



Zootaxa 2878: 1–61 (2011)
www.mapress.com/zootaxa/

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Monograph

ISSN 1175-5326 (print edition)

ZOOTAXA

ISSN 1175-5334 (online edition)

ZOOTAXA

2878

Generic Synopsis of the Formicidae of Vietnam (Insecta: Hymenoptera), Part I — Myrmicinae and Pseudomyrmecinae

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Magnolia Press
Auckland, New Zealand

Accepted by J. Longino: 25 Jan. 2011; published: 13 May 2011

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**Generic Synopsis of the Formicidae of Vietnam (Insecta: Hymenoptera),
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(*Zootaxa* 2878)

61 pp.; 30 cm.

13 May 2011

ISBN 978-1-86977-667-1 (paperback)

ISBN 978-1-86977-668-8 (Online edition)

FIRST PUBLISHED IN 2011 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

<http://www.mapress.com/zootaxa/>

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

Alpha taxonomy of Vietnamese ants was initiated by European and American authors in the early 20th century, and approximately 160 species and infraspecific taxa were described or recorded in this early period. From 1965 to 1966 an inventory project of insects in northern Vietnam was conducted by the Agriculture Ministry of Vietnam, and 36 ant species were recorded. The identity of those taxa, however, needs to be revised based on the modern taxonomy of ants. Since the

end of the 1980's dozens of ant species have been newly recorded or described from Vietnam. Regional revisions dealing with Vietnamese species have also been published for several genera including *Myrmica*, *Probolomyrmex*, *Pheidole*, *Acanthomyrmex* and *Anillomyrma*. Furthermore, two new genera, *Parvimyrmex* (Myrmicinae) and *Opamyrmex* (Amblyoponinae), were recently described from the country. However, there has been no comprehensive systematic treatment of the Vietnamese ants to date. In order to develop the taxonomy of ants in Vietnam, we have begun a program to: (1) explore local ant faunas; (2) give species codes to all species; (3) overview ant genera known from Vietnam; (4) describe unnamed taxa and review higher taxa known from Vietnam and adjacent areas. Ninety-two genera in twelve subfamilies have so far been recognized by us: DOLICHODERINAE: *Chronoxenus*, *Dolichoderus*, *Iridomyrmex*, *Liometopum*, *Ochetellus*, *Philidris*, *Tapinoma*, *Technomyrmex*; FORMICINAE: *Acropyga*, *Anoplolepis*, *Camponotus*, *Cladomyrma*, *Echinopla*, *Gesomyrmex*, *Lasius*, *Lepisiota*, *Myrmoteras*, *Nylanderia*, *Oecophylla*, *Paratrechina*, *Paraparatrechina*, *Plagiolepis*, *Polyrhachis*, *Prenolepis*, *Pseudolasius*, Undescribed genus "eg-2"; PSEUDOMYRMECINAE: *Tetraoponera*; CERAPACHYINAE: *Cerapachys*, *Simopone*; AENICTINAE: *Aenictus*; DORYLINAE: *Dorylus*; LEPTANILLINAE: *Leptanilla*, *Protanilla*; AMBLYOPONINAE: *Amblyopone*, *Myopopone*, *Mystrium*, *Opamyrmex*, *Prionopelta*; PONERINAE: *Anochetus*, *Centromyrmex*, *Cryptopone*, *Diacamma*, *Harpegnathos*, *Hypooponera*, *Leptogenys*, *Odontomachus*, *Odontoponera*, *Pachycondyla*, *Platythyrea*, *Ponera*; ECTATOMMINAE: *Gnamptogenys*; PROCERATIINAE: *Discothyrea*, *Probolomyrmex*, *Proceratium*; MYRMICINAE: *Acanthomyrmex*, *Anillomyrma*, *Aphaenogaster*, *Calyptomyrmex*, *Cardiocondyla*, *Cataulacus*, *Crematogaster*, *Dacatria*, *Dilobocondyla*, *Gauromyrmex*, *Kartidris*, *Lasiomyrma*, *Liomyrmex*, *Lophomyrmex*, *Lordomyrma*, *Mayeriella*, *Meranoplus*, *Monomorium*, *Myrmecina*, *Myrmica*, *Myrmicaria*, *Oligomyrmex*, *Paratopula*, *Parvimyrmex*, *Pheidole*, *Pheidologeton*, *Pristomyrmex*, *Proatta*, *Pyramica*, *Recurvidris*, *Rhopalomastix*, *Rhoptromyrmex*, *Solenopsis*, *Strumigenys*, *Temnothorax*, *Tetramorium*, *Vollenhovia*, *Vombisidris*. As the first major contribution to the third goal of the program, here we provide: (1) a key to subfamilies, (2) a key to myrmicine genera, and (3) a synopsis of myrmicine and pseudomyrmecine genera known from Vietnam. A second paper will deal with the Aenictinae, Cerapachyinae, Dorylinae, Leptanillinae, Amblyoponinae, Ponerinae, Ectatomminae and Proceratiinae, and a third with the Dolichoderinae and Formicinae.

Introduction

The family Formicidae is one of the dominant terrestrial invertebrate groups in Vietnam, and ants play various ecological roles such as predators of small animals, scavengers, indirect herbivores (through symbioses with homopterans), seed feeders and dispersers, soil-mixing agents and as the prey of small animals. Several exotic species, e.g. *Solenopsis geminata* and *Monomorium pharaonis*, may be nuisance and insanitary pests in urban areas. Recent inventories of local ant faunas in northern Vietnam (Bui 2002; Yamane et al. 2003; Bui & Eguchi 2003; Eguchi et al. 2005) have discovered high levels of species richness. For example, a total of 160 species belonging to 50 genera were recorded only from Cuc Phuong National Park, a lowland limestone forest (Yamane et al. 2003). Alpha taxonomy (descriptive taxonomy) of Vietnamese ants was initiated by European and American authors in the early 20th century, and approximately 160 species and infraspecific taxa were described or recorded in the period (Bingham 1903; Santschi 1920a, b, 1924; Wheeler 1927, 1928; Karavaiev 1935). From 1965 to 1966 an inventory project of insects in northern Vietnam, conducted by the Agriculture Ministry of Vietnam, recorded 36 ant species (National Institute of Plant Protection 1976). The identity of those taxa, however, needs revision based on the modern taxonomy of ants. Since the end of the 1980's dozens of ant species have been newly recorded or described from Vietnam (e.g. Radchenko 1993a, 1993b; Radchenko & Elmes 2001; Roncin 2002; Dubovikoff 2004; Eguchi & Bui 2005, 2006; Eguchi 2006). Regional revisions dealing with Vietnamese species have also been published for several genera including *Myrmica* (Radchenko & Elmes 2001, Radchenko et al. 2006), *Probolomyrmex* (Eguchi et al. 2006), *Pheidole* (Eguchi 2008), *Acanthomyrmex* (Eguchi et al. 2008), and *Anillomyrma* (Eguchi et al. 2010). Furthermore, two new genera, *Parvimyrmex* (Myrmicinae) and *Opamyrmex* (Amblyoponinae), were recently described from the country (Eguchi & Bui 2007, Yamane et al. 2008). However, there has been no comprehensive systematic treatment of Vietnamese ants and to some extent the taxonomy of ants in Vietnam is still at an early stage. This is mainly due to the hyperdiversity of the fauna and attendant taxonomic problems.

How can we develop the taxonomy of ants in Vietnam? The activities of the Myrmecological Society of Japan provide a useful framework. Since the society was established in 1965, upon M. Kubota's initiative, many amateurs and professionals have conducted faunal, taxonomic and ecological studies of Japanese ants. In the process, common names (Japanese names) have been given to almost all ant species known from Japan (the Japanese Society of Myrmecology (ed.) 1988). Because the type material of most Japanese ants was stored in western museums, and taxonomic literature on ants was hardly available in Japan, Japanese myrmecologists faced difficulties in determin-

ing the scientific names of Japanese ants (even common species) until the last few decades. In spite of the difficulty in verifying scientific names, common names allowed Japanese myrmecologists to accumulate and compile information on Japanese ants. Based upon those results, identification guides and distribution maps of Japanese ants at the species level were published (the Japanese Society of Myrmecology (ed.) 1989, 1991, 1992; Terayama & Kihara 1994). In recent years the identity of Japanese ant species has been confirmed by referring to modern taxonomic literature and type material. The "Japanese Ant Color Image Database" was set up on the web in 1995. It was revised in 2003 as "Ant Image Database (Japan)": <http://ant.edb.miyakyo-u.ac.jp/>), and "Ants of Japan" was published (Japanese ant database group 2003).

In order to develop the taxonomy of ants in Vietnam, we plan to proceed with a multi-stage program of research.

- I) *Exploring local ant faunas.* Inventory work on local faunas provides basic and indispensable information for conducting biodiversity conservation. Thus, we will continuously explore local ant faunas especially in the central highlands of Vietnam where intensive surveys are yet to be conducted.
- II) *Giving species codes to all species.* A species code system will be established for accumulating and compiling taxonomic and other biological information from various sources. Our recognition of species, based mainly on worker morphology, will be augmented with additional kinds of biological information.
- III) *Overviewing ant genera known from Vietnam.* These overviews of the Vietnamese genera of ants, in a series of papers covering the various subfamilies, will contain identification keys to the genera, facilitating research and conservation programs on ants in both natural and disturbed environments.
- IV) *Describing unnamed species and reviewing named taxa known from Vietnam and adjacent areas.* Species codes will be gradually replaced by scientific names and named taxa will be reviewed, both through comparison to type material and description of new species.

As the first major contribution to the third goal of the program, here we provide: (1) a key to subfamilies, (2) a key to myrmicine genera, and (3) a synopsis of myrmicine and pseudomyrmecine genera known from Vietnam. A second paper (in preparation) will deal with dorylomorