head, the hairs on the scapes are fine,

abundant and erect or suberect, the dorsum of the mesosoma, petiole and all surfaces of the gaster have erect and suberect hairs. The *tibia of the middle leg also has coarse setae on the outer surface.*

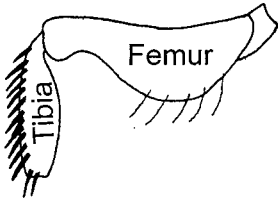


Fig. 587. Middle left tibia of the holotype worker of *P. mirabilis* (Rosario, Bolivia, LACM), showing the coarse setae on the extensor surface.

All surfaces, including the mandibles, are smooth and glossy.

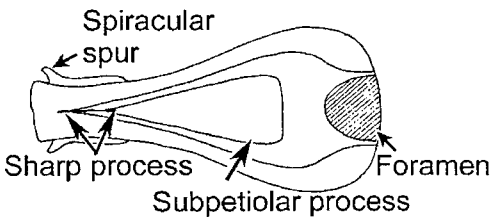


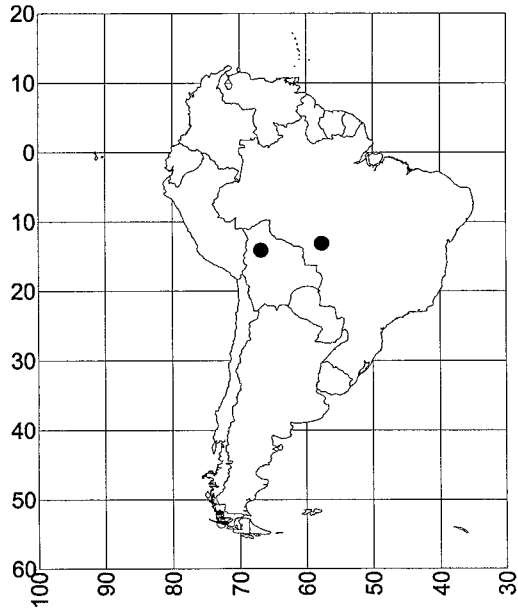
Fig. 588. Ventral surface of the petiole of a paratype worker of *P. mirabilis* (Rosario, Bolivia, CWEM).

The ant is a concolorous golden yellow with the mandibular teeth and the area of the frons being slightly darker in color.

Female and Male
Unknown.

COMPARISON

Pachycondyla mirabilis is an easily recognized species as it is the only one in the genus with the following combination of characteristics: well developed conical setae on the middle tibia, yellow in color and with a smooth and glossy integument. *Pachycondyla mirabilis* can be separated from other members in the *ochracea* species complex as



Map 67. *Pachycondyla mirabilis*.

the integument of *P. guianensis*, *P. holmgreni* and *P. gilva* is dull or only weakly shining. Other shiny species of New World *Pachycondyla* (*P. carb-*

onaria, *P. commutata*, *P. laevigata*, and *P. marginata*) are all black.

DISTRIBUTION

BOLIVIA: *El Beni* (Rosario [Lago Rocagua]). BRASIL: *Mato Grosso* (Burití [18-vii-1973, W. Buren, LACM]).

HABITAT

Pachycondyla mirabilis occurs in mature montane rainforest, between 550 - 650 meters elevation.

BIOLOGY

One worker was collected under a stone.

ETYMOLOGY

From Latin, *mirabilis*, meaning wonderful or strange, referring to the smooth and polished integument of this unusual species.

TYPE SERIES

Holotype worker (LACM), 2 paratype workers (CWEM, LACM), Bolivia, Rosario, Nov. 1921 (L. Rocagua), W. Mann.

Pachycondyla moesta Mayr

Figures - **Worker**: 589 (side view), 590 (metasternal process), 591 (head and mandible); **Female**: 592 (side view), 593 (head); **Male**: 313 (top of head), 594 (side view), 595 (head and clypeus); **Map** 68

crenata species complex

Pachycondyla moesta Mayr, 1870:395-396, ♀, Colombia (without locality) [specimens identified by Mayr, NHMW and Santschi seen, NHMB]; *Neoponera pallipes moesta*: Emery, 1901a:47; Forel, 1899:13; Forel, 1909:252 ♀ (only mentioned); *Neoponera moesta*: Wheeler and Wheeler, 1971:1205, larva, Fig. 12 a-h; *Pachycondyla pallipes moesta*: Emery, 1890b:42; of *P. crenata*: Forel, 1899:13; *Neoponera (Neoponera) crenata moesta*: Mann, 1916:413 (considered to be a junior synonym of *P. crenata* by Mayr, 1887: 534; and Brown, 1957:234)

Neoponera stipitum Forel, 1901b:348-349, ♀, ♀, Colombia, Sierra Nevada de Santa Marta: San Antonio [lectotype worker, 5 paralectotype workers, 2 paralectotype females here designated, MHNG, 2 paralectotype workers here designated, NHMB] *Neoponera (Neoponera) stipitum*: Emery, 1911:73; Mann,

moesta México to Argentina

1916:413; *Pachycondyla stipitum*: Bolton, 1995:310; (suggested as a synonym of *crenata* by Brown, 1957:234) **new synonymy**

Neoponera unidentata stirps *sulcatula* Santschi, 1919a: 38-39, ♀ Fig. 2, ♀, Argentina, Cordoba: Cruz Grande [lectotype here designated, NHMB]; stirps of *P. carinulata*: Santschi, 1939:313 (Brown, 1957:234 suggested it was a synonym of *P. crenata*) **new synonymy**

Neoponera crenata stirps *confusa* Santschi, 1921:86, ♀, Brasil [lectotype here designated, NHMB] (suggested to be a synonym of *P. crenata* by Brown, 1957:234) **new synonym**

Neoponera crenata stirps *confusa* variety *lata* Santschi, 1921: 86, ♀, Argentina: Chaco Austral, [unavailable name, type seen NHMB], (material referred to *P. crenata* by Brown, 1957:234) **material referred here**

Neoponera mesonotalis Santschi, 1923:246-247, ♀, ♂, Brasil: Santa Catarina: Blumenau [lectotype and 2 paralectotypes here designated, NHNG]; *Pachycondyla mesonotalis*: Bolton, 1995:307 **new synonym**

Neoponera crenata stirps *moesta* var. *subcarinata* Santschi, 1939:313-314, Brasil, Santa Catharina [Catarina], Nova Teutonia [Teutônia], ♀ [unavailable name, type seen NHMB] **material referred here**

DISCUSSION

Worker

The worker is a *relatively small* (total length 6.5 mm) *reddish brown* specimen. The head length is 1.5 mm;

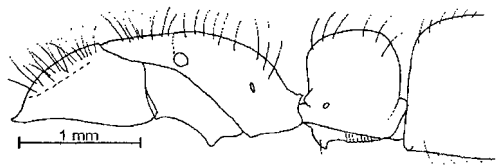


Fig. 589. Mesosoma, petiole and the anterior part of the first gastral tergite of a worker of *P. moesta* (Matagalpa, Nicaragua, CWEM).

the head width is 1.3 mm. The scape (length 1.25 mm) extends approximately the first funicular segment

past the posterior lateral corner. The mandible has 11 teeth, the anterior border of the clypeus is weakly angulate. The *malar carina* is *poorly developed*, but extends the entire length to the anterior edge of the eye. The *eye* is *relatively large* (maximum diameter 0.35 mm) the diameter is nearly twice the length of the distance from the eye to the anterior border of the head (side view). The *pronotal shoulder* is *swollen*, but barely forms a carina. The *metanotal suture* is *barely obvious* on the dorsum of the mesosoma. The *propodeal spiracle* is *elongated* and the posterior lateral edges of the propodeum are rounded. The *petiole* is *shaped like a loaf of bread* with a broad convex horizontal dorsal face, which is longer than the anterior or posterior faces. The subpetiolar process is formed into a

broadly rounded lobe with a small anterior angle.



Fig. 590. Metasternal process of a worker of *P. moesta* (Matagalpa, Nicaragua, CWEM), as seen from behind.

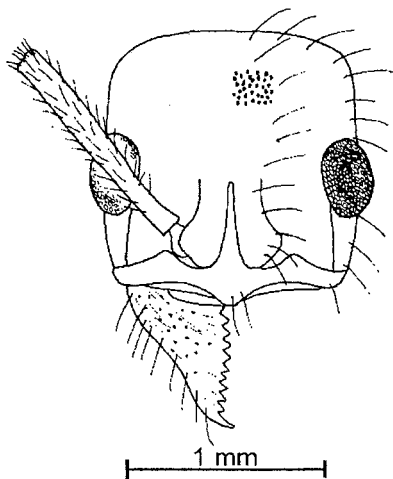


Fig. 591. Head and mandible of a worker of *P. moesta* (Matagalpa, Nicaragua, CWEM). Only a small portion of the sculpture is shown.

Erect hairs are moderately abundant on most surfaces, including the mandibles, clypeus, dorsum of the head, ventral surface of the head, scapes, mesosoma, petiole and all surfaces of the gaster, the hairs on the legs are erect or suberect.

The *mandibles* are finely striate and weakly shining, the dorsum of the head is covered with fine punctures, with the surfaces between the punctures shining, the sculpture on the dorsum of the mesosoma is similar, that on the side of the mesosoma is coriaceous with poorly defined striae on the mesopleuron and side of the propodeum, with the surfaces weakly shining. The petiole is finely punctate and weakly shining; the gaster is finely punctate and moderately shining.

The head and mesosoma are reddish brown, the petiole and gaster are dark reddish brown, the appendages are pale brown to nearly yellow.



Fig. 592. Mesosoma, petiole and first gastral tergite of a female of *P. moesta* (paralectotype female of *P. mesonotalis*).

Female

The female is *slightly larger than the worker* (total length 7 mm) and similar to the worker, except that three *small ocelli* are present and the *petiole is more cuboidal-shaped*, with the length being approximately equal to the length of the anterior and posterior faces (as seen from the side). The

mesosoma is adapted for flight and is equipped with well-developed wings.

Erect and suberect hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, shaft of the scape; a few are on the side of the head and along the posterior margin; erect hairs are present on the mesosoma, petiole and gaster. The legs (including the tibiae) have mostly suberect hairs. Appressed fine golden pubescence is present on nearly all surfaces and is especially obvious on the head, dorsum of the mesosoma and all surfaces of the gaster.

The mandibles are finely striate with scattered punctures and are weakly shining; the remainder of the surfaces are punctate and moderately shining, especially the dorsum of the pronotum, mesopleuron and dorsum of the gaster.

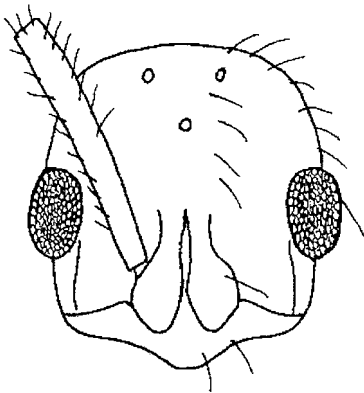


Fig. 593. Head of the female of *P. moesta* (paralectotype female of *P. mesonotalis*).

Male

The male is a *small* (total length 6 mm, head length 0.95 mm, head width 0.5 mm, scape length 0.2 mm) *dark reddish brown* specimen with slightly lighter colored appendages. The mandibles are tiny, edentate and do not meet when closed. The *clypeus is swollen medially* and the *eyes occupy more than 1/2 of the side of the head*. The *ocelli are much larger than those of the female* (0.12 mm in diameter). The *petiole is broadly rounded dorsally* and *does not form a well-developed horizontal dorsal face*. The gaster is constricted between the posterior edge of the postpetiole and the remainder of the gaster.

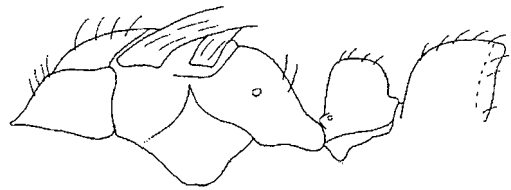


Fig. 594. Mesosoma, petiole and first gastral tergite of a male of *P. moesta* (Matagalpa, Nicaragua, CWEM).

Erect hairs are abundant on the mouthparts, clypeus, posterior border of the head, few are present on the scapes and sides of the head; erect hairs are abundant on the dorsum of the mesosoma, petiole and all surfaces of the gaster, the legs (including the tibiae) have many erect and suberect hairs. Appressed golden pubescence is

present on most surfaces and especially conspicuous on the dorsum and side of the mesosoma, posterior face of the petiole and all surfaces of the gaster.

Most surfaces are finely punctate and at least moderately smooth and glossy.

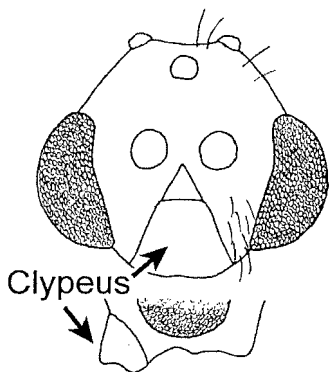


Fig. 595. Head of a male of *P. moesta* (Matagalpa, Nicaragua, CWEM). The inset shows the clypeus as seen from the side.

COMPARISON

The workers of *P. moesta* are most similar to those of *P. crenata*, but differ in the shape of the petiole, in which the apex is distinctly lower anteriorly than posteriorly and the pronotal carina is less well developed as is the malar carina. The unusual shape of the petiole would separate it from all of the others in *Pachycondyla*.

Wheeler and Wheeler (1974) provide characteristics to separate the larva of *P. moesta* from that of *P. crenata*.

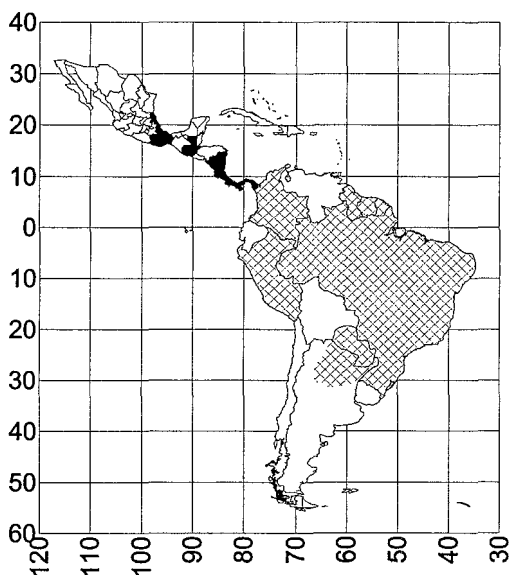
The male of *P. moesta* is noticeably larger than the male of *P. crenata* (total length about 5 mm). The clypeus of the male of *P. moesta* is more swollen and slightly overhangs the anterior edge of the clypeus. The surface forms a small rounded lobe in *P. crenata*. The apex of the petiole of *P. moesta* is slightly angulate, but is broadly rounded in *P. crenata*. The third discoidal cell of the wing of *P. moesta* is more elongated (longest diagonal length of cell 0.63 mm) and wider anteriorly, as compared to *P. crenata* (length 0.41 mm). The workers of the two species are very similar and difficult to distinguish, but the multiple differences in the males leave little doubt that they are different species.

The specimens from Nicaragua are nearly identical to the types, differing in that the medial process on the clypeus is more lobe-like, the pronotal carina is less developed and the appressed pubescence on the dorsum of the gaster is finer. Apparently species JTL-013 (Longino, website) is *P. moesta* (single specimen was not seen).

The identity of this species has been confused in the past and it has thus been described several times under several names, which accounts for the numerous synonymies.

DISTRIBUTION

MEXICO: Kempf (1972) lists *Oaxaca, Veracruz*. GUATEMALA: (Forel, 1909). NICARAGUA: *Matagalpa* (Hotel Selva Negra [CWEM]). COSTA RICA: *Heredia* (Estación

Map 68. *Pachycondyla moesta*.

Biológica La Selva [INBio, MCZC], Braulio Carrillo National Park [Longino, website]; *Alajuela* (Jiménez [Emery, 1890b, 1894b]). PANAMA: *Panamá* (El Lano-Cartí Road [COOK]). COLOMBIA: *Magdalena* (San Antonio [Forel, 1901b]); *Valle del Cauca* (33 mi W Cali [CASC]). PERU (Kempf, 1972). GUIANAS (Kempf, 1972). BRASIL: *Rondônia* (Porto Velho [Mann, 1916], Camp 41 [Madeira-Mamoré Railroad - *P. stipitum*, Mann, 1916]); *Paraná* (Rio Negro [NHMB], Curitiba [CASC]); *Mato Grosso* (Lavras [MCZC]); *Santa Catarina* (Blumenau [Santschi, 1923], Nova Teutônia [Santschi, 1939], same

locality [CASC]); *Distrito Federal* (Brasília [CASC]); Kempf (1972) lists the additional states of *Amazonas*, *Pará*, *Goiás*, *Espírito Santo*, *Guana-bará*, *Minas Gerais*, *Rio de Janeiro*, *São Paulo* and *Rio Grande do Sul*. PARAGUAY: (Kempf, 1972). ARGENTINA: *Córdoba* (Cruz Grande [Santschi, 1919a]); *Chaco* (Chaco Austral [Santschi, 1921]).

HABITAT

This species was found in tropical wet, cloud forest, at 1285 meters elevation.

BIOLOGY

Two nests were found in dead twigs hanging from the canopy (2 cm diameter). Winged sexuals and brood were collected in a nest in July. A dealate female was collected in a twig in Nicaragua (July). Wheeler and Bequaert (1929) reported that this species was collected from the foliar domatia of *Tococa* sp. (near *formicaria*).

ETYMOLOGY

Apparently derived from the Latin word *maestus*, a feminine normative form of the word, meaning sad or sorrowful.

Pachycondyla oberthueri Emery

Figures - **Worker**: 68 (metasternal process), 82 (petiole), 228 (side view), 239 (head), 240 (mandible); **Female**: 596 (side view), 597 (head); **Male**: 598 (side view), 599 (forewing), 600 (head); **Map** 69

crenata species complex

Pachycondyla oberthueri Emery, 1890a:74-75, ♀, Brasil, Pará: Bragança; *Neoponera oberthueri*: Emery, 1901a:47; *Neoponera* (*Neoponera*) *oberthueri*: Emery, 1911:73; *Pachycondyla oberthueri*: Bolton, 1995:307

DISCUSSION

Worker

The worker is a *small* (total length 5 mm) *reddish brown* ant with yellowish brown mandibles, antennae and legs. The mandibles have approximately 12 teeth that are nearly equal in size, the anterior margin of the clypeus is angulate and overhangs the anteclypeus. The *malar carina* is *moderately well developed* and extends from near the anterior edge of the head nearly to the eye. The *eyes* are *large* (maximum diameter 0.4 mm) and are located less than one diameter from the anterior edge of the head (side view). The *scape* is *long* (2.25 mm) and extends about $\frac{1}{3}$ length past the posterior lateral corner of the head. The *pronotal carina* is *sharp* and overhangs the side of the pronotum, the *promesonotal suture* is well developed and breaks the sculpture;

the *metanotal suture* is *barely marked*, especially on the dorsum of the mesosoma where it is barely noticeable. The *propodeal spiracle* is *elongated*. The *anterior face of the petiole* is *vertical for about $\frac{1}{2}$ of its length* and then *bends broadly backward, forming a sloping dorsal face*, which *meets the posterior face near the posterior edge*. The posterior face is strongly convex, except near the apex where it is slightly concave. The subpetiolar process is poorly developed and consists of a small ventrally directed hook, a concave region, followed by a convex posterior region. The post-petiole is rounded between the faces. The *second pretergite* has a *stridulatory file*, the arolia are poorly developed.

Long (up to 0.36 mm, most about 0.1 mm) *erect golden hairs* are *present* on the mandibles, clypeus, dorsum of the head, ventral surface of the head, sides of the head, posterior

margin, *antennal scape*, mesosoma, petiole, gaster and legs, appressed yellowish pubescence is present on the head, mesosoma and gaster.

The *mandibles are glossy and weakly sculptured* with very fine striae and scattered punctures. The head is densely but finely punctate and moderately smooth and glossy. The dorsum of the mesosoma has similar sculpture; the side of the mesosoma is moderately shining with fine striae. The anterior and dorsal faces of the petiole are finely punctate and moderately shining, as is the side. The gaster is finely punctate and moderately shining.

Female

The female (dealate, undescribed) is an *intermediate sized* (total length 11 mm) reddish brown specimen with brown mandibles, clypeus, cheeks, antennae and legs. The mandibles have approximately 12 teeth. The anterior margin of the clypeus is convex and forms a *small medial lobe*, which overhangs the anteclypeus. This medial lobe is slightly concave when viewed from above. The head length is 1.96 mm; the head width is 1.64 mm. The eye (maximum diameter 0.58 mm) is located approximately $\frac{1}{2}$ diameter from the anterior margin of the head. The *malar carina is well developed*. The *ocelli are small*, the median ocellus (diameter 0.10 mm) is located approximately two diameters from the lateral ocellus (diameter 0.09 mm). The scape (1.76 mm) surpasses the posterior lateral corner of the head by the first funicular segment. The

sides of the head are nearly straight and slightly converging anteriorly, the posterior border is nearly straight. The pronotal shoulder has a well-developed sharp carina; the *propodeal spiracle is slit-shaped*. The *anterior face of the petiole is convex* and broadly rounded and *meets the posterior face near the posterior edge of the apex*, the posterior face is slightly convex basally and slightly concave near the apex. The subpetiolar process consists of a small posteriorly directed small tooth anteriorly, followed by a strongly concave region and a ventrally directed tooth at about mid length with the remainder of the process narrowing posteriorly. The anterior face of the postpetiole is broadly rounded into the dorsal face. The *stridulatory file on the second pretergite is well defined*. The arolium between the tarsal claws is poorly developed.

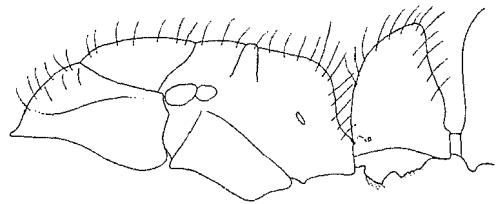


Fig. 596. Mesosoma and petiole of a possible female of *P. oberthueri* (Pasco, Perú, LACM).

Erect hairs are present on the mandibles, dorsal and ventral surfaces of the head, sides of the head, posterior margin, the shaft of the scape, the dorsum of the mesosoma, the dorsum of the petiole, the sub-

petiolar process and all surfaces of the gaster. The hairs on the legs are abundant and mostly suberect. Appressed fine white pubescence is present on the head, dorsum of the mesosoma, sides and posterior face of the propodeum, on the petiole and gaster.

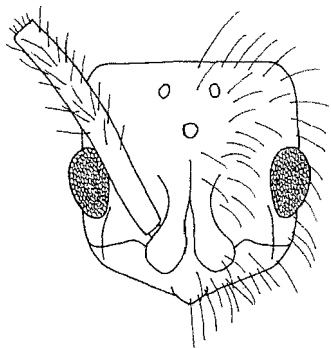


Fig. 597. Head of a possible female of *P. oberthueri* (Pasco, Perú, LACM).

The mandibles are finely sculptured with scattered punctures; the dorsum of the head is finely punctate, as is the mesosoma, petiole and gaster, the head is weakly shining, the mesosoma, petiole and gaster are moderately shiny.

The female was not associated with workers and may not be conspecific. It is very similar to the worker, but larger than would be expected and the petiole is less convex posteriorly than the petiole of the worker.

Male

The male (undescribed) is a *small* (total length 7 mm) *yellowish brown* specimen. The mandible is tiny, the

oberthueri northern South America

anterior border of the clypeus is slightly concave medially and convex over all. The head length is 1.05 mm, the width (posterior to the eye) is 0.98 mm. The *ocelli are moderately large* (maximum diameter of the median ocellus is 0.2 mm), the lateral ocelli are located less than one diameter

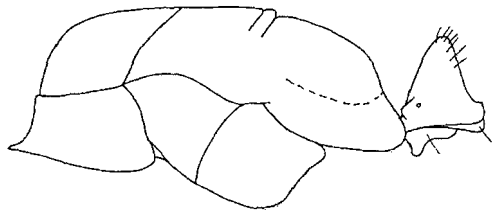


Fig. 598. Mesosoma and petiole of a male of *P. oberthueri* (Pará, Brasil, NHMW).

from the median ocelli (oblique upper and side view). The *Mayrian furrows are not developed*, but the parapsidal sutures are present. The *pronotal shoulder is not swollen*. The *petiole has a characteristic shape* with a sharp apex, located posteriorly and a well-developed ventrally directed subpetiolar process. The wing is typical for the genus, with an elongate third

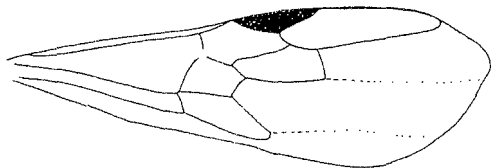


Fig. 599. Left forewing of a male of *P. oberthueri* (43 mi E Tingo Maria, Perú, CASC).

discoidal cell. It is similar to the wing of members of the *ochracea* species complex.

Erect hairs are sparse except for on the petiole, where a few are present. Very fine erect pubescence is present on the mesosoma, petiole and gaster.

Most surfaces are only moderately sculptured and at least partially smooth and glossy.

Neither of the two males was associated with workers, but G. Mayr identified one of them.

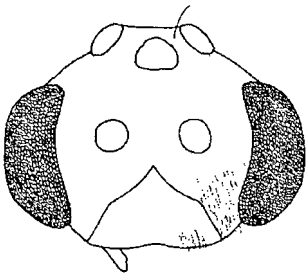


Fig. 600. Head of a male of *P. oberthueri* (Pará, Brasil, NHMW).

COMPARISON

The unusual shape of the petiole would separate the worker and female of *P. oberthueri* from most of the others in the *crenata* species complex. *Pachycondyla oberthueri* could be confused with *P. carinulata*, but differs in that the highest point on the petiole of *P. carinulata* is near the middle of the apex. Additionally the mandibles of *P. carinulata* are finely sculptured with striae and are not glossy as in *P. oberthueri*. Finally *P. carinulata* is nearly black with reddish brown legs. *Pachycondyla oberthueri*

is also similar to *P. goeldii*, from which it can be separated by the glossy mandibles (striate in *P. goeldii*) and the shape of the petiole (the highest point is near the middle of the petiole in *P. goeldii*).

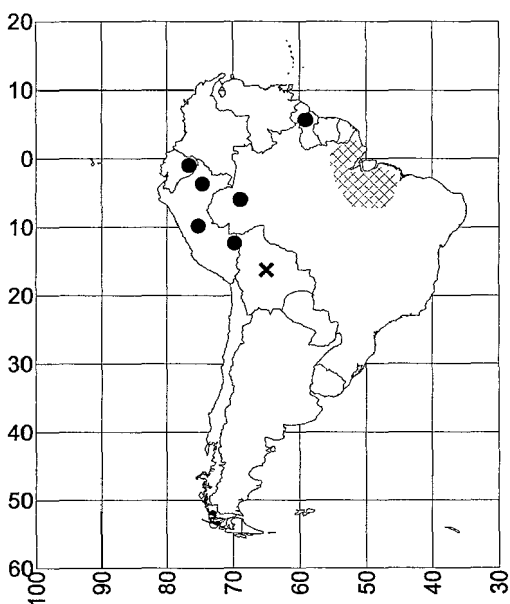
Pachycondyla oberthueri is most closely related to *P. cavinodis*, but the posterior face is mostly convex, not strongly concave as in *P. cavinodis* and the posterior dorsal edge does not overhang the posterior face, as it does in *P. cavinodis*, although it is concave in this region.

Pachycondyla oberthueri could be confused with the closely related *P. coveri* from Perú. It differs in that the posterior edge of the apex of the petiole is angulate, nearly forming a peak, whereas it is broadly rounded in *P. coveri*. Additionally the mandibles of *P. oberthueri* are mostly smooth and glossy, not coriaceous and dull as in *P. coveri*.

The males of *P. oberthueri* are nearly identical to the males of *P. guianensis*, being small yellow specimens lacking the Mayrian furrows and having similar wing venation. The propodeal spiracle of *P. oberthueri* is elongated, not circular as in *P. guianensis*. The subpetiolar process is much more developed in *P. oberthueri*, which has the typical form of members of the *crenata* species complex, consisting of an anterior angle followed by a concave region. Most other small males are brown with well-developed Mayrian furrows.

The males would be likely confused with males of *Odontomachus*, as the apex of the petiole is relatively

sharp as in males of *Odontomachus*. The males of both genera, as well as the males of *Anochetus*, have large pits near the base of the mandibles. Apparently there is no simple character that would separate such males, other than the males of *Anochetus* often have a weakly bidentate petiolar node.



Map 69. *Pachycondyla oberthueri*. The "X" indicates an unknown locality in Bolivia.

DISTRIBUTION

ECUADOR: *Napo* (Tiputini Biodiversity Station [CWEM, based on single male]). PERU: *Madre de Dios* (15 k NE Puerto Maldonado [MCZC]); *Loreto* (Boquerón [LACM]); *Pasco* (Pan de Azúcar [LACM, ♀]). GUYANA: *Cuyuni-Mazaruni* (Kamakusa). BRASIL: *Amazonas* (High Falls [Rio Tarumá]); *Pará* (Belém, near Belém, Mpio. Benevides, Icoaraci, Bragança [Emery, 1890a]). BOLIVIA (without locality, MCZC, AMNH). Kempf [1972] lists the state of *Amapá*, BRASIL.

HABITAT

Unknown, other than it has been collected at 550 meters elevation.

BIOLOGY

Unknown.

ETYMOLOGY

This species was named in honor of Mr. René Oberthür, who collected the holotype.

Pachycondyla obscuricornis Emery

Figures - **Worker**: 17 (second pretergite), 41 (metasternal process), 171 (tip of gaster), 601 (side view), 602 (head); **Map** 70

apicalis species complex

Pachycondyla flavicornis variety *obscuricornis* Emery, 1890a:58, ♀, Brasil, Pará (without locality); *Neoponera flavicornis* variety *obscuricornis*: Emery, 1901a:47; *Neoponera* (*Neoponera*) *obscuricornis*: Emery, 1911:72, Mann, 1916:410; *Pachycondyla obscuricornis*: Bolton, 1995:308

DISCUSSION

Worker

The worker is a *moderate sized* (total length 10 - 11 mm) *black* ant with *brown appendages, including the funiculus*. The mandibles have approximately 10 teeth, in addition to several smaller denticles located between the teeth. The anterior margin of the clypeus is convex but the *anterior medial margin is concave*. The *malar carina is present* and nearly reaches the eye. The *eye is large* (maximum diameter 0.8 mm) located less than one maximum diameter from the anterior margin of the head (side view). The *eyes are located slightly posteriorly on the head*. The *antennal scapes are moderately long* (2.2 mm) and extend approximately the first two funicular segments past the posterior corner of the head. The posterior margin of the head is slightly concave; the posterior

lateral corners are slightly angulate. The *pronotal carina is poorly developed*, the *metanotal suture is well developed*, breaking the sculpture on the dorsum of the mesosoma and noticeably depressing the mesosoma when viewed in profile. The *propodeal spiracle is slit-shaped*. The anterior face of the petiole is broadly rounded into the dorsal face, the posterior face is nearly vertical and the dorsal face is broadly rounded, the *posterior lateral margins of the posterior face are poorly developed*. The subpetiolar process is relatively

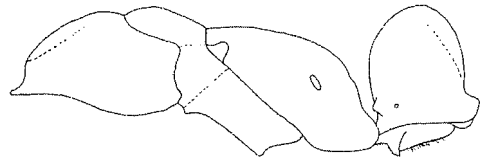


Fig. 601. Mesosoma and petiole of a worker of *P. obscuricornis* (Madre de Dios, Perú, CASC).

small and consists of a small anterior lobe with a ventrally and posteriorly directed tooth, the remainder of the process is poorly developed. The metasternal process consists of two elongate triangular lobes.

Erect hairs are sparse with a few present on the frontal carina, the clypeus, the mandibles, hairs are absent on most of the dorsal and ventral surfaces of the head, the posterior margin, the sides of the head, the scapes (except at the apex), *absent on the dorsum of the mesosoma*, the *dorsum of the petiole* and the dorsum of the gaster, a few tiny hairs are present on the subpetiolar process and the ventral surface of the gaster. A few hairs are present on the coxae, but are mostly absent on the remainder of the legs.

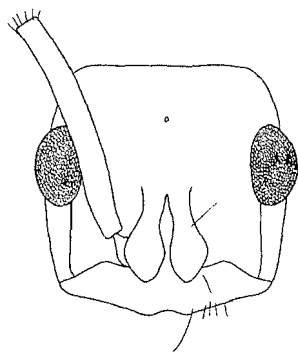


Fig. 602. Head of a worker of *P. obscuricornis* (Sucumbíos, Ecuador, COOK).

The *mandibles are finely striate*; the remainder is mostly very finely punctate and dull.

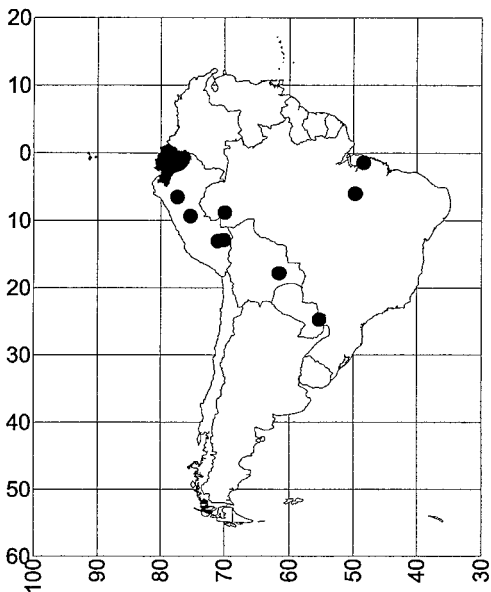
Female and Male

Unknown.

COMPARISON

Wild (2005) cleared the confusion regarding the identity of *P. obscurecornis*. The worker of *P. obscuricornis* would be most easily confused with that of the common and widely distributed *P. verenae*. *Pachycondyla obscuricornis* can be easily separated as the posterior lateral edge of the petiole does not sharply differentiate the lateral and posterior faces of the petiole, as it does in *P. verenae*. Additionally *P. obscuricornis* has dense appressed pubescence on the hypopygium, which is lacking or greatly reduced in *P. verenae*. The shape of the metasternal process of *P. obscuricornis* would also separate this species from *P. verenae*, in which the separation of the lobes is not concave apically, as it is in *P. verenae* and it lacks the oblique striae, which are apparently always present in *P. verenae*. *Pachycondyla obscuricornis* is more closely related to *P. apicalis* than it is to *P. verenae*. It can be easily separated from *P. apicalis* as *P. obscuricornis* lacks the yellow-tipped funiculus. The lack of erect hairs on the dorsum of the mesosoma would separate *P. obscuricornis* from the similar *P. cooki*.

Wild (2002) lists a species near *P. obscuricornis*, which is the true *P. obscuricornis* (Wild, pers. comm.); the *P. obscuricornis* listed in Wild (2002) are actually *P. verenae* (Wild, pers. comm.).



Map 70. *Pachycondyla obscurecornis*.

DISTRIBUTION

ECUADOR: *Esmeraldas* (Quinindé [00°17'00"N 79°20'00"W QCAZ]); *Pichincha* (Unión de Toachi [QCAZ]); *Napo* (Sucumbíos [Shushufindi, 0°10.96'S 76°38.95'W, COOK, CWEM], Río Hollín [00°42'S 77°40'W QCAZ], Puerto Napo [QCAZ]); *Los Rios* (C. C. R. Palenque [1°25'56"S 79°45'10"W QCAZ]). Wild (2005) lists *Napo* (Jatun Sacha [7 k ESE Puerto Misahualli]). **PERU:** *Madre de Dios* (Río Tambopata Reserve [30 k SW Puerto Maldonado, CASC]); *Ucayali* (Pucalpa [CASC]); *Huánuco* (Monson Valley [Tingo Maria, LACM]); *San Martín* (Davidcillo [30 k NNE Tarapoto]). **BRASIL:** *Rondônia* (Abuná [Rio Madeira]); *Pará* (Tucurul [LACM]).

Wild (2005) lists *Pará* (Utinga [near Belém]). **BOLIVIA:** Wild (2005) lists *Santa Cruz* (Las Gamas [Parque Nacional Noel Kempf Mercado]). **PARAGUAY:** Wild (2005) lists *Canindeyú* (Reserva Natural Bosque Mbaracayú).

HABITAT

Pachycondyla obscuricornis can be found in rainforest, subtropical tall forest and at the edge of second growth rain forest at 0 - 700 m (Wild, 2005). One series from Ecuador was collected at 1100 m. It is a rarely collected rain forest ant (Wild, 2005).

BIOLOGY

Little is known of the biology of this species and most of the published data actually refer to the common *P. verenae* (Wild, 2005). One nest was collected in a rotten log (Wild, 2005).

Gobin et al. (2003) discuss the energetic cost of reproductive conflicts in *P. obscuricornis* (records could refer to *P. verenae*?). Volatile chemicals are found in the venom gland as well as Dufour's gland (Morgan et al., 2003). The secretions of the mandibular gland have been analyzed by Morgan et al. (1999). The ultrastructure of the labial glands was described by Lommelen et al. (2002).

ETYMOLOGY

The name of this species is derived from two Latin words, *obscurus*, meaning dark and *cornus*, meaning horn, referring to the dark funiculus of the worker.

Pachycondyla pergandei (Forel)

Figures - **Worker**: 51 (subpetiolar process), 198 (head and mandible), 603 (side view, top view), 604 (metasternal process); **Male**: 322 (side view), 324 (head, side view), 605 (head, frontal view); **Map** 71

arhuaca species complex

Euponera (*Mesoponera*) *pergandei* Forel, 1909:245-246, ♀, Guatemala, without specific locality [lectotype here designated, MHNG]; *Mesoponera pergandei*: Kempf, 1972:141; Wheeler and Wheeler, 1974: 279-280, larva, Fig. 2; *Pachycondyla pergandei*: Bolton, 1995:308

DISCUSSION

Worker

The worker is a *relatively small* (total length about 5 - 6 mm) *black* ant with reddish brown mandibles, clypeus, antennae and appendages. The *mandibles are long* (~ 1 mm) with about 12 teeth (the basalmost teeth poorly developed). The anterior border of the clypeus is convex and *medially it forms a raised area with a longitudinal depression in the middle*. The head is slightly wider anteriorly and the posterior margin is weakly concave. The head length is 1.29 mm; the head width is 1.15 mm. The *malar carina is absent*. The *eyes are relatively small* (maximum diameter 0.18 mm) located approximately one diameter from the anterior margin of the head (side view) and with about 32 ommatidia. The antennal scape (1.08 mm) extends approximately one diameter (approximately ½ of the first

funicular segment) past the posterior lateral corner of the head. The *pronotal shoulder is rounded* and the mesosoma is weakly depressed at the promesonotal suture and more *strongly depressed at the metanotal suture*. The propodeum is rounded between the two faces and the *propodeal spiracle is small* (0.03 mm) *and circular*. The petiole is moderately narrowed as seen in profile with a nearly straight anterior face, a well-developed obliquely sloping dorsal face and a slightly convex posterior face without sharp posterior lateral margins. The *anterior and posterior faces of the petiole are nearly parallel*. The subpetiolar process is a thickened lobe with a tiny ventrally directed hook anteriorly. The anterior face of the postpetiole is vertical, straight and meets the dorsal face head at nearly a right angle. The stridulatory file is absent on the second pretergite and the arolia are

absent on the tarsi. The metasternal process consists of two well developed triangular lobes.

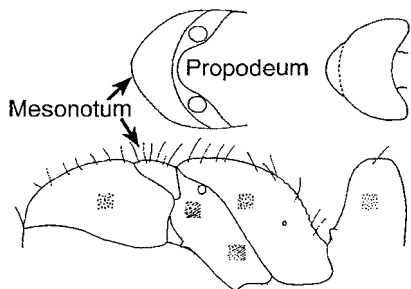


Fig. 603. Mesosoma and petiole of the lectotype worker of *C. pergandei*. The insets show the mesonotum and petiole as seen from above.



Fig. 604. Metasternal process of a worker of *P. pergandei* (Chocó, Colombia, CWEM), as seen from behind.

Long (up to 0.35 mm) erect hairs are found on the clypeus and mandibles, shorter (up to 0.1 mm) hairs are scattered on the dorsal and ventral surfaces of the head, sides of the head, antennal scape, dorsum of the mesosoma, petiole and gaster, similar hairs are present on the legs, including the tibiae. *Appressed whitish or golden pubescence is abundant on the dorsum of the head, dorsum of the mesosoma and dorsum of the gaster.*

The entire dorsal surface of the mandible is finely striate and weakly

shining, the dorsum and sides of the head are finely punctate, as is much of the mesosoma, most surfaces are moderately shining. The side of the pronotum is similar to the dorsum, the mesopleuron and metapleuron are horizontally striate and partially smooth, the side of the propodeum is mostly punctate. The side of the petiole is finely punctate and glossy, the front face is similar and posterior face is nearly completely smooth and glossy, with punctures near the apex and in the middle. The dorsum of the gaster is punctate and only moderately shining.

Female

Unknown.

Male

The male (undescribed) is a *small* (total length 6 mm) *dark brown ant with strongly contrasting yellowish brown or reddish brown mandibles, maxillary and labial palps, legs, pronotum and scutum.* The head length is 1.14 mm; head width is 0.85 mm. The anterior margin of the clypeus is slightly convex, the surface of the clypeus, as seen in profile, is convex but rounded posteriorly. The eyes are large (maximum diameter 0.5 mm) located less than one maximum diameter from the lateral ocellus (as seen in an oblique view from the top and side). *The propodeal spiracle is oval-shaped.* The petiole is moderately wide when viewed in profile, with the anterior and posterior faces converging to a rounded apex. The subpetiolar process has a ventrally direct-

ed anterior tooth followed by a region that diminishes in width posteriorly.

Erect hairs are sparse on most surfaces, but are present on the anterior border of the clypeus, dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and all surfaces of the gaster. *Appressed to suberect pubescence is abundant on many surfaces*, including the dorsum of the head, dorsum of the mesosoma, lower half of the anterior face of the petiole, lower surfaces of the posterior face of the petiole and all surfaces of the gaster.

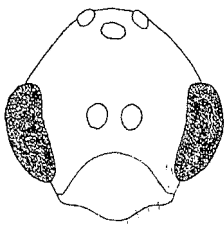


Fig. 605. Head of a male of *P. pergandei* (Perú, MCZC).

Most surfaces are sculptured and weakly shining, the propodeum has fine striolae and dorsum of the gaster is moderately shining.

No males associated with workers were seen. W. L. Brown (MCZC) identified the males used for the description. One apparent male from Limón, Costa Rica, has a dark brown pronotum and scutum (CASC).

COMPARISON

Pachycondyla pergandei and *P. conicula* from northern South America are very similar. The two species

can be easily separated based on a number of good characteristics. The medial part of the clypeus of *P. pergandei* has a longitudinal depression; this same region is raised into a swollen area or a carina in *P. conicula*. The antennal scape extends well past the posterior lateral corner in *P. pergandei*, but does not reach the corner in *P. conicula*. The mesonotum is remarkably short in *P. pergandei*, whereas it is of the normal form (as in most of the remainder of the genus) in *P. conicula*. The worker of *P. pergandei* is slightly smaller than the worker of *P. conicula*.

The workers of *P. pergandei* could be easily confused with the nearly identical *P. cernua* from the state of Napo, Ecuador. *Pachycondyla pergandei* can be easily separated as it lacks the ventrally directed tooth on the posterior edge of the subpetiolar process.

The worker of *P. pergandei* is similar to the worker of the Central and South American *P. arhuaca*. It can be separated by the shape of the petiole, which lacks the sharp posterior lateral margin (present in *P. arhuaca*).

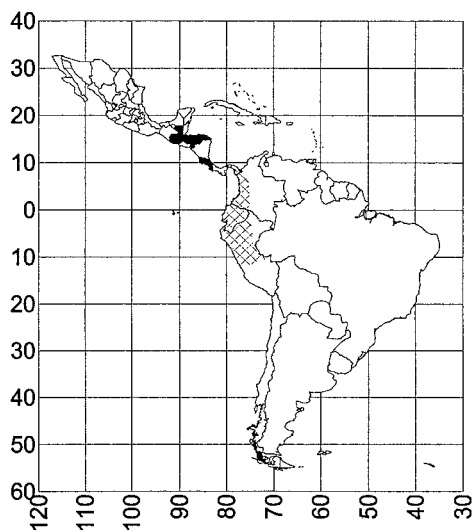
The shape of the petiole of *P. pergandei* is very similar to that of the worker of *P. venusta*. The two species can be easily separated by a number of characters. The mandibles are finely, but distinctly striate in *P. pergandei*, whereas they are smooth and polished in *P. venusta*. The mesopleuron is mostly horizontally striate in *P. pergandei* and is smooth and polished in *P. venusta*.

The unusual coloration is present in all of the males (except 1) of *P. pergandei* and *P. conicula* that were seen and if consistent, would separate the males of these two species from all of the others in the genus, including the male of the closely related *P. cernua*. The males of *P. pergandei* can be separated from those of *P. conicula* by the shape of the clypeus when viewed in profile, which is convex and rounded, not forming a relatively flat surface, which is abruptly lowered posteriorly in *P. conicula*. Additionally, the posterior part of the head of *P. pergandei* is oval - shaped, not broadly rounded as in *P. conicula*. The male of *P. pergandei* can be separated from the male of the closely related *P. cernua*, as it lacks a ventrally directed angle on the posterior edge of the subpetiolar process.

DISTRIBUTION

GUATEMALA (no specific locality [Kempf, 1972]). HONDURAS: *Cortés* (Lago Yojoa [MCZC]); *Atlántida* (21 ? La Ceiba, 14 k S La Ceiba [MCZC]). COSTA RICA: *Heredia* (La Selva Biological Station [MCZC]); *Guanacaste* (Miraflores, [COOK]); *Limón* (5.5 k E Guápiles). COLOMBIA: *Chocó* (10 k SW San José del Palmar [MCZC]); *Nariño* and *Valle del Cauca* (Isla Gorgona [Baena, 1993], 5 k W Cali [CASC]). ECUADOR: *Esmeraldas* (Lita [La Bocona, CWEM]); *Pichincha* (Finlandia [16 k SE Santo Domingo de los Colorados, MCZC]); *Manabí* (73 k NE Chone [MCZC]); *Napo* (Daimi [QCAZ]); *Napo-Pastaza* (13 mi W Mera [σ ,

CASC]); *Los Ríos* (C. C. R. Palenque [QCAZ]). PERU: *Junín* (18 mi NE La Merced [Río Perené, CASC]).



Map 71. *Pachycondyla pergandei*.

HABITAT

This species has been collected in riparian tropical rain forest at 29 - 513 meters elevation. It was collected in a cacao plantation in Ecuador.

BIOLOGY

A colony in Ecuador was nesting in the soil. Workers can be collected in sifted litter. A loose male was collected in July (Colombia), a second in May (Costa Rica) at a black light trap. Nothing else is known of the biology of this species.

ETYMOLOGY

This species was named in honor of the North American myrmecologist Theodore Pergande (1840 - 1916), who obtained the type series for Forel.

Pachycondyla procidua Emery

Figures - **Worker**: 59 (pronotum, top view), 212 (side view), 606 (head), 607 (metasternal process); **Female**: 608 (side view, top of pronotum), 609 (head); **Map** 72

crassinoda species complex

Pachycondyla procidua Emery, 1890a:75-76, ♀, French Guiana: Cayenne; Santschi, 1921:87, ♀; Kempf, 1964:50-51, ♀; *Pachycondyla* (*Pachycondyla*) *procidua*: Emery, 1901a:45

DISCUSSION

Worker

The worker is a *relatively large* (13 mm) *dark reddish brown* species. The *mandibles have approximately nine teeth*, the anterior border of the clypeus is broadly convex when viewed directly from above, it can be seen to be slightly depressed medially when viewed obliquely. The *eye is small* (maximum diameter 0.4 mm) and is located slightly more than 1 diameter from the anterior border of the head (side view). The *malar carina is absent*. The scape extends slightly past the posterior lateral corner of the head. The *pronotal shoulder is formed into a sharp carina*, which overhangs the side of the pronotum. The *metanotal suture is slightly depressed* below the level of the remainder of the mesosoma and definitely breaks the sculpture when

seen from above. The *propodeal spiracle is elongated*. The propodeum is rounded along the posterior lateral edge. The *anterior face of the petiole is nearly vertical and slightly concave* and meets the broadly rounded posterior face near the anterior edge of the apex. The *anterior face of the postpetiole* (first segment of the gaster) *is concave* and forms a *sharp angle* with the dorsal face of the postpetiole.

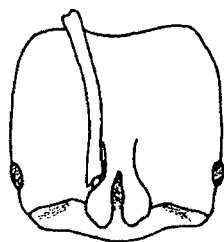


Fig. 606. Head of a worker of *P. procidua* (King Frederic William IV Falls, Suriname, MCZC).

Erect hairs are moderately abundant and in general are short (up to 0.5 mm on the dorsum of the mesosoma, most hairs < 0.3 mm in length). The *scape* has several short (up to 0.2 mm) *erect hairs* in addition to fine suberect pubescence. Appressed golden pubescence is moderately abundant on the head, the mesosoma and more abundant on the dorsum of the gaster.

Most surfaces are punctate and moderately to strongly shining. The *mandibles* are mostly smooth and glossy with scattered punctures, the dorsum of the head and surface of the *scape* are densely and finely punctate but shining. The mesosoma has scattered punctures, but most surfaces are at least moderately glossy, the mesopleuron, and the side and lower posterior face of the propodeum have poorly defined striae. The petiole is finely punctate and mostly glossy, as is the dorsum of the gaster. The metasternal process consists of two broad lobes with tiny teeth at the apex.



Fig. 607. Metasternal process of a worker of *P. procidua* (10 k W Sinnamary, French Guiana, CWEM) as seen from behind.

Female

The female is a *large* (total length 14 mm) dull black ant with dark brown appendages. The *mandible* has eight well-developed teeth, which are approximately equal in size, except for the apicalmost tooth, which is slightly larger. The preapical tooth is smaller than the others. The anterior border of the clypeus is broadly convex; the head is widest at the level of the eye and the posterior margin is strongly concave. The head length and head width are 3 mm. The *malar carina* is absent and the eye (maximum diameter 0.6 mm) is located approximately $\frac{1}{2}$ diameter from the anterior margin of the head. The ocelli (maximum diameter 0.15 mm) are located approximately two diameters apart. The *scape* (2.5 mm) nearly reaches the posterior lateral corner of

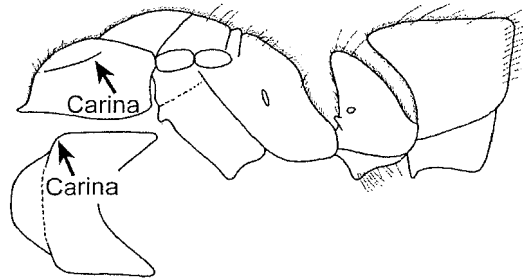


Fig. 608. Mesosoma, petiole and first gastral segment of a female of *P. procidua* (Cuzco, Perú, NHMB). The inset shows the pronotum as seen from above.

the head. The *pronotal carina* is well developed and slightly overhangs the side of the pronotum, especially anteriorly. The *propodeal spiracle* is

slit-shaped. The *petiole* is narrow when viewed in profile with a slightly concave anterior face and a broadly rounded posterior face and meet at an angle at the anterior edge. The subpetiolar process forms a broad lobe anteriorly. The anterior face of the postpetiole is strongly concave and forms an acute angle anteriorly with the dorsal face.

Erect hairs are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, sides of the head, shaft of the scape, dorsum of the mesosoma, legs, dorsum of the petiole, the subpetiolar process and all surfaces of the gaster. Appressed golden pubescence is present on most surfaces but does not hide the sculpture.

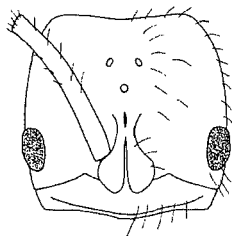


Fig. 609. Head of a female of *P. procidua* (Cuzco, Perú, NHMB).

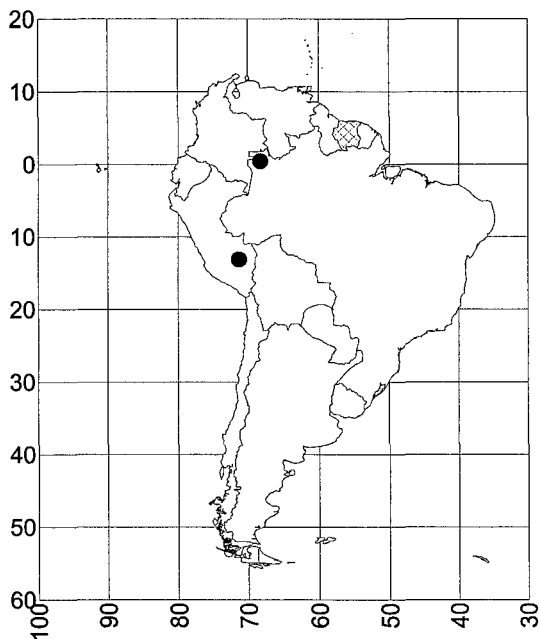
The dorsal surface of the *mandible* is smooth and glossy with scattered punctures. The head is punctate, as is the mesosoma, the petiole and the gaster, with most surfaces only weakly shining.

Male

Unknown.

COMPARISON

The shape of the anterior face of the postpetiole distinguishes *P. procidua* from most of the others in the genus. *Pachycondyla procidua* can be separated from the common *P. harpax*, in which the two faces of the postpetiole form an angle, by the presence of the metanotal suture on the dorsum of the mesosoma and by the pronotal carina, which overhangs the side of the pronotum, both of which are reduced or absent in workers of *P. harpax*. *Pachycondyla cernua* and *P. concava* have concave anterior faces of the postpetiole, but both species have malar carinae, which are absent in *P. procidua*.



Map 72. *Pachycondyla procidua*.

DISTRIBUTION

PERU: *Cuzco* (Cuzco [Santschi, 1921). FRENCH GUIANA: *Cayenne* (10 k W Sinnamary [CWEM], type locality: Cayenne). GUIANAS (Kempf, 1972). SURINAME: *Kerie* (King Fredrick William IV Falls [Courantyne, MCZC]; *Sipaliwini* (Witi [Wittie] Creek, Brownsberg Natuur Park, LACM). BRASIL: *Amazonas* (Iruaretê [0°27'0"N 67°22'0"W, MCZC]).

HABITAT

This species has been collected in the tropical forest.

BIOLOGY

Unknown, except workers from French Guiana were collected in the plant *Phyllodendron linnei*.

ETYMOLOGY

From the Latin word *proci*, meaning fallen down or prostrate, referring to the form of the anterior face of the postpetiole.

Pachycondyla purpurascens Forel

Figures - **Worker**: 65, 250 (clypeus), 252 (mandible), 610 (side view), 611 (metasternal process), 612 (head); **Female**: 613 (side view), 614 (head); **Map** 73

crassinoda species complex

Pachycondyla purpurascens Forel, 1899:12, Plate 1, Fig. 10, ♀, Costa Rica, Caché [lectotype worker here designated, MHNG]; *Pachycondyla* (*Pachycondyla*) *fuscoatra purpurascens*: Emery, 1901a:45 (apparently provisionally considered junior synonym of *P. impressa*: Kempf, 1961:195)

DISCUSSION**Worker**

The worker is a *large* (total length 16 mm) *black* ant. The mandible has approximately nine teeth; the anterior

medial margin of the clypeus is concave. The *length of the clypeus at the medial point* (from the anterior edges of the frontal lobes) is *long*, approximately 0.4 mm. The *eye is moderately large* (0.6 mm) located

purpurascens Costa Rica to Bolivia

one maximum diameter from the anterior margin of the head (side view). The scapes are moderately long, extending approximately the first funicular segment past the posterior lateral corner of the head. The sides of the head are convex, the posterior margin is concave. The *pronotum* is swollen at the shoulder, but does not form a carina. The promesonotal suture is well marked on the dorsum of the mesosoma; the *metanotal suture* is poorly marked and does not break the sculpture. The *propodeal spiracle* is slit-shaped. The *petiole* is rectangular-shaped when viewed in profile, with the anterior and posterior faces being nearly parallel and a well-developed horizontal face is present. The subpetiolar process consists of a small ventrally directed angle followed by a swollen region, which gradually diminishes in width posteriorly. The anterior face of the postpetiole is vertical and nearly forms a right angle with the dorsal face. The *stridulatory file* is absent on the second pretergite and the arolia are poorly developed.

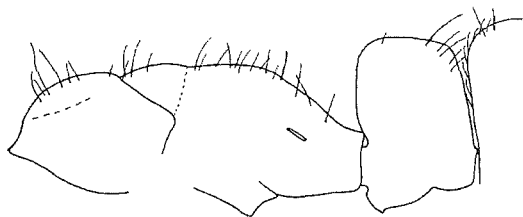


Fig. 610. Mesosoma and petiole of the lectotype worker of *P. purpurascens* (MHNG).



Fig. 611. Metasternal process of a worker of *P. purpurascens* (Guanacaste, Costa Rica, CWEM), as seen from behind.

Erect and suberect hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin of the head, *shaft of the scapes*, erect hairs are generally absent on the sides of the head, except in the malar region, erect hairs are abundant on the dorsum of the mesosoma, on the petiole and all surfaces of the gaster, the hairs on the legs are erect to suberect.

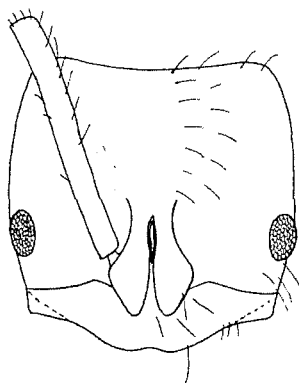


Fig. 612. Head of the lectotype worker of *P. purpurascens*.

The *mandibles* are *finely striate and dull*, the dorsum of the head is mostly punctate, but fine poorly defined striae are present near the posterior area of the frontal carinae, the mesosoma is punctate, but also has fine striae, which are mostly transverse on the dorsum of the pronotum, longitudinal on the mesonotum, longitudinal on the anterior $\frac{1}{4}$ part of the propodeum and transverse on the posterior $\frac{3}{4}$ part and mostly horizontal on the sides of the mesosoma, horizontal on the side of the petiolar node, but transverse across the dorsal face, all surfaces are dull.

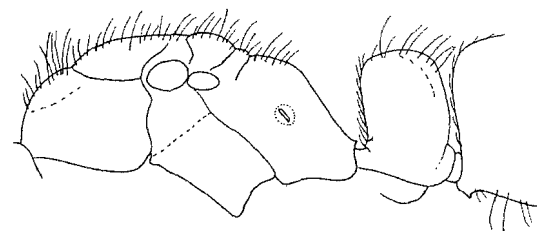


Fig. 613. Mesosoma and petiole of the female of *P. purpurascens* (Guanacaste, Costa Rica, CWEM).

Female

The female (undescribed) is *similar to the worker* with a *relatively elongate clypeus* (length at the anterior medial point to the frontal lobes is approximately 0.4 mm), the *eyes are moderate in size* (maximum diameter 0.62 mm), the head length is 3.2 mm; head width is 3.0 mm. The *pronotal shoulder is swollen*, but does not form a carina. The *propodeal spiracle is slit-shaped*, the *petiole and postpetiole are similar to those of the worker*.

The pilosity and sculpture are similar to those of the worker.

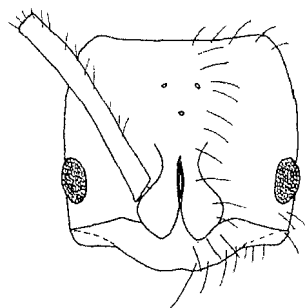


Fig. 614. Head of a female of *P. purpurascens* (Guanacaste, Costa Rica, CWEM).

Male

Unknown.

COMPARISON

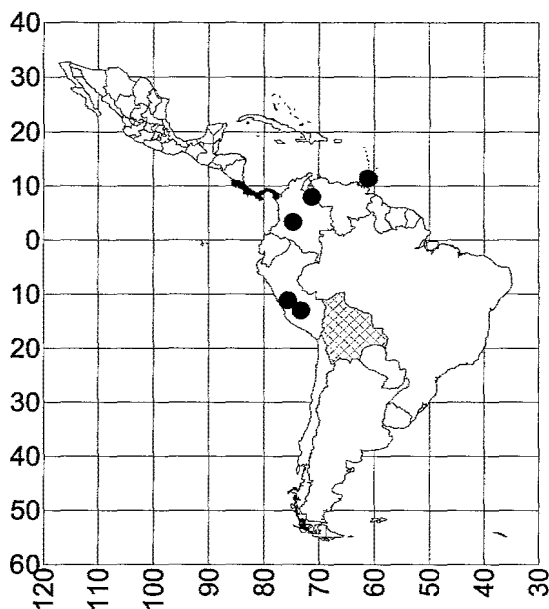
Longino (website) pointed out the validity of *P. purpurascens*. The female and the worker are nearly identical to those of *P. impressa*, differing only in having a longer clypeus. *Pachycondyla purpurascens* is closely related to the Peruvian and Bolivian *P. inca*, but differs in having the dorsal surface of the mandible smooth or very weakly striate, whereas the mandible of *P. inca* is strongly striate. The size, shape of the clypeus and the smooth mandibles of *P. purpurascens* could cause confusion with *P. striata*. It can be easily separated by the lack of a carina on the pronotal shoulder, which is present in *P. striata*. Additionally *P. purpurascens* lacks the prominent striae on the dorsum of the pronotum, which are present in *P. striata*.

Kempf (1961) suggested that this species would be shown to be a synonym of *P. impressa* as it was simply a little larger than the typical *P. impressa*, but cautioned that the differences in size should be further examined. He did not mention the differences in the lengths of the clypeuses. The differences appear to be consistent and *P. purpurascens* will be regarded as a valid species.

DISTRIBUTION

COSTA RICA: *Cartago* (San Juan Viñas [MCSN], Juan Viñas [9°54'N 83°45'W], Cachí [9°50'N 83°48'W], type locality); *Guanacaste* (Cerro Cacao [10°56'N 85°28'W], Cacao Field Station, [CWEM], Maritza Field Station [CWEM], Pitilla Field Station [CWEM], Estación Cacao [SW side Volcán Cacao [INBio]); *Puntarenas* (Monteverde); *San José* (Braulio Carrillo National Park [Bajo La Hondura, 10°04'N 83°59'W, LACM]). Longino (website) lists mid to upper elevation sites, from Cordillera de Guanacaste to Cordillera Volcánica Central and concludes that is probably continuous in montane sites throughout Costa Rica. **PANAMA:** *Bocas del Toro* (Fortuna-Chiriquí Road [CWEM]). **COLOMBIA:** *Huila* (Gigante [IAVH]). **PERU:** *Cuzco* (Vilcanota [MCSN]); *Junín* (Valle Chanchamayo [USNM]). **VENEZUELA:** *Táchira* (Río Cobre of the Catatumba system below La Grita [USNM]). **TRINIDAD:** (Río Cobre [USNM]). **BOLIVIA:** *Chuquisaca* (Tiguipa [USNM]); state unknown (Río Colorado [present in several

departamentos, USNM]); (without locality, Staudinger [MCSN]; *Cochabamba* (109 k E Cochabamba [CWEM]).



Map 73. *Pachycondyla purpurascens*.

HABITAT

Pachycondyla purpurascens occurs in wet mountain forest and mountain hardwood cloud forest. Longino (website) lists elevations of 800 - 1500 meters.

BIOLOGY

Most specimens were collected as individual foragers or extracted from leaf litter. Dealate females were collected in February (Costa Rica) and April (Colombia). The specimen from Trinidad was collected in a cave in a nest made of guano fragments.

Longino (website) found a nest in a steep bank along a trail. A worker captured a *Gnamptogenys* ant worker from a nest he was excavating. The forager moved irregularly back and forth but then went to a simple, circular hole in the bank. He excavated the hole horizontally into the bank to a depth of arm's-length plus trowel length. At that point, he began scooping out a few workers at a time and obtained a total of 16 workers.

This species was collected in the same locality as *P. impressa*, which supports the hypothesis that it is a valid species.

ETYMOLOGY

The name of this species is derived from the Latin word *purpureus*, meaning purple, possibly referring to the slight purple reflections of the integument of this species.

Pachycondyla recava new species

Figures - **Worker**: 76 (petiole, top view), 225 (petiole, side and top view), 615 (side view), 616 (metasternal process), 617 (head); **Map** 74

crenata species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *small* (total length 6.5 mm) *black ant with yellow appendages* and with the *anterior half of the head somewhat yellowish*. The mandibles have about 12 teeth; the anterior margin of the clypeus is broadly convex and the *medial lobe is strongly convex and overhangs the remainder of the clypeus*. The head length is 1.44 mm (including the entire

medial clypeal lobe); the head width is 1.23 mm. The *malar carina is moderately well-developed* and extends approximately $\frac{2}{3}$ of the distance to the eye. The maximum diameter of the eye is 0.40 mm. The scape (1.40 mm) extends approximately the first 2 funicular segments past the posterior lateral corner of the head. The sides of the head are broadly convex; the posterior margin is weakly concave. The *pronotal shoulder forms a sharp carina*, which overhangs the remain-

der of the pronotum. The *metanotal suture is not impressed* and is poorly marked on the dorsum of the mesosoma and barely interrupts the sculpturing. The *propodeal spiracle is slit-shaped*. The *anterior face of the petiole is nearly vertical and concave* and meets the broadly rounded posterior face near the anterior edge. The central region of the *posterior face of the petiole is strongly concave*. The subpetiolar process is poorly developed and consists of a tiny anterior tooth and a lobe, which gradually diminishes in width posteriorly. The anterior face of the postpetiole is vertical and meets the dorsal face in a broad curve. The *stridulatory file is well developed* on the second pretergite and the arolia are present but poorly developed. The metasternal process consists of two wide lobes, which are barely separated by two straight surfaces.



Fig. 615. Mesosoma and petiole of the holotype worker of *P. recava*.



Fig. 616. Metasternal process of the holotype worker of *P. recava* as seen from behind.

Erect hairs are abundant on most surfaces including the mandibles, clypeus, sides of the head, posterior margin of the head, dorsal and ventral surfaces of the head, *scapes*, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster; the hairs on the legs are mostly sub-erect. Appressed pubescence is sparse and only noticeable on the gaster.

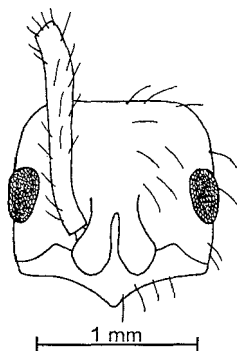


Fig. 617. Head of the holotype worker of *P. recava*.

The *mandibles are very finely striate with scattered punctures* and only weakly shining, the medial lobe of the clypeus is longitudinally concave, with very fine striae laterally. The dorsum of the head is punctate and weakly shining, the dorsum of the mesosoma has scattered punctures and is moderately smooth and glossy, the side of the pronotum is smooth and glossy, the remainder of the side of the mesosoma is striolate, finely punctate and weakly to moderately shining. The petiole is finely punctate, glossy and shining, especially the posterior face. The gaster has fine scattered punctures and is moderately shining.

Female and Male

Unknown.

COMPARISON

Pachycondyla recava is clearly a member of the *crenata* species complex, with a well-developed medial angular lobe on the clypeus and with a well-developed pronotal carina, lack of the depression at the metanotal suture and the stridulatory file is present on the second pretergite. The shape of the petiole of *P. recava* would cause confusion with only *P. unidentata* and *P. striatinodis*. The concave posterior face of the petiole can easily distinguish *P. recava*, which is convex in the other two species. *Pachycondyla recava* also lacks the striae found on the petiolar node of *P. striatinodis*.

Workers of *P. recava* could be easily confused with workers of the Venezuelan *P. rugosula* with the posterior face of the petiole being concave, as the posterior face of the petiole is strongly concave in both species. *Pachycondyla recava* can be easily separated, as such *P. rugosula* is larger (total length 8 mm) and all surfaces of the petiole are punctate, not smooth and glossy as in *P. recava* (especially the posterior face).

DISTRIBUTION

Known only from the type locality in the state of *Valle del Cauca*, COLOMBIA.

HABITAT

This species was found in a valley or possibly a watershed at 550 meters.

BIOLOGY

Unknown.

ETYMOLOGY

From Latin, *recavus*, meaning arched inward, referring to the posterior face of the petiole of the worker of this species.

TYPE SERIES

Holotype worker (IAVH), COLOMBIA Valle del Cauca Calima Cuenca media Río Calima campo, 03°56' 48"N 76°40'30"W, 550m vegeta. V. 1993, R. Aldana, Leg; # IAVH 35309; *Pachycondyla* sp 2.



Map 74. *Pachycondyla recava*.

Pachycondyla rostrata Emery

Figures - **Worker**: 209 (head), 210 (side view); **Female**: 618 (side view), 619 (head); **Map** 75

rostrata species complex

Pachycondyla rostrata Emery, 1890a:59-61, ♀, Venezuela, San Esteban; *Neoponera rostrata*: Emery, 1901a:47; *Neoponera (Eumecopone) rostrata*: Emery, 1911:71; *Pachycondyla rostrata*: Bolton, 1995:309

DISCUSSION

Worker

The worker (undescribed) is a moderate sized dark ant (total length 13 mm). The mandible is greatly elongate, longer than the length of the head and has about 18 small teeth. The anterior border of clypeus is nearly straight. The malar carina is developed only about $\frac{1}{2}$ of the distance to the eye. The head is slightly narrower anteriorly and the posterior border is nearly straight. The eyes are moderately large (maximum diameter 0.6 mm) occupying nearly $\frac{1}{3}$ of the length of the side of the head. The scape is long, extending nearly $\frac{1}{2}$ of its length past the posterior lateral corner. The carina is present on the pronotal shoulder (but poorly developed); the metanotal suture is depressed below the level of the remainder of the mesosoma and breaks the sculpturing on the dorsum. The anterior face the petiole is broadly convex; the posterior face is nearly vertical.

Long (up to 0.6 mm) erect and suberect hairs and golden appressed pubescence are present on all surfaces.

The mandibles are finely longitudinally striate, the remainder of the surfaces is punctate, all surfaces except the gaster (weakly shining) are dull.

Female

The female is a large (total length 17 mm) black specimen with reddish brown legs. The mandible is very long (2.9 mm) with 18 well-developed teeth and with smaller teeth or denticles between most of the teeth. The head length is 3.0 mm; the head width is 2.4 mm. The head is narrowed anteriorly and posterior margin is concave. The eye is large (maximum diameter 0.66 mm) and is located slightly more than one diameter from the anterior margin of the head. The malar carina is well developed, but only reaches $\frac{2}{3}$ of the distance to the eye. The ocelli are well developed (maximum diameter of the median ocellus 0.14 mm, of the lateral ocellus 0.12 mm). The scape (length

3.6 mm) extends about $\frac{1}{3}$ of the length past the posterior lateral corner of the head. The *pronotal carina* is poorly developed; the *propodeal spiracle* is slit-shaped. The *anterior face of the petiole* is slightly convex, sloping upwards posteriorly and rounded into the posterior face, which is nearly vertical. The subpetiolar process is well developed and consists of a rounded or rectangular lobe anteriorly and a slender area posteriorly. The anterior face of the postpetiole has a broadly rounded face. The *stridulatory file* is well developed on the second pretergite; and the arolium is well developed between the tarsal claws.

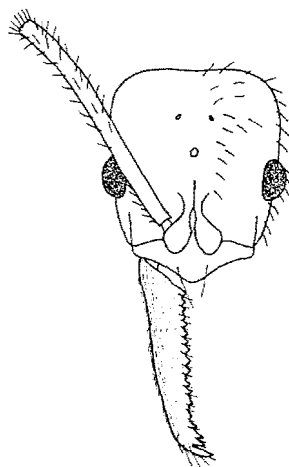


Fig. 619. Head of a female of *P. rostrata* (Sucumbíos, Ecuador, LACM).

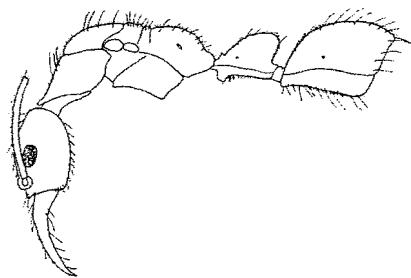


Fig. 618. Head, mesosoma, petiole and postpetiole of a female of *P. rostrata* (Sucumbíos, Ecuador, LACM).

Erect hairs are present on the mandibles, clypeus, sides the head, posterior margin of the head, dorsal and ventral surfaces of the head, the shaft of the scape and mesosoma, petiole and gaster; the hairs on the legs are coarse, abundant and mostly sub-erect. Golden pubescence is present on the head, mesosoma, petiole and gaster.

The mandibles are finely sculptured and dull, the head is punctate, most surfaces of the mesosoma are dull and punctate, as are the petiole and gaster.

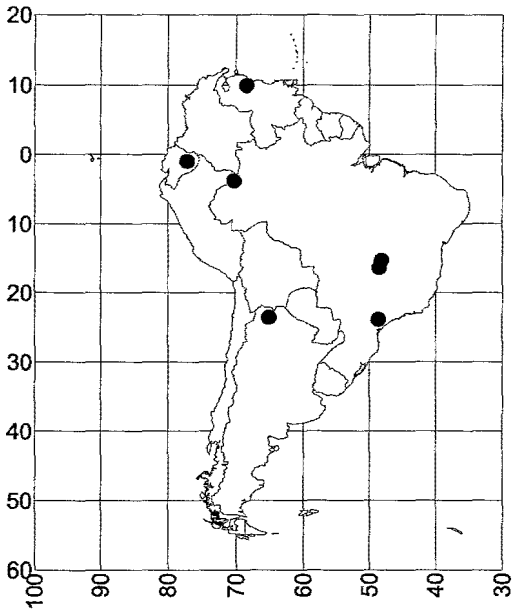
Male

Unknown.

COMPARISON

The worker and female of *P. rostrata* are easily separated from nearly all of the others in the genus *Pachycondyla* by the greatly elongated mandibles. *Pachycondyla rostrata* could only be confused with *P. agilis* (which also has elongated mandibles), from which it can be separated by the presence of a moderately developed carina on the pronotal shoulder, which is lacking in *P. agilis*. In addition, the anterior face of the petiole of *P. rostrata* is convex, not straight or

slightly concave as in *P. agilis*. The differences between these two are slight and when sufficient material is available to evaluate the characteristics, they may be shown to be the same species.



Map 75. *Pachycondyla rostrata*.

DISTRIBUTION

COLOMBIA: *Amazonas* (Leticia [MCZC]). ECUADOR: *Sucumbios* (Garzacochoa-Anangu [175 k ESE of Coca, ♀ LACM]). VENEZUELA: *Carabobo* (type locality: San Esteban). BRASIL: *Goiás* (Anápolis [MCZC], Goiânia [Kempf, 1972]); *São Paulo* (Campinas [Borgmeier, 1937]). ARGENTINA: *Salta* (Chaco Occidental [Los Colorados, ~ 50 k NE Joaquin, V. González, LACM]).

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

The name of this species comes from the Latin word *rostratus*, which means beaked or curved and refers to the curved beak-like form of the mandibles, especially when viewed from the side.

Pachycondyla rugosula Emery new status

Figures - **Worker**: 66, 621 (head), 69 (subpostpetiolar process), 226 (pronotum, top view), 620, 622 (side view); **Female**: 623 (side view), 624 (head); **Male**: 312 (head, side view), 625 (side view), 626 (head, frontal view); **Map** 76

crenata species complex

Neoponera unidentata variety *rugosula* Emery, 1901b:30-31, ♂, Perú, without specific locality (together with *Neoponera laevinodis* André, 1902:14-15, ♀, ♀, Perú, Huallaga, Río Mixiollo [equated with *Neoponera laevinodis*: Emery, 1911:72]; (synonymized with *P. unidentata* by Brown, 1957:232, Brown lists variant spellings of *rugatula* by Santschi and *rugulose* by Wheeler)

Neoponera unidentata var. *rugatula* Santschi, 1919a:38, attributed to Emery (see above), *nomen nudum*, *Pachycondyla unidentata* var. *rugatula*: Bolton, 1995:309

DISCUSSION

Worker

The worker is a *medium-sized* (total length 8 mm) dark reddish brown ant with brown or orange appendages. The mandibles have approximately 11 teeth, which alternate in size. The anterior border of the clypeus is convex with a medial lobe, which overhangs the anteclypeus. The posterior lateral corners of the head are angulate and the posterior margin is concave. The head length is 1.6 - 1.75 mm; the head width 1.5 - 1.6 mm. The *malar carina* is present and sharp. The eye (maximum diameter 0.40 - 0.45 mm) is approximately one diameter from the anterior margin of

the head. The scape (1.5 - 1.6 mm) extends approximately the first funicular segment past the posterior lateral corner of the head. The sides of the head are convex and slightly narrowed anteriorly, slightly wider at a point just posterior to the eyes and the posterior border is concave. The *carina on the pronotal shoulder* is very sharp and slightly overhangs the side of the pronotum. The *mesosoma* is only slightly depressed at the *metanotal suture*, which is not evident on the dorsum of the mesosoma. The *propodeal spiracle* is elongated. The *anterior face of the petiole* is vertical and meets the broadly rounded posterior face at the anterior edge of the apex. The posterior face of the

petiole is strongly outlined by *sharp lateral carinae* and is convex, possibly flat or even strongly concave. The subpetiolar process consists of a downward directed angle anteriorly followed by a concave region and a broadly rounded lobe at mid length, which gradually diminishes in width posteriorly. The anterior face of the postpetiole is concave and meets the dorsal face at a rounded angle. The *stridulatory file* is well-developed on the second pretergite. The arolia are poorly developed.

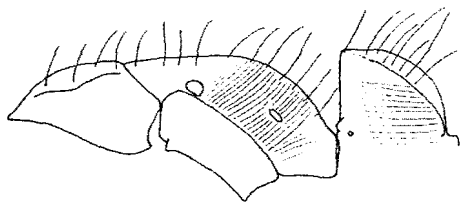


Fig. 620. Mesosoma and petiole of a worker of *P. rugosula* (Reserva Tambopata, Madre de Dios, Perú, LACM).

Erect and suberect hairs are abundant on the mandibles, dorsal and ventral surfaces of the head, sides of the head, posterior margin, shaft of the scape, dorsum of the mesosoma, dorsum of the petiole and all surfaces of the gaster; the hairs on the legs are mostly suberect and sparse. Appressed pubescence is present on the head, dorsum of the mesosoma, anterior and posterior faces of the petiole and all surfaces of the gaster.

The *mandibles* are finely striate and weakly shining with scattered punctures. The medial angulate lobe on the clypeus has longitudinal striae.

The head is densely punctate with the *punctures being arranged in somewhat poorly defined striae*, which diverge posteriorly. The dorsum of the pronotum is covered with moderately

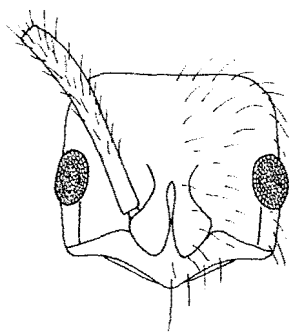


Fig. 621. Head of a worker of *P. rugosula* (Reserva Tambopata, Madre de Dios, Perú, LACM).

coarse punctures, which are arranged in *poorly defined transverse striae*, the side of the pronotum and the mesopleuron are finely sculptured and weakly shining. The punctures on the mesonotum and dorsum of the propodeum are not as well defined, the side of the pronotum is finely punctate smooth and glossy. The mesopleuron has poorly defined horizontal striae, the *side of the propodeum has well defined coarse striae*, which are obliquely horizontal. The anterior face of the petiole is smooth and glossy (finely punctate), the *sides of the petiole have poorly defined horizontal striae*, mostly concentrated mid height, the posterior surface is finely punctate and shiny. The gaster is finely punctate and shining.

Specimens from Venezuela (USNM) are unusual as most of the series has a strongly concave posterior

face of the petiole. This appears to be an artifact and they are considered to be *P. rugosula*.

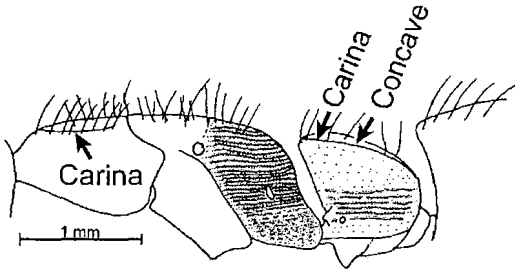


Fig. 622. Mesosoma and petiole of a worker of *P. rugosula* (Venezuela, collected at Hoboken, USNM). The posterior face of the petiole is concave in this specimen.

Female

The female is a *moderate sized* (total length 8.5 mm) dark reddish brown specimen with lighter brown appendages. The mandibles have 12 or 13 teeth. The head is similar to that of the worker with the length being 1.8 mm and the width 1.7 mm. The eye (maximum diameter 0.5 mm) is located less than one diameter from the anterior edge of the head. The ocelli are small with the median ocellus (0.10 mm) located more than two diameters from the lateral ocellus (diameter 0.06 mm). The scape (1.6 mm) extends $1\frac{1}{2}$ funicular segments past the posterior lateral corner of the head. The *carina on the pronotal shoulder is sharp* and slightly overhangs the side of the pronotum; the propodeal spiracle is elongate. The petiole and postpetiole are similar to those of the worker.

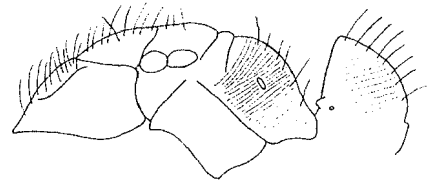


Fig. 623. Mesosoma and petiole of a female of *P. rugosula* (Caracas, Venezuela, LACM).

The pilosity is similar to that of the worker.

The sculpture is similar to that of the worker with the *obliquely horizontal striae on side of the propodeum* and with *fine striae on the side of petiole*.

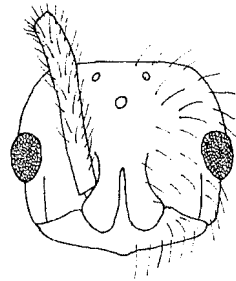


Fig. 624. Head of a female of *P. rugosula* (Caracas, Venezuela, LACM).

Male

The male (undescribed) is a *small* (total length 6 mm) dark brown specimen. The *clypeus is swollen* (viewed in profile) and partly overhangs the anterior border of the clypeus. The eyes are moderate in size (maximum diameter in side view 0.59 mm), separated from the lateral ocellus by about $\frac{1}{2}$ of the eye diameter (0.24 mm) as seen obliquely from the

side and above. The median ocellus (diameter 0.14 mm) is separated from the lateral ocellus (0.14 mm) by 1 diameter. The pronotal shoulder is swollen but does not form a distinct carina. The *Mayrian furrows* are well developed and meet in the middle of the scutum. The *propodeal spiracle* is elongated. The *petiole* is unlike that of the worker and female and is nearly conical with a slightly convex anterior face and a broadly convex posterior face, which form the highest point near the middle of the apex. The subpetiolar process consists of a lobe, which gradually diminishes in width posteriorly. The anterior face of the postpetiole is broadly rounded into the dorsal face.

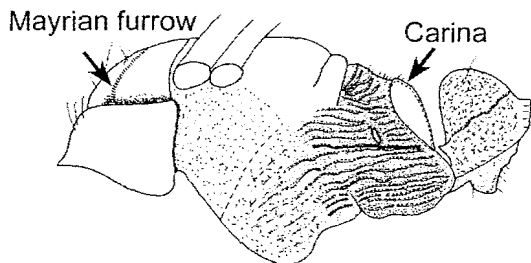


Fig. 625. Mesosoma and petiole of a male of *P. rugosula* (Reserva Tambopata, Madre de Dios, Perú, LACM).

Erect hairs are present on all surfaces of the head, the mesosoma, the petiole and the gaster; the hairs on the legs are mostly suberect and not abundant. The middle tibia has three suberect hairs on the outer surface, the posterior tibia has seven hairs on the outer surface and two hairs on the inner margin.

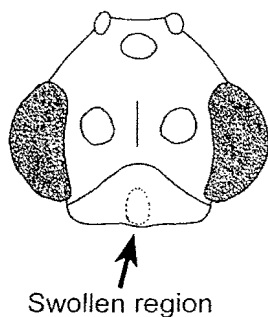


Fig. 626. Head of a male of *P. rugosula* (Reserva Tambopata, Madre de Dios, Perú, LACM).

The clypeus and head are very finely punctate and weakly shining. The punctures on the mesosoma are mostly fine, but a few striae are located on the posterior edge of the katepisternum and on the side of the propodeum. The side of the petiole has very poorly defined horizontal striae. The gaster is finely punctate and weakly shining.

COMPARISON

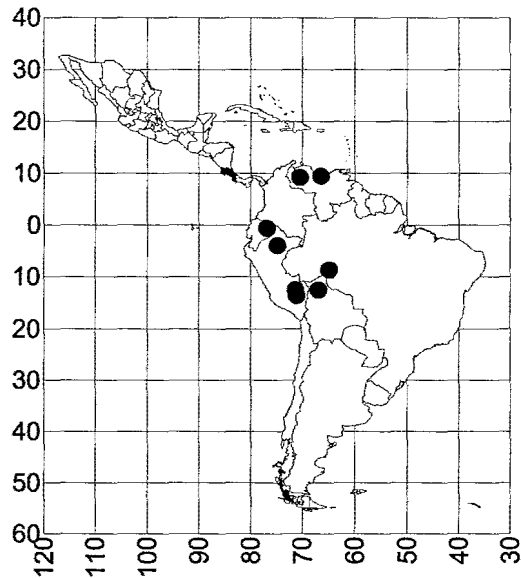
The worker and female of *P. rugosula* are very similar to those of *P. unidentata*, but can be separated by the more coarse punctures on the dorsum of the pronotum, the prominent obliquely transverse striae on the side of the propodeum and the horizontal striae on the side of the petiole. The striae on the latter two structures are nearly always missing on workers and females of *P. unidentata* and if they are present, they do not cover the entire surface. The anterior border of the postpetiole is more concave than it is in *P. unidentata*.

The concavity of the posterior face of the petiole of the specimens of *P. rugosula* from Venezuela could cause confusion with the Colombian *P. recava*. They can be easily separated as *P. recava* is much smaller (total length 6.5 mm) and the petiole, especially the posterior face, is smooth and glossy, not sculptured as in *P. rugosula*.

The male of *P. rugosula* is essentially identical to that of *P. moesta*. Striae are poorly developed on the side of the propodeum of males of *P. rugosula* and essentially absent on the side of the petiole. The *Pachycondyla rugosula* male can be separated from the male of *P. unidentata* by the swollen medial region of the clypeus, which appears as an angle when the head is viewed in profile.

DISTRIBUTION

COSTA RICA: *Limón* (Pandora [LACM]). **ECUADOR:** *Napo* (Orellana, Tiputini Biodiversity Station [STDC]). **PERU:** *Loreto* (Boquerón); *Madre de Dios* (Cocha Totora [LACM], Colpa Quebrada [near Cocha Cashu, LACM], Sotilejo [LACM], Reserva Tambopata [LACM]). **VENEZUELA:** *Distrito Federal* (Caracas [collected in quarantine in San Francisco, 1946, LACM]); *Trujillo* (15 k ESE Boconó); from an unknown locality in Venezuela, collected at Hoboken (USNM). **BRASIL:** *Rorôndônia* (Rio Madeira [Madera-Mamoré Rail Road Company, Camp 41, LACM]). **BOLIVIA:** *El Beni* (Cavinas, LACM).



Map 76. *Pachycondyla rugosula*.

HABITAT

This species was found in a wet forest along a river.

BIOLOGY

Two series from Perú (Colpa Quebrada, Sotilejo) were collected in *Cecropia* sp. plants. The specimens collected in quarantine were in the orchid *Cattleya mossiae* [Orchidaceae]. Specimens from Venezuela were intercepted at Hoboken, New Jersey (USA) on *Cattleya* orchids [Orchidaceae], 23-x-1946, 9-i-1946 and 9-i-1947.

ETYMOLOGY

The species name is derived from the Latin word *ruga*, meaning wrinkle and the diminutive *ulus*, together meaning small wrinkles, referring to the sculpture on the dorsum of the pronotum.

Pachycondyla rupinicola new species

Figures - **Worker**: 94 (larva), 96 (head, side view), 205 (side view), 627 (head and mandible); **Female**: 628 (side view), 629 (head); **Male**: 309 (tibia), 630 (side view and top of mesosoma), 631 (head, frontal and side views); **Map** 77

ferruginea species complex

Mesoponera n. sp. Larva, Wheeler & Wheeler, 1974:279-280, Figs. Fig. 1a-g

DISCUSSION

Worker

The worker is a *moderately small* (total length about 7 mm) *reddish brown* ant. The mandibles have 9 - 10 teeth. The anterior border of the clypeus is predominantly convex, although it is notably concave along the anterior medial border. The head length is 1.95 mm; the head width 1.7 mm. The *eyes are relatively large* for members of the *ferruginea* species complex (0.3 mm), separated from the anterior margin of the head by less than one diameter (side view) and containing more than 100 ommatidia. The ocelli are weakly developed in some workers. The *antennal scape is relatively long* (1.8 mm), surpassing the posterior lateral corner by nearly two diameters. The posterior border of the head is concave. The pronotal shoulder is completely rounded. The mesosoma is short and robust and only *weakly depressed at the metanotal*

suture, the *propodeal spiracle is circular in shape*. The *anterior and posterior faces of the petiole are nearly parallel* and the *apex forms a broad horizontal surface*. The *sub-petiolear process has a posteriorly directed tooth*. The *stridulatory file is absent* on the second pretergite as are the arolia near the tarsal claws.

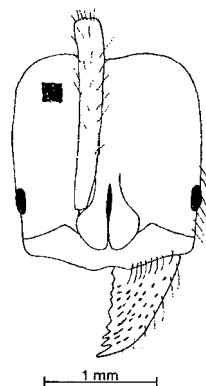


Fig. 627. Head and mandible of the holotype worker of *P. rupinicola*. Only a small portion of the sculpture is shown.

The mandibles are smooth and glossy with slight evidence of striae and with scattered punctures, the remainder of the ant is dull and punctate, except the gaster, which is moderately shining. The mesopleuron and side of the propodeum have poorly defined oblique (higher posteriorly) striae. The side of the petiole has poorly defined horizontal striae.

Erect and suberect hairs are abundant on the mandibles, clypeus, sides of the head (mostly near the eyes), posterior margin (sparse), dorsal and ventral surfaces of the head, antennal scape, mesosoma, petiole, subpetiolar process and all surfaces of the gaster. The legs are nearly without erect or suberect hairs. Appressed golden pubescence is present on nearly all surfaces.

Female

The female is similar to the worker and only slightly larger in size (total length 9 mm). The head length is 2.05; the head width 1.9 mm. The eye is relatively larger (0.7 mm), separated from the anterior edge of the head by less than $\frac{1}{2}$ of the maximum diameter (side view) and contains more than 300 ommatidia. The ocelli are small (maximum diameter of the medial ocellus 0.09 mm), but well developed. The scape (1.95 mm) extends about the first funicular segment past the posterior lateral margin of the head. The mesosoma is short and robust with well-developed wings. The anterior and posterior faces of the petiole are nearly parallel

and the apex forms a slightly convex surface. The subpetiolar process is like that of the worker, forming a posteriorly directed tooth. The other characters are as in the worker.

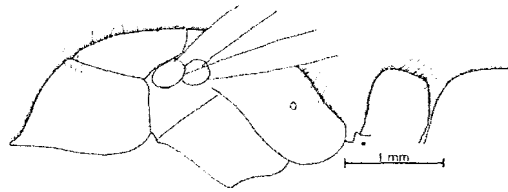


Fig. 628. Mesosoma, petiole and postpetiole of a paratype female of *P. rupinicola*.

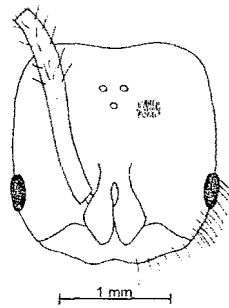


Fig. 629. Head of a paratype female of *P. rupinicola*. Only a small portion of the appressed pilosity is shown.

Male

The male is smaller than the worker and female (total length < 7 mm). The mandibles are tiny and do not meet when closed. The surface of the clypeus is swollen. The head length and head width are 1.1 mm. The eyes are large (0.6 mm in side view), occupying more than one half of the sides of the head (oblique side view), the scapes are short and do not

extend past the posterior edge of the eye. The *ocelli* are well developed but small (maximum diameter of the median ocellus 0.1 mm). The mesosoma is short and robust and depressed at the metanotal suture. The Mayrian furrows are well developed and the wings are well developed. The *propodeal spiracle* is oval-shaped. The *petiole* is somewhat triangular-shaped and the *anterior and posterior faces* are not parallel, but the apex forms a broadly rounded surface. The subpetiolar process has a *posteriorly directed tooth*.

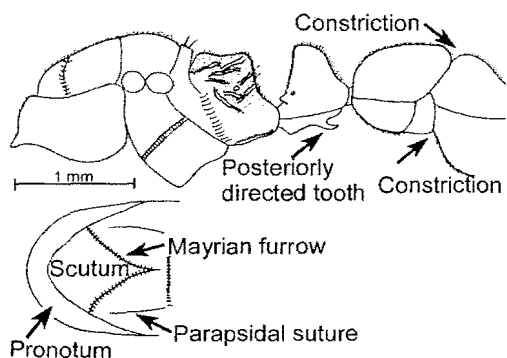


Fig. 630. Mesosoma, petiole and postpetiole of a paratype male of *P. rupinicola*, with the anterior part of the mesosoma as shown from above.

Erect and suberect hairs are short (up to 0.07 mm) and sparse, mostly restricted to the mouthparts, posterior face of the petiole and ventral surface of the gaster. Most surfaces are densely covered with a suberect to erect fine (less than 0.05 mm in length) golden pubescence.

The surface of the clypeus is

smooth and glossy; the remainder of the head is coriaceous and weakly shining. The mesosoma is punctate and moderately shining, the mesopleuron has the punctures in rows, the side of the propodeum has reticulated rugae. The petiole is punctate and coriaceous, the posterior face is smooth and glossy. The gaster is finely punctate and shining.

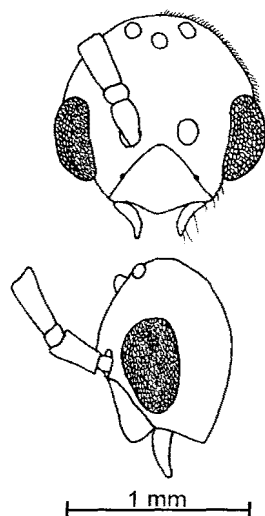


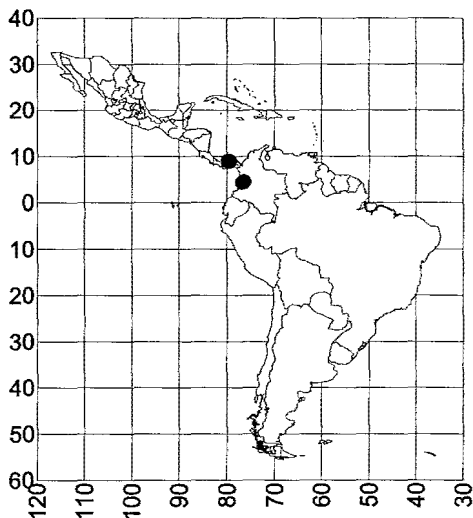
Fig. 631. Head of a paratype male of *P. rupinicola*, as seen from the front and from the side.

COMPARISON

The worker and female of *P. rupinicola* are nearly identical to those of *P. ferruginea*. *Pachycondyla rupinicola* differs in having a rectangular-shaped petiole (as seen from the side). *Pachycondyla rupinicola* can be separated from *P. lunaris* by its larger size (*P. lunaris* workers are less than 6 mm in total length) and by its longer antennal scapes (those of *P. lunaris* do

not extend past the posterior lateral corner of the head). The color and circular shape of the propodeal spiracle separate *P. rupinicola* from most the others.

The female of *P. rupinicola* appears to be similar to what Forel (1899) described as *Ponera ferruginea* var. ? *panamensis*, which we consider to be a synonym of *P. ferruginea*. Females of *P. rupinicola* differs in being larger (total length 8 - 9 mm) and having nearly a straight posterior face of the petiole (as seen from above), as compared to the description of *Ponera ferruginea* var. *panamensis*.



Map 77. *Pachycondyla rupinicola*.

Pachycondyla silvestrii from the Ivory Coast is similar to *P. rupinicola*. The similarity appears to be superficial, as the subpetiolar process of *P. rupinicola* has the posteriorly directed tooth, whereas the process in *P. silvestrii* is a broadly rounded lobe.

DISTRIBUTION

PANAMA: *Panamá* (Cerro Campana [MCZC]). COLOMBIA: *Valle del Cauca* (near Buenaventura, 4.5 k above [Río Aguaclara on road to Cali], 3.2 k E Aguaclara [old Cali Road, MCZC], 6 k above Aguaclara Road [old Cali Road, MCZC]).

HABITAT

Pachycondyla rupinicola has been collected in second growth rain forest, in a clearing in secondary forest, in a cloud forest and in rocky tropical canyons.

BIOLOGY

Unknown, except winged females and males were present in a nest in June. The worker from Panamá was collected in a leaf litter extraction.

ETYMOLOGY

From Latin, *rupina* meaning rocky chasm and *cola* for inhabitant, referring to the habitat of this species. The name was provided by Bill Brown.

TYPE SERIES

Holotype worker (MCZC), 13 paratype workers (CASC, CWEM, IAVH, LACM, MCZC, MIZA, MZSP, USNM); 2 females (MCZC, CWEM) and two males (MCZC, CWEM); 4.5 km above R. Aguaclara on old rd. to Cali, Mun. Buenaventura 17-19 June; COLOMBIA: Valle, 1971.WL Brown S, Chaplin, R. B. Root C. Pearson B.

Pachycondyla schoedli Mackay and Mackay

Figures - **Worker**: 5 (metasternal process), 30 (subpostpetiolar process), 35 (mesopleuron and propodeum), 283 (side view), 632 (head); **Map** 78

aenescens species complex

Pachycondyla schoedli Mackay and Mackay, 2006:49-51, ♀, Figs. 1-3

DISCUSSION

Worker

The worker is a *moderate sized* (total length 10 mm) *black* mostly shiny ant with *some bluish or greenish reflections*. The mandibles have approximately 10 teeth. The anterior border of the clypeus is *broadly convex but concave medially*. The *malar carina is absent*, but a small raised area is located near the posterior edge of the clypeus and the surface is slightly raised at the position where the carina would be expected to be present. The head is 2.35 mm long and 2.15 mm wide. The sides of the head are broadly convex, the posterior margin is concave. The *eyes are small* (maximum diameter 0.48 mm) located about one maximum diameter from the anterior margin of the head. The *scape is long* (length 2.5 mm) and extends about two funicular segments past the posterior lateral corner of the head. The pronotal shoulder has a slightly developed margin; the *metanotal suture is depressed* below the level of the

remainder of the mesosoma and breaks the sculpture on the dorsum of the mesosoma. The *propodeal spiracle is slit-shaped*. The *petiole is moderately thickened* when viewed in profile with poorly developed spiracular horns, a straight anterior face and a broadly rounded posterior face, which meets the anterior face near the anterior edge. The *posterior lateral edges of the petiole are sharp*. The subpetiolar process is poorly developed and consists of a tiny ventrally directed anterior angle and a thick posterior process, which gradually diminishes in width. The anterior surface of the postpetiole is weakly angulate between the two faces, the *stridulatory file is well developed* on the second pretergite, but the arolia are weakly developed. The lobes of the metasternal process are triangular-shaped and widely spaced, similar to the condition in *P. aenescens* and *P. fauveli*.

Erect hairs are abundant on the mandibles and clypeus (up to 0.6 mm in length), absent on the shaft of the scape except at the apex. A few

scattered hairs are present on the dorsal and ventral surfaces of the head, but are generally absent on the sides and the posterior margin, the dorsum of the mesosoma has a few scattered short (0.2 mm) erect hairs, as does the petiole and the gaster. The coxae and femora have a few erect hairs, the *tibiae are without erect hairs*, except near the region of the spur. Golden appressed pubescence is present on most surfaces, but is not especially dense and does not hide the sculpturing.

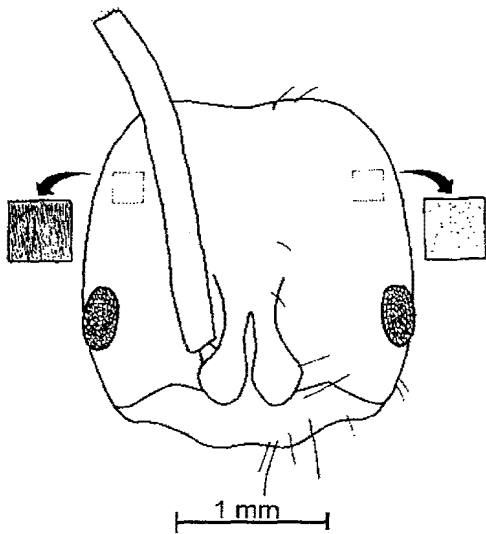


Fig. 632. Head of the holotype worker of *P. schoedli*. The appressed pubescence is shown on the right side (left side of figure), the sculpture on the left side of the head (from Mackay and Mackay, 2006).

Most surfaces are moderately to strongly shining, but with punctures, including the head, dorsum of the mesosoma, sides of the mesosoma, petiole and gaster. Moderate bluish reflections are present, especially on the head and the mesosoma.

Female and Male

Unknown.

COMPARISON

The worker of *P. schoedli* is very similar to the worker of *P. carbonaria*. The two species can be separated as *P. schoedli* lacks the extensive bluish reflections of *P. carbonaria* and is less sculptured, specifically the upper half of the mesopleuron (anepisternum) mostly lacks the obliquely horizontal striae, which are present in *P. carbonaria*.

Pachycondyla schoedli is also similar to *P. aenescens*. It can be easily separated as the mesopleuron is mostly smooth and glossy, not roughly sculptured and dull as in *P. aenescens*. The extensive and golden appressed pubescence of *P. schoedli* could cause confusion with the worker of *P. eleonorae*. It can be easily separated by the straight anterior face of the petiole, which is convex and somewhat angulate anteriorly in *P. eleonorae*.

Two workers in the LACM (Venezuela, Trujillo) are similar and intermediate between *P. schoedli* and *P. aenescens*, but the punctate head and the completely sculptured mesopleuron of these workers suggest that

they are more closely related to *P. aenescens*.



Map 78. *Pachycondyla schoedli*.

DISTRIBUTION

ECUADOR: *Pichincha* (type locality); *Cotopaxi* (Otonga, 0°25'S 79°00'W, 19-xi-1994, S. Salazar, 24-vi-2004, D. Donoso [QCAZ]).

HABITAT

This species was found in a montane forest at 1978 - 2150 meters elevation.

BIOLOGY

The type series was extracted from forest litter. Individual foragers were collected in June and November.

ETYMOLOGY

This species was named in honor of the memory of Stefan Schödl of the Naturhistorisches Museum in Wien, Vienna, Austria, friend and myrmecologist, recognizing all of his assistance of our work.

TYPE SERIES

Holotype worker (CASC), 10 paratype workers (CASC, CWEM, IAVH, MCZC, MZSP, NHMW, QCAZ), ECUADOR: *Pichincha*, Bellavista Reserve, 2150m, 12 km S. Nanegalito, 00°00'32"S 78°41'08' W and 0°0'54"W 78°40'56"W, 30.X. 1999-215, R. Anderson.

Pachycondyla schultzi new species

Figures - **Worker**: 86 (dorsal view of pronotum), 89, 190 (petiole), 189 (side view of postpetiole), 633 (side view), 634 (head); **Map** 79

emiliae species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *small* (total length 6.5 mm) *dark reddish black* specimen with reddish brown appendages. The mandible has approximately 10 teeth; the *medial region of the anterior border of the clypeus is noticeably concave*. The head length is 1.48 mm, the head width is 1.30 mm. The *malar carina is well developed*; the *eye is large* (maximum diameter 0.41 mm) located about $\frac{1}{2}$ diameter from the anterior margin of the head (side view). The *scape is relatively long* (1.8 mm) and extends nearly $\frac{1}{2}$ length past the posterior lateral corner of the head. The *pronotal carina is developed* but only slightly overhangs the side of the pronotum. The promesonotal suture is well developed and slightly depressed on the dorsum of the mesosoma, the *metanotal suture is more developed and significantly depresses the dorsum of the mesosoma* and interrupts the sculpture. The *propodeal spiracle is circular-shaped*. The petiole is thick when viewed in profile with the *anterior and posterior faces being nearly straight and nearly*

parallel and forming a well-developed dorsal face, which slopes downward anteriorly. The regions between the anterior face and the dorsal face, as well as the posterior face and the dorsal face, are distinctly angulate. The subpetiolar process is poorly developed. The *posterior lateral edges of the petiole form a sharp carina* and separate the posterior face from the sides and from the dorsal face. The stridulatory file is well developed on the second pretergite. The metasternal process cannot be seen due to the mounting technique used on both known specimens.

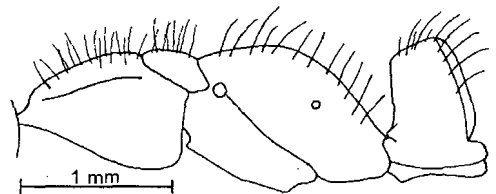


Fig. 633. Mesosoma and petiole of the holotype worker of *P. schultzi*.

Erect hairs are relatively long (up to 0.2 mm) and are present on the mandibles, clypeus, dorsal and ventral surfaces of the head, the scapes, the mesosoma, the petiole and all surfaces of the gaster, the hairs on the legs are mostly suberect.

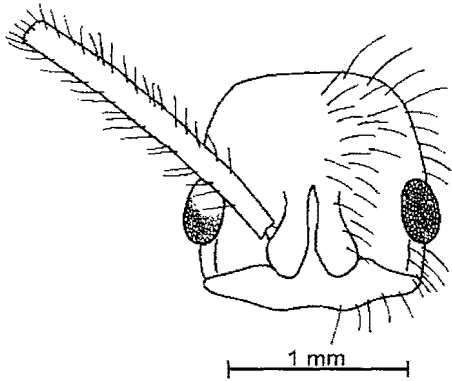


Fig. 634. Head of the holotype worker of *P. schultzi*.

The *mandibles* are finely striate and have scattered punctures, but are moderately smooth and glossy. The dorsum of the head is densely and evenly punctate, as is the dorsum of the mesosoma. The *side of the pronotum* is striate and dull, as is the remainder of the side of the mesosoma. The petiole is mostly horizontally striate and dull, except for the region near the posterior edge of the apex, as well as the posterior face, which are shining. The gaster is finely punctate and only weakly shining.

Female and Male

Unknown.

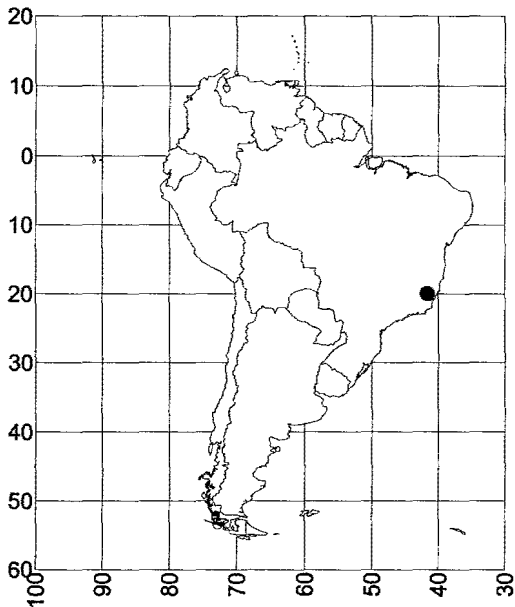
COMPARISON

The worker of *P. schultzi* is similar to members of the *crenata* species complex, but can be easily separated by the well defined dorsal face of the petiole, which is separated from both the anterior and posterior face by angles. Additionally the mesosoma of *P. schultzi* is depressed at the metanotal suture and the propodeal spiracle is circular, conditions not found in the *crenata* species complex.

The worker of *P. schultzi* is similar to that of *P. venusta*, which is of approximately the same size and color. The worker of *P. schultzi* can be easily separated from that of *P. venusta* by the shape of the petiole (apex rounded in *P. venusta*) and the horizontal striae that cover the mesopleuron (the mesopleura of *P. venusta*, as well as the other closely related species, *P. concava* are smooth and glossy). *Pachycondyla schultzi* can be separated from the closely related *P. concava* as it lacks the concave anterior face of the postpetiole. Additionally the anterior medial margin of the clypeus of *P. schultzi* is concave, not angulate as in *P. concava*.

It is difficult to place *P. schultzi* in a species complex. It has several characteristics of the *crenata* species complex, including the malar carina and the carina on the pronotal

shoulder. On the other hand the concave anterior medial margin of the clypeus, the deep constriction of the



Map 79. *Pachycondyla schultzi*.

metanotal suture on the dorsum of the mesosoma and the thickened, ventrally convex subpetiolar process, suggest that it may be related to *P. constricta*. It together with *P. venusta* and *P. concava* apparently form a link bet-

ween the *constricta*, *emiliae* and *crenata* species complexes. *Pachycondyla schultzi* and the others will all be placed in the *emiliae* species complex until they are better known.

DISTRIBUTION

Collected from an unknown locality in Brasil. A worker in the MCZC was collected in BRASIL: *Espirito Santo* (Santa Teresa).

HABITAT

Unknown.

BIOLOGY

The holotype was on a *Bromelia*.

ETYMOLOGY

Named in honor of Dr. Ted Schultz, who has helped us in our taxonomic work and loaned us the holdings of *Pachycondyla* in the USNM, including the holotype.

TYPE SERIES

Holotype worker (USNM), Brazil, x-9-39, Lot 39-16201, EQA 67065.

Pachycondyla solisi new species

Figures - **Worker**: 113 (clypeus), 253 (head), 635 (side view, top views of pronotum, mesonotum and petiole), 636 (metasternal process); **Female**: 637 (side view), 638 (head); **Map** 80

foetida species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *moderately large* (total length 13 mm) *black* ant. The mandibles have approximately 12 teeth, some of which are poorly defined. The head is 3.15 mm long and 3.0 mm wide. The sides of the head are convex and rounded and narrowed anteriorly. The posterior border of the head is concave. The anterior border of the clypeus is broadly convex but slightly concave medially. The *eye is large* (maximum diameter 0.9 mm) located about one diameter from the anterior margin of the head (side view). The *malar carina is well developed* but only extends about $\frac{2}{3}$ of the length to the eye. The scape (3.0 mm) extends about two funicular segments past the posterior lateral corner. The *pronotal carina is sharp* and well developed and overhangs the side of the pronotum and forms an angle on the dorsum of the mesosoma. The *metanotal suture is depressed* on the dorsum of the mesosoma and breaks the sculpture. The *propodeal spiracle*

is slit-shaped; the posterior lateral edges of the propodeum form a carina which is slightly crenulated. The *anterior face of the petiole is nearly straight and vertical and meets the broadly rounded posterior face near the anterior edge of the apex*. The subpetiolar process is poorly developed. The *stridulatory file is developed* on the second pretergite; the arolia are poorly developed. The metasternal process consists of two broad lobes.

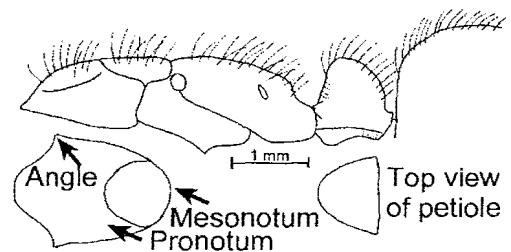


Fig. 635. Mesosoma and petiole of the holotype worker of *P. solisi*. The insets show the pronotum and mesonotum, as well as the petiole, as seen from above.

Long (1 mm) erect hairs are present on the clypeus and the gaster,

shorter (0.2 - 0.7 mm) erect hairs are present on the dorsal and ventral surfaces of the head, sides of the head, posterior margin, on the scapes, the dorsum of the mesosoma, dorsum of the petiole, all surfaces of the gaster and legs. Appressed pubescence is present on the head, dorsum of the mesosoma, sides of the propodeum and all surfaces of the gaster.



Fig. 636. Metasternal process of a worker of *P. solisi* (Pará, Brasil, CWEM), as seen from behind.

The mandibles are striate with scattered punctures and weakly shining, the dorsum of the head has longitudinal striae. The dorsum of the mesosoma has poorly developed striae, the sides of the mesosoma have weak striae and are moderately shining. The anterior face of the petiole has striae, the sides and posterior face are nearly free of sculpture and most of the petiole is smooth and glossy. The gaster is finely but densely punctate and weakly shining.

Female

The female is a *relatively large* (total length 18 mm) *black* ant with reddish brown appendages. The mandible has about 11 teeth, the basalmost teeth are poorly defined.

The anterior border of the clypeus is weakly convex and slightly concave medially. The head length is 3.76 mm; the head width is 3.58 mm. The head is narrowed anteriorly and strongly concave posteriorly. The *malar carina* is well developed and extends about $\frac{2}{3}$ of the distance to the eye. The *eye* is large (maximum diameter 1.11 mm) located about one diameter from the anterior margin of the head (side view). The scape (3.36 mm) extends about the length of the first funicular segment past posterior lateral corner of the head. The median ocellus is 0.14 mm in diameter, located nearly two diameters from the lateral ocellus (oblique view from the side and above). The *pronotal carina* is sharp and well developed and overhangs the side of the pronotum. The *propodeal spiracle* is slit-shaped. The *petiole* is thick when viewed in profile with a *straight anterior face* and a *broadly rounded posterior face*, which meets the anterior face at the anterior edge. The subpetiolar process consists of a broad blunt anterior lobe, followed by a straight posterior process, which gradually diminishes in width. The anterior face of the postpetiole is vertical and rounds into the dorsal face.

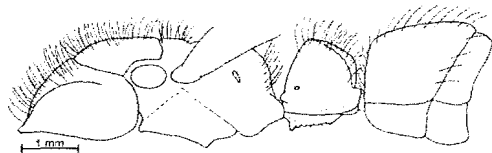


Fig. 637. Mesosoma, petiole and first gastral tergite of the paratype female of *P. solisi*.

Erect hairs are similar to those of the worker and are present on the same surfaces; the golden appressed pubescence is similar to that of the worker.

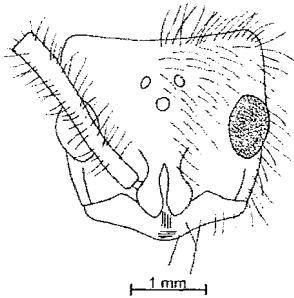


Fig. 638. Head of the paratype female of *P. solisi*.

The dorsum of the head is covered with striae, which diverge posteriorly, the dorsum of the mesosoma is mostly punctate and moderately shining, the side of the pronotum is coriaceous and shining, the anepisternum is finely striate, the katepisternum is coriaceous, both surfaces are shining. The side of the propodeum is moderately shining. Most surfaces of the petiole are glossy and shining with a few transverse striae on the anterior face. The gaster is finely punctate and moderately shining.

Male

Unknown.

COMPARISON

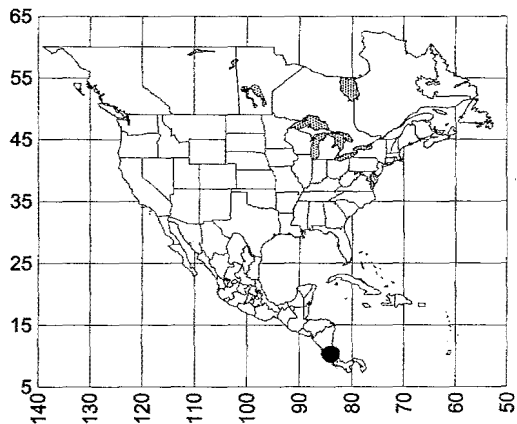
Pachycondyla solisi could be confused with *P. chyzeri*, but can be separated as the eyes are placed in the middle of the side of the head (more

anteriorly in *P. chyzeri*), has a partially developed malar carina (completely lacking in *P. chyzeri*), having the highest point of the petiole near the anterior face (in the middle of the apex in *P. chyzeri*) and having the posterior face of the petiole completely smooth and glossy (weakly punctate in *P. chyzeri*).

Pachycondyla solisi is similar to *P. lineaticeps*, but can be easily separated as the posterior face of the petiole of *P. solisi* is smooth and glossy, not rugulose as in *P. lineaticeps* (thanks to Jack Longino for pointing this out).

DISTRIBUTION

Known only from the Braulio Carrillo National Park in the state of Heredia, COSTA RICA.



Map 80. *Pachycondyla solisi*.

HABITAT

Unknown.

BIOLOGY

Unknown.

TYPE SERIES

Holotype worker (INBio # CR1000312327), one paratype worker (CWEM # CR1000312343) and one paratype winged female (INBio # CR1000312328), Est. El Ceibo, P. N. Braulio Carrillo, 400-600m, Prov. Here. COSTA RICA, C. Chaves, Feb 1990.

ETYMOLOGY

This species is named in honor of our friend, the Costa Rican myrmecologist, Manuel Solís of the Institute for Biodiversity, who loaned us the type series as well as many other interesting ants.

Pachycondyla stigma (Fabricius)

Figures - **Worker**: 3 (palps), 15 (larva head), 24, 26, 139 (tibia), 25, 140 (mandible), 129 (metasternal process), 136 (larva), 137 (clypeus), 173 (head), 174 (petiole and postpetiole), 639 (side view); **Female**: 135 (metasternal process), 640 (head and mandible), 641 (petiole); **Male**: 135 (metasternal process), 325 (side view), 641 (petiole), 642 (head); **Map** 81

stigma species complex

Formica stigma Fabricius, 1804:400, ♀, South America; Roger, 1860: 285-286 ♀ (*P. quadridentatus*); Roger, 1862:288-289; *Ponera stigma*: Mayr, 1863:450; Emery, 1894b:49; Forel, 1899:15; *Pachycondyla* (*Pseudoponera*) *stigma*: Emery, 1900b:314; Emery, 1901a:46; *Pseudoponera stigma*: Forel, 1901c:398, Fig. c (leg); *Euponera* (*Pseudoponera*) *stigma*: Forel, 1908:37; Santschi, 1913:35; *Euponera* (*Trachymesopus*) *stigma*: Emery, 1911:85; Forel, 1912:39; Wheeler, 1913:481; Wheeler and Mann, 1914:13; Mann, 1916:415; Smith, 1934:563-564; Wheeler and Wheeler, 1952:627-628, larva. *Trachymesopus stigma*: Wilson, 1958:355; *Mesoponera stigma*: Wheeler and Wheeler, 1976: 55-58; *Pachycondyla stigma*: Bolton, 1995:310

Ponera americana Mayr, 1862:722 ♀, Colombia; Forel, 1899:16 (synonymy by Emery, 1887:434)

Euponera (*Trachymesopus*) *brunneus* Donisthorpe, 1948:300, ♀, ♀ New Guinea (synonymy by Wilson, 1958d:355)

Euponera (*Trachymesopus*) *nixonii* Donisthorpe, 1943:441 ♀, New Guinea; Donisthorpe, 1948: 299 ♀ (synonymy by Wilson, 1958:355)

Euponera (*Trachymesopus*) *sexdentatus* Donisthorpe, 1949:746 ♀, New Guinea (synonymy by Wilson, 1958:355)

Ponera stigma var. *attrita* Forel, 1893:362-363, ♀, ♀, ♂, Antilles: Saint Vincent; Forel, 1899:16; *Pachycondyla* (*Pseudoponera*): Emery, 1901a:46; *Euponera* (*Pseudoponera*) *stigma* var. *attrita*: Forel, 1908:37; *Euponera* (*Trachymesopus*) *attrita*: Emery, 1911:85; *Trachymesopus attrita*: Kempf, 1972:251; *Pachycondyla stigma* var. *attrita*: Bolton, 1995:303 **new synonymy**

Euponera (*Trachymesopus*) *stigma* variety *rufescens* Wheeler and Mann, 1914:13, ♀, ♀, Haiti, Lago Assuei near Manneville [lectotype worker, 2 paralectotype workers, 1 paralectotype female designated, MCZC, 3 syntype workers seen, AMNH)]; *Trachymesopus stigma* variety *rufescens*: Kempf,

1972:251; *Pachycondyla stigma* var. *rufescens*: Bolton, 1995:309 **new synonymy**

DISCUSSION

Worker

The worker of this species is easily recognized as the *mandible has only 6 teeth*. Workers are *small* (total length 5 mm) *dark reddish brown with paler brown appendages*. The *eyes are tiny* (maximum diameter 0.07 mm) and located approximately two diameters from the anterior margin of the head (side view). The scapes extend to the posterior lateral corners of the head. The *dorsum of the mesosoma is nearly flat* (in profile) with the promesonotal suture weakly depressed and the *metanotal suture more strongly depressed* below the level of the mesosoma. The *side of the propodeum is depressed* near the

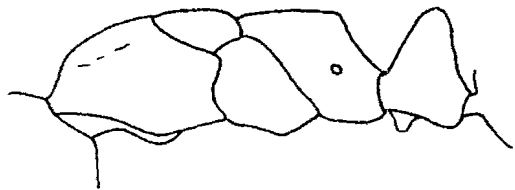


Fig. 639. Mesosoma and petiole of a worker of *P. stigma* (near Tela, Honduras, MCZC). The erect hairs are not shown.

posterior edge of the mesopleuron with the side forming a sharp edge with the posterior face of the propodeum. The *petiole is narrow* when viewed in profile with the anterior and posterior faces meeting at the apex in

a blunt angle. The *subpetiolar process is blunt and rounded* both anteriorly and posteriorly. The anterior border of the postpetiole is slightly concave and is abruptly rounded into the dorsal face.

Erect hairs are abundant on most surfaces, including the mandibles, the dorsal surface of the head, the scapes, the dorsum of the mesosoma, the legs, the petiole and all surfaces of the gaster. *Golden appressed pubescence is found on most surfaces*.

The head, mesosoma and gaster are mostly dull and covered with fine punctures, the *mandibles are striate and moderately shining*.

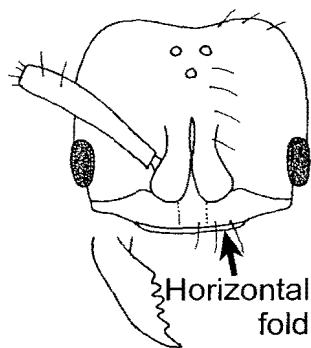


Fig. 640. Head and mandible of a female of *P. stigma* (Orange Walk, Belize, CWEM), showing a front view of the right mandible.

Female

The *female is similar to the worker*, except *slightly larger* (about 7 mm total length) with well-developed ocelli and the mesosoma adapted for

flight. The *mandible has 6 well-developed teeth* and the *clypeus is separated into two sections horizontally by a horizontal fold*. The *eyes are relatively large* (maximum diameter 0.36 mm) located about one third of the maximum diameter from the anterior border of the head (side view). The *scapes extend slightly past the posterior lateral corner*. The *petiole is similar in shape to that of the worker* and the subpetiolar process is rounded both anteriorly and posteriorly.

Erect hairs are present on the mandibles, clypeus, shaft of the scape, posterior margin of the head, dorsal and ventral surfaces of the head, mesosoma, petiole and gaster. The legs have few erect and suberect hairs. Most surfaces are covered with a fine dense golden pubescence, which is slightly raised from the surface.

The mandibles are smooth and glossy with fine striae and scattered punctures, the remainder of the surfaces are dull and finely punctate, the gaster is weakly shining.

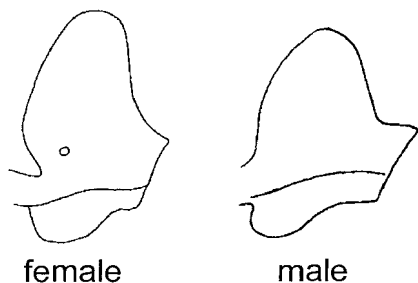


Fig. 641. Petioles of a female (Ennery, Haiti, MCZC) and male (Bonacca Island, Honduras, MCZC) of *P. stigma*.

Male

The male (undescribed) is *small* (total length about 5 - 6 millimeters). The mandibles are very tiny and mostly hidden when closed. The *horizontal carina on the clypeus is barely developed*. The *eyes are intermediate in size* (maximum length 0.45 mm) located about $\frac{1}{5}$ of the maximum diameter from the anterior border of the head (side view). The scape is short (0.15 mm) and the pedicel is even shorter (0.05 mm). The *ocelli are well developed*. The petiole and the subpetiolar process are similar to those of the worker.

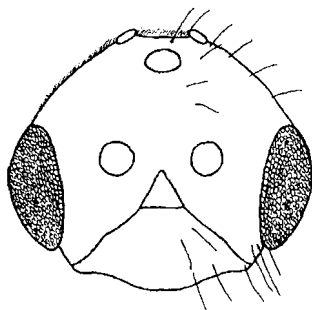


Fig. 642. Head of a male of *P. stigma* (Orange Walk, Belize, CWEM).

Erect and suberect hairs are present on the clypeus, sides of the heads, posterior margin, dorsal and ventral surfaces of the head, mesosoma, petiole and all surfaces of the gaster; there are few erect or suberect hairs on the legs. Fine golden appressed pubescence is present on most surfaces, but is very sparse as compared to the female.

Most surfaces are covered with coriaceous sculpture, but many regions are at least moderately shining, especially the side of the mesosoma, petiole and gaster.

COMPARISON

The worker and female of *P. stigma* are difficult to confuse with any of the other species of the genus *Pachycondyla*, based on the small number of mandibular teeth and broadly rounded subpetiolar process and the poorly developed horizontal carina on the clypeus.

Pachycondyla stigma is similar to *P. succedanea*. Workers of *P. stigma* can be separated as they are slightly larger (total length > 4 mm, 4 mm or less in *P. succedanea*), the horizontal carina on the clypeus is poorly developed (well-developed and formed into a sharp carina in *P. succedanea*) and the subpetiolar process is broadly rounded posteriorly (angulate in *P. succedanea*). The females and males of *P. stigma* can also be distinguished from those of *P. succedanea* by the lack of an angle on the posterior edge of the subpetiolar process. *Pachycondyla succedanea* has the subpetiolar process angulate posteriorly, it is mostly restricted to Costa Rica, and the female has seven mandibular teeth.

Pachycondyla stigma can be distinguished from another closely related species, *P. cognata*, as the latter species has seven mandibular teeth, the subpetiolar process is angulate posteriorly and *P. cognata* is mostly restricted to Costa Rica.

Pachycondyla stigma is very similar to *P. gilberti*. The workers and females of both species have 6 mandibular teeth and the subpetiolar process is rounded posteriorly. They can be easily separated as the horizontal carina is well developed on the clypeus of workers and females of *P. gilberti*; it is nearly absent in workers and females of *P. stigma*. The males are difficult to separate. Those of *P. gilberti* tend to be smaller (total length 3.5 - 5 mm) and medium brown, those of *P. stigma* larger (TL 5 - 6 mm) and dark brown. Kempf (1960a) separated *P. gilberti* from *P. stigma* using a number of characteristics, especially the form of the mandibles of the female, which are not elongated as in *P. stigma* and are more worker-like.

The male of *P. stigma* is nearly identical to that of *P. arhuaca*. It differs in being slightly more hairy, specifically with erect or suberect hairs between the eye and the clypeus and on the scutum. The apex of the petiole is more angulate in *P. arhuaca* than it is in *P. stigma*.

All of the above mentioned species are very similar to members of the genus *Hypoponera*. They can all be separated by the presence of a pair of tibial spurs on the posterior tibia; only one spur is present in members of *Hypoponera*. The mandibular teeth of the worker and female of *Pachycondyla* are well developed, not consisting of only small denticles as in workers and females of *Hypoponera*.

There is considerable variability in *P. stigma*. Wheeler and Mann

(1914) referred to smaller (total length 3.5 - 4.5), red specimens from Haiti as *Euponera (Trachymesopus) stigma* var. *rufescens*. Wheeler and Mann (1914) state that the workers could not be callows, as the callows of *P. stigma* have a drab color. Examination of the type material (MCZC) suggests it does not differ from *P. stigma* significantly and it is considered a synonym. Forel (1893) recognized *P. stigma* var. *attrita* from St. Vincent Island as a separate taxon. It differs primarily in its larger size (6 - 6.2 mm). Forel lists additional characters, including the denser sculpture and duller integument, longer, narrower mandibles, with the concave external border. He states that these characters are not consistent and that intermediates were found. It is thus also considered to be a synonym of *P. stigma*.

DISTRIBUTION

(New World only). UNITED STATES: *Florida*: (Avon Park and Lake Worth [Smith, 1934], Lake Worth, Archbold Biological Station, Sarasota, West Palm Beach, Tamismi Trail). Deyrup et al. (1989) list the counties of Broward, Collier, Dade, Highlands, Lee, Martin, Monroe, Palm, Beach and Sarasota. BAHAMAS: Andros Island, Nassau. MEXICO: *Tamaulipas* (Sótano de Gómez Farías [3 k ESE Gómez Farías, Reddell and Cokendolpher, 2001]); *San Luis Potosí* (Río Amahac [Anahuac?], Tamazunchale, 7 mi S Ciudad Valles, Cueva de San Pedro [4 k N Tlamaya, Reddell and Cokendolpher, 2001], Cueva Tepametl [3 k

NE Tlamaya, Reddell and Cokendolpher, 2001], Sótano de Tlamaya [2.5 k NNW Xititla, Reddell and Cokendolpher, 2001]); *Jalisco* (south slope Nevado de Colima, Estación Biológica Chamela, Santa Cruz Island [Graciosa Bay]); *Nayarit* (54 k S Rosamorada); *Veracruz* (Tezonapa, Pueblo Nuevo, 10 k N Cárdenas, near Tezonapa, Pueblo Nuevo, Los Tuxtlas [Quiroz and Valenzuela, 2003]); *Tabasco* (6 mi N Cárdenas, 3 k SE Teapa, 5 k W Las Flores); *Guerrero* (Atoyac de Alvarez); *Tabasco* (Teapa [Río Puyacatengo], Tenosique); *Chiapas* (Tuxtla Chico, 10 k S Palenque, 8 k SW El Jacote). BELIZE: *Toledo* (3.4 mi N San José); *Orange Walk* (Lamanai); *Cayo* (near Teakettle Bank); *Belize* (Manatee). GUATEMALA: *Petén* (Estación Biológica Las Guacamayas, Parque Nacional Tikal); *Alta Vera Paz* (Estación Biológica Lechua, Trece Aguas); *Izabal* (Parque Arqueológico Quiriguá); *Sololá* (Patulul); *Suchitepéquez* (12.3 k N Patulul); *Escuintla* (Nueva Concepción [Las Mercedes, Forel, 1899]). EL SALVADOR: *La Libertad*, *San Salvador* (hills between Apopa and Nejapa); *Sonsonate* (Sonsonate); *Usulután* (Usulután, 3 k E Usulután); *La Soledad* (Barra de Santiago). HONDURAS: *Atlántida* (near Tela, Lancetilla [near Tela], 14 k S La Ceiba, west of La Ceiba); *Yoro* (Subirana, La Fraqua Farm); *Isla de la Bahía* (Bonacca Island). NICARAGUA: state unknown (El Recreo [locality in four different states]); *Granada* (4.3 mi SW San Jorge); *Río San Juan* (5.1 mi SE El Castillo

[Bartola)]. COSTA RICA: *Guana-caste* (9.5 k NW La Cueva, Bagaces, 13.5 k SW Bagaces [Lomas Barbudal Reserve], Monteverde, 24 k NW Cañas); *Alajuela* (Peñas Blancas, near San Mateo [Forel, 1908]); *Limón* (Zent, Port Limón, near Siquirres); *Cartago* (3-5 k E Turrialba); *Puntarenas* (Monteverde, Golfito, Las Cruces, Carara, Parque Nacional Corcovado [Sirena, Llorona], Manuel Antonio National Park, Reserva Biológica Carara, 4 mi W Villa Neily, 27 k N & 8 k W San Ramón); *Heredia* (Estación Biológica La Selva, Guápiles, near Guápiles); *San José* (20 k S San Carlos); unknown state (Manglares [Forel, 1908]). COCOS ISLAND (Costa Rica): without locality. PANAMA: *Panamá* (Barro Colorado Island, Canal area, Corozal, Summit, Cerro Campana, Cerro Galera, El Llano-Cartí Rd. [km. 8.4], Parque Soberanía, Gamboa, 8 k N El Llano); *Colón* (3 mi W Colón, 5 k NE Piña Rina Road, Fort Sherman, Old Gamboa Road, Monte Lirio, Soberanía National Park near Gamboa, Soberanía National Park - Río Frijolito, Soberanía National Park - Pipeline Road, Soberanía National Park - NW Río Hased, Santa Rita Ridge, Bugaba [Forel, 1899]); *San Blas* (El Llano-Cartí Road); states unknown (Pelón Road, Quebrada Juan Grande, San Cristóbal [locality in six different states]); *Colón* (Cuipo [= Quipo]); *Darién* (Estación Peresinico, Caña Station, Serrania de Pine). COLOMBIA: *Chocó* (Parque Nacional Enseñada de Utría, Río Napiti); *Magdalena* (Río Frio, Sierra Nevada

de Santa Marta [Forel, 1912]); *Guajira* (Don Diego, Quebrada Guacoche near Don Diego, Río Don Diego, Dibulla [Forel, 1912], Serrania de Macuira); *Antioquia* (Turbo); *Chocó* (10 k SW San José del Palmar); *Santander* (Fundación); *Valle del Cauca* (Buenaventura, 12 mi E Buenaventura, 3.2 k E Río Agua Clara); *Meta* (Villavicencio); *Tolima* (Melgar); *Caquetá* (Florencia); *Amazonas* (Parque Nacional Cahuinari); *Nariño* (18 mi SE Mocoa). Baena (1993) reports it from *Cauca* (Isla Gorgona). ECUADOR: *Esmeraldas* (Santo Domingo de los Colorados [Santschi, 1913], 13.5 k NW Santo Domingo de los Colorados, 11 k SE San Lorenzo [La Chiquita], 10.7 k S Esmeraldas, Quinde); *Pichincha* (Endesa Forest, 13.5 k NW Santo Domingo de los Colorados, 25.9 k N Jivino Verde); *Imbabura* (Urcuquí); *Los Rios* (47 k S Santo Domingo [Río Palenque], 19k WSW Mocache, Jauneche [14 k WSW Mocache]); *Guayas* (Balao Chico, 60 k S Guayaquil, 3 k SW Bucay); *Napo* (Limón Cocha, 20 k S Tena, near Dureno); *Sucumbíos* (Bioque, Shushufindi, Limón Cocha Biological Reserve). PERU: *Pichilingue* (Los Rios); *Huánuco* (Tingo Maria, Monsón Valley); *Pasco* (Pan de Azúcar); *Loreto* (Yanamono Lodge); *Madre de Dios* (15 k E Puerto Maldonado, 15 k NE Puerto Maldonado, near Puerto Maldonado); *Yurac* (67 mi E Tingo Maria). VENEZUELA: *Aragua* (Rancho Grande); *Distrito Federal* (Chuspa); *Amazonas* (3 k N San Carlos de Río Negro, Río Mavaca

Camp, Las Culebras, Culebra); *Cojedes* (San Carlos, Cojedes); *Bolívar* (Canaima). TRINIDAD: *Mayaro* (Mayaro Bay, Maracas Valley, Guayaguayare Bay); *Nariva* (Nariva Swamp, Northern Range); *Port of Spain* (Port of Spain); *Saint Andrew* (Cumuto); state unknown (Mt. Tucuhrt). FRENCH GUIANA: *Cayenne* (45 k W Karou, 10 k W Sinnamary). SURINAME: *Kerie* (King Fred William IV Falls); *Comewyne* (Meerzorg); *Sipaliwini* (Rallen-Voltzberg Reserve, Raleigh); state unknown (Vank). GUYANA: *Cuyuni-Mazaruni* (Kartabo, Camaria, Bartica, Kalacoon, Oko River, Kamakusa, Orinoco River); *Essequibo* (Essequibo); *Dememera -Mahaica* (Kaieteur); *Siparuni* (Tukeit); *Potaro-Siparuni* (Hoori Creek); *Kerie* (Courantyne River); state unknown (Cuyuni River). BRASIL: *Amazonas* (Benjamin Constant, Itacoatiara, Manaus, north of Manaus, 66 k N Manaus; Rio Tarumã, Ilha de Curari-Várzea); *Amapá* (Serra do Navio & Amapari [Kempf, 1960a]); *Rondônia* (Porto Velho, Rio Madeira, Abuná [Mann, 1916], Camps 39 and 41 [Madeira-Mamoré Railroad - Mann, 1916]); *Pará* (Utinga, Concelção do Araguaia, Belém, near Belém, 12 W Belém, 30 k S Belém, Tucurul, Pirelli Plantation, Conceição do Araguaia, Ben Fica, Icoaraci, Manaus [Mann, 1916]), Rio Cuminá & Jacareacanga [Kempf, 1960a]); *Goiás* (La Selva Caraguata-tuba, Campinas & Aragarças [Kempf, 1960a]); *Pernambuco* (Recife & Tapera [Kempf, 1960a]); *Mato Grosso* (Diamantino, Rio Papagaio, Rio Sacre,

Faz. Sta. Blanca, Rondonopolis & Poconé [Kempf, 1960a]); *São Paulo*: (São Paulo, Mogi-Guaçu, Agudos & São José do Rio Preto [Kempf, 1960a]). PARAGUAY: *Canindeyú* (La Selva Mbaracayú, Jejuimi); *Cordillera* (San Bernardino [Forel, 1906]). Wild (2002) additionally lists *Amambay* (Parque Nacional Cerro Corá); *Cordillera* (Caacupé); *Guairá* (Roque González); *Itapúa* (El Tirol); *Misiones* (Est. Ñu Porá); *Paraguari* (Parque Nacional Ybycuí); *San Pedro* (General Resquín, Tapiracuai Loma). ARGENTINA: *Formosa* (Ing. Juárez [Kempf, 1960a]). CUBA: *Santiago de Cuba* (Gran Piedra, S side of Pico Turquino); *Pinar del Río* (Bolondrón); *Cienfuegos* (Cienfuegos, Soledad, Central Jaronú, Pico Turquino, San Blas; Mina Carlota [Smith, 1934], 7 k N Los Piñales, Central (Jaronú); Ciénaga de Zapata); *Santa Clara* (San Juan Mountains); Gran Piedra; (Trinidad Mountains). JAMAICA: (Chinchona, path to Cunacuna); *Saint Mary Parish* (Oracabessa); West Mor [Auchindown, Scott's Cove]). HAITI: (Northeast Foothills, La Hotte, Grande Rivière, La Visite, Ennery, Diquini, Petionville, St. Marc, Bituini). DOMINICAN REPUBLIC: *Villa* (Alta Gracia); *La Altagracia* (Higüey to Nisibón [km 49]), *Santiago* (south of Santiago); *Barahona* (2 k N Polo); *La Vega* (Casabito Forest, Constanza, Jarabacoa); *Santiago* (foothills of the Cordillera Central south of Santiago). GRENADA: without locality. SAINT JOHN ISLAND: without locality; VIRGIN ISLANDS (Tortola Island [Mt. Sage]). MARTINIQUE (7 k SE

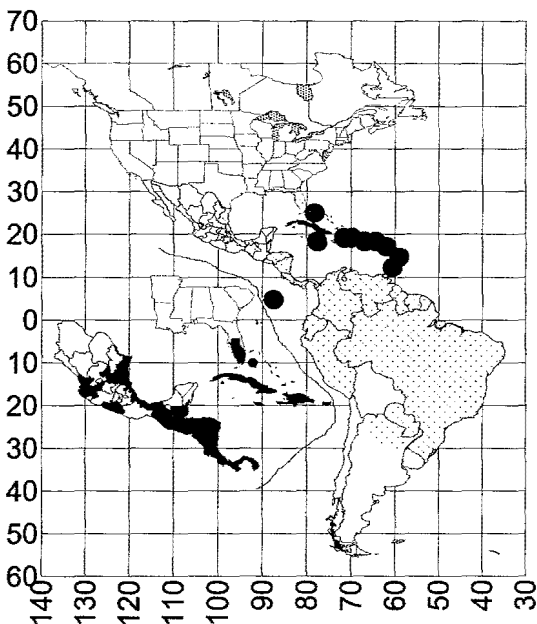
Jen. DI& N-3). PUERTO RICO: (Arecibo, El Yunque [Campamiento Elisa Goldberg], Mayaguez, Utuado, San Lorenzo); CULEBRA ISLAND [Wolcott, 1936]), SAINT THOMAS ISLAND. GUANA ISLAND (Long Lake Man's Point). *Pachycondyla stigma* var. *rufescens* was reported from the shore of Assuey at Manneville, Haiti. SAINT VINCENT ISLAND (Bowwood Valley, near Kingston [Forel, 1893]). SAINT JOHN ISLAND: without locality. Country unknown: San José Mindoro.

forest, at the edge of a lake, forest patch, grass with weeds and scattered trees, dry evergreen forest, primary and secondary growth rain forest, transition between tierra firme and seasonal flooded forest, in a clearing in secondary forest, a steep forest ravine slope, a wet quebrada, evergreen tropical forest, moist live oak/pine forest 10 - 15 m tall, at elevations ranging from 0 - 2300 m. One collection from México was found at 3400 m (MCZC). It is often found nesting in the shade. This species was found apparently accidentally in a cave (Reddell and Cokendolpher, 2001).

Longino (website) states that it is common in wet lowland habitats in Costa Rica, including mangroves and is usually found in open or disturbed sites, as well as banana plantations and mature rain forest.

BIOLOGY

Nests are found in the soil, often under litter, or rotten logs, in rotten wood, under bark, in a well rotted *Nasutitermes* termite nest on the forest floor and occasionally in twigs. They nest in moist sand. They are also collected under flower litter, in forest litter, in dead stems and in rotten pine branches on forest floor. Brood was present in nests in July (Belize, Guatemala, Nicaragua, Ecuador) and August (Costa Rica). Winged females and males were collected in nests in January (Ecuador), February (Costa Rica, Venezuela, Brasil), March (Colombia, Perú, Jamaica), April, August (México), May (Panamá,



Map 81. *Pachycondyla stigma*.

HABITAT

This common species is found in a variety of habitats, ranging from grasslands (Quiroz-Robledo and Valenzuela-González, 1995), disturbed rain forest in a park, wet lowland

Martinique), July (Guatemala, Costa Rica, Panamá, Perú), August (Panamá, Jamaica), September (Honduras), October (Perú, Venezuela, Paraguay, Guana Island) and December (México, Honduras). The sexuals are attracted to blacklights and mercury vapor lamps. Alate females were collected March (Costa Rica, Colombia), June and July (Perú), July (Costa Rica, Ecuador), July and August (México, Brasil) and October (Guano Island). Dealate females have been collected in May (Ecuador), June (México), July (Guatemala, Nicaragua), August (Costa Rica) and September (Guatemala). A colony-founding queen was found in a large rotten log in January (Costa Rica) and a female was collected under bark in June. Mating flights occur between 07:30 and 11:30.

Workers are predaceous (Maes, 1989) and are common in extractions of sifted leaf litter rotten wood and are attracted to subterranean baits.

The specimens from French Guiana were nesting in the plant *Phyllodendron linnei*. Specimens were collected on flowers of *Eupatorium* sp. [Asteraceae].

The frog *Dendrobates bistrionicus* eats this species.

Behavior.

Oliveira et al. (1998) discuss the division of labor in this species, with emphasis on the mutual antennal rubbing that occurs between nestmates. They are not rapid ants and escape when the nest is disturbed. Although they are small, they can sting.

ETYMOLOGY

The name of this species is based on the Greek word *stigma*, meaning mark or spot, possibly referring to the stigma on the wing of the female.

Pachycondyla striata F. Smith

Figures - **Worker**: 57 (larva), 59 (pronotum, top view), 60, 247, 643 (head), 217 (mesosoma), 244 (pronotum, side view), 245(pygidium), 644 (metasternal process); **Female**: 645 (side view), 646 (head), 647 (forewing), 648 (pygidium), 649 (petiole); **Male**: 298 (side view), 299 (tibia), 650 (head); **Map** 82

crassinoda species complex

Pachycondyla striata Smith, 1858:106, ♀, Brasil, Rio de Janeiro (= Guanabara), Rio de Janeiro [2 syntype workers seen, BMNH]; Roger, 1861a:6, ♀; Mayr, 1863:439; Santschi, 1921:86-87 ♂; larvae, Wheeler and Wheeler, 1952, 616; 1964:452; Kempf, 1961:201-203; *Pachycondyla (Pachycondyla) striata*: Emery, 1901a:45; Eidmann, 1936:34-35

Pachycondyla striata variety *nitidiventris* Santschi, 1921:87, ♀, Uruguay, Nueva Helvetia; Brasil, Mato Grosso, frontier with Bolivia [4 cotypes seen, NHMB] (synonymy by Kempf, 1961:201)

DISCUSSION

Worker

The worker is a relatively *large* (total length about 13 mm) *dark brown* specimen with lighter brown appendages. The mandibles have about 12 teeth. The anterior medial border of the clypeus is slightly concave, the *eyes are moderately large* (0.58 mm maximum diameter) located approximately one diameter from the anterior edge of the head (side view). The *malar carina is absent*. The *scape extends past the posterior lateral corner* of the head. The posterior margin of the head is concave. The *pronotal carina is well developed* and sharp and slightly overhangs the side of the pronotum (similar to that

of *P. villosa*). The *metanotal suture is not marked* on the dorsum of the mesosoma. The dorsal face of the propodeum slopes broadly into the

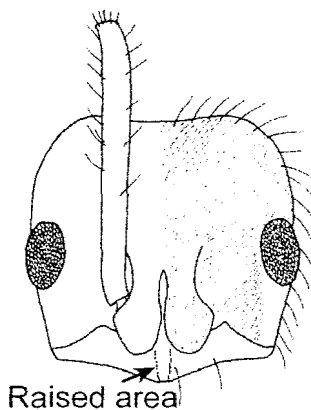


Fig. 643. Head of a worker of *P. striata* (Tingo Maria, Perú, MCZC).

striata southern Brasil, Bolivia south to Argentina

posterior face, the *propodeal spiracle* is *slit-shaped*. The *petiole* is *thick* when viewed in profile and *rectangular-shaped*. The anterior face of the postpetiole is vertical and sharply bends into the dorsal face, nearly forming an angle. The dorsal face of the pygidium is concave, as in *P. impressa*.

Erect hairs are present on most surfaces, including the clypeus, dorsal and ventral surfaces of the head, sides of the head, *scapes*, dorsum of the mesosoma, legs, including the tibiae, dorsal surface of the petiole and all surfaces of the gaster; appressed golden pubescence is sparse on most surfaces except the gaster, where it is moderately dense.



Fig. 644. Metasternal process of a worker of *P. striata* (São Paulo, Brasil, CWEM), as seen from behind.

The *dorsum of the head* is mostly *finely striate longitudinally*; the striae are poorly developed on the sides of the head, but *striae are present on the side of the mesosoma as well as the dorsum*. The side of the petiole is nearly without striae; the dorsum of the petiole has mostly transverse very fine striae. The gaster is mostly punctate.

striata southern Brasil, Bolivia south to Argentina

Female

The female is *similar to the worker* in *lacking the malar carina*, having *relatively large eyes*, a *well-developed carina on the pronotal shoulder* and a similar shaped petiole. It is a large (total length 15 mm) black specimen with brown legs.

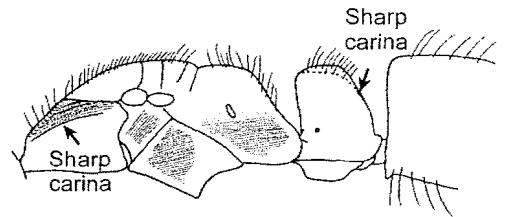


Fig. 645. Mesosoma and petiole of a female of *P. striata* (São Paulo, Brasil MCZC).

Erect and suberect golden hairs are abundant on the mandibles, clypeus, dorsal and ventral surfaces of the head, posterior margin, sides of the head, dorsum of the mesosoma, dorsum of the petiole, subpetiolar process and all surfaces of the gaster.

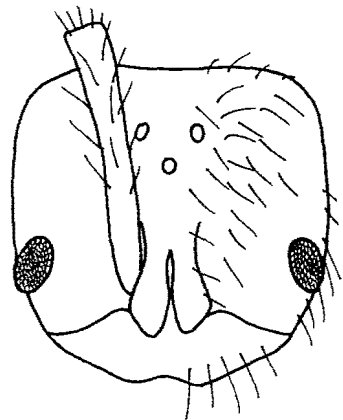


Fig. 646. Head of a female of *P. striata* (São Paulo, Brasil MCZC).

The hairs on the legs are similar and abundant but are mostly suberect. Appressed golden pubescence is dense on most surfaces, but is fine and hides little of the surface sculpturing.



Fig. 647. Left forewing of a female of *P. striata* (São Paulo, Brasil MCZC).

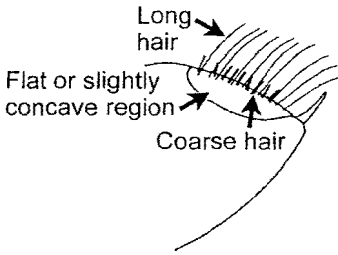


Fig. 648. Pygidium of a female of *P. striata* (São Paulo, Brasil MCZC).

The *striae* are also present on the dorsum of the head but are poorly developed, especially on the sides of the head. The *mandibles* are mostly covered with fine *striae*. The dorsum of the pronotum has numerous mostly longitudinal *striae*, the scutum and scutellum are covered with coarse longitudinal *striae*. The mesopleuron and metapleuron are covered with fine nearly horizontal *striae*; the remainder of the ant is dull and punctate.

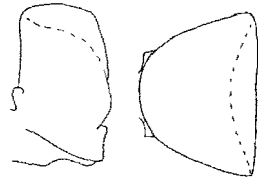


Fig. 649. Side view and top view of the petiole of a female of *P. striata* (from Kempf, 1961).

Male

The male is a *large* (total length 13 mm) *dark brown* specimen. The anterior edge of the *clypeus* is *convex to slightly concave* and the clypeus is swollen in the middle. The *eyes* are *large* and occupy approximately one half of the side of the head. The *ocelli* are *small* (maximum diameter of the median ocellus 0.12 mm), the median ocellus is located 0.2 mm from the lateral ocellus, which is greater than the diameter as the median ocellus.

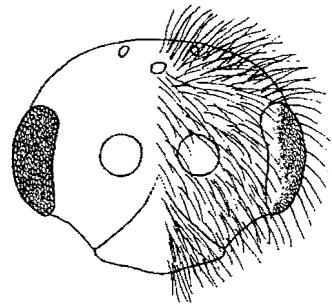


Fig. 650. Head of a male of *P. striata* (Santa Catarina, Brasil).

The *pronotal shoulder* is swollen and forms a raised area, which is broadly rounded. The *propodeal spiracle* is *slit-shaped*. The *petiole* is *thick* when viewed in profile with the

two faces converging dorsally and forming a rounded apex. The subpetiolar process is angulate anteriorly and gradually diminishes posteriorly.

Coarse erect hairs are extremely abundant on all surfaces, especially the head, the mesosoma and petiole. Fine appressed golden pubescence is also abundant on most surfaces.

The head of the male is punctate or coriaceous, as is the mesosoma and the petiole, the gaster is finely punctate, most surfaces are dull, the mesosoma is weakly shining, as is the petiole, the gaster slightly more shining.

COMPARISON

There are several species of New World *Pachycondyla* in which the workers and females have conspicuous striae on the dorsum of the head, including *P. tarsata*, *P. fuscoatra*, *P. lineaticeps*, *P. magnifica* and *P. striata*. *Pachycondyla striata* can be easily separated from *P. tarsata*, as it lacks the inner claw on the tarsal claws and the swellings on the upper anterior region of the postpetiole, both of which are present in *P. tarsata*. *Pachycondyla striata* differs from *P. lineaticeps* in the shape of the petiole, which is nearly rectangular, not with the posterior face broadly rounded into the dorsal face. Additionally *P. striata* is much larger (total length of *P. lineaticeps* 10 mm). *Pachycondyla striata* can also be separated as it occurs mostly in southern South America, not Central America and northern South America as does *P. lineaticeps*. The striae on

the head and dorsum of the pronotum of *P. striata* are not as coarse and well defined as they are in *P. magnifica*. *Pachycondyla striata* has approximately 50 striae across the widest point of the pronotum, whereas *P. magnifica* has about 35. *Pachycondyla striata* could be easily confused with *P. fuscoatra*. It differs in having a well-developed pronotal carina (lacking in *P. fuscoatra*) and the stria on the head are finer and not as well defined. *Pachycondyla striata* can be confused with *P. impressa*, but differs in that *P. impressa* lacks the striae on the head and lacks a well-developed carina on the pronotal shoulder. Otherwise they are very similar.

The males of three common species are very similar: *P. striata*, *P. impressa* and *P. villosa*. *Pachycondyla striata* can be separated from the other two by the presence of dense erect hairs on most of the surfaces (sparse or only moderately abundant in the other two species). The subpetiolar process of *P. striata* is angulate anteriorly, not broadly rounded as in *P. impressa*, or with a large ventral process in *P. villosa*.

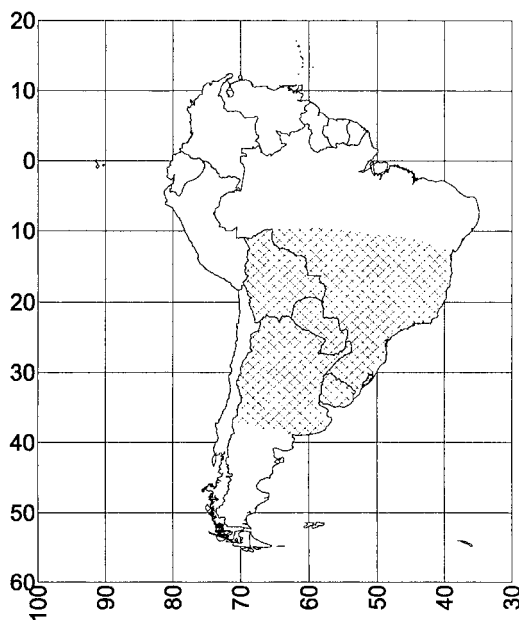
DISTRIBUTION

BRASIL *Espírito Santo* (Santa Tereza); *Minas Gerais* (3 k N Careaçú, Carmo da Cachieira, Mariana, Monsenhor Paulo, Ouro Fino, Passa Quatro, Viçosa); *Mato Grosso* (frontier with Bolivia [Santschi, 1921]); *Paraná* (Arapongas, Curitiba, Rio Negro, Rolandia, São Roque, Castro, Vila Velha Park, Foz do Iguazú, Rolanda); *Goiás* (Anápolis,

striata southern Brasil, Bolivia south to Argentina

Goiânia); *Distrito Federal* (Brasília [Sandoval and Zambrano, 2007]); *São Paulo* (Agudos, Barão Geraldo, Cachoeira das Emas, near Cosmópolis, Cidade Universitária de São Paulo, Forestal Caraguatatuba, Guarujá, Ilha do Cardoso, Município de Mogi das Cruzes, Piracicaba, São Paulo, Barueri, Campos do Jordão, Ferraz de Vasconcelos, Guapiara, Guaratinguetá, Itanhaém, Mairiporã, Parana-placaba, Pindamonhangaba, Rio Claro, São Bernardo do Campo, Suzano, Serra da Bocaina, Serra da Cantareira, Teodoro Sampaio, Boracéia Biological Station [M de Salesópolis], Parque Estadual Intervalas [Pizo and Oliveira, 2000]); *Rio de Janeiro* (Serra da Carioca, Rio de Janeiro [type locality], Mendes, Petrópolis, Pôrto das Caixas, Paineras, Parque Nacional Itatiaia [$22^{\circ}20'0''S$ $44^{\circ}35'0''W$]); *Rio Grande do Sul* (Torres, Rio Grande, São Leopoldo [Wheeler, 1925], Santa Maria, Nova Petrópolis, Pareci Novo, Pôrto Alegre, Três Arroios, Uruguaiana); *Santa Catarina* (Blumenau, Encano Alto, Cauna, Corupa, Florianópolis, Gaspar, Luzerna, Nova Teutônia, Rodeio, ridge above Seara). BOLIVIA: *Santa Cruz* (Caraparicito); *El Bení* (Cachuela Esperanza). PARAGUAY: *Cordillera* (San Bernardino), *Alta Paraná* (Puerto Bertoni); *Canindeyú* (Reserva Mbaracayú [Jejuimi]); *Itapúa* (El Tirol, [19.5 k NNE Encarnación]); *Paraguari* (Parque Nacional Ybycuí). ARGENTINA: *Misiones* (San Ignacio [Santschi, 1921], Iguazú National Park, 8 k NE San Androcito, Parque Provincial

Tacú Cuaré, Parque Provincial Cañadón de Profundidad, 20 k E Wanda); *Formosa* (Laishi [Santschi, 1919a]); *Entre Ríos* (Estación Sosa, Parque Nacional El Palmar); *Jujuy*: (5 mi N San Pedro, San Rafael de Jujuy, Finca Mina Aguilar); *Tucumán* (Quebrada de los Sosa, Horcomolle, Tucumán); *Salta* (Oran). Kempf (1961) also lists *Corrientes*, *Santa Fé*, *Chaco*, *Santiago del Estero*, *Santa Fé*, *Córdoba*, *San Luis* and *Catamarca*. URUGUAY: *Colonia* (Nueva Helvetia); *Maldonado* (La Sierra).



Map 82. *Pachycondyla striata*.

HABITAT

Pachycondyla striata can be found in wet myrtaceous forest, rain forest, riparian rain forest, open grassy

areas and cerrado [scrub vegetation], at sea level to 1300 meters elevation.

BIOLOGY

Pachycondyla striata nests in rotten wood, under logs, or in the soil and forages on the soil surface. Brood was collected in September (Emery, 1894a). Dealate females were collected in January (Argentina), April (Brasil), August and December (Argentina). Eidmann (1936) reports finding a loose, dealate female in September and nest founding queen with two eggs in October (southern Brasil).

Foragers collect diaspores on the forest floor (Pizo and Oliveira, 2000) and later discard the clean seeds intact on the refuse pile (Pizo and Oliveira, 2001). Foragers ignore seeds of *Croton priscus* (Euphorbiaceae), which bear a white elaiosome and are attractive to other ants (Passos and Ferreira, 1996). Seedlings of the rain forest tree *Clusia criuva* are more frequent and survivorship is higher close to nests of *P. striata* (Passos and Oliveira, 2002). The nests have higher concentrations of total nitrogen and phosphorus than random soil samples (Passos and Oliveira, 2002).

Ortiz and Camargo-Mathias (2003) discuss the structure of the venom gland of *P. striata*. Volatile chemicals are found in the venom gland as well as Dufour's gland (Morgan et al., 2003). Tomotake et al. (1992) describe the mandibular glands of the workers and females. The secretions of the mandibular gland have been analyzed by Morgan et al.

(1999). Forster and Camargo (2002) discuss the morphology of the corpora allata in workers and females. This species produces foam from the tip of the gaster as a defense mechanism, as does *P. harpax*.

This species may be associated with leaf cutting ants. Eidmann (1936) found a nest-founding female with two eggs in a fungus chamber of a large nest of *Atta sexdens*. He collected another dealate female on the surface of an *Atta* nest, which suggested an experiment. He placed a female in a horizontal gypsum nest, with a choice of two chambers. One chamber was filled with soil; the other where the queen was placed remained empty. The nest was kept moist, but food was not provided. The queen began to excavate an irregular tunnel by the second day of her captivity without constructing a chamber. She began oviposition after eleven days and guarded her eggs in her mandibles, hidden in the darkest corner of the nest. The experiment shows that the female can excavate her own nest and that initially the eggs are few in number. This was reinforced by the discovery of only two eggs found in the *Atta* nest.

Tarsilister loretoensis (Coleoptera: Histeridae) are found in the nests (Reichensperger, 1936).

ETYMOLOGY

The name of this species is derived from the Latin word *stria*, meaning channel or furrow, referring to the striae on numerous parts of the body, especially the pronotum.

striata southern Brasil, Bolivia south to Argentina

Pachycondyla striatinodis Emery

Figures - **Worker**: 74 (petiole, side view), 75, 221 (tarsal claws), 222 (petiole, posterior face), 651 (head), 652 (side view), 653 (metasternal process); **Female**: 654 (side view, posterior view of petiole), 655 (head); **Map** 83

crenata species complex

Pachycondyla striatinodis Emery, 1890a:75, Costa Rica: Alajuela, Jiménez ♀, Emery, 1890b:43, 1894b:48-49 (described twice); Forel, 1899:13; *Neoponera striatinodis*: Emery, 1901a:47; *Neoponera (Neoponera) striatinodis*: Emery, 1911:72; *Pachycondyla striatinodis*: Bolton, 1995:310

Neoponera rugosinodis André, 1902:15 - 17, ♀, Perú: Huallaga, Río Mixiollo; *Pachycondyla striatinodis* var. *rugosinodis*: Emery, 1911:72; Bolton, 1995:309 **provisional synonymy**

Neoponera (Neoponera) bakeri Mann, 1916:411-412, Plate 1, Fig. 9, ♀, ♀, Brasil, Porto Velho and Rio Madeira at Porto Velho [two syntype workers seen, MCZC, 1 syntype worker seen, AMNH, 2 cotype workers seen, LACM] (synonymy by Kempf, 1960b:391)

DISCUSSION

Worker

Workers of this species are *moderately sized* (total length 9 mm) *black ants with yellowish brown appendages*. The *anterior medial border of the clypeus forms a sharp angle*, but the clypeus is without a carina. The *eye is moderate sized* (maximum diameter 0.46 mm) and is located about one diameter from the anterior border of the head (side view). The *malar carina is well developed* and sharp anterior to the eye. The *scapes extend about 1/3 length past the posterior lateral corners of*

the head. The *carina at the pronotal shoulder is very well developed*, sharp and overhangs the side of the pronotum. The *promesonotal suture is well developed*; the *metanotal suture is barely indicated*, especially on the dorsum. The propodeum is rounded between the two faces and the *spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with a *vertical anterior face and a convex and rounded posterior face, which meets the vertical face at a blunt angle*. The anterior face of the postpetiole is slightly concave and meets the dorsal face at a rounded angle. The metasternal process consists of two sharp

pointed lobes that curve inward.

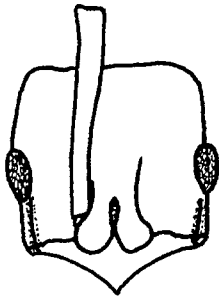


Fig. 651. Head of a worker of *P. striatinodis* (Tingo Maria, Perú, MCZC). The erect hairs are not shown.

Erect hairs are abundant on most surfaces, including the sides of the head, dorsal and ventral surfaces of the head, *shaft of the scape*, dorsum of the mesosoma, legs, dorsum of the petiole and all surfaces of the gaster. *Appressed golden pubescence is abundant* on most surfaces and may even be matted on the dorsum of the mesosoma and the dorsum of the gaster.

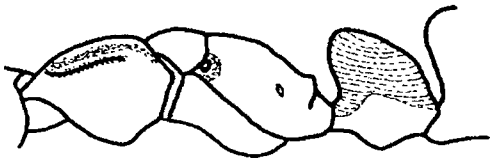


Fig. 652. Mesosoma and petiole of a worker of *P. striatinodis* (Barro Colorado Island, Panamá, MCZC). The erect hairs are not shown.

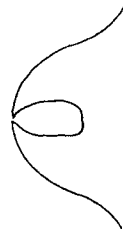


Fig. 653. Metasternal process of a worker of *P. striatinodis* (Frijolito, Panamá, CWEM) as seen from behind.

The *mandibles are finely striate and moderately shining*, the *dorsum of the head is covered with striae* with punctures between the striae, the dorsum of the mesosoma is punctate or granulose, the region below the pronotal carina is smooth and shiny, the remainder of the side of the pronotum is weakly punctate and moderately shining. Much of the mesopleuron is shining, except for the uppermost section (anepisternum), which is transversely striate. The side of the propodeum is rugose, the dorsum and posterior faces are shining. The *sculpture of the petiole is characteristic* of this species with *horizontal rugae on the sides*, which extend and form *horizontal striae across the anterior face*. The *posterior face has parallel horizontal striae*. The gaster is finely punctate and partially shining. The anterior coxa, femur and tibia are shining, the other coxae are dull, but the other femora and tibiae are moderately shining.

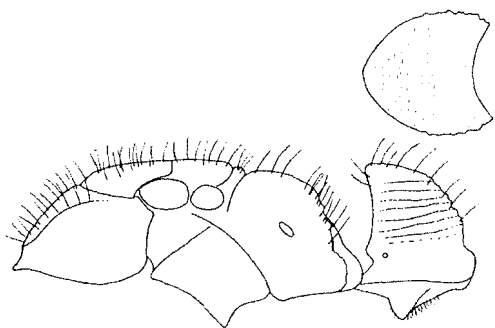


Fig. 654. Mesosoma and petiole of a female of *P. striatinodis* (Cerro Campana, Panamá, CWEM). The inset shows the petiole as seen from behind.

Female

The female is a *moderately large* (11 mm) *black* specimen with *reddish brown mandibles and antennae and yellowish brown legs*. The mandible has approximately 13 teeth; the medial part of the clypeus forms a flat lobe with longitudinal striae, which overhangs the remainder of the clypeus. The *malar carina is well developed* and nearly reaches the eye. The posterior border of the head is broadly concave. The *scapes are relatively short* and barely extend past the posterior lateral corners of the head. The *eye is large* (maximum diameter 0.5 mm) and located about one maximum diameter from the anterior margin of the head. The *carina on the pronotal shoulder is well developed*, sharp and greatly overhangs the side of the pronotum. The metanotum is well developed; both sutures (promesonotal and metanotal) interrupt the sculpture on the dorsum of the mesosoma. The

striatinodis Guatemala to northern South America

petiole is similar to that of the worker, with a vertical anterior face, which meets the broadly rounded posterior face at the anterior edge. The *stridulatory file is well developed* on the second pretergite, the arolia are poorly developed.

Erect hairs are abundant on all surfaces, including the dorsum and the ventral surfaces of the head, sides of the head, posterior margin, scapes, the dorsum of the mesosoma, the anterior and posterior faces of the petiole and all surfaces of the gaster, most hairs on the legs are erect or at least suberect. Appressed golden pubescence is abundant on nearly all surfaces.

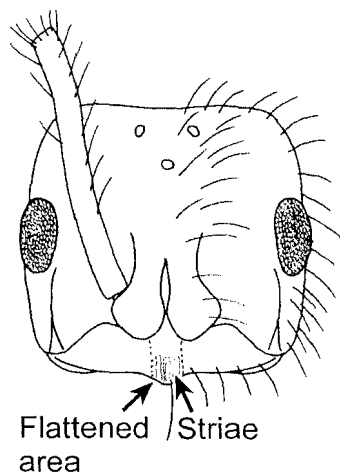


Fig. 655. Head of a female of *P. striatinodis* (Cerro Campana, Panamá, CWEM).

The head and dorsum of the mesosoma are predominantly punctate, the side of the pronotum and mesopleuron are finely punctate and moderately shiny, the side of the

propodeum is covered with rugulae and the posterior face of the propodeum is nearly smooth and glossy, the *petiole has horizontal striae on the anterior face, sides and posterior face*. The gaster is finely punctate and glossy.

Male

Unknown.

COMPARISON

The striae or rugae covering all surfaces of the petiole would allow easy recognition of the worker and female of *P. striatinodis*. *Pachycondyla foetida* is the only other species with striae on all surfaces of the petiole. *Pachycondyla foetida* can be easily separated by its larger size (total length > 10 mm), dark legs (reddish brown), depressed metanotal suture and the medial margin of the clypeus is broadly rounded. The extremely well developed carina on the pronotal shoulder would separate *P. striatinodis* from most other similar species. Finally the contrast between the black background color and the yellowish or reddish brown legs would allow further separation of *P. striatinodis* from most others.

Pachycondyla striatinodis could be confused with the widely distributed *P. unidentata*, which also has a sharp carina on the pronotum and yellowish or reddish brown legs. The shapes of the petioles of the two species are very similar. *Pachycondyla unidentata* can be easily separated as the posterior face of the petiole (as well as the sides) are mostly smooth

and shining with scattered punctures and are without the horizontal striae found in *P. striatinodis*. Additionally the anterior medial process on the clypeus of *P. unidentata* is formed into a blunt angle, not a sharp angle as in *P. striatinodis*.

Pachycondyla striatinodis could also be confused with *P. recava*. It differs in that the entire petiole of *P. recava* is completely smooth and glossy and concave posteriorly, not convex as in *P. striatinodis*.

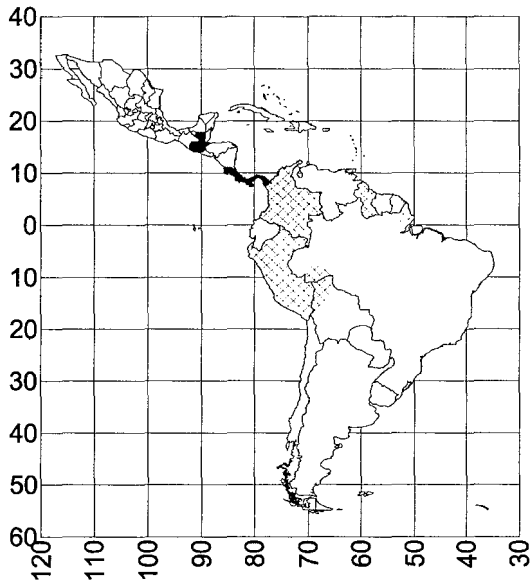
Pachycondyla striatinodis could be confused with *P. holcotyle*, which also has striae on the sides of the petiole. *Pachycondyla striatinodis* can be separated by the shape of the petiole, that of *P. holcotyle* has the anterior and posterior faces nearly parallel with a dorsal face. The striae that are present on the posterior face of *P. striatinodis* are lacking in *P. holcotyle*.

The description of *Pachycondyla striatinodis* var. *rugosinodis* matches the worker of *P. striatinodis* quite well and is considered a provisional synonym. Andre (1902) suggests it is closely related, but feels it differs based on the sculpturing of the petiole. He saw no actual specimens of *P. striatinodis*.

DISTRIBUTION:

GUATEMALA: *Escuintla* (Pantaleón [Forel, 1899]). COSTA RICA: *Alajuela* (Jiménez [Forel, 1899]); *Puntarenas* (Osa Peninsula Corcovado [USNM, MCZC]). PANAMA: *Panamá* (Barro Colorado Island [USNM, LACM, MCZC], Cerro Campana

[COOK]); *Colón* (Río Frijolito, CWEM), Bugaba [Forel, 1899]; *San Blas* (Nusagandi). COLOMBIA: *Antioquia* (Providencia [MCZC]); *Meta* (Villavicencio



Map 83. *Pachycondyla striatinodis*.

[USNM]). PERU: *Huánuco* (Monson Valley [LACM, MCZC, NHMB], Tingo Maria [CASC]); *San Martín* (Río Huallaga [5°6'29"S 75°36'23"W at Río Mixiollo André, 1902, 8°1'0"S 76°39'0"W]). GUYANA (without locality [USNM]; *Cuyuni-Mazaruni* (Kartabo [MCZC], Forest Settlement

[MCZC]), watershed between Upper Essequibo & New River [MCZC]). BRASIL: *Rondônia* (Porto Velho [Mann, 1916], Rio Madeira at Porto Velho [Mann, 1916], Camps 39 and 41 [Madeira-Mamoré Railroad - Mann, 1916]); *Amapá* (Vila Amazonas), state unknown (Barro Colorado [possibly mislabeled and from Panamá]). BOLIVIA: *El Beni* (Rurrenbaque [USNM], Cavinás Beni [USNM]).

HABITAT

Unknown, specimens have been collected between 345 and 1200 meters elevation.

BIOLOGY

These ants nest in the ant plant *Cecropia hispidissima* [Cecropiaceae]. Sexuials were collected in September (Panamá) and May (Colombia).

Pachycondyla striatinodis is mimicked by the salticid spider *Myrmarachne parallela* (Reiskind, 1977) [Salticidae].

ETYMOLOGY

The name of this species is based on the Latin word *stria*, meaning channel or furrow and *nodus*, meaning swelling, referring to the striae on the side of the petiole.

Pachycondyla succedanea (Roger)

Figures - **Worker**: 131, 175 (petiole and subpostpetiolar process), 143 (clypeus), 144 (mandible), 176 (head), 180, 182, 656 (side view), 657 (metasternal process), 658 (head and mandible); **Female**: 126 (mandible), 130 (metasternal process), 133, 659 (side view), 134, 660 (head), 156 (petiole and postpetiole), 161 (head); **Male**: 321 (side view), 661 (petiole), 662 (head); **Map** 84

stigma species complex

Ponera succedanea Roger, 1863b:170, ♂, ♀, ♂, Cuba (without specific locality); Mayr, 1863:450; *Pachycondyla (Pseudoponera) succedanea*: Emery, 1901a:46, 49; *Euponera (Trachymesopus) succedanea*: Emery, 1911:85; Wheeler, 1913:481; *Trachymesopus succedanea*: Kempf, 1960a: 424; *Pachycondyla succedanea*: Bolton, 1995:310

Euponera (Trachymesopus) cauta Mann, 1922:8, ♀, Honduras, Lombardia [lectotype worker, 5 paralectotype workers seen, USNM], 2 cotypes seen, MCZC]; *Trachymesopus cauta*: Kempf, 1960a:423; *Trachymesopus cautus*: Brandão, 1991:382 **new synonymy**

Euponera (Trachymesopus) stigma compressinodis Borgmeier, 1928:62-64, ♀, Brasil: São Paulo, Raiz da Serra [2 "paratype" females seen, MCZC]; *Trachymesopus compressinodis*: Kempf, 1960a: 425-426, ♀ (junior synonym of *P. cauta* - Brown, 1963:7) **new synonymy**

DISCUSSION

Worker

The worker is a *small* (total length about 3.5 - 4.5 mm) *dark reddish brown* ant. The *mandibles have six or seven teeth*, often with a smaller tooth between the two basalmost teeth. The *clypeus is divided by a horizontal carina*, which is especially sharp laterally and overhangs the anteclypeus, and a longitudinal medial carina is present. The medial carina mostly dis-

appears in the middle of the clypeus. The head is relatively small (width 0.84 mm, length 0.92 mm). The *eye is small* (maximum length 0.05 - 0.10 mm) located about ½ - 2 diameters from the anterior border of the head. The *frontal carinae are widely spaced* (0.13 mm at the narrowest point). The *scapes are relatively short* (0.70 mm) and do not reach the posterior lateral corner of the head. The pronotum is swollen at the shoulder, but does not form a carina. The *dorsal face of the*

succedanea Honduras to Bolivia and southern Brasil

propodeum is slightly depressed below the level of the *mesonotum*, the *spiracle* is elongated to slit-shaped and the posterior lateral edges of the *propodeum* are angulate, nearly forming *carinae*. The two faces of the *petiole* are narrowed toward the apex.

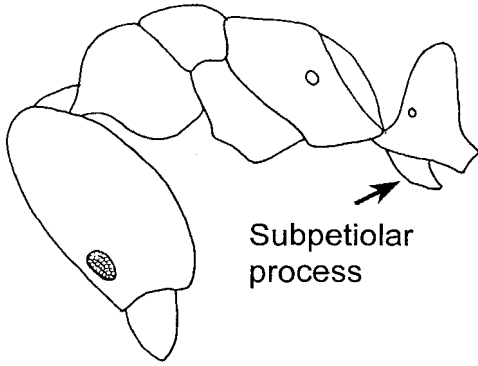


Fig. 656. Head, mesosoma and petiole of a worker of *P. succedanea* (cotype worker of *P. cauta*, MCZC).

The subpetiolar process is rounded anteriorly and forms two well-developed blunt angles posteriorly. The anterior face of the postpetiole meets the dorsal face at nearly a right angle. The *stridulatory file* is absent on the second pretergite, as are the *arolia*. The metasternal process consists of a pair of fang-like slender fingers.

Erect and suberect hairs are present on the mandibles, clypeus, anterior to the eyes on the side of the head, dorsal and ventral surfaces of the head, posterior border, shaft of the scape, dorsum of the mesosoma,



Fig. 657. Metasternal process of a worker of *P. succedanea* (Puntarenas, Costa Rica, CWEM) as seen from behind.

dorsum of the petiole, subpetiolar process and all surfaces of the gaster. Most surfaces are covered with golden mostly appressed pubescence.

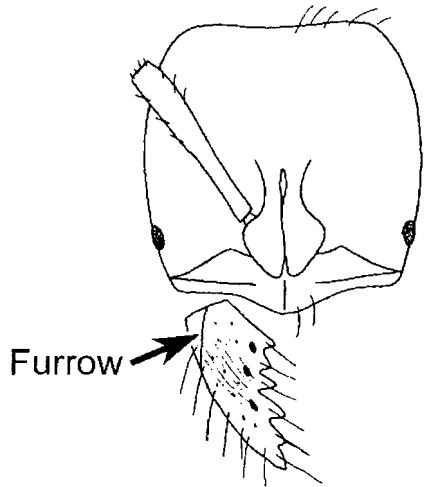


Fig. 658. Head and mandible of a worker of *P. succedanea* (Puntarenas, Costa Rica, CWEM).

The *mandibles* are smooth and glossy with fine striae and scattered punctures. The remainder of the surfaces are finely punctate and dull, the petiole and gaster are weakly shining.

Female

The female is similar to the worker, a *small* (total length 5 mm) *reddish brown* specimen. The *mandible has 6 - 7 teeth*. The clypeus is similar to that of the worker with a *medial sharp longitudinal carina and a transverse carina*. The sides of the head are nearly straight and parallel; the posterior border is slightly concave. The *eye is large* (maximum diameter 0.24 mm, located about $\frac{1}{4}$ - $\frac{1}{2}$ diameter from the anterior edge of the head (side view)). The head is relatively small (0.90 mm in width, 0.96 mm long). The *scape does not reach or extends slightly past the posterior lateral corner of the head*. The ocelli are small (diameter of median ocellus 0.06 mm) but well developed. The medial ocellus is located about 2 - 4 diameters from the lateral ocellus. The pronotum is slightly swollen at the shoulder. The dorsal face of the propodeum is slightly lower than that of the metanotum, the *propodeal spiracle is oval-shaped* and the posterior lateral edges of the propodeum are nearly formed into a carina. The *petiole is narrow* when viewed in profile and narrowed towards the apex. The subpetiolar process is rounded anteriorly and strongly angulate posteriorly, the posterior edge consists of two angulate lobes when viewed from below.

Scattered erect hairs are present on most surfaces and the appressed golden pubescence is more abundant than in the worker.

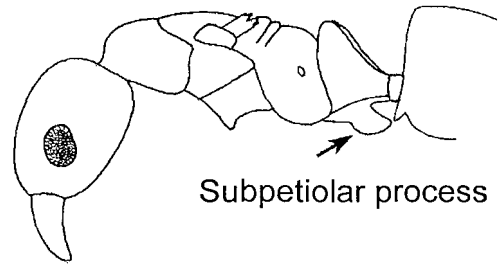


Fig. 659. Head, mesosoma, petiole and the anterior part of the post-petiole (first gastral segment) of a female of *P. succedanea* (cotype of *P. compressinodis*, MCZC).

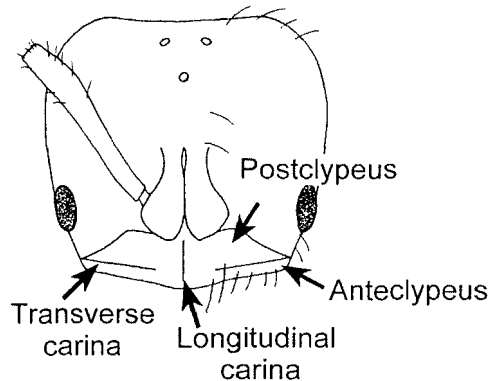


Fig. 660. Head of a female of *P. succedanea* (Puntarenas, Costa Rica, CWEM).

Erect hairs are sparse, short (up to 0.2 mm in length, most hairs 0.1 mm in length) and are located on the mandibles, clypeus, scapes, a few are present on the dorsal surface of the head, several are present on the ventral surface of the head, present on the dorsum of the mesosoma, dorsum of

the petiole and all surfaces of the gaster. The legs have a few scattered erect hairs. Appressed pubescence is sparse on the head, more abundant on the dorsum of the mesosoma and the gaster are weakly shining.

The *mandibles are smooth and glossy* with scattered punctures, the remainder of the surfaces is finely punctate and dull.

Male

The male is also *small* (4 mm total length) with tiny edentate mandibles, which are mostly hidden when closed and do not meet in the middle. The *eye is large* (0.3 mm in greatest diameter) located very close (0.03 mm) to the anterior border of the head. The *ocelli are well developed but small*. The anterior face of the petiole is nearly straight, the posterior face is broadly rounded with the petiole narrowed towards the apex, the subpetiolar process is similar to that of the worker.

Erect hairs are scattered over the surface, as well as moderately abundant golden appressed pubescence.



Fig. 661. Petiole of a male of *P. succedanea* (Tingo Maria, Perú, MCZC).

Most surfaces are punctate and dull, the sides of the head, the pronotum, the dorsum of the mesosoma and the gaster are weakly shining.

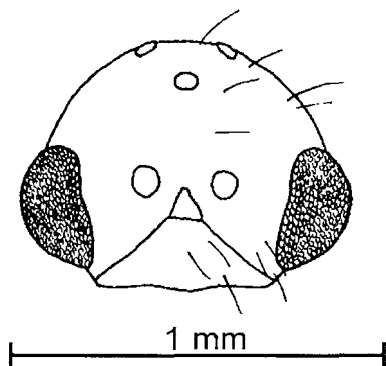


Fig. 662. Head of a male of *P. succedanea* (Tingo Maria, Perú, CWEM).

COMPARISON

Although types of *P. succedanea* could not be located and were presumably destroyed during World War II, specimens from Cuba fit Roger's description and are assumed to be *P. succedanea* and were used to establish the identity of this species.

The worker of *P. succedanea* would be most likely confused with that of *P. cognata*, but can be separated by the relatively widely spaced frontal carinae (separated by 0.1 mm or less in *P. cognata*). It is also more widely distributed than *P. cognata*, which is known only from Costa Rica and Panamá.

Pachycondyla succedanea workers could also be confused with those of *P. stigma*, but can be separated by

the six or seven mandibular teeth (6-toothed in *P. stigma*) and the clypeus is divided horizontally by a carina (poorly developed carina present in *P. stigma*). The workers can be distinguished as being smaller (total length usually less than 4 millimeters), having a slightly larger eye (maximum diameter approximately equal to the distance between the eye and anterior edge of head) and especially by the form of the subpetiolar process, which is angulate posteriorly, forming two laminae or flanges (rounded posteriorly in *P. stigma*).

Separation of the males and females of *S. succedanea* and *P. stigma* is difficult. The female of *P. succedanea* is smaller than that of *P. stigma* (total length 5.5 - 7 mm). The transverse clypeal carina of *P. stigma* is not as sharp as it is in the female of *P. succedanea*. The subpetiolar processes of the female and male of *P. succedanea* are angulate posteriorly, not completely rounded as in the female and male of *P. stigma*.

The mandibular furrow is nearly always well developed in the worker and female of *P. succedanea*, but is poorly developed in the worker and female of *P. stigma*.

The males can be separated from those of *P. stigma* by the form of the subpetiolar process, which is angulate as in the workers, not rounded posteriorly as in *P. stigma*.

The worker and female of *P. succedanea* could be confused with those of *P. gilloglyi*. They can be easily separated as the mandibles of *P. succedanea* are smooth and shiny,

whereas those of *P. gilloglyi* are entirely striate. They can also be separated by the six-toothed mandible (usually, sometimes seven-toothed), which has seven teeth in the worker and female of *P. gilloglyi*. The males of *P. succedanea* can be easily separated as the depression at the base of the mandible extends nearly the entire length, not just $\frac{1}{2}$ the length as in the male of *P. gilloglyi*. Additionally the posterior margin of the subpetiolar process of *P. succedanea* is angulate, not rounded as in the male of *P. gilloglyi*. The male of *P. gilloglyi* has deep depressions on the head located laterally and anteriorly to the insertion of the antenna. This region is only slightly depressed in males of *P. succedanea*.

This species, as well as the other species in the *stigma* complex, could be easily mistaken to be members of *Hypoponera*. The two spurs on the posterior tibia can separate them, only one spur occurs in members of *Hypoponera*. Also the mandibular teeth of the worker and female are well defined, not reduced to denticles as in most species of *Hypoponera*. Finally the metasternal process is well developed, not nearly absent as in workers and females of *Hypoponera*.

Specimens in the LACM and INBio were labeled by Dr. Longino as JTL-011, specimens on his website with the same number are *P. gilloglyi* (thanks to Alex Wild and Jack Longino for pointing this out).

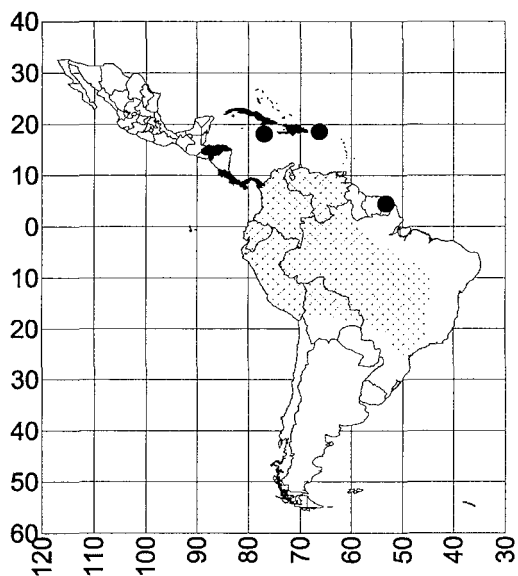
DISTRIBUTION

HONDURAS: *Atlántida* (Lom-

succedanea Honduras to Bolivia and southern Brasil

bardia, type series of *P. cauta*). COSTA RICA: *Cartago* (3 - 5k E Turrialba [Río Reventazón], Llorona); *Heredia* (La Selva Biological Station, 17 S Puerto Viejo, 16 k N Volcán Barba, Finca el Uno la Virgen, 10°20'N 84°4'W); *Puntarenas* (Reserva Biológica La Carara, 6 k SW Estación Biológica Las Cruces, 11 k SW Estación Biológica Las Cruces, Golfito, Parque Nacional Corcovado, Sirena); *Limón* (near Siquirres); *Alajuela* (Peñas Blancas). Longino (website) lists Cordillera de Tilarán, Cordillera Volcánica Central and San Vito (Wilson Botanic Garden). PANAMA: *Bocas del Toro* (Continental Divide, La Culebra Trail); *Panamá* (Cerro Campana, El Llano-Cartí Road [km. 7.5]); *Colón* (Cerro Gaitán); *Veraguas* (Cerro Tute [4 k W Santa Fé]). COLOMBIA: *Chocó* (10 k SW San José del Palmar, Río Torito, 760 m, Finca Los Guadales); *Huila* (Parque Nacional Cuevas de los Guacharos, 10 K SE Palestina, Finca Merenberg, 12 k W Belen); *Valle del Cauca* (Loboguerrero, 3.2 k above Agua Claro, near Queremal, Río San Juan, Río San Juan near Queremal, Loboguerrero to Represa de Calima Km 38, 3.2 km above R. Aguaclara on old rd. to Cali, Mun. Buenaventura). ECUADOR: *Esmeraldas* (31.7 k NW Lita); *Pichincha* (Tinalandia, 16 k SW San Domingo de los Colorados, 27.9 k W Machachi [CWEM, larger than normal], Manabí 78 km NE Chone); *Guayas* (3 k SE Bucay, 3 k SW Bucay); *Manabí* (78 k NE Chone); *Napo* (20 k S Tena); *Cotopaxi* (Otunga); *Los Rios* (Río Palenque);

Napo-Pastaza (Puyo Oriente). PERU *Pasco* (Pasco, near Pozuzo); *Huánuco* (Tingo Maria, Monson Valley); *Madre de Dios* (Puerto Maldonado). VENEZUELA: *Aragua* (Rancho Grande, Portachulo Pass, Parque Nacional H. Pittier). FRENCH GUIANA: *Cayenne* (35 k W Sinnamary). BRASIL: *Rio de Janeiro* (Rio de Janeiro); *São Paulo* (Est. São Paulo, São Paulo Reserva Forestal Caraguatatuba, Raiz da Serra [Borgmeier, 1928]); *Goiás* (Reserva Forestal Caraguatatuba). BOLIVIA: *Cochabamba* (Río Carmen, 105 k E Cochabamba). JAMAICA: *St. Andrew Parish* (Blue Mountains [Hardwar Gap]); *St. Ann Parish* (2.5 mi S Moneague, Cedar V. [valley?]); (Trelawny [Quick Step]); Parish unknown (Chinchona). HAITI: several departments, probably *du Sud* (La



Map 84. *Pachycondyla succedanea*.

Visite, La Hotte), several departments, probably *Oeste* (La Selle Range). DOMINICAN REPUBLIC: *La Vega* (La Ciénega, Casabito Forest, Jarabacoa); *Barahona* (2 k N Polo); *Villa* (Villa Altigracia); Mount Diego de Ocampo). CUBA: *Santa Clara* (Trinidad Mountains [Buenos Aires], 21°56'0"N 80°0'0"W); *Santiago de Cuba* (South side of Pico Turquino); *Soledad* (Cien Fuegos [Cumanyagua]); *Cienfuegos* (Mina Carlota). PUERTO RICO: *Senatorial de Humacao* (El Yunque); *Maricao* (Maricao Forest); (Río Sierra de los Órganos Rangel); two sites on island (San Lorenzo).

HABITAT

This species is found in a variety of habitats, including tropical rain forest, steep primary forest, a shady ravine, cloud forest, wet mountain forest to hardwood pine valley forest and even a coffee plantation. It is often found near forest edges. Longino (website) reports it from Atlantic lowland rain forest in Costa Rica up to 1200 m. Elevations range from 0 – 2200 meters.

BIOLOGY

These ants nest in rotten wood (logs and stumps) in areas of sandy or clay soils. Rarely, they nest in the soil. It apparently never nests in the canopy

and those found in treefalls move there after the tree has fallen (Longino, website). Males were collected in nests in March (Costa Rica, Perú), alate females were collected in nests in June (Perú), July and September (Costa Rica) and December (French Guyana). Single, dealate females were collected in March (Jamaica), June (Perú), July (Costa Rica) and October (Venezuela). Four dealate females were collected together without brood or workers (Ecuador), suggesting nests are formed by pleometrosis. Two other dealate females were found together in a rotten log, without brood or workers, further suggesting pleometrosis. Workers from Panamá and Bolivia were extracted from leaf litter. Specimens in Costa Rica inhabit the leaf litter on the forest floor (Longino, website).

Pachycondyla succedanea is relatively common, but mostly unknown because it is easily confused with the common *P. stigma* in collections.

ETYMOLOGY

The basis of the name of this species is the Latin word *succedaneus*, meaning following after or substitute for, apparently meaning that this species substitutes the closely related *P. stigma*.

Pachycondyla tarsata (Fabricius)

Figures - **Worker**: 23 (postpetiole, top view), 145, 663 (side view), 146 (subpostpetiolar process), 147, 664 (head and mandible), 148, 208 (tarsal claws), 149 (metasternal process), 207 (top view of mesosoma, petiole and postpetiole); **Female**: 150 (side view), 151 (head), 152 (palps), 153 (forewing), 154 (tarsal claw); **Male**: 154 (tarsal claw), 155 (side view), 156 (head and palps), 157 (genitalia); **Map** 85

tarsata species complex

Formica tarsata Fabricius, 1798:280, ♀, Senegal; Latreille, 1802b:736, ♀; *Ponera tarsata*: Smith, 1858: 94; Roger, 1860: 310-311, ♀; *Paltothyreus tarsatus*: Mayr, 1862:736; Mayr, 1866a:894, ♂; *Neoponera tarsata*: Emery, 1901a:47; *Pachycondyla tarsata*: Dalla Torre, 1893:35; Bolton, 1995:310

Ponera gagates Guérin-Méneville, 1844:423-424, ♀, Senegal (synonymy by Roger, 1860:310; Roger 1863a:17)

Ponera pestilentia F. Smith, 1858:92 ♀, Sierra Leon (synonymy by Roger, 1860:310)

Pachycondyla spiniventris F. Smith, 1858:92 ♂, Sierra Leon (synonymy by Roger, 1860:310; Roger 1863a:17)

Pachycondyla simillima F. Smith, 1858:105-106, ♀, Plate 7, Fig. 17, South Africa (synonymy by Emery, 1892b:557)

DISCUSSION

Worker

The worker is a *moderately large* (total length 13 mm) dark reddish brown ant. The *mandibles have approximately 18 teeth*. The *median portion of the clypeus is formed into a broad lobe*, which overhangs the remainder of the clypeus. The surface of the lobe has two longitudinal

depressions separating three distinct lobes (there are exceptions to this). The head is nearly square, with the length (including the lobe of the clypeus) being 3.1 mm, the width 3.0 mm. The *eyes are relatively small* (maximum diameter 0.56 mm) located slightly more than one maximum diameter from the anterior margin of the head. The scape is relatively short (2.66 mm), extending about 1½

funicular segments past the posterior lateral corner of the head. The sides of the head are slightly narrowed anteriorly, angulate posteriorly, with the medial posterior margin concave. The mesonotum and propodeum are barely separated on the dorsum of the mesosoma, but the metanotal suture is well developed on the side. The *propodeal spiracle is elongated*. The *petiole is relatively narrow* when viewed in profile with a distinctly concave anterior face and a broadly rounded convex posterior face, the faces of which form a poorly defined dorsal face. The subpetiolar process is well developed and consists of a thickened triangular lobe. The *anterior upper corners of the postpetiole* (first gastral tergum) *are swollen and angulate*. The *stridulatory file is apparently absent* (pretergite can not be well seen in the specimen from São Paulo, but the stridulatory file is absent in Old World specimens of *P. tarsata*). The dorsum of the pygidium is slightly concave. The arolia are not developed. The *tarsal claws have a distinct tooth* along in inner medial margin on both sides.

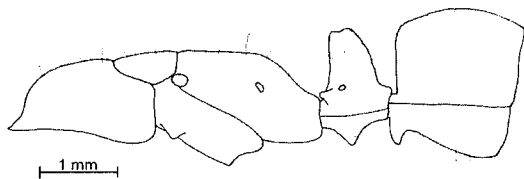


Fig. 663. Mesosoma, petiole and postpetiole of a worker of *P. tarsata*, as seen from the side (São Paulo, Brasil).

Erect hairs are abundant on the clypeus, especially along the anterior border, as they are on the dorsum of the head, the antennal scapes, the sides of the head, the posterior margin, the ventral surface of the head, the dorsum of the mesosoma, all surfaces of the petiole and all surfaces of the gaster; the hairs on the legs are mostly erect, or at least suberect. Appressed pubescence is sparse and noticeable only on the head and the gaster.

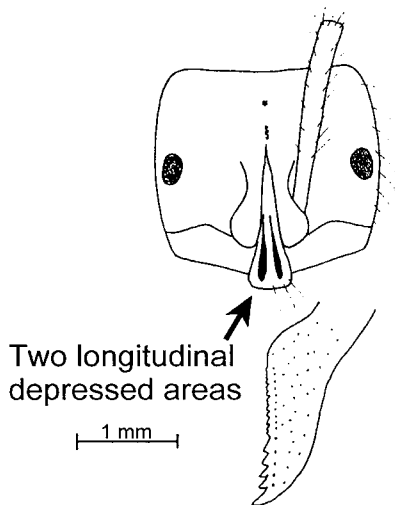


Fig. 664. Head of a worker of *P. tarsata* (São Paulo, Brasil). The insets shows the mandible as seen from the front (at the same scale).

The *mandibles are smooth and glossy* with scattered punctures, the lobe of the clypeus has poorly defined longitudinal striae; the dorsum of the head has well-developed longitudinal striae, which diverge posteriorly. The

dorsum of the pronotum has very coarse longitudinal striae, which pass transversely across the pronotum anteriorly and form longitudinal striae on the side the pronotum, the dorsum of the mesonotum has coarse transverse striae as does the dorsum of the propodeum, much of the side of the mesopleuron is smooth and glossy, but the upper region has fine striae, the sides of the propodeum have obliquely directed striae, the petiole is mostly smooth and glossy, but poorly defined striae are present on the sides and transverse striae are present across the dorsum of the node, the gaster is moderately smooth and glossy with scattered punctures.

Female and male

See the discussion of the *tarsata* species complex.

COMPARISON

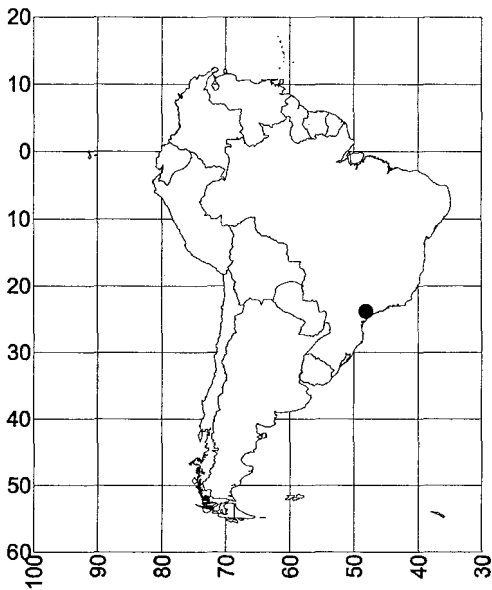
Pachycondyla tarsata can be easily separated from all of the New World species by the angulate anterior lateral corners of the postpetiole and the presence of single small teeth on each of the inner margins of the tarsal claws. The specimen from São Paulo is nearly identical to the typical Old World *Pachycondyla tarsata*. It can be differentiated by the form of the surface of the medial lobe of the clypeus (which is completely concave with notable longitudinal striae in most Old World *P. tarsata*), smooth surface of the mandible (striate and dull in Old World *P. tarsata*), the transverse striae on the mesonotum

(longitudinal in most Old World *P. tarsata*) and by the smooth and glossy dorsal surface of the gaster (smooth and glossy, but with scattered coarse punctures in most Old World specimens of *P. tarsata*). It is probable that this specimen of *P. tarsata* is a mislabeled Old World species, but it may also represent a new species.

It is interesting to note that the striae on the dorsum of the pronotum are very similar to those of *P. magnifica*. The two species are apparently not closely related and easily separated by the claw on the inner border of the tarsal claw and the angles on the postpetiole of *P. tarsata*, both of which are absent in *P. magnifica*.

There are currently a number of subspecies recognized (*P. tarsata delagoensis* [Emery], *P. tarsata mediana* [Santschi], *P. tarsata robusta* [Santschi], *P. tarsata striata* [Santschi], *P. tarsata striatidens* [Santschi] and *P. tarsata subopaca* [Santschi]) and possibly some of these may be recognized as valid species when the Old World fauna is evaluated. The specimen from São Paulo would be identified as *P. tarsata delagoensis* in Santschi's key (1919b:81-82). It is very similar to a specimen from Mozambique (MCZC), differing in having more smooth mandibles and a more developed subpostpetiolar process.

Smith (1858:94) lists *P. tarsata* as being a South American species (Demerara, Pará, Brasil), which may be further support for the hypothesis that this species is found in the New World. Unfortunately *P. commutata*



Map 85. *Pachycondyla tarsata*.

was misidentified as *P. tarsata* prior to 1860 (Roger, 1860), which may also explain Smith's report.

DISTRIBUTION

In the New World it is found only from São Paulo in the state of São

Paulo, BRASIL (AMNH, collected 5-6-08 [1908]). It may also occur in the state of Para, Brasil (see above).

HABITAT

Unknown in the New World.

BIOLOGY

Unknown in the New World. *Pachycondyla tarsata* has volatile material in the venom gland, which includes bitter-tasting cyclic dipeptides (Morgan et al., 2003). Although workers forage individually, workers transfer prey to other workers during the journey back to the nest (López et al., 2000).

ETYMOLOGY

The name of this species is derived from the Greek word *tarsos*, referring to the sole of the foot, presumably referring to the unusual form of the tarsal claw.

Pachycondyla theresiae Forel

Figures - **Worker**: 108 (petiole, posterior face), 263 (side view), 665 (head);
Map 86

foetida species complex

Pachycondyla theresiae Forel, 1899:13-14, Plate 1, Fig. 11, ♀, Panamá, Bugaba, Volcán de Chiriquí [lectotype and 1 paralectotype designated, MHNG, one "paratype" seen, MCZC]; *Neoponera theresiae*: Emery, 1901a:47; *Neoponera* (*Neoponera*) *theresiae*: Emery, 1911:72; *Pachycondyla theresiae*: Bolton, 1995:310

DISCUSSION

Worker

The worker is a *moderately large* (total length about 10 mm) *dark reddish black* ant with reddish brown mandibles and dark brown appendages. The anterior margin of the clypeus is broadly rounded, the eyes are located somewhat posteriorly on the head at a distance of about one diameter from the anterior edge of the head (side view) and the *malar carina* is well developed. The scape extends slightly more than the first funicular segment past the posterior lateral corner. The *pronotal carina* is well developed and sharp, the mesosoma is slightly depressed at the *metanotal suture*, which breaks the sculpturing on the dorsum. The *propodeal spiracle* is slit-shaped. The anterior face of the petiole is nearly vertical

and joins the rounded posterior face at a right angle.

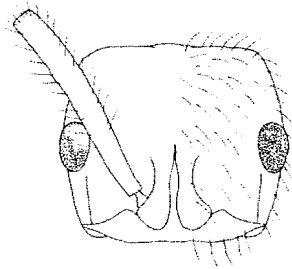


Fig. 665. Head of a worker of *P. theresiae* (Puntarenas, Costa Rica, MCZC).

Most surfaces, including the dorsum of the head, mesosoma, petiole and all surfaces of the gaster are covered with erect hairs, as are most of the parts of the legs. Appressed golden pubescence is abundant on the dorsum of the head,

theresiae Costa Rica to Perú and northwestern Brasil

the mesosoma and the dorsum of the gaster.

The *mandibles are finely and longitudinally striate* with the apex and the parts near the teeth being smooth and glossy. The head is completely dull and finely punctate, the mesosoma is punctate, but the pronotum (both the top and the side) as well as other parts of the side of the mesosoma are weakly shining. The *side of the petiole has distinct horizontal striae, as does the lower half of the front face of the petiole, as well as the lower half of the back the petiole.* The gaster is finely punctate and moderately shining.

Female and Male

Unknown.

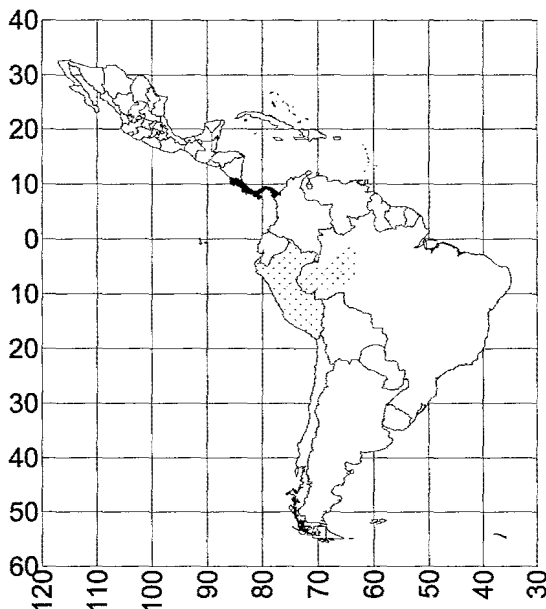
COMPARISON

Pachycondyla theresiaae is similar to *P. villosa* and *P. foetida*, but can be easily distinguished by its smaller size (total length of both of the latter species > 10 mm). *Pachycondyla theresiaae* could be easily confused with *P. bugabensis*, it can be separated by the horizontal striae on the side the petiole, which are lacking in *P. bugabensis*.

DISTRIBUTION

COSTA RICA: *Puntarenas* (Sirena, Peninsula Osa, 8.28 N 83.35 W [LACM, MCZC], 6 km S. San Vito [8° 42'N 83°W, MCZC]). Longino (website) lists the Wilson Botanical Garden near San Vito. **PANAMA:** *Panamá* (Bugaba [Forel, 1899]); *Chiriquí* (Volcán de Chiriquí [Forel,

1899]). **PERU** (Kempf, 1972), **BRAZIL** (*Amazonas* [Kempf, 1972]).



Map 86. *Pachycondyla theresiaae*.

HABITAT

Longino (website) found this species in wet forest habitats.

BIOLOGY

Workers forage in the low arboreal zone (Longino, website). Longino collected a worker at the extrafloral nectaries of *Passiflora* [Passifloraceae].

ETYMOLOGY

This species was named in honor of princess Thérèse de Bavière, Abbesses of Saint Anne de Munich (1850 - 1925). The specimens were collected by Champion.

Pachycondyla unidentata Mayr

Figures - **Worker**: 23 (postpetiole, top view), 76, 223 (petiole, posterior face), 76 (petiole, top view), 220 (postpetiole, top view, showing stridulatory file), 224 (petiole, side and top view), 226 (pronotum, top view), 666 (side view), 667 (head and front of pronotum), 668 (metasternal process); **Female**: 669 (mesosoma and petiole), 670 (head); **Male**: 310 (side view), 671 (head); **Map** 87

crenata species complex

Pachycondyla unidentata Mayr, 1862:720, ♀, ♀, Brasil, Amazonas [lectotype worker, 5 paralectotype workers, 1 paralectotype dealate female here designated, NHMW], Mayr, 1863:439; Dalla Torre, 1893:35; Forel, 1899:14; *Neoponera unidentata*: Emery, 1901a:47; *Neoponera (Neoponera) unidentata*: Emery, 1911:72; Mann, 1916:411; *Pachycondyla unidentata*: Bolton, 1995:311

Neoponera unidentata variety *eburneipes* Wheeler & Bequaert, 1929:29, ♀, ♀, Brasil: Acre, Rio Branco [syntype worker seen, USNM] (synonymy by Brown, 1957:232)

Neoponera unidentata variety *maya* Wheeler and Bequaert, 1929:30, ♀, Guatemala Trece Aguas, Alta Vera Paz [one cotype worker seen, MCZC] (synonymy by Brown, 1957:232)

Neoponera unidentata variety *trinidadensis* Wheeler and Bequaert, 1929:30, ♀, Trinidad, Port of Spain [3 syntype workers seen, MCZC] (synonymy by Brown, 1957: 232)

DISCUSSION

Worker

The worker is a *relatively small* (total length about 6 mm) *dark reddish brown* ant with *yellowish brown appendages*. The anterior medial border of the clypeus forms a bluntly rounded to slightly angulate process. The region anterior to the eye is formed into a moderately well developed

malar carina, the eye is *relatively large*, occupying nearly one third of the length of the side of the head. The antennal scape extends about the first 2 funicular segments past the posterior lateral corner. The *pronotal shoulder forms a very sharp carina*, which greatly overhangs the sides of the pronotum. The *metanotal suture is barely evident* on the dorsum of the mesosoma. The *propodeal spiracle is*

unidentata México to Bolivia and southern Brasil

elongated or oval-shaped. The *petiole is thick* when viewed in profile with the *anterior face being nearly vertical*, straight, or slightly concave, the *posterior face being convex and rounded* and meeting the anterior face at the anterior edge of the petiole. The posterior lateral margins of the petiole are sharp and usually form a crenulated carina. The metasternal process consists of two wide lobes, which terminate in small angles.

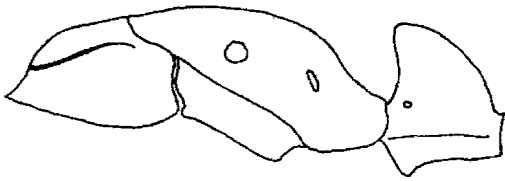


Fig. 666. Mesosoma and petiole of a worker of *P. unidentata* (Chiapas, México, CWEM).

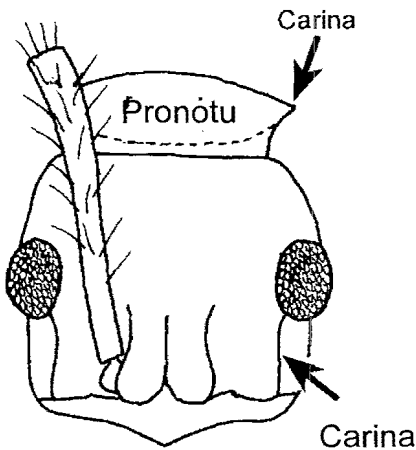


Fig. 667. Head and anterior edge of pronotum of a worker of *P. unidentata* (Bajo Calima, Colombia, CWEM).

Erect hairs are abundant on most surfaces, including the dorsal and ventral surfaces of the head, the scape, dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster, the hairs on the tibiae are suberect.

The dorsum of the head is densely and evenly punctate, but shining between the punctures, the *dorsum of the mesosoma is more finely punctate and more glossy*, the sides of the pronotum are finely punctate and shiny, the remainder of the sides of the mesosoma is slightly more coarsely punctate, but is also shining between the punctures. The *anterior face and sides of the petiole are finely punctate and glossy*, the *posterior face is very finely punctate and very smooth and glossy* and the dorsum of the post-petiole is finely punctate and moderately glossy, as is most of the remainder of the gaster. The *stridulatory file is well developed*.

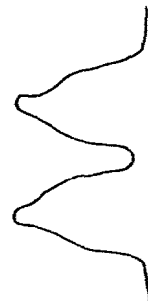


Fig. 668. Metasternal process of a worker of *P. unidentata* (Chiapas, México, CWEM) as seen from behind.

Female

The female is similar to the worker, differing in being larger (total length about 9 mm) and is the same color. The anterior medial border of the clypeus is similar to that of the worker, the malar carina is well developed, the pronotal carina is also well-developed and overhangs the side of the pronotum, the spiracle and petiole are similar in shape to those of the worker.

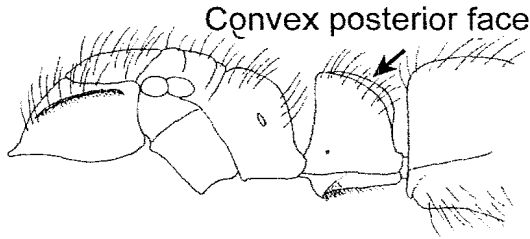


Fig. 669 Mesosoma, petiole and anterior part of the gaster of a female of *P. unidentata* (Granada, Nicaragua, CWEM).

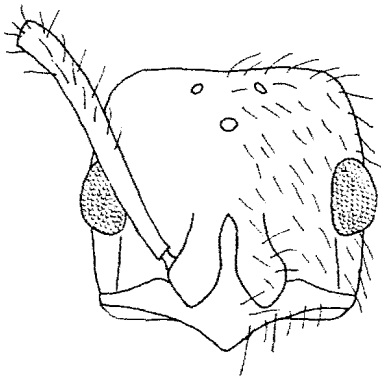


Fig. 670. Head of a female of *P. unidentata* (Granada, Nicaragua, CWEM).

The pilosity and sculpture are similar to that of the worker, except the dorsum of the gaster has more abundant appressed golden pubescence.

Male

The male (undescribed) is a relatively small (total length 6.2 mm) brown ant with yellowish brown legs and a yellowish brown tip of the gaster. The head length is 1.02 mm; the head width is 0.88 mm. The eyes are large (0.6 mm) and occupy more than half of the side of the head. The ocelli are large, with the median ocellus separated by approximately one diameter from the lateral ocellus (seen obliquely from above and from the side). The pronotum is only slightly swollen at the shoulder; the propodeal spiracle is slit-shaped. The petiole is thick when viewed in profile with a straight anterior face and a broadly rounded posterior face, the subpetiolar process is poorly dev-

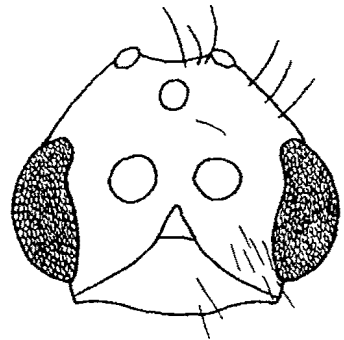


Fig. 671. Head of a male of *P. unidentata* (Granada, Nicaragua, CWEM).

eloped and consists of an angulate lobe anteriorly with the remainder gradually diminishing in size posteriorly.

Erect hairs are abundant on the clypeus, the dorsal and ventral surfaces of the head, the posterior margin, the sides of the head, a few hairs are on the scape. The dorsum of the mesosoma has numerous erect hairs, as does the petiole and the gaster. The hairs on the legs are mostly erect, with the length being about $\frac{1}{2}$ the width of the tibia.

The head, mesosoma, petiole and the gaster are finely punctate and moderately shining.

COMPARISON

Pachycondyla unidentata can be separated from other members of the *crenata* species complex, including *P. crenata* and *P. carinulata*, as the highest point on the petiole is located near the anterior face (highest area about mid point in the latter two species). *Pachycondyla unidentata* can be separated from the Central and South American *P. striatinodis*, as it lacks striae on all surfaces of the petiole (which are present in *P. striatinodis*). Rarely in *P. unidentata* a few striae may be present on the lower half of the side of the petiole. *Pachycondyla unidentata* is similar to the Colombian *P. recava*, but differs in having the posterior face of the petiole convex and dull, not concave, smooth and glossy as in *P. recava*. Finally *P. unidentata* can be separated from the South American *P. goeldii*,

as the anterior face of the petiole is nearly vertical, not inclined to an approximately 45 degree angle as in *P. goeldii*. *Pachycondyla unidentata* is similar to *P. bugabensis*, but can be separated as it lacks the depression at the metanotal suture on the dorsum of the mesosoma.

Workers of *P. unidentata* could be easily confused with workers of the Venezuelan *P. rugosula* with the posterior face of the petiole being concave. They can be easily separated as the posterior face of the petiole is always convex, not flattened and strongly concave as in such workers of *P. rugosula*.

The workers of the new Costa Rican species *P. antecurvata* could be confused with those of *P. unidentata*. They can be separated by the shape of the petiole. A poorly defined dorsal face is present in *P. antecurvata* with the highest point being at approximately the middle of the apex of the petiole, not near the anterior edge as in *P. unidentata*.

DISTRIBUTION

MEXICO: *San Luis Potosí* (18 mi S Tamazunchale, Huichuican, Sótano de Tampemoche [8 k NW Aquismón, Reddell and Cokendolpher, 2001]), (intercepted at Brownsville and Laredo, TX and Philadelphia); *Oaxaca* (Palomares); *Veracruz* (Santa Lucrecia, Las Hamacas, Pueblo Nuevo nr Tezonapa, 17 k N Santiago Tuxtla, Córdoba, Los Tuxtlas, Mirador, Santa Lucrecia, Trail above Presidio, Laguna Encantada [near San Andrés

Tuxtla, Horvitz and Schemske, 1990)]; México (Citlaltepetl); Chiapas (Yaxoquintela Ocosingo, Palenque Ruins, Laguna Ocotál Grande, 10 k S Palenque, Yaxoquintela, 15 k N Boca Lacantun); Tabasco (Villa Hermosa, Teapa [Forel, 1899]); Quintana Roo (Majahual, Vallarta); without locality (intercepted at Philadelphia). BELIZE: Cayo (Augustine, 24 mi SE Belmopan, Teakettle Bank, Pook's Hill [near Teakettle Bank]). GUATEMALA: Petén (Parque Nacional Tikal); Alta Vera Paz (Cacao - Trece Aguas); Izabal (Polochic River); without locality (intercepted in Philadelphia [PA], Boston [MA] and Charleston [SC]). HONDURAS: Atlántida (Lancetilla nr Tela, La Ceiba); Colón (Corocito); Francisco Morazán (Augustine). NICARAGUA: Managua (Las Nubes); Granada (Volcán Mombachó); Río San Juan (5.1 mi SE El Castillo [Bartola]); Zelaya (La Bodega [near Bluefields], La Fonseca [near Bluefields]). COSTA RICA: Puntarenas (Osa Peninsula Corcovado 8°28'N 83°35'W, Rincón, 1 - 5 mi NW Rincón, Osa Peninsula, Golfito, Río San Luís, Ojo de Agua, Reserva Biológica Carara); Heredia (Río Toro Amarillo vic. Guápiles, Rincón Osa Peninsula, 10°20'N 84°04'W, Carara Biological Reserve, La Selva Biological Station, 3 k S Puerto Viejo, near Puerto Viejo); Guanacaste (Parque Nacional Santa Rosa); Alajuela (Jiménez [Emery, 1890b, 1895b, Forel, 1899]); Limón (Matina, near Guapiles, 10 k ESE Moravia); Cartago (Turrialba); without locality (intercepted in New York). PAN-

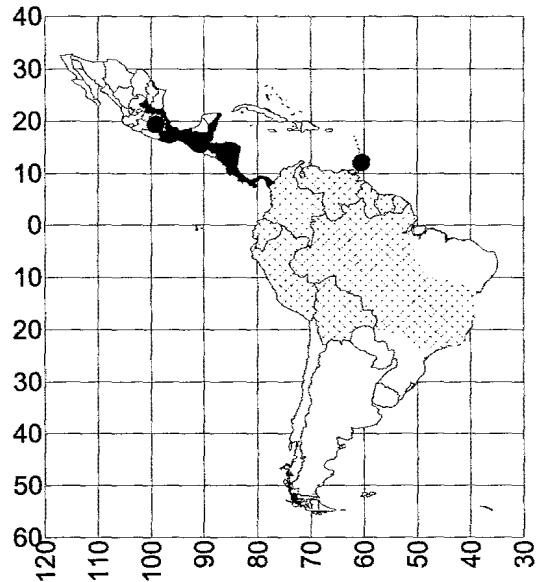
AMA: Coclé (El Valle, La Mesa near El Valle); Colón (3 k N El Valle, Fort Sherman, Bugaba [Forel, 1899]); Chiriquí (Volcán de Chiriquí [Forel, 1899]); Panamá (Canal Zone, Gatuncillo, 3 k E El Valle, Barro Colorado Island, Gamboa, Bugaba). COLOMBIA: Chocó (10 k SW San José del Palmar); Magdalena (Sierra Nevada de Santa Marta [Forel, 1901b]); Vaupés (Río Vaupés); Meta (2 k N Villavicencio, 5 k N Villavicencio, 3 mi W Villavicencio); Valle del Cauca (Bajo Calima); Amazonas (Leticia); without locality (intercepted at Miami [FL], San Francisco [CA], Hoboken [NJ]). ECUADOR: Cotopaxi (Unión del Toachi); Sucumbíos (Shushufindi); Morona-Santiago or Zamora-Chinchipe (Río Zamora); Pichincha (6 mi W Santo Domingo de los Colorados); Napo (20 k NE Archidona, Tiputini Biodiversity Station, Río Hollín); Napo-Pastaza (2-8 mi N Puyo). PERU: Huánuco (Monsón Valley, Tingo Maria, 5 mi SW Las Palmas, 43 mi E Tingo Maria); Lima (Callanga); Madre de Dios (Puerto Maldonado, near Puerto Maldonado, 15 k NE Puerto Maldonado, 30 k SW Puerto Maldonado, Parque Nacional Pampas de Heath, Reserva Tambopata, Manu National Park, [Tobin, 1997]); Loreto (Iquitos, 28 k S Iquitos); Yurac (67 mi E Tingo Maria); without locality (intercepted in New York). San Martín (Huallaga) Cuzco, (Collana); without locality (intercepted at Miami [FL]). VENEZUELA: Aragua (Rancho Grande); Delta (Orinoco Delta); Bolívar (Canaima). TRINIDAD: Port

of Spain (Port of Spain [Wheeler and Bequaert, 1929]); *Nariva* (Northern Range). GUYANA: *Dememera-Mahaica* (Kaieteur, Dunoon); *Essequibo* (Essequibo); *Cuyuni-Mazaruni* (Kartabo, Kartaba Point, Bartica, Kamakusa, Oko River [Cuyuni Tributary]); *Mazaruni-Potaro* (Takutu Mountains); *Bartica* (Penal Settlement [Wheeler, 1918b]); state unknown (Chenapown [Chenapowu?]). SURINAME: *Kerie* (King Fredrick William IV Falls, Courantyne); *Northwest Division* (Wauna and Tokomaru Region). FRENCH GUIANA: *Cayenne* (Conamani, W of Sinnamarie [Forest Patagaei]). BOLIVIA: *El Bení* (Tumupasa, Rurrenbaque, Cachulata Esperanza); *Santa Cruz* (35 k SSE Flor de Oro). BRASIL: *Amazonas* (Benjamin Constant, Manaus, Manaus to Itacoatiara Road [Km. 23], 20 k NE Manaus, 66 k N Manaus); *Acre* (Rio Branco [Wheeler & Bequaert, 1929]); *Rondônia* (Rio Madeira, Madeira-Mamoré railroad [Mann, 1916], 62 k SW Ariquemes, Porto Velho); *Pará* (Manaus [Mann, 1916]); *Bahia* (Ilhéus, Caravellas [Forel, 1912]); *Mato Grosso* (3 k E Diamantino). Kempf (1972) also lists *Amapá*, *Minas Gerais* and *Rio de Janeiro*. Specimens in the USNM were intercepted at the Philippine Islands.

HABITAT

Pachycondyla unidentata is a relatively common species found in habitats ranging from grasslands (Quiroz-Robledo and Valenzuela-González, 1995), to dry forest, primary rain forest, lowland rainforest,

mature tierra firme forest, tropical evergreen forest and in a forest ravine, at elevations ranging from 20 - 1200 meters elevation.



Map 87. *Pachycondyla unidentata*.

BIOLOGY

This species nests in hollow twigs (in the vegetation and on the forest floor) and in rotten logs and stumps. A nest was found in litter on palm leaves. It occurs in areas with sandy soils and can be collected in leaf litter. Sexuials were found in nests in February - March (Costa Rica), March (Perú), May (British Guyana), June (Colombia, Perú, Brasil), July (Venezuela), July and August (México), August (Guatemala), September (Nicaragua, British Guyana), November (French Guiana) and December (Trinidad, Perú). Loose winged sexuials were collected in February (Perú), April (México), May (Costa Rica) and

August (México). Wheeler (1918) reports that Beebe found dealate females in September in British Guyana. Other dealate females were collected in January (Guyana), June (Ecuador), August (Costa Rica) and November-December (Perú). It is very active and stings rather severely when handled (Wheeler and Bequaert, 1929). Foragers are found on low vegetation in the rainforest and can be collected in baits in the vegetation.

It nests in a number of plants, including a 1-meter tall *Cordia nodosa* [Boraginaceae], in *C. hispidissima* (Wheeler and Bequaert, 1929), in *Cecropia membranacea* [Cecropiaceae], and *C. polystachya*. It is common in the state of Chiapas, México, where it nests in the bulbous-based *Tillandsia* (Brown, 1957) [Bromeliaceae]. Wheeler (1942) re-reported it nesting in the petiolar swellings of *Triplaris paniculata* [Polygonaceae]. It was found nesting in the stems of *Clibadium microcephalum* (Compositae, Heliantheae), excavated by the beetle, *Scolytodes elongates* [Scolytidae] (Nesom and Stuessy,

1982). Specimens were collected in *Costus laevis* [Costaceae] (Schemske vouchers, LACM). These ants tend the extrafloral nectaries of the perennial monocot *Calathea ovandensis* (Horvitz and Schemske, 1990a) [Marantaceae]. This species lives in the epiphyte *Tillandsia bulbosa* (Dejean et al., 1995) [Bromeliaceae]. Several females were collected on *Byttneria aculeata* [Sterculiaceae] (Costa Rica). Specimens intercepted at the US border [USNM] were collected on bananas, philodendron, in bamboo and in *Cattleya* [Orchidaceae].

They have been collected in the stomach of *Streptoprocne zonaris albicincta* [white collared swift - Apodidae].

ETYMOLOGY

The species name is based on two Latin words, *unus*, meaning one and *dentatus*, meaning toothed or pointed, possibly referring to the larger apical tooth of the mandible of the worker and female. It may be based on the anterior medial angle of the clypeus, which overhangs the anteclypeus.

Pachycondyla venusta (Forel)

Figures - **Worker**: 88 (side view of postpetiole), 188 (side view), 190 (petiole), 672 (head), 673 (metasternal process); **Map** 88

emiliae species complex

Neoponera venusta Forel, 1912:38-39, ♀, Brasil, Espírito Santo [lectotype designated, MHNG]; *Pachycondyla venusta*: Bolton, 1995:311

DISCUSSION

Worker

The worker is a *small* (total length 5 mm) *black* ant with *orange mandibles, antennae and legs*, showing a *sharp contrast between the colors*. The mandible has about 11 teeth, the anterior border of the clypeus is broadly rounded with a small lobe which overhangs the remainder of the clypeus. The head is wider anteriorly than posteriorly, the posterior margin is straight. The *malar carina is well-developed* and the *eye is large* (0.3 mm maximum length) located less than $\frac{1}{2}$ diameter from the anterior margin of the head. The *scape is long*, extending approximately $\frac{1}{3}$ length past the posterior lateral corner. The *pronotal shoulder forms a weak carina*, the *mesosoma is impressed at the metanotal suture*. The *anterior face of the petiole is nearly straight*, the *posterior face broadly convex and rounded*, both faces meet at the dorsum and form a poorly defined dorsal face. The *stridulatory file is*

present on the second pretergite. The metasternal process consists of two broad short widely spaced, but incurved processes.

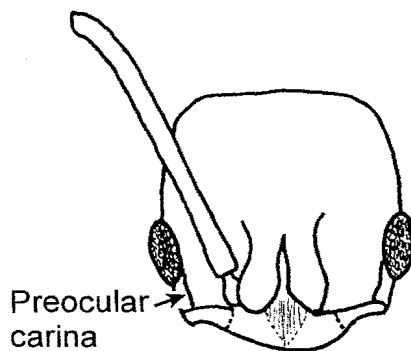


Fig. 672. Head of a worker of *P. venusta* (Espírito Santo, Brasil, MCZC).

Long (about 0.3 mm in length) erect hairs are present on the mandibles, clypeus, scapes, dorsal and ventral surfaces of the head, mesosoma, gaster and legs. Appressed fine golden pubescence is present on the head, dorsum of the mesosoma and gaster.



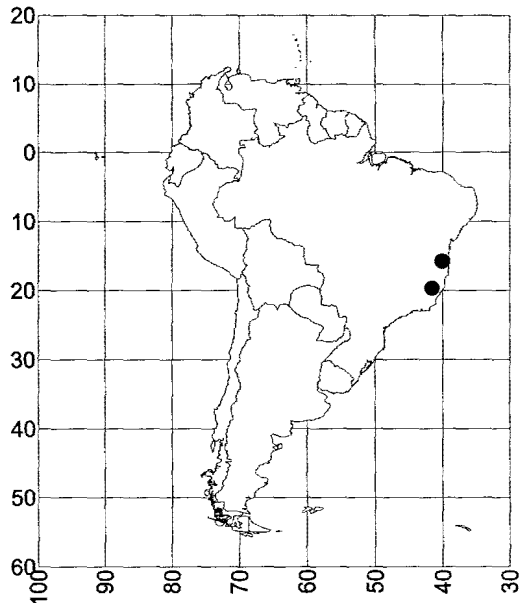
Fig. 673. Metasternal process of a worker of *P. venusta* (Espírito Santo, Brasil, MCZC) as seen from behind.

The mandibles are smooth and glossy with scattered punctures, the head is densely and evenly punctate, the dorsum of the pronotum and mesonotum are punctate similar to the head, the dorsum of the propodeum is very finely punctate, the side of the pronotum is smooth and glossy with the sculpture abruptly separated from that of the dorsum of the pronotum by the carina, most of the mesopleuron is smooth and glossy, the upper half of the side of the propodeum is covered with longitudinal striae, the lower half is mostly smooth and glossy. The anterior face of the petiole has fine striolae, the striae on the side of the petiole are poorly defined, leaving the surface moderately shining, the posterior face is mostly smooth and glossy, but with poorly defined transverse striae, the gaster is punctate and moderately shining.

Female and Male
Unknown.

COMPARISON

It is difficult to place *P. venusta* in a species complex. The angulate anterior border of the clypeus, the presence of a malar carina, carina on the pronotal shoulder, the stridulatory file on the second pretergite, horizontal striae on the posterior face of the petiole, as well as the punctate surfaces, especially the head and dorsum of the pronotum, all suggest that this species is a member of the *crenata* species complex. On the other hand the depressed metanotal suture and the circular propodeal spiracle place it in the *emiliae* species complex.



Map 88. *Pachycondyla venusta*.

The impression at the metanotal suture would separate *P. venusta* from members of the *crenata* species

complex. The shape of the petiole is nearly identical to that of the Central and South American *P. pergandei*. The two species can be easily separated by their distributions. Additionally the mandibles of *P. venusta* are smooth and polished, whereas they are distinctly and finely striated in *P. pergandei*. In addition the mesopleuron is smooth and polished, not striated as it is in *P. pergandei*.

Pachycondyla venusta is closely related to *P. schultzi*. It can be easily separated by the predominantly smooth and shiny mesopleuron, which is completely horizontally striate in *P. schultzi*. The petiole has a relatively sharp apex, not a broad apex with a flattened dorsal face as in *P. schultzi*.

Pachycondyla venusta is even more similar to *P. concava*, but can be easily separated as it lacks the concave anterior face of the post-

petiole found in *P. concava*. It also lacks the medial sharp lobe on the anterior edge of the clypeus. The females and males cannot be compared, as they are unknown in all three species.

DISTRIBUTION

BRASIL: *Espírito Santo* (locality unknown, Santa Teresa [MCZC]); *Bahia* (Ilhéus [MCZC], REBIO UNA [MCZC]).

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

The species name comes from the Latin word *venustus*, meaning beautiful, which describes this attractive species.

Pachycondyla verenae (Forel)

Figures - **Worker**: 163 (mesosoma), 169 (side view), 171 (tip of gaster), 674 (head), 675 (metasternal process); **Female**: 676 (side view), 677 (head); **Male**: 291 (side view), 292 (head); **Map** 89

apicalis species complex

Neoponera apicalis var. *verenae* Forel, 1922:90, ♀, Panamá (without specific locality); [lectotype worker, 1 paralectotype worker designated, MHNG]; considered junior synonym of *P. apicalis* by Brown, 1957:230 and Bolton, 1995:311; new status: Wild, 2005:10-13

Neoponera (Neoponera) obscuricornis: Mann, 1916:410 (misidentification)

DISCUSSION

Worker

The workers are *moderate sized* (total length 8 - 9 mm) *black* ants. The *mandibles are mostly smooth and glossy*; the *remainder of the ant is dull*, which forms a strong contrast. The *malar carina is well developed and sharp*. The *eyes are large*, occupying more than $\frac{1}{3}$ of the length of the side of the head. The *scapes extend about $\frac{1}{3}$ length past the posterior lateral corner*. The *dorsum of the mesosoma is nearly straight, but is slightly depressed at the metanotal suture*. The *shoulder of the pronotum is swollen but does not form a distinct carina*. The *propodeal spiracle is elongated and slit-shaped*. The *petiole is thick* when viewed in profile with both the anterior and posterior faces being convex and rounded and meeting at a *rounded apex*. The

posterior lateral borders of the petiole meet at a sharp margin, which nearly forms a carina. The *metasternal process is formed of two wide lobes, which are more separated near the apex than at the base*. The *lower inner margin has oblique striae*.

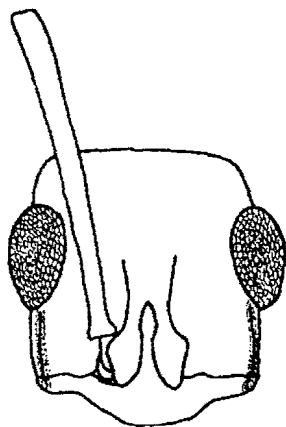


Fig. 674. Head of a worker of *P. verenae* (Cauca, Colombia, MCZC).

Erect hairs are sparse, with a few on the mandibles, clypeus, coxae, femora, tibiae (many of the hairs on the legs are suberect), ventral surface of the gaster and posterior $\frac{1}{3}$ of the gaster. *Erect and suberect hairs are absent* on the side of the head (a few may be present on the cheeks or on the malar area) the dorsum of the mesosoma, the petiole, the first and on most of the second terga.



Fig. 675. Metasternal process of a worker of *P. verenae* (CWEM), as seen from behind.

The mandibles of the worker are finely striate and moderately shining. The remainder of the ant is either *very finely striate or very finely punctate and dull*.

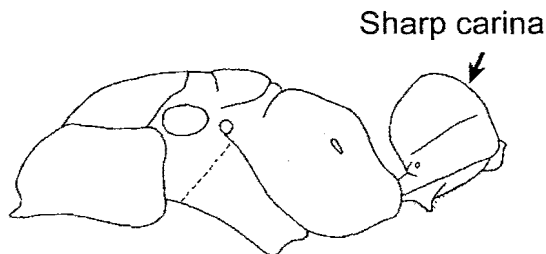


Fig. 676. Mesosoma and petiole of a female of *P. verenae* (Valle del Cauca, Colombia, CWEM).

Female

The female (undescribed) is similar to the worker, lacking erect hairs on the dorsum of the mesosoma, the petiole and most of the dorsum of the gaster. The large eyes and the well-developed carina anterior to the eye would further assist in recognizing this species. The posterior lateral edges of the petiole form a sharp carina. The total length is 12 mm, the head length is 2.4 mm and the head width is 1.7 mm. The eyes are large (0.86 mm maximum diameter) located less than one diameter from the anterior edge of the head. The ocelli are small (the diameters of the medial and lateral ocelli are 0.09 mm). The scape (2.7 mm) extends about $\frac{1}{3}$ length past the posterior lateral corner of the head. The carina on the side of the pronotum is sharp and slightly overhangs the side of the pronotum. The propodeal spiracle is slit-shaped and the stridulatory file is well developed.

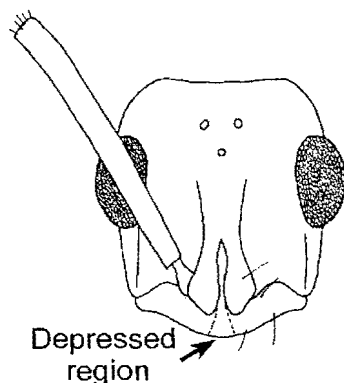


Fig. 677. Head of a female of *P. verenae* (Valle del Cauca, Colombia, CWEM).

The sculpture is similar to that of the worker.

Male

The male (undescribed) is a *moderately large* (total length about 12 mm) *black* specimen. The *cavity at the base of the mandible is relatively large* with the depressed area being more than $\frac{1}{2}$ the length of the mandible. The head length is 1.5 - 1.6 mm; the head width 1.3 - 1.4 mm. The eyes are relatively small with a diameter of 0.8 mm (side view). The ocelli (maximum diameters of the medial and lateral ocelli 0.2 mm) are separated by about one diameter. The pronotal shoulder is swollen but does not form a margin. The *Mayrian sutures are developed* but do not connect in the center of the scutum; the parapsidal sutures are well developed. The propodeal spiracle is slit-shaped. The petiole is rounded dorsally and the two faces (anterior and posterior) are about equal in length and shape. The posterior lateral regions of the petiole are broadly rounded and not sharply bent as they are in the worker and the female. The stridulatory file on the second pretergite is well developed and even slightly wider than it is in the worker and female.

Most of the bodily surfaces including the sides of the head, the dorsum of the mesosoma, the dorsum of the petiole and all surfaces of the gaster are covered with short (most about 0.25 mm in length) flexuous golden or silver hairs.

The tiny mandibles are weakly shining and the remainder of the body is dull.

It would be difficult to recognize the male without workers or females.

COMPARISON

The lack of erect hairs on the dorsum of the mesosoma, petiole and first tergum of the worker and the female of *P. verenae* would separate this species from all of the others of the genus *Pachycondyla*, except for *P. apicalis*, *P. obscuricornis*, *P. bucki* and *P. magnifica*. *Pachycondyla verenae* can be separated from the last two species by the large eyes, which occupy more than $\frac{1}{3}$ of the side of the head. The workers and females of *P. verenae* can be separated from *P. apicalis* as the apex of the funiculus is usually dark, but may be reddish brown, but is never yellow as it is in *P. apicalis*. The posterior lateral edges of the petiole of the worker and female of *P. verenae* are sharp and may even form a carina, whereas in *P. apicalis* this area is mostly rounded.

This species has been consistently confused with *P. obscuricornis*. Wild (2005) recently resolved the confusion between the species. The two species can be easily separated as the posterior lateral margins of the petiole of *P. verenae* are sharp, those of *P. obscuricornis* are broadly rounded. Additionally *P. verenae* lacks the dense pubescence on the hypopygium, which is present on the hypopygidium of *P. obscuricornis*. *Pachycondyla verenae* is much more common than *P. obscuricornis*.

The male of *P. obscuricornis* is completely dark brown or black, including the entire antenna, which would separate it from that of *P. apicalis*, in which the antenna is completely pale brown. The side of the petiole lacks the rugae that are found in the male of *P. apicalis*. Thus it is unlikely that the male would be confused with the other two closely related species. It may be difficult to separate it from the unknown male of the rarely collected *P. cooki* from Colombia south to Brasil.

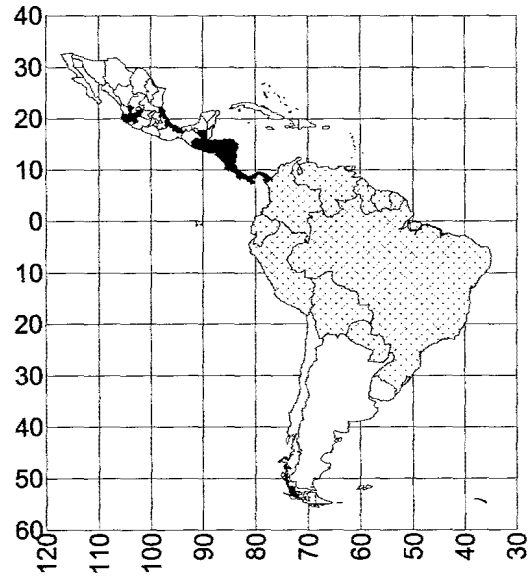
DISTRIBUTION

MEXICO: *Veracruz* (Pueblo Nuevo nr. Tezonapa, Las Hamacas Los Tuxtlas [Quiroz and Valenzuela, 2003], 17 k N Santiago Tuxtla, trail above Presidio, Wild [2005] includes Laguna Encantada); *Jalisco* (Puerto Vallarta); *Guerrero* (Wild, 2005). **GUATEMALA:** *Alta Vera Paz* (Estación Biológica Lechua). **EL SALVADOR:** *La Libertad* or *Chiquimula* (5 mi N Quezaltepeque). **HONDURAS:** *Atlántida* (14 km S. La Ceiba, El Boquero, Lancetilla nr Tela); *Colón* (Sangrelaya). **NICARAGUA:** *Granada* (Granada); *Río San Juan* (5.1 mi SE El Castillo [Bartola]); *Rivas* (Pica Pica); Wild (2005) lists *Atlántico Sur* (Masilena near Bluefields). **COSTA RICA:** *Alajuela* (Emery, 1890b; Forel, 1899) (Monteverde Cloud Forest Reserve); *Heredia* (Río Toro Amarillo vic. Guápiles, Parque Nacional Braulio Carrillo, Estación Biológica La Selva, 10°20'N 84°4'W); *Cartago* (Turrialba, 8 k ESE Moravia); *Puntarenas* (Parque Nac-

ional Amistad, Parque Nacional Corcovado, Golfito, 5 k W Rincón, Turrialba Pocotel Lodge, Reserva Biológica Carara, Ojo de Agua); *Limón* (Sector Cerro Cocori, Zent, 10 k ESE Moravia); Wild (2005) lists *Cartago* (8 k ESE Moravia, Turrialba); *Limón* (Río Toro Amarillo, Zent); *Puntarenas* (Llorona). **PANAMA:** *Bocas del Toro* (Continental Divide); *Chiriquí* (Hartman's Plantation, Ojo, 5 k N Santa Clara); *Coclé* (El Valle, La Mesa above El Valle, El Café); *Colón* (Fort Sherman, Santa Rita Ridge); *Darién* (Caña Station, Estación Peresinico, Parque Nacional Darién); *Panamá* (Canal area, Cerro Azul, Cerro Campana, Ancon, Cerro Jefe, El Llano-Cartí Road, Barro Colorado Island, West Gamboa); *San Blas* (Nusagandi); *Veraguas* (5.5 k W Santa Fé); Wild (2005) lists *Chiriquí* (Bugaba); *Coclé* (El Copé); *Colón* (Gamboa, Canal Zone); *Panamá* (Barro Colorado Island). **COLOMBIA:** *Valle del Cauca* (Río Tatabro, Medio Calima, Bajo Calima, Buenaventura, Anchicayá Viejo); *Huila* (Rivera, 4 k NE Rivera, 3 k E Rivera, Rivera Hot Springs, Finca Piedamonte); *Meta* (75 k E Puerto López, Carimagua, Reserva La Macarena [Fernández and Schneider, 1989]); *Bolívar* (Cartagena); Fernández (1990) lists *Antioquia*, *Amazonas* and *Chocó*, in addition to some of the states listed above; Wild (2005) notes *Cauca* (Isla Gorgona, near Yanaconas); *Chocó* (10 k SW San José del Palmar, Río Torito, Finca Los Guadales); *Magdalena* (2-3 k above Minca, 2 k ESE Minca, 4 k N San Pedro); *Meta* (Transecto

Sumapaz); *Valle del Cauca* (km 98 on old road Cali to Buenaventura). ECUADOR: *Pichincha* (ENDESA Forest, 13.5 k NW Santo Domingo, 12.3 k SE Santo Domingo, La Unión del Río Toachi); *Pichilingue* (Los Rios); *Sucumbíos* (2.84 k N Shushufindi, Sacha Lodge, Dureña); *Napo* (Tiputini Biodiversity Station, Yasuni National Park); Wild (2005) includes *Napo* (Jatun Sacha); *Pichincha* (1 mi W Santo Domingo de los Colorados). PERU: *Huánuco* (Monson Valley [Tingo Maria], 43 mi E Tingo Maria, 5 mi SW Las Palmas); *Junín* (18 mi NE La Merced [Colonia Perené]); *Madre de Dios* (Parque Nacional Pampas de Heath, Tambopata Research Center, Río Tambopata [20 k S Puerto Maldonado], Estación Biológica Cocha Cashu); Wild (2005) includes *Madre de Dios* (15 k NE Puerto Maldonado, 10 k S Puerto Maldonado). VENEZUELA: *Bolívar* (Canaima, Wild [2005] lists 49 k ENE Tumeremo, Río Grande, Guárico Parque Nacional Guatapo). FRENCH GUIANA: *Cayenne* (35 k W Sinnamary). GUYANA: *Dememera-Mahaiica* (Kaieteur); *Cuyuni-Mazaruni* (Kartabo); Wild (2005) lists *Cuyuni-Mazaruni* (Bartica, Camaria, Cuyani River, Kamakusa); *Demerara-Mahaiica* (Dunoon). BRASIL: *Rondônia* (Porto Velho and Abuná [Mann, 1916]); *Pará* (Mosqueiro, Belém); *Mato Grosso do Sul* (3 k NW Posto Tagi, 8 k SE Ponta Porá, 3 k N Nova Alvorada, 3 k SW Cruzaltina, 26 k E Campo Grande), 3 k NW Picadinha); *São Paulo* (Rio Claro, 33 k SE

Campinas); Wild (2005) lists the states of *Amazonas* (80 k NNE Manaus, Igarape Maua, km 34 Manaus to Itacoatiara Highway); *Bahia* (CEPEC/CEPLEC, Rodovia Ilhéus/Itabuna); *Goiás* (Faz Acerio Jatai, km 46 on road to Goiana); *Rondônia* (Rio Madeira); *Distrito Federal* (Brasilia [Sandoval and Zambrano, 2007]); *São Paulo* (Agudos, Cachoeira das Emas,



Map 89. *Pachycondyla verenae*.

Piraçununga, Est. Ecológica Mogi Guaçu, Rio Claro). BOLIVIA: *Santa Cruz* (Buena Vista, 3.7 k SSE Buena Vista); Wild (2005) includes the following localities from the state of *Santa Cruz*: 10k NW Terevinto, 35 k SSE Flor de Oro, Las Gamas and Noel Kempf Mercado. PARAGUAY: *Canindeyú* (Colonia Once de Septiembre). Wild (2005) includes *Amambay* (Parque Nacional Cerro Corá); *Caa-guazú* (Pastoreo); *Canindeyú* (Colonia

11 de Setiembre, Reserva Natural Bosque Mbaracayú, Lagunita, Aguara Ñu, Tendal); *Misiones* (Ayolas); *Paraguari* (Parque Nacional Ybycuí).

HABITAT

Pachycondyla verenae is a common species that is found in tropical rain forests, subtropical forests, riparian habitats, riparian areas in the llanos [grasslands], gallery forests and wet forests to open urban environments and cacao plantations, from 0 to 925 m elevation. Wild (2005) notes that southern populations seem to be more commonly collected in open habitats while northern populations are more likely be found in forests.

BIOLOGY

Pachycondyla verenae nests in rotten wood and logs (Traniello and Hölldobler, 1984; Wild, 2002), in twigs and under stones. One nest was under fresh cow manure. Brood and winged males were found in nests in July (Ecuador). Males were collected in nests in May, June and July (Panamá). Alate females were collected in July and October (Costa Rica). A male was collected in June (Costa Rica). Dealate females have been collected in April (Costa Rica), May, June and July (Panamá). Colonies are small, with about 40 (Gobin et al., 2003) to 100 workers (Fresneau, 1984; Wild, 2005). Nests are polygynous (Fresneau, 1984; Traniello and Hölldobler, 1984). Düssmann et al. (1996, listed as *P. obscuricornis*) found that intercastes occur in nests

(between workers and females), which mate and lay eggs and which are distinct from ergatoid females (permanently wingless caste) and gamergates (mated, egg-laying workers). Workers are commonly found foraging on the ground and can be extracted from leaf litter.

Pachycondyla verenae is a very active, alert, predaceous and scavenging species, which can carry droplets of liquids between the mandibles (Hölldobler, 1985; Wild, 2005). It preys on a wide variety of insects, including crickets, cockroaches, termites, Lepidoptera larvae and parts of insects (Traniello and Hölldobler, 1984; Oliveira and Hölldobler, 1991; Gobin et al., 2003; Wild, 2005; Longino website). They are an important predator on the termites *Nasutitermes costalis* (Traniello, 1981). A group of foragers were feeding on carrion of the large, green tropical lizard *Iguana iguana*. Workers forage visually and can detect the E-vector of linearly polarized skylight (Duelli and Duelli-Klein, 1976) and there is no recruitment to food sources (Traniello and Hölldobler, 1984). Baena (1993) found them eating the product of the decomposition of fungi that were attached to branches of trees. Foragers are often collected in pitfall traps, leaf litter extractions, as well as baits on the soil surface.

Pachycondyla verenae has been collected in the ant plant *Cecropia hispidissima*.

Pachycondyla verenae (listed as *P. obscuricornis*) is mimicked by the clubionid spider *Castianeira mem-*

nonia (Reiskind, 1977). They are preyed on by the moss toad *Bufo coniferus* in Nicaragua (Wild, 2005). They are parasitized by a head-decapitating phorid fly in the genus *Apocephalus* (species 84) (Brown and Feener, 1998).

BEHAVIOR

Workers and virgin females in a laboratory colony were very aggressive to each other (Oliveira and Hölldobler, 1991), which has a significant energetic cost to the colony (Gobin et al., 2003). There is considerable aggression between egg laying workers when a nest queen dies (Oliveira and Hölldobler, 1991). The workers escape when a nest is disturbed and later return for the brood. They have a painful sting.

A number of the glands in this species have been studied, including the pygidial gland (Traniello and Hölldobler, 1984 - listed as *P. obscurecornis*), the metapleural gland (Hölldobler and Engel-Siegel (1984) and the labial gland (Lommelen et al., 2002, 2003). Hölldobler and Engel-Siegel (1982) described the tergal and sternal glands of the male. The pygidial gland produces a pheromone which is apparently transferred to the posterior legs by self grooming behavior and used to lead other ants during nest relocation (Traniello and Hölldobler, 1984).

ETYMOLOGY

This species was named in honor of an unspecified woman named Verena.

Pachycondyla vieirai new species

Figures - **Worker**: 22 (propodeum), 206 (side view), 188 (top view), 678 (head, top, frontal and side views), 679 (base of scape), 680 (petiole and gaster, top view); **Map** 90

vieirai species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *medium-sized* (total length 8 mm) *dark brown* specimen with *lighter brown appendages*. The mandible has about 12 teeth, most of the teeth except the apical tooth, are poorly defined. The anterior border of the clypeus is broadly convex. The *head is relatively long* (head length 1.74 mm, head width 1.24 mm) and the *eye is relatively large* (0.25 mm) located about $1\frac{1}{2}$ diameter from the anterior edge of the head (side view). The *malar carina is absent*. The posterior border of the head is broadly rounded, but a *well-developed nuchal collar or flange* is present. The *scape is relatively long* (2.42 mm) and extends nearly $\frac{1}{2}$ length past the posterior lateral corner of the head. The *pronotal shoulder is rounded*, the mesonotum is relatively short and forms an arc when viewed from above, the *metanotal suture is depressed and breaks the sculpture* on the dorsum of the mesosoma. The dorsal face of the propodeum is

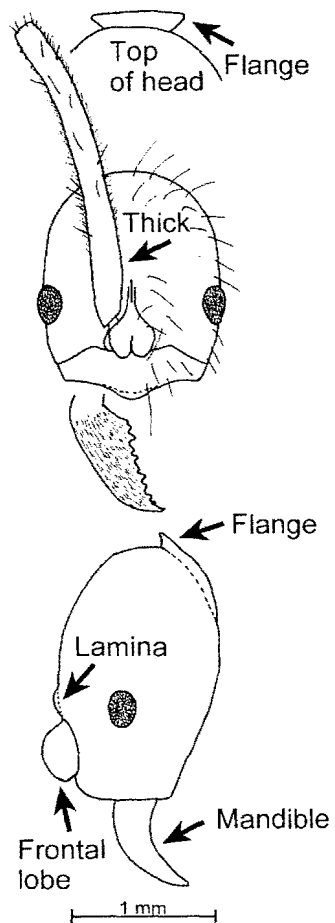


Fig. 678. Head of the holotype worker of *P. vieirai*, as seen from the top (back of the head) front and from the side.

slightly convex and is separated from the posterior face by an angle, formed from the two posterior lateral carinae, which pass and meet dorsally. The *propodeal spiracle* is tiny and circular. The *petiole* is very broad when viewed in profile with a nearly vertical anterior face, a broadly rounded dorsal face and rounded posterior face; the subpetiolar process is very long, extending more than half the length of the bottom of the petiole. The anterior face of the postpetiole is broadly rounded into the dorsal face.

Erect hairs are present on the dorsal and ventral surfaces of the head, the clypeus, the scapes, the dorsum of the mesosoma, the legs, including the tibiae, the dorsum of the petiole and all surfaces of the gaster. Appressed yellowish hairs are present on the head, dorsum of the mesosoma, petiole and gaster.

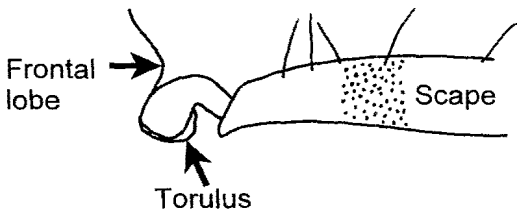


Fig. 679. Base of the scape of the holotype worker of *P. vieirai*. Only a small portion of the sculpture is shown.

All surfaces are roughly sculptured, most with scattered coarse punctures, the side of the mesosoma and petiole are weakly shining and the punctures on the dorsum of the second gastral tergite are elongated.

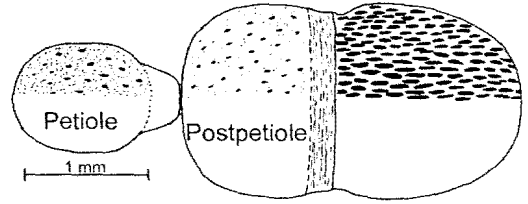


Fig. 680. Dorsum of the petiole, postpetiole and second gastral tergite of the holotype worker of *P. vieirai*, showing the scattered punctures on the petiole and postpetiole, and the elongated punctures on the second tergite of the gaster.

Female and Male

Unknown.

COMPARISON

Pachycondyla vieirai is a very unusual easily recognized species. The tiny circular propodeal spiracle and the elongated petiole would separate it from all of the others in the genus. *Pachycondyla vieirai* could be confused with members of *crenata* species complex, but the shape of the propodeal spiracle and the lack of the malar carina would easily distinguish it. *Pachycondyla vieirai* is not closely related to *P. rupinicola*, and can be easily separated by the presence of scattered coarse punctures, which are completely lacking in *P. rupinicola*.

DISTRIBUTION

Known only from the type locality in central ECUADOR (*Los Rios*).

Map 90. *Pachycondyla vieirai*.**HABITAT**

Unknown.

BIOLOGY

Unknown.

TYPE SERIES

Holotype worker (QCAZ),
 ECUADOR. LOS RIOS, C.C.R.
 PALENQUE 29m, 79°45'10"W
 01°25'56", 01SEP1976 T. DeVries.

ETYMOLOGY

Named in honor of our myrmecological colleague and close friend Juan Vieira, who has loaned us numerous ants from Ecuador including this specimen.

Pachycondyla villosa (Fabricius)

Figures - **Worker**: 103 (metasternal process), 105 (larva), 109 (petiole), 114 (pronotum, viewed from above), 264 (head), 267 (mesonotum), 681 (side view); **Female**: 104 (wing), 682 (side view), 683 (head); **Male**: 12 (genitalia), 285 (head, side view), 295 (side view), 684 (head, frontal view); **Map** 91

foetida species complex

Formica villosa Fabricius, 1804:409 ♀, Central America; *Ponera villosa*: Roger, 1861a:1-3 ♀, ♀; *Pachycondyla villosa* Mayr, 1862:720, Mayr, 1863:440; Dalla Torre, 1893:35; Forel, 1899:14; *Neoponera villosa*: Emery, 1901a:47; Wheeler and Wheeler, 1952:615, larva; *Neoponera (Neoponera) villosa*: Emery, 1911:72-73; Mann, 1916:412; *Pachycondyla villosa*: Bolton, 1995:311

Ponera bicolor Guérin-Ménéville, 1844:424, ♀, México (synonymy by Roger, 1861a:1)

Ponera pilosa Smith, 1858:95, ♂, Brasil, Villa Nova (synonymy by Roger, 1861a:1)

Ponera pedunculata Smith, 1858:96, Plate 6, Fig. 25, ♀, Brasil, Rio Constantia [worker seen, was compared to type by Brown, MCZC] (synonymy by Roger, 1861a:1)

DISCUSSION

Worker

Workers of this species are *large* (total length about 15 mm) *black* ants with *black or reddish brown tibiae*. The anterior border of the clypeus is convex but is concave medially. The *malar carina is well developed* and sharp, shining and well marked against a background of golden appressed pubescence. The maximum diameter the eye is about one fourth the length of the side of the head and is located more than one maximum diameter from the insertion of the

mandible (side view). The scape extends approximately the first two funicular segments past the posterior lateral corner of the head. The *carina on the pronotal shoulder is sharp* and slightly overhangs the side of the pronotum. The *metanotal suture is well marked* on the dorsum of the mesosoma and depresses the level slightly below the remainder of the mesosoma. The *propodeal spiracle is slit-shaped*. The posterior face of the propodeum is separated from the side of the propodeum by a definite carina. The *petiole is thick* when viewed in profile, with a *vertical anterior face*

villosa southern USA (Texas) to southern Brasil

and a *convex broadly rounded posterior face that meets the anterior face at the anterior point of the apex of the petiole*. The posterior lateral edges of the petiole nearly form carinae. The *stridulatory file is well developed on the second pretergite*.

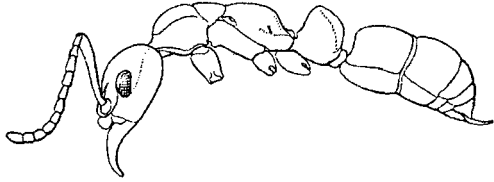


Fig. 681. Side view of a worker of *P. villosa* (from Creighton, 1950).

Erect hairs are abundant on most surfaces, including the dorsal and ventral surfaces of the head, the antennal scapes, the posterior border of the head, the dorsum of the mesosoma, dorsum of the petiole, all surfaces of the gaster, the hairs on the legs are either erect or suberect. Appressed golden pubescence is abundant on most surfaces, especially the mesosoma, petiole and gaster.

The head is covered with coarse punctures, which are somewhat aligned in rows. The dorsum of the mesosoma has finer punctures, and surfaces which are not hidden by appressed pubescence are glossy and shiny. The side of the mesosoma is mostly punctate, but the surfaces are nearly completely hidden by appressed pubescence. The petiole is finely punctate with surfaces not hidden by appressed pubescence, being shining.

The dorsum of the gaster is punctate, but most surfaces are densely covered with appressed pubescence.

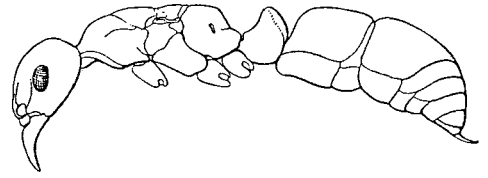


Fig. 682. Side view of a female of *P. villosa* (from Creighton, 1950).

Female

The female *is larger* (about 17 mm total length) *than the worker*, usually *black with reddish brown femora and appearing somewhat golden due to the abundant appressed pubescence*. The anterior border of the clypeus is slightly concave medially and the *malar carina is well developed*. The distance between the insertion of the mandible and the anterior border of the clypeus is greater than the maximum diameter of the eye (side view). The *ocelli are well developed* and the scape extends slightly past the posterior lateral corner. The *pronotal carina is very well developed, sharp and overhangs the side of pronotum*. The metanotal suture is well developed and forms a well-defined metanotum. The *petiole is shaped as in the worker*. The wing is similar to that of other members of the genus.

The pilosity and sculpture are similar to that of the worker.

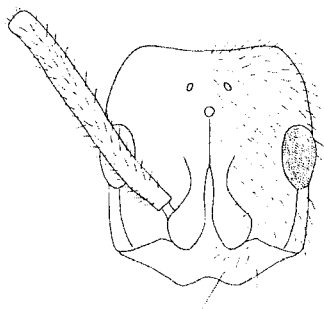


Fig. 683. Head of a female of *P. villosa* (Veracruz, México, CWEM).

Male

The male is a *large* (total length 14 mm) predominantly *black* specimen. The anterior border of the clypeus is slightly concave. The ocelli are moderately large (maximum diameter of the median ocellus is 0.19 mm, located 0.19 mm from the lateral ocellus, whose diameter is 0.21 mm). The *pronotal shoulder is swollen*, the *propodeal spiracle is slit-shaped*. The *petiole is thick* when viewed in profile with a *nearly straight anterior face* and a *broadly rounded posterior face*, which form a blunt rounded apex. The subpetiolar process consists of an angulate lobe, gradually diminishing in size posteriorly. The *stridulatory file is present* on the second pretergite, the arolia are well developed.

Erect hairs are moderately abundant on the head, mesosoma, petiole and gaster; appressed golden pubescence is dense on most surfaces.

Most surfaces are finely coriaceous and moderately shining.

The *males come in two color forms*: completely black and black

with yellow legs and a yellow gaster. It is possible that two species are involved.

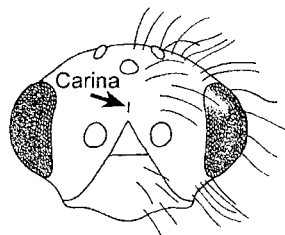


Fig. 684. Head of a male of *P. villosa* (Cauca, Colombia, IAVH).

COMPARISON

Pachycondyla villosa vies with *P. harpax* for being the most common and widely distributed member of the genus in the New World. *Pachycondyla villosa* is much larger than *P. harpax* (total length of the worker, female and male of *P. harpax* < 10 mm). Workers of *P. villosa* can be easily confused with *P. holcotyle*, *P. theresiae*, and *P. foetida*. The side of the petiole of *P. villosa* is without any evidence of striae, which are present in the other three species. The first two of these three species are also smaller (total length < 11 mm), *P. foetida* is approximately the same size. *Pachycondyla foetida* also has horizontal striae on the posterior face of the petiole, which are lacking in *P. villosa*. *Pachycondyla villosa* could also be misidentified as *P. bugabensis*, as both lack striae on the sides and posterior face of the petiole. It is much larger (total length of workers of *P. bugabensis* is < 10 mm) and the legs are dark red (ferruginous red in color

in *P. bugabensis*).

It is easy to confuse this common species with several other species. For example, smaller specimens with striae on the dorsum of the head between the eyes are *P. lineaticeps*, specimens with a rectangular shaped petiole, a concave pygidium with horizontal lateral striae are *P. impressa*, specimens with two lateral angulate processes on the pygidium are *P. crassinoda*. It is mostly dull in color, not shiny black as in the relatively large *P. commutata*, *P. laevigata* and *P. marginata*. *Pachycondyla fisheri* is a similar size, but lacks the preocular and pronotal carinae.

It is similar to the closely related *P. curvinodis* and *P. inversa*, but can be separated from both species by the straight anterior face of the petiole (concave in the other two species). Mariano et al. (2000) compare the cytogenetics of *P. villosa* and *P. inversa*.

The males of three common species are very similar: *P. villosa*, *P. striata* and *P. impressa*. *Pachycondyla villosa* males can be separated from the males of the other two species by the presence of the relatively large sharp subpetiolar process, which is blunt and rounded or only angulate anteriorly in the other two species. The erect hairs of *P. villosa* are not as abundant as they are in *P. striata* and the petiole is not covered with rugae as it is in *P. impressa*. The males of the closely related *P. curvinodis* and *P. inversa* are unknown, but it could be expected

that the anterior faces of the petioles of these two species would be concave.

DISTRIBUTION

UNITED STATES: *New York* (New York City [boat from Panamá Zone, MZCZ]); *Texas* (13 k S Falfurrias, Jct. FM 509 & 106, 6.5 mi N Jct. FM 292 & 106, Sabel Palm Grove, 15 mi E Rio Hondo, Edinburg, Skidmore, Kennedy, Brownsville, 4 mi N Encino, Mission, Kingsville, Santa Ana Nat'l Wildlife Refuge, Bentsen, Rio Grande State Park, Rio Grande City, 10 mi W Boca Chica, near Artesia Wells [Whittaker, 1984], 15 mi NW Alice, 4 mi N Encino, Harlingen, Uvalde, San Diego [Pergande, 1895], Mission). MEXICO: *Tamaulipas* (Altas Cañas to San José Road, Gomez Farias and vicinity, Los Cedros @ Gómez Farias, Ciudad Victoria, 15.08 k SW Ciudad Victoria, Sótano de Molina [Reddell and Cokendolpher, 2001]); *Nuevo Leon* (Horsetail Falls, Monte Chipinque, 20 mi S Linares); *San Luis Potosí* (El Salto, El Pujal, Tamazunchale, Puerto de Lobos, 22 mi E Ciudad de Maíz, 21.34 k NE Ciudad de Maíz); *Sonora* (San Bernardino [Río Maro]); *Sinaloa* (Escuinapa, Mazatlán, Presidio de Mazatlán [Forel, 1899]); *Jalisco* (Estación Biológica Chamela, Puerto Vallarta [male with black gaster, CASC]); *Nayarit* (54 k S Rosamorada, San Blas, 2 mi E San Blas, vicinity of Compostela, Tepic [Pergande, 1895; Forel, 1899]); *Colima* (Armería); *Guerrero* (Puerto Marqués); *Veracruz* (Lalo, Catamaco, origin of Río Atoyac

villosa southern USA (Texas) to southern Brasil

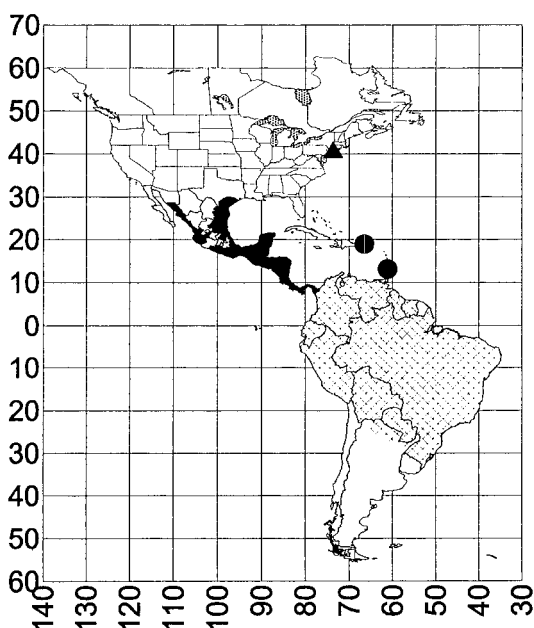
[near Córdoba], Cardel La Mancha, Ozuluama, Mirador, Camarón Barranca, El Palmar, Los Tuxtlas [Quiroz and Valenzuela, 2003], foot of Orizaba [Wheeler, 1942]); *Tabasco* (10 k N Cárdenas, Balancán, Teapa [Forel, 1899]); *Hidalgo* (Jacala); *Oaxaca* (Tehuantepec [La Buena Ventura]); *Chiapas* (Tuxtla Chica, Tapachula, near Tuxtlas Gutierrez); *Campeche* (Grutas de San Antonio [Reddell and Cokendolpher, 2001]); *Quintana Roo* (Reserva Ecológica "El Eden", Reserva Carrillo Puerto, Cenote de Juan Coh [Reddell and Cokendolpher, 2001]; Sian Ka'an [Dejean, 1990], Puerto Morelos [Dejean and Corbara, 1990b]); *Yucatán* (5 k NE Mérida, Chichén Itzá, Cinco de Mayas Cave, 5 km NE Mérida, Kabah, Ruinas de Kabah, Temax [Forel, 1899], Colonia Yucatan, Cueva de Cinco de Mayo [Wheeler, 1938], Actún Silil [Reddell and Cokendolpher, 2001], Actún Xpukil [Reddell and Cokendolpher, 2001]). BELIZE: *Cayo* (Augustine). GUATEMALA: *Sololá* (Patulul); *Izabal* (Zacapa, Chacón Machaca); *Petén* (Tikal, Santa Amelia [Pochuta]); *Alta Vera Paz* (Estación Biológica Lechua); several departments (San Jose, San Jerónimo [Forel, 1899]); *Escuintla* (Mocá, Pantaleón [Forel, 1899]); *Chiquimula* or *Suchitepéquez* (Guatalón). EL SALVADOR: *Sonsonate* (Sonsonate); *La Libertad* (Hacienda Capolinas [5 k NE Quezaltepeque]). HONDURAS: several states (near La Unión); sites in five states (Río Grande); *Yoro* (El Zamorano); *Francisco Morazán* (Augustine, Zamorano); *Atlántida* (Tela,

Lancetilla [Mayr, 1863; Forel, 1899]; Panamá [Forel, 1899]; *Colón* (Prieta). NICARAGUA: *León* (Masaya); *Managua* (Managua), *Granada* (4.3 mi SW San Jorge, Mombacho Volcano); *Zelaya* (La Bodega [near Blue Fields]). COSTA RICA: *Alajuela* (Turrúcares, Hamburg Farm, Jiménez [Emery, 1890b, 1894b; Forel, 1899]); *Limón* (Puerto Limón, vicinity of Guapiles, Tortuguero National Park); *Cartago* (Pucare River, Turrialba); *Puntarenas* (Península Osa, [Parque Nacional Corcovado, Sirena 8°28'N 83° 35'W], Playa Manuel Antonio [6 k S Quepos], Estrella, Sarmiento, Pita); *Heredia* (Río Toro Amarillo vic. Guápiles, La Selva Biological Station [Sandoval and Zambrano, 2007], Puerto Viejo, near Puerto Viejo, 15 k S Puerto Viejo, Finca La Pacífica [near Cañas], San Juan River near Oro Verde Lodge [10 ° 41'N 83° 58'W]); *Guanacaste* (Had. Palo Verde and Río Tempisque, Loma Barbudal, 7 k WNW Bagaces, Palo Verde, Santa Rosa, Santa Rosa National Park); states unknown (La Lola, Libena [Líbano?]). PANAMA: *Panamá* (Barro Colorado Island [male with yellow gaster, CASC], Howard Air Force Base, Parque Soberanía, Marajal [near Colón, Canal Zone]); *San Blas* (Nusagandi); *Colón* (Colón, Santa Rita Ridge [17 k E Trans. Highway], near Cuipo); *Chiriquí* (without locality); *Los Santos* (East slope Cerro Montoso); *Darién* (Caña Station, Mine Trail). COLOMBIA *Guajira* (Río Don Diego, Dibulla [Forel, 1912]); *Antioquia* (Turbo); *Boyacá* (Chiquinquirá); *Cundinamarca* (Bogotá); *Mag-*

dalena (Río Frio, Aracataca, Santa Marta); *Valle del Cauca* (Calabazo [Forel, 1912], Yataco, Puerto Merizalde, Bajo Calima, Bajo Anchicayá, 3.2 k E Río Aguacalara [Old Cali Road], Buenaventura [Sandoval and Zambrano, 2007], 12 mi E Buenaventura, San Cipriano and Aguacalara [Baena, 1993]); *Meta* (Angostura Island [Río Guayabero], Puerto Gaitán, Puerto Lleras, Caña de la Curia, Reserva La Macarena [Fernández and Schneider, 1989]); *Huila* (La Plata); *Amazonas* (Leticia). ECUADOR: *Pichincha* (Quito [Forel, 1921]); *Napo* (11 k W Pano, Tena, Limón Cocha, 1 mi N Limón Cocha, near Dureno, 25.9 k N Jivino Verde, Tiputini Biodiversity Station, Coca); *Sucumbíos* (Limón Cocha Biological Research Station, Shushufindi, Sacha Lodge, Cuyageno); *Pastaza* (Tena - Puyo [km. 36]); *Morona-Santiago* (Gualaquiza); *Tungurahua Oriente* (5 mi S Tena near Napo River); states unknown (Hacienda de Penguel, Río Buena Boisa); many possible states (Esperanza). PERU: *Loreto* (Iquitos, near Iquitos [male with yellow gaster, CASC]); *Huánuco* (Monson Valley [males with black gasters, CASC], Cerros del Sira, Tingo Maria), *Lima* (Callanga), *Cuzco* (La Convención [Escalante, 1993]); *Napo* (Lower Río Napo); *Yurac* (67 mi E Tingo Maria); *Madre de Dios* (15 k NE Puerto Maldonado, 30 k SW Puerto Maldonado, Parque Nacional Pampas de Heath, Avispas, Estación Biológica Cocha Cashu, Colpa Quebrada [near Cocha Cachu]); state unknown (Bagua Cajamarca). VENEZUELA: *Monagas*

(42 k SE Maturín); *Aragua* (Rancho Grande); *Guárico* (Hato Masaguaral [44 k S Calabozo], 16 k S Calabozo); *Barinas* (Barinitas); state unknown (Akuriman); several states (San Esteban [Emery, 1890b]). TRINIDAD: *Nariva* (San Augustine); *Saint George* (North Range); *Nariva* (Nariva Swamp). GUYANA: *Demerara-Mahaica* (Kaieteur); *Cuyuni-Mazaruni* (Kartabo, Kamakusa, Oko River, Forest Settlement [Río Mazaruni]); *Kerie* (Courantyne, King Frederick William IV Falls); *Essequibo* (Río Essequibo). SURINAME: *Kerie* (King Frederic William IV Falls). FRENCH GUIANA *Cayenne* (35 k W Sinnamary). BRASIL: *Amapá* (Kempf, 1972); *Amazonas* (Rio Branco, Igarapé, Manaus to Itacoatiara Highway [km. 34], 24 k NE Manaus); *Acre* (Kempf, 1972); *Rondônia* (Rio Madeira, Porto Velho & Abuná [Mann, 1916], Abuná, Camps 39 and 41 [Madeira-Mamoré Railroad - Mann, 1916]; *Pará* (Manaus, Santarém, Taperinha, Tucuru, Ypiranga Rio Negro, Reserva Ducke, 14 km from Manaus [Mann, 1916]); *Bahia* (Itabuna [CEPLAC - Trunzer et al., 1998, probably *P. inversa*, see Kolmer and Heinze, 2000b], Research Center of Cocoa (De Medeiros et al., 1995); *Minas Gerais* (Barro Alto); *Mato Grosso* (Burití, Sinop); *Mato Grosso do Sul* (6 k SE Campo Grande, Urucum Corumbá); *Distrito Federal* (Brasilia [Sandoval and Zambrano, 2007]); *São Paulo* (Caraguatatuba Reserve, Cachoeira das Emas, Piraçununga, Iporanga, Agudos, São Paulo [Forel, 1912]); *Rio*

de Janeiro (Rio de Janeiro); *Paraná* (Rolândia). Brandão (1991) lists *Goiás*, *Distrito Federal*, *Pernambuco*, *Espírito Santo*, *Santa Catarina*. BOLIVIA: *El Beni* (Rio Mamoré).



Map 91. *Pachycondyla villosa*. The triangle indicates the introduction record from New York City.

PARAGUAY: *Cordillera* (San Bernardino); *Itapúa* (Pastoreo); *Canindeyú* (Reserva Natural Bosque Mbaracayú); *Alto Paraná* (Tacuru Pucu [Emery, 1906]); *Asunción* (Asunción [Forel, 1907]). Wild (2002) lists *Alto Paraguay* (Parque Nacional Defensores del Chaco); *Amambay* (Parque Nacional Cerro Corá); *Caaguazú* (Alemán Kué); *Canindeyú* (Reserva Natural Bosque Mbaracayú [Lagunita]); *Central* (Areguá, Luque); *Concepción* (Entre Flores 13 k N Concepción, Horqueta); *Cordillera*

villosa southern USA (Texas) to southern Brasil

(Caacupé Campamento Jack Norment); *Paraguari* (Parque Nacional Ybycuí); *San Pedro* (Jaguarete Forest Río Verde). ARGENTINA: *Misiones* (Iguazú, Delicia, San Ignacio [Santschi, 1921]); *Salta* (Río Pescado). PUERTO RICO [AMNH].

HABITAT

This common species is found in a variety of habitats, ranging from grasslands (Quiroz-Robledo and Valenzuela-González, 1995), primary forest (Roth et al., 1994), secondary rain forest, tropical rain forest, wet tropical rain forest, lowland forest, mangrove, bosque medio, the edge of natural forest, gallery forest, epiphyte forest, open grassy areas with a few trees, area with scattered oaks, to highly disturbed areas such as cacao plantations and even dry scrub forest. Elevations range from 1.5 - 1100 m. Wild (2002) includes undisturbed primary tall forest, gallery forest, scrub forest, campo cerrado [scrub vegetation], pastures, lawns and orchards. This species has been collected in caves near the entrances (Reddell and Cokendolpher, 2001).

BIOLOGY

This species nests in wood, including dead, hard trees, dead branches and trunks, stumps, under bark and even in dead logs on the ground. It is one of the rare Ponerinae that nests in trees (Dejean and Corbara, 1990b). Dealate queens sometimes establish their first nests in hollow twigs. Nests usually start cooperatively with two or more

queens who establish a dominance order with a division of labor (D'Ettoire et al., 2005). One nest was at the base of small tree.

Brood was collected in a nest in July (Ecuador). Males were found in nests in June (Nicaragua), July (Ecuador) and December (Texas). Winged females have been collected in January and March (Costa Rica), March - April (Guatemala), June (USA), July (USA, Panamá), November (British Guyana) and December (USA, Perú, Costa Rica). Males have been collected in May (Costa Rica) and August (Honduras). Dealate females were collected in February (Costa Rica), March (México), May (Costa Rica), July (México, Panamá), August (Brasil) and September (Texas, Brasil).

It is a common arboreal ant in Brasil (De Medeiros et al., 1995) and also forages commonly on the forest floor. Workers are predaceous (Maes, 1989; Dejean et al., 1990) and prey on termites (Wild, 2005). Foragers also feed on nectar (Paul and Roces, 2003) and can carry droplets of liquids between their mandibles (Hölldobler, 1985). They can be found in forest leaf litter, on trees, at baits on the soil surface and in pitfall traps.

They nest almost exclusively in bromeliad epiphytes (*Aechmea bracteata*) in the state of Quintana Roo, México (Dejean, 1990; Dejean and Olmsted, 1997) and are occasionally found in *Cecropia* sp., especially in *Cecropia hispidissima* [Cecropiaceae]. Wheeler (1942) lists this species as nesting in pseudobulbs

of *Schomburgkia tibicinis* [Orchidaceae]. This species lives in the epiphytes *Tillandsia bulbosa* [Bromeliaceae] and *T. streptophylla* (Dejean et al., 1995). It nests in peripheral cavities of trees of *Bursera simaruba* [Burseraceae] and protects it from attack from the leaf cutting ant *Atta cephalotes* (Dejean et al., 1992). It collects nectar from the mistletoe *Phoradendron tomentosum* [Loranthaceae] in southern Texas (Whittaker, 1984).

Zara et al. (2002) did chemical analysis of the different larval instars and (2003) discussed the cytochemical and chemical analysis of the fat bodies of this species. Caetano (1988) described the digestive and excretory system. Lipids are the first materials to be deposited in the oocytes (Caperucci and Camargo-Mathias, 2006). The size of the corpora allata in females, located dorsolaterally to the esophagus, is inversely related to the development of the ovaries (Camargo and Caetano, 1995b).

Pachycondyla villosa is eaten by the lepto-dactylid "veragua robber" frog, *Eleutherodactylus biporcatus* in Nicaragua (Wild, 2005). It is the prey of the army ant *Eciton mexicanum*. *Pachycondyla villosa* is mimicked by the salticid spider *Zuniga magna* (Reiskind, 1977), but only the female (McIver and Stonedahl, 1993). The male of the spider mimics the ant *Pseudomyrmex gracilis* (McIver and Stonedahl, 1993). One colony was nesting together with an ant of the genus *Cephalotes* in Colombia. It apparently has a positive relationship

with the carpenter ant *Camponotus atriceps* (Majer et al., 1994, listed as *C. abdominalis*).

BEHAVIOR

This is a very aggressive ant, with a painful sting (feels like being stabbed with a hot needle). The sharp pain mostly subsides after about a half an hour, but remains tender for a few days. They are avoided by the army ant *Eciton burchelli* (García-Pérez, 1989).

Forty percent of founding colonies are pleometrotic, with two (24%) or three (16%) nest females and may lead to polygynous nests (Trunzer et al., 1998, probably refers to *P. inversa* - see Kolmer and Heinze, 2000b). The females leave the nest to forage before the first workers are developed (Trunzer et al., 1998). Workers lay eggs which are utilized as food by the colony (Camargo Mathias and Caetano, 1995a). The queens mate with two or more males and the queens that cooperatively form new nests are not closely related (Kellner et al., 2007).

Workers in queenless colonies form a dominance hierarchy, using "boxing" and biting (Heinze et al., 1996). The top ranking individuals lay the most eggs, but lower ranking individuals also lay eggs, which result in the production of males (Trunzer et al., 1999). The dominant workers eat

the eggs of other workers. The presence of larvae reduces the numbers of eggs in the nest, by feeding on the eggs and fewer eggs are laid when larvae are present (Heinze et al., 1996).

Individual foragers show strong fidelity to a particular area, but forage individually, without recruitment, although tandem running has been observed during nest relocations (Freneau, 1985). *Pachycondyla villosa* responds differently to different prey types and does not always use the sting (Dejean and Corbara, 1990b). Dejean et al. (1990), discuss the behavior of *P. villosa* when foragers prey on rhinotermitid termites. They move their antennae posteriorly and lift as many legs as possible from the soil surface to avoid contact with the termites. Foragers follow four types of paths including classical exploration, area-concentrated searching, reserve behavior and homing (Dejean and Corbara, 1998).

Workers demonstrate polyethism, with tasks changing during their development (Pérez-Bautista et al., 1985).

ETYMOLOGY

The name of this species is derived from the Latin word *villosus*, meaning hairy, referring to the condition of this species.

Pachycondyla zuparkoi new species

Figures - **Worker:** 114 (pronotum, viewed from above), 267 (mesonotum), 685 (side view), 686 (head), 687 (metasternal process); **Map** 92

foetida species complex

DISCUSSION & DESCRIPT.

Worker

The worker is a *relatively large* (total length 14 mm) *black* ant with *dark brown appendages*. The mandibles have 14-15 teeth, the anterior margin of the clypeus is convex, but slightly concave medially, the head is narrowed anteriorly and posteriorly to the eye and posterior margin is strongly concave. The head length is 3.0 mm; the head width is 2.8 mm. The *malar carina is well developed*; the eye (0.80 mm in maximum diameter) is located more than one diameter from the anterior edge of the head (side view). The scape (2.96 mm) extends approximately the first two funicular segments past the posterior lateral corner of the head. The *pronotum is slightly swollen at the shoulder, but does not form a carina* and the side of the *pronotum is noticeably concave and depressed below the swollen region*. The mesonotum is nearly circular in shape (viewed from above) and the length is 1.7 mm. The *propodeal spiracle is slit-shaped*. The *anterior face of the petiole is vertical*

and *meets the posterior and dorsal faces near the anterior edge*. The *posterior face is swollen medially, making the outline of the petiole to appear rectangular-shaped*. The subpetiolar process is well developed and forms an anterior ventrally directed angle, followed by a part of the process, which is gradually narrowed posteriorly. The *stridulatory file is well developed* on the second pretergite and the arolia are present between the tarsal claws, but are small. The metasternal process consists of two broad lobes.

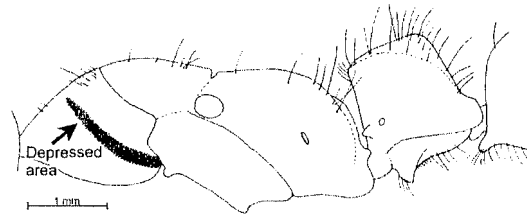


Fig. 685. Mesosoma and petiole of the holotype worker of *P. zuparkoi*.

Erect hairs are abundant on the dorsal and ventral surfaces of the head, the mandibles, the *entire shaft of the scape*, the posterior margin, the dorsum of the mesosoma and dorsum

of the petiole, the subpetiolar process and all surfaces of the gaster. The hairs on the legs are suberect to erect. Appressed pubescence is obvious on the dorsum and sides of the head, the mesosoma, petiole and all surfaces of the gaster.

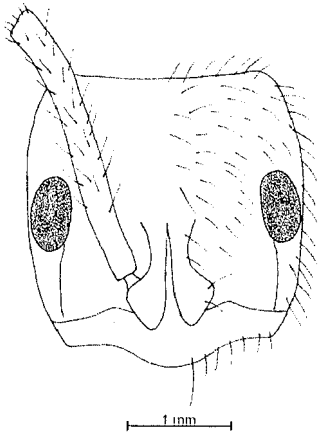


Fig. 686. Head of the holotype worker of *P. zuparkoi*.

The *mandibles* are dull and striate, the dorsum of the head is completely and coarsely punctate, the punctures are somewhat arranged in rows and form poorly defined striae. The dorsum of the mesosoma is mostly finely punctate and weakly shining, the sides of the mesosoma have similar sculpturing and the petiole and gaster are finely punctate and very weakly shining.

Female and Male
Unknown.

COMPARISON

The worker of *P. zuparkoi* is very similar to that of the common *P. villosa*. They are of approximately the same size and the petiole is similar in shape, when viewed in profile. The head is essentially identical when viewed in full-face, including the presence of the malar carina. The gaster is identical with the well-developed stridulatory file. They are immediately separable as *P. zuparkoi* lacks the pronotal carina (present and sharp in *P. villosa*) and the mesonotum is longer and rounded convexly posteriorly (shorter and concave posteriorly in *P. villosa*). The shape of the petiole and the lack of the pronotal carina would separate it from all of the others in the *foetida* species complex.



Fig. 687. Metasternal process of the holotype worker of *P. zuparkoi*.

DISTRIBUTION

Known only from the type locality in the *Huánuco* state of PERU.



Map 92. *Pachycondyla zuparkoi*.

HABITAT

Unknown.

BIOLOGY

Unknown.

ETYMOLOGY

Named in honor of Robert Zuparko of the California Academy of Science, in recognition of his continued support of our work.

TYPE SERIES

Holotype worker (CASC), PERU: Monson Valley, Tingo Maria, X-15-1954; E. I. Schlinger & E. S. Ross collectors.

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GLOSSARY

Acrotergite - the anteriormost part of a gastral tergite. The acrotergite of the second gastral tergite (segment immediately posterior to the postpetiole) often has a stridulatory file (Fig. 17) in workers, females and males of *Pachycondyla*.

Aedeagus - the “penis” of the male ant (Fig. 12). It is composed of two lobes, which usually has small teeth along the ventral edge and is apparently also used to open the female genitalia. It is the innermost of the paired appendages, when the male is viewed from above. See volsellae and parameres.

Alitrunk - same as mesosoma.

Allogrooming - a behavioral act in which an individual ant grooms a nestmate.

Anepisternum - the upper part of the mesopleuron (Fig. 281). It is usually defined by a suture in females and males and is poorly defined in workers. The lower part is the katepisternum.

Angle - dull spine or triangular projection.

Anteclypeus - the anterior part of the clypeus (Figs. 2 & 66), often separated from the postclypeus in *Pachycondyla* by a transverse carina. Sometimes referred to as the apron.

Antenna - one of the pair of appendages on the dorsum of the

head. This appendage consists of the basalmost segment, the scape and several distal segments, the funiculus. Antennae is pleural form.

Anterior border - the edge of a structure closest to the front of the ant. This is commonly used to refer to the front edge of the clypeus.

Apical - section of a structure farthermost from the body.

Apicalmost - object farthermost from body, such as the last segment of the antenna, or the outermost tooth of the mandible.

Apron - the anterior rim of the clypeus just above the mandibles (Kugler, 1994). This is more correctly referred to as the anteclypeus.

Appressed - refers to hairs, which form an angle of less than 30° with body surface, usually laying on the body surface.

Arcuate - arched or bowed in shape.

Arolium - pad-like structure located between the tarsal claws (Fig. 221). The pleural is arolia.

Articulation - area where two sections of the body unite and where they are movable. An example would be the union of the antenna and the head.

Barbulate - Bolton (2003) refers to the condition of any tibial

spur, which is not simple and not broadly pectinate.

Basal border - edge of mandible which is located under the clypeus when the mandibles are closed. It is without teeth in *Pachycondyla*.

Basalar sclerite - round process, which is raised from the surface along the upper edge of the mesopleuron (anepisternum).

Basalmost - object closest to the body, such as the mandibular tooth closest to the clypeus.

Bicarinate - with two carinae, for example the clypeus of some ant species, in which two small teeth often extend from the carinae anteriorly from the medial border.

Brood - the eggs, larvae and pupae or immature individuals of the nest.

Buccal cavity - the mouth cavity (preoral cavity). It contains the labium and maxilla and is closed by the labium and the labrum. The function is to store the buccal pellet while liquids are extracted from the food and to serve as a cavity for the storage of the mouthparts.

Buccal pellet - a small mass of food, which is partially digested in the buccal cavity. The worker (and female) extracts liquids from the mass and later discards it, as the adult *Pachycondyla* do not eat solid food.

Carina - a ridge in the sculpture of an ant. Carinae is pleural form (Fig. 59).

Caste - a form of an adult ant, for example worker, soldier, female, male.

Cercus - one of a pair of appendages on the end of the gaster (terga 8 and/or 9) of a male (Fig. 9), which is knobbed and covered with hair in *Pachycondyla* (Fig. 12). They are apparently sensory in function. Note that Gordh and Headrick (2001) consider it to be incorrectly applied to the Hymenoptera. The pleural is cerci.

Cheek - same as the gena.

Claustral - type of nest formation in which a single female digs a nest and later plugs the entrance before egg laying.

Club - enlarged apical segment or segments of the funiculus, which form a distinct mass separated from the remainder of the funiculus.

Clypeus - a sclerite of the head located between the frons and labrum, above and posterior to the mandibles (Fig. 2).

Cocoon - a dark tough sack constructed by a larva late in the last instar to protect the developing pupa. These are often found in the nests of *Pachycondyla*.

Colony - a single unit, consisting of a reproducing female (queen) and workers. Other castes, such as soldiers, winged females and winged males, together with brood, may occur in the nest.

Compound eye - the visual organ found in both workers and sexuals. It is composed of numerous ommatidia, or units.

Conical seta - thickened blunt-tipped hair (Figs. 24 & 158) on the middle tibia of workers and females of some species of *Pachycondyla*.

Cordate - heart shaped.

Coriaceous - leather-like sculpture.

Cotype - one of several specimens chosen to represent a species by the individual who originally described the species. See syntype, holotype, lectotype and paralectotype.

Coxa - basal (first from body) segment of leg (Fig. 6). Coxae is plural.

Crenulate - scalloped with small, blunt teeth.

Denticle - small tooth.

Denticulate - covered with small teeth or spines.

Dimorphic - refers to a situation in which workers are of two sizes or forms. Some of the Old World species of *Pachycondyla* are dimorphic. See monomorphic and polymorphic.

Distal - section of an appendage farthest from the to body. See proximal.

Dorsal - top of structure.

Dorsum - referring to the top of structure.

Ecarinate - lacking carina or ridge.

Edentate - without teeth.

Egg - the first development stage of an ant.

Emarginate - notched.

Epicuticle - the outer covering of an insect.

Epigaecic - active on soil surface. (See hypogaecic).

Epinotum - old term for propodeum.

Epistome - old term for clypeus.

Erect - refers to hairs that are at or close to a 90° angle with the

surface. See suberect, subappressed and appressed.

Ergatogyne - individual intermediate between a worker and a female.

Extensor surface of leg - outer surface.

Eye - an organ used for sight. A pair of compound eyes is usually present on the sides of the head (Fig. 2) and 3 additional eyes (ocelli) are located posteriorly on the head of the males and females.

Eye diameter - the maximum length of the eye, measured with the head in an obliquely side view (view to see the maximum length).

Facet - same as ommatidium.

Female - reproductive individual in the nest, or the queen, or winged individuals that are capable of reproduction after mating. Although workers are also females, they are not referred to as the female.

Femur - third segment of the leg, located between the trochanter and the tibia. The plural is femora.

Fenestra - circle in the integument located in the ventral part of the petiole of ants in the genus *Ponera*. The integument is so thin in the area that it allows the transmission of light, similar to a window.

Flagellum - the part of the antenna distal to the pedicel.

Flexor surface of leg - posterior surface.

Flexuous - refers to hairs, which are long and curved.

Fossa - the concavity where the base of the scape articulates with the head. Fossae is the plural form.

Foveolate - sculpture composed of relatively large round depressions.

Frons - section of the head located between the frontal area and the region of the medium ocellus.

Frontal area - small triangular area located between the frontal carinae and posterior to the clypeus.

Frontal carinae - longitudinal ridges on the inner side of the insertion of the antenna. Frontal carinae is the plural form.

Frontal lobe - plate-like extension of the frontal carina located above the insertion of the antenna (Fig. 2). These are characteristically abruptly widened in *Pachycondyla*.

Foramen - hole, such as at the posterior of the head where it attaches to the mesosoma.

Full face view - the orientation of a structure, usually the head or the mandible, which is perpendicular to the line of sight.

Funiculus - the remainder of the antenna distal to the first segment or scape (Fig. 2). Also referred to as the funicle, funicule and the flagellum.

Gaster - the section of the abdomen posterior to the postpetiole (Fig. 1). Actually it is composed of the fourth segment of the abdomen to the end of the abdomen and is usually considered to include the postpetiole in *Pachycondyla*, which is fused to the gaster.

Genitalia - reproductive appendages of the male (Fig. 9), including the inner aedeagi, middle volsellae, and outer parameres (Fig. 12).

Gena - part of the head on each side, below (anterior to) the eyes. Genae is the plural form.

Granulose - form of sculpture in which the surface resembles sandpaper.

Gula - ventral surface of the head behind the labium, extending to the posterior foramen and bounded laterally by the malar area. Gulae is the plural form.

Gyne - female or queen.

Habitus - general form of the body of an ant.

Haplodiploid - method of reproduction in which the determination of sex is due to the number of chromosomes, the male is haploid, the female is diploid. This form of sexual determination occurs in ants and other Hymenoptera.

Haplometrosis - nest foundation by a single female.

Head length - the distance measured from the anterior edge of the clypeus to the posterior edge of the head, near the middle of the head.

Head width - the distance measured from one side to the other of the head, posterior to the eyes and excluding the eyes.

Helcium - reduced presclerite on the posterior ventral edge of the petiole and true postpetiole which articulates with the posterior segment.

Holotype - a single specimen selected by the authority who described a species to represent the species. It is considered to be the true form of the species. See paratype and lectotype.

Homologous - an adjective which refers to structures which had the same evolutionary origin.

Horizontal - adjective which refers to striae which are parallel to the ground when an ant is in the normal, walking position.

Humeral angles - anterolateral corners of the pronotum, in the region of the "shoulder".

Hypogaedic - subterranean.

Hypopygium - the sternite of the ultimate segment of the gaster (Fig. 171).

Inquiline - a species which lives in the nest of an ant species, usually doing no harm other than consuming food from ant workers.

Insertion - the place where the antenna connects to the head.

Instar - one of the developmental stages of the larva.

Katepisternum - the lower part of the mesopleuron. It is usually defined by an upper mesopleural oblique suture in males and females and is poorly defined in workers. The upper part is the anepisternum.

Labial palp - one of the two elongated appendages located in the mouth region (Fig. 3). This palp is shorter than the maxillary palp and is usually composed of 4 segments in the worker, female and male (Fig. 156) of *Pachycondyla*. The function is to "taste" the food.

Labium - one of the mouthparts, the second maxilla, forms the floor of the buccal cavity. The function is to manipulate the food pellet in the buccal cavity and to close the buccal cavity. The labial palps attach to the labium.

Labrum - one of the mouthparts located immediately below and behind the clypeus, which covers and forms the roof of the buccal cavity. It covers about the anterior $\frac{1}{2}$ of the labium when the mouthparts are tucked into the buccal cavity.

Larva - the immature life stage of an ant (Fig. 13), which follows the egg and precedes the pupa. Ants go through several larval stages, which are called instars. The pleural is larvae.

Laterad - towards the side.

Lectotype - a single specimen chosen by a reviewer of a group, to represent a species. It is selected from a series of 2 or more cotypes or syntypes, which were named by the individual who originally described the species. See cotype, holotype and syntype.

Leg - any one of the three paired appendages on the mesosoma of ants. The parts, from the body, are: coxa, trochanter, femur, tibia and tarsus.

Lenticular - lens shaped, with anterior and posterior faces convex.

Lestobiosis - situation in which a species of tiny ants lives in the walls of the nest of a larger species and steals food from the larger ants.

Lobe - rounded structure, for example when the frontal carinae are rounded and cover the insertion of the antennae or the posterior lateral corners of the head (posterior lateral lobe).

Longitudinal - adjective which refers to striae which are parallel to the long axis of the body.

Major - largest worker (see minor). Referred to as soldier in some ant genera, such as *Pheidole*.

Malar area - region between the base of the mandible and the compound eye, along the side of the head.

Malar carina - a ridge (Fig. 18) that is located between the base of the mandible and the eye (or region near the eye) that is found in many species of *Pachycondyla*, including members of the *crenata*, *villosa*, *apicalis* and *emiliae* species complexes. The function is unknown.

Male - the masculine caste in an ant nest. These members normally have wings and mating with females is their only function, after which they die. They play no other role in the nest, such as excavation, caring for brood, foraging etc. Those of many species are not even able to feed themselves. These individuals have only one set of chromosomes, see haplodiploidy.

Mandibles - the "jaws", or first pair of appendages (Fig. 2), located on the head anterior to the buccal cavity. They are used for ripping and tearing, for nest excavation, as well as for carrying food back to the nest, or brood within the nest.

Mandible length - the distance from the apicalmost edge of the mandible to the point of attachment of the mandible to the head, near the outer edge.

Mandibular furrow - an obliquely oriented groove (Fig. 348) that extends from the base of the mandible near the clypeus laterally

and anteriorly to the edge of the mandible (most species) or along the entire lateral edge of the mandible (*P. tarsata*). It is apparently always present, but not always well developed in all species of *Pachycondyla*. It is often well developed in some species of the *stigma* species complex and in the *tarsata* species complex, especially in the females. It is apparently represented by an elongated mandibular furrow or depression in the males (Fig. 156). The function is unknown, but could possibly be used to disperse the mandibular gland secretion. Members of the *ochracea* species complex have a small, usually poorly defined pit in this region, which is associated with a short furrow in *P. holmgreni* (Fig. 516), suggesting that the two features are homologous. See next entry

Mandibular pit - small depression near the base of the mandible of some species of *Pachycondyla* that were formerly members of the genus *Cryptopone*. It is apparently homologous with the mandibular groove, but see Brown (1963) for an alternate opinion.

Marginate - with an elevated border or ridge.

Masticatory border - edge of the mandible with teeth.

Maxilla - one of the mouthparts, located immediately behind or under the mandibles. The plural is maxillae. As it is segmented, it obviously evolved from an appendage. The function is to manipulate the food pellet in the buccal cavity.

Maxillary palp - one of the two elongated appendages located in the region of the mouth (Fig. 3). This palp is usually longer than the other elongated appendage in the mouth region, the labial palp and is usually composed of 4 segments in the workers and females of *Pachycondyla* and 6 segments in the males (Fig. 156). The numbers of segments vary in different ant genera and may be of importance in separating genera. Its function is sensory, to "taste" the food.

Mayrian furrows - the y-shaped (often the y does not meet at the base) groove (Fig. 322 & 630) on the scutum of male ants. It is not present in all males of *Pachycondyla*.

Mesonotum - the dorsum of the second section of the mesosoma (Figs. 1 & 106).

Mesopleural oblique suture - furrow on the side of the mesopleuron which separates the anepisternum from the katepisternum in males and females. It is normally poorly developed in the worker.

Mesopleuron - the side of the mesonotum (Figs. 6, 35). Composed of a dorsal sclerite, the anepisternum and a lower sclerite the katepisternum.

Mesosoma - middle region of the ant's body, consisting of the thorax and the propodeum, or first segment of the abdomen (Fig. 1). It cannot be called thorax as it is a compound structure. Also referred to as alitrunk, especially in winged ants. Mesosomata is the plural form.

Metanotal suture - elongate depression separating the mesonotum from the propodeum (Fig. 19), or the metanotum and the propodeum when the metanotum is defined. Traditionally referred to as the metanotal suture, a more proper name would be the notopropodeal suture (F. Serna, pers. Comm.).

Metanotum - the region of the mesosoma located between the mesonotum and the propodeum, present between the scutellum and the propodeum in the female (Fig. 6) and male (Fig. 9) and occasionally defined in workers.

Metapleural gland - a mass of secretory tissue found inside the mesosoma proximal to the metapleural lobe. It is responsible for producing antibiotics for protecting the brood and ants in the nest.

Metapleural lobes - a pair of lobes on both sides of the mesosoma located in the most posterior and ventral part (metapleuron), covering glands called the metapleural glands; adjacent to the point of insertion of the peduncle of the petiole.

Metapleuron - a poorly defined region on the lower side of the propodeum, below where it fuses with the metathorax, including the metapleural lobes.

Metasternal process - a pair of lobe-like appendages (Fig. 5) located on the metasternum between and anterior to the posteriormost coxae (Fig. 129), and prominent in workers, females and males of *Pachycondyla*.

Minim - smallest worker in a dimorphic or polymorphic species, or one of the first, small workers to appear as a result of the formation of a new nest.

Minor - smallest worker (see major).

Monogynous - species in which there is a single queen or reproducing individual, in a single nest.

Monomorphic - refers to a situation in which all of the workers of a species are of a single size or form, occurring in most species of *Pachycondyla*. See dimorphic and polymorphic.

Myrmecology - the study of ants.

Myrmecologist - an ant specialist.

Nanitic - small worker that is a member of a new nest. Later the workers will be normal sized as in other colonies.

Nest - often synonymous with colony, but may be simply a satellite group of ants, which are part of a larger colony.

Nestmate - another individual in the nest, usually a second worker.

Node - the dorsal section of the petiole, which is somewhat differentiated from the remainder of the petiole.

Nodiform - in the form of a knot or knob, referring to the shape of the petiole of some ants.

Nuptial flight - a situation found in most species of ants in which individuals of both sexes fly from the nest and either mate in the

air or mate on the ground some distance from the nest.

Obliquely vertical - refers to striae which are at an angle greater than 45° from the ground when an ant is in the normal walking position.

Ocellus - one of the small single faceted eyes located near the posterior border of the head in workers of a few genera of ants and in females and males (Fig. 9). They consist of a single middle or medial ocellus and two lateral ocelli. Note that the pleural is ocelli.

Ommatidium - a single unit of the compound eye. The pleural is ommatidia.

Palp - a segmented appendage located either on the maxilla or labium.

Parabiosis - situation in which two species of ants live together in a single colony, but maintain their brood separately.

Paralectotype - Additional specimens that were part of a cotype or syntype series, that are chosen by a reviewer to represent a species, in addition to the single lectotype.

Paramere - one of the lobed outermost appendages of the male genitalia (Fig. 12). These structures protect the volsella and aedeagus and also grasp and hold the female on the outer surface of the gaster, with the other two pairs of appendages being internal.

Parapsidal suture - a furrow (Figs. 300, 467 & 630) that separates the medial area of the scutum from the parapsis near the base of the anterior wing.

Parapsis - lateral part of the scutum, near the base of the forewing.

Paratype - one of the specimens chosen to represent a species by the individual who originally describes a species, in addition to the single holotype.

Pectinate - refers to a situation in which a structure has a row of tiny teeth or spines. This condition occurs on the tibial spurs of *Pachycondyla*.

Pedicel - one or two segments of the abdomen, which are called the petiole and the postpetiole. Actually they are the second and third segments of the abdomen, the first being the propodeum. Also refers to the second segment of the antennae (Fig. 9), part of the funiculus, distal to the scape and attached to the remaining segments of the antenna.

Peduncle - anterior portion of the petiole which is long and stalk-like in some genera of ants. The peduncle articulates with the mesosoma.

Peritreme - a cuticular ring which surrounds a spiracle (Fig. 186).

Petiolar spur - a lateral projection located near the anterior base of the petiole, near the petiolar spiracle. The function is unknown, but it may protect the peduncle or attachment of the petiole to the mesosoma.

Petiole - the single segment of the pedicel or the anterior segment in subfamilies that have two segments in the pedicel. It is actually the second segment of the abdomen (Fig. 1).

Pheromone - a chemical substance used for communication between members of a species. Common examples would include the alarm pheromone which alerts others to a threat, trail pheromone, which attracts and guides workers to a food site and the sexual pheromone which serves to attract males to females.

Piligerous - bearing hair, usually referring to punctures.

Pleometrosis - situation in which two or more females participate in the formation of the same initial nest. They may continue to coexist or may fight and be reduced to a single female at a later time after the nest is well established.

Plesiomorphy - referring to structures with similar form, which represent the primitive condition in the ancestor.

Pleural - lateral section of a body part.

Polydomous - refers to a species in which a single colony occupies several nesting sites.

Polyethism - division of labor in workers. It can be based on age (younger workers responsible for nest activities, older ants responsible for foraging), or size (larger workers are often involved in nest defense, smaller individuals in nest activities and foraging).

Polygynous - nest in which two or more reproducing females are present. In a situation in which a single male mates with several females, it is simply referred to as multiple mating.

Polymorphic - refers to a situation in which ant workers are of several sizes or forms, such as in *P. laevigata*. See monomorphic and dimorphic.

Porcate - sculpture that consists of longitudinal and parallel raised lines.

Postclypeus - the posterior part of the clypeus (Fig. 2), often separated from the anterior part (anteclypeus) by a transverse carina.

Posterior border of the head - the edge of the head, furthest back in full face view (Fig. 2).

Posterior lateral corner - the region at the back of the head, between the side of the head and the posterior border (Fig. 2).

Posterior lateral lobe - prominent posterolateral corner of the head in some genera of ants.

Posterior lateral edge - the point located at the back and side edge of the head.

Postpetiole - the second segment of the pedicel or waist (Fig. 1). It is actually the third abdominal segment and is fused with the gaster in *Pachycondyla*. This segment is not a true postpetiole as it lacks the helium, and would be more properly referred to as the second segment of the metasoma (F. Serna, pers. comm.).

Postpharyngeal gland - a secretory organ located behind the pharynx, which produces pheromones.

Pretergite - a narrow, transverse flange on the anterior edge of each of the tergites of the gaster. The second

pretergite often has a stridulatory file in *Pachycondyla*.

Preocular carina - the same as malar carina.

Promesonotal suture - elongate depression located between the pronotum and the mesonotum.

Pronotal carina - a ridge (Figs. 19 & 59) located on the upper side of the pronotum ("shoulder") in some species of *Pachycondyla*.

Pronotal shoulder - the upper side of the pronotum.

Pronotum - the dorsum of the first section of the mesosoma (Fig. 1).

Propodeal spiracle - a hole in the side of the propodeum, circular, oval-shaped, or slit-shaped, which is used for the intake of air. The shape of this structure is very useful in separating species of *Pachycondyla*.

Propodeum - the posterior most part of the mesosoma (Fig. 1), which is actually the first segment of the abdomen which has become fused with the thorax in ants and most other Hymenoptera. Two parts are extremely important for the identification of ants: the basal face or the dorsal surface and the declining face, or the posterior, usually nearly vertical surface.

Prothorax - first segment of the mesosoma.

Protuberance - protruding bump on the surface.

Proximal - section closest to body, i.e. of an appendage (see distal). See distal.

Pruinose - covered with fine silvery hairs, giving the surface a frosted appearance.

Psammophore - a beard of long hairs located at the underside of the head. This is commonly found in desert ants, especially those that live in sandy areas. The ants use it to carry "baskets" of small sand grains during excavation.

Pubescence - short, usually fine appressed hairs covering a specific area of the body surface.

Punctate - sculpture marked by small round depressions.

Pupa - the third major stage of the development of an ant, following the larval stage. The pupa of *Pachycondyla* is enclosed in a tough, dark cocoon. The ant emerges (encloses) from the cocoon and becomes an adult. The pleural is pupae.

Pygidial spine - a long, down turned process located at the posterior dorsal edge of the gaster (Fig. 12). It is a characteristic of the tribe Ponerini and is found only in the males. It may be involved in reproduction, but is also defensive in function, used to jab the predator.

Pygidium - dorsal surface of the last exposed gastral segment (Fig. 9).

Queen - egg laying female in a nest.

Queenright - a colony with a queen, usually used to refer to a laboratory colony.

Replete - an inactive worker with a greatly distended gaster which is used for food storage. Occurs in *Myrmecocystus* and *Prenolepis*.

Reticulate - net-like sculpture.

Rugae - wrinkles (Fig. 290) on the surface of a specific structure (ruga is singular).

Rugulae - small wrinkles.

Rugulose - with small wrinkles.

Scale - refers to a rudimentary, forward angled petiole in some genera of ants (i.e. *Tapinoma*).

Scape - the first segment of the antenna (Fig. 2), which is elongated in ant workers (as well as females and most males).

Scape length - the maximum distance measured from the proximal base of the scape (excluding the basal condyle or attachment) to the distal most edge.

Scrobe - a groove on the dorsum of the head, which serves for the reception of the antennal scape.

Sculpture - the pattern of elevated and impressed surfaces on an ant.

Scutellum - a small, shield-like sclerite, located posterior to the scutum and just anterior to the metanotum in males (Fig. 9) and females (Fig. 6) and absent in the worker. It is the posterior part of the mesonotum.

Scutum - a large, shield-like sclerite, located posterior to the pronotum and anterior to the scutellum of the female (Fig. 6) and male (Fig. 9). It is the anterior part of the mesonotum.

Sensillum - a sense organ.

Sensu lato - Latin for "in the wide sense", referring to the widest interpretation of a taxon, for example, arbitrarily including subspecies and varieties within a single species.

Sensu stricto - Latin for "in the strict sense", referring to the narrowest interpretation of a taxon,

excluding subspecies and varieties.

Simple - condition in which the tibial spur lacks comb-like teeth. See tibial spur.

Smooth - a condition of the surface of the integument without sculpture. It is often glossy or polished, strongly reflecting light.

Soldier - a worker ant, which is much larger than normal workers and often has an enlarged head. New World *Pachycondyla* do not have soldiers, but some species are polymorphic, especially *P. laevigata* and there could be division of labor among the different sized workers.

Somite - a body segment. (pl. somites)

Spatulate - spoon shaped.

Spine - a thorn-like outgrowth of the body, often located on the propodeum.

Spinule - small spine.

Spinulose - with small spines.

Spiracle - a hole (Fig. 22) in the cuticle through which air passes to reach the internal tissues by way of a system of tubes.

Spiracular horn - projection located anteriorly to the spiracle on the petiole.

Spongiform - resembling a sponge, soft and porous, poorly defined mass surrounding the petiole and postpetiole of the ants of the tribe Dacetini (*Strumigenys*).

Spur - stiff sharp projection located on the distal surface of the tibia (Fig. 26). See tibial spur.

Sting - spine-like organ located at the apex of the gaster (Fig. 6) and is used for defense in ant workers and females. The sting is hollow and

injects a toxic venom. This causes a very painful reaction in the larger species of *Pachycondyla*.

Sternum - ventral section of a structure, especially of the mesosoma.

Stria - fine raised line on the surface of specimen. The plural is striae and the adjective striate.

Striate - possessing striae.

Striola - very fine raised line on a surface. The plural is striolae and the adjective striolate.

Stridulation - production of sound by friction as a result of movement between two body parts. Used for communication, especially when a worker alerts others that she is buried.

Stridulatory file - a series of transverse ridges (Fig. 17) located on the top of the gaster, on second pretergite (the anterior edge of the second gastral tergum) that are used in communication. The ants apparently move this file back and forth to create a rasping noise. This structure is found in the workers, females and males in members of most species complexes of *Pachycondyla*, but appears to have been independently lost several times.

Subappressed - refers to hairs, which are about 45° with the body surface.

Subequal - almost equal in length or size to another structure.

Suberect - refers to hairs, which are not quite upright, at between 44 - 90° from the surface.

Subopaque - nearly opaque but with a slight luster.

Subpetiolar process - a ventral extension of the sternum of the petiole (Fig. 27), which has characteristic shapes in members of *Pachycondyla*.

Subpostpetiolar process - a ventral extension of the sternum of the postpetiole (Figs. 30, 131).

Sulcus - a furrow or groove. Pleural is sulci.

Suture - an elongate depression, usually located at the juncture of two body sections (Fig. 397).

Synapomorphy - a derived (evolved) taxonomic character, which is shared by two or more taxa, showing they evolved from a common ancestor.

Syntype - a specimen that was originally used to describe a species, that is part of a series in which a holotype was not selected. The same as cotype. See lectotype and paralectotype.

Tandem running - a process in which workers follow each other, with the heads nearly in contact with the gasters of the proceeding ants. It is used in *Pachycondyla* when moving to a new nest site and also in other genera as a method to recruit workers to a food source.

Tarsus - the ultimate part of the leg ("foot"), attaching to the tibia and consisting of several segments (tarsomeres) and two tarsal claws. The pleural is tarsi.

Tergum - dorsum of each segment, usually refers to the gaster. Pleural is terga.

Tergite - dorsum of a segment, usually used when only 1 sclerite is involved.

Thorax - the generalized middle section of an insect. In ants, it is referred to as either the mesosoma or alitrunk and includes the propodeum, which is partially the first segment of the abdomen. Thus the middle body part should not be referred to as the thorax in ants.

Tibia - the fourth segment of the leg, located between the femur and the tarsus. The pleural is tibiae. At least one spur is present at the distal end of each tibia.

Tibial spur - a spine-like appendage (Fig. 26), which is found on the distal edge of the tibia. Such spurs may be simple (without tiny teeth), pectinate (with comb-like teeth) or barbulate (intermediate between the previous two conditions).

Tooth - an elongate angle found on the mandible or possibly other parts of the body.

Trochanter - the second and smallest segment of the leg, positioned between the coxa and the femur.

Trophallaxis - the interchange of food between individual ants. These liquids are stored in the crop, which is located inside the gaster.

Type - a specimen chosen to represent a species. It could be any of a number of forms, including holotype, paratype and lectotype, among many others.

Type locality - location where the specimen or series were collected, which were used to describe the species.

Venom - a toxic liquid injected by the sting of *Pachycondyla* workers and females.

Ventral - refers to the underside of a structure.

Volsella - the middle pair of male genital appendages (with the male viewed from above), located between the aedeagus and the parameres (Fig. 12). They are often knobbed or hooked at the end and apparently serve to connect to the female and firmly anchor the male during copulation.

Voucher specimen - a labeled specimen (usually a series of several specimens), which is (are) deposited in a museum, as part of an ecological, behavioral or other study. It can be referred to if there is any question concerning the identity of the specimens. The deposition of voucher specimens is an essential part of any scientific investigation.

Worker - a normally non-reproductive female of the colony which is responsible for nest activities such as nest excavation, foraging, brood care, etc.

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<i>crenata</i>	293
<i>ferruginea</i>	323
<i>foetida</i>	335
<i>gilberti</i>	346
<i>globosa</i>	360
<i>goeldii</i>	365
<i>harpax</i>	380
<i>holmgreni</i>	392
<i>impressa</i>	399
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<i>globosa</i>	360
<i>harpax</i>	380
<i>impressa</i>	398
<i>inversa</i>	412
<i>lattkei</i>	427
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<i>purpurascens</i>	492
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Appendix 1. Checklist of the New World species of *Pachycondyla*. The lower case “x” indicates the caste is described, the capital “X” indicates the caste is first described in this book. Spaces are available for the inclusion of future new species. “aen” = *aenescens*, “api” = *apicalis*, “arh” = *arhuaca*, “con” = *constricta*, “cra” = *crassinoda*, “cre” = *crenata*, “cur” = *curiosa*, “emi” = *emiliae*, “fer” = *ferruginea*, “foe” = *foetida*, “lae” = *laevigata*, “lev” = *leveillei*, “och” = *ochracea*, “ros” = *rostrata*, “rub” = *rubra*, “sti” = *stigma*, “tar” = *tarsata*. No species have been reported from Chile.

Species	In my collection	Species complex	♀ (x = described)	♀	♂	USA	Mexico/CAmerica	Caribbean	Colombia/	Ecuador/Peru	Brasil	Bolivia	Paraguay	Argentina
<i>aenescens</i>		aen	x	x	x		x		x	x		x		
<i>agilis</i>		ros	x			?					x		x	x
<i>antecurvata</i>		cre	X				x			x	x			
n. sp.														
<i>apicalis</i>		api	x	x	X		x		x	x	x	x		
<i>arhuaca</i>		arh	x	X	x		x		x	x	x	x		
<i>becculata</i> n. sp.		arh	X	X			x		x	x				
<i>breviscapa</i> n. sp.		fer		X								x		
<i>bucki</i>		sti	x						x		x			
<i>bugabensis</i>		foe	x	X	X		x		x	x				
<i>carbonaria</i>		aen	x	x			x		x	x				
<i>carinulata</i>		cre	x	x			x		x	x	x	x		
<i>cavinodis</i>		cre	x	X	X		x			x	x			
<i>cernua</i> n. sp.		arh	X		X					x				
<i>chinensis</i>		rub	x	x	x	x								
<i>chyzeri</i>		aen	x	X					x	x				

Species	In my collection	Species complex	♂ (x = described)	♀	♂	USA	Mexico/Camerica	Caribbean	Colombia/	Ecuador/Peru	Brasil	Bolivia	Paraguay	Argentina
<i>cognata</i>		sti	x	x	X		x		x					
<i>commutata</i>		lae	x	x	x		x		x	x	x	x	x	
<i>concava</i> n. sp.		emi	X								x			
<i>conicula</i> n. sp.		arh	X	X	X				x	x				
<i>constricta</i>		con	x	x	x		x		x	x	x	x		
<i>constricticeps</i> n. sp.		cra	X											x
<i>cooki</i> n. sp.		api	X						x	x	x			
<i>coveri</i> n. sp.		cre	X							x				
<i>crassinoda</i>		cra	x	x	?			x	x	x	x	x	x	
<i>crenata</i>		cre	x	x	x		x		x	x	x	x	x	x
<i>curiosa</i> n. sp.		cur		X							x			
<i>curvinodis</i>		foe	x	X			x		x	x				
<i>dismarginata</i> n. sp.		foe	X				x							
<i>donosoi</i> n. sp.		cre	X		X					x				
<i>eleonorae</i>		aen	x	X						x				
<i>emiliae</i>		emi	x						x	x				
<i>fauveli</i>		aen	x	x	x				x	x		x		
<i>ferruginea</i>		fer	X	x			x		x	x	x			
<i>fiebrigi</i>		cre	x	X									x	x
<i>fisheri</i> n. sp.		aen	X	X	X		x							
<i>foetida</i>		foe	x	x			x		x	x	x	x		

Species	In my collection	Species complex	♀ (x = described)	♀	♂	USA	Mexico/CAmerica	Caribbean	Colombia/	Ecuador/Peru	Brasil	Bolivia	Paraguay	Argentina
<i>fusca</i> n. sp.		aen	X						x					
<i>fuscoatra</i>		cra	x	X					x					
<i>gilberti</i>		sti	x	x	X		x	x	x	x	x			
<i>gilloglyi</i> n. sp.		sti	X	X	X		x			x				
<i>gilva</i>		och	x	x	x	x	x							
<i>globularia</i> n. sp.		cre	X	X					x	x	x	x	x	
<i>goeldii</i>		cre	x	x	X				x	x	x			
<i>guianensis</i>		och	x	x	X		x		x	x	x			
<i>harpax</i>		cra	x	x	x	x	x	x	x	x	x	x	x	
<i>hispidia</i> n. sp.		aen	X	X					x	x				
<i>holcotyle</i> n. sp.		aen	X				x		x					
<i>holmgreni</i>		och	x						x	x	x			
<i>imprensa</i>		cra	x	x	X		x		x	x	x	x		
<i>inca</i>		cra	x	x	X					x	x	x		
<i>insignis</i> n. sp.		foe	X	X			x							
<i>inversa</i>		foe	x	X			x		x	x	x	x	x	
<i>laevigata</i>		lae	x	x	x		x		x	x	?			
<i>latinoda</i> n. sp.		cre	X	X	X						x			
<i>lattkei</i> n. sp.		cra	X		X				x					

Species	In my collection	Species complex	♂ (x = described)	♀	♂	USA	Mexico/C.America	Caribbean	Colombia/	Ecuador/Peru	Brasil	Bolivia	Paraguay	Argentina
<i>recava</i> n. sp.		cre	X						x					
<i>rostrata</i>		ros	X	x					x	x	x			x
<i>rugosula</i>		cre	x	x	X		x		x	x	x	x		
<i>rupinicola</i> n. sp.		fer	X	X	X		x		x					
<i>schoedli</i>		aen	X							x				
<i>schultzi</i> n. sp.		emi	X								x			
<i>solisi</i> n. sp.		foe	X	X			x							
<i>stigma</i>		sti	x	x	x	x	x	x	x	x	x		x	x
<i>striata</i>		cra	x	x	x						x	x	x	x
<i>striatinodis</i>		cre	x	x			x		x	x	x	x		
<i>succedanea</i>		sti	x	x	x		x	x	x	x	x	x		
<i>tarsata</i>		tar	x	x	x						x			
<i>theresiaae</i>		foe	x				x			x	x			
<i>unidentata</i>		cre	x	x	X		x		x	x	x	x		
<i>venusta</i>		emi	x								x			
<i>verenae</i>		api	x	X	X		x		x	x	x	x	x	
<i>vieirai</i> n. sp.		vie	X							x				
<i>villosa</i>		foe	x	x	x	x	x	x	x	x	x	x	x	x
<i>zuparkoi</i> n. sp.		foe	X							x				

Appendix 2. List of collections consulted and curators who facilitated the loan of materials.

AMNH	American Muséum of Natural History, James Carpenter
CASC	California Academy of Sciences, Robert Zuparko, Vincent Lee,
Brian Fisher	
COOK	Collection of Jerry Cook (USA), Jerry Cook
CSTD	Collection of Shawn Dash (USA) Shawn Dash
CWEM	Collection of William and Emma Mackay (USA)
GBFM	Graham Fairchild Museo de Invertebrados (Panamá), Diomedes
Quintero	
IAVH	Collection of the Humboldt Institute (Colombia), Fernando
Fernández,	
	Tania Arias
IMLA	Fundación e Instituto Miguel Lillo, Universidad Nacional de
Tucumán,	
	Argentina
INBio	Institute for Biodiversity (Costa Rica), Manuel Solís
LACM	Los Angeles County Museum of Natural History, Weiping Xie,
Roy Snelling	
MCSN	Museo Civico di Storia Naturale (Italy), Roberto Poggi
MCZC	Museum of Comparative Zoology, Stefan Cover
MIZA	Instituto de Zoología Agrícola (Venezuela), John Lattke
MZSP	Museu de Zoologia da Universidade de São Paulo (Brasil),
Roberto Brandão	
MHNG	Muséum d'histoire naturelle, Ville de Genève (Switzerland),
Bernhard Merz	
NHMB	Naturhistorisches Museum Basel (Switzerland), Daniel Burckhart
NHMW	Naturhistorisches Museum Wien (Austria), Stefan Schödl, Herbert
Zettler, Manuela Vizek	
QCAZ	Museo de Zoología, Pontificia Universidad Católica del Ecuador,
Juan Vieira, David Donoso	
UNCM	Museo de Entomología "Francisco Luis Gallego", Raúl Vélez
Ángel (Colombia)	
USNM	United Status Nacional Muséum, Ted Schultz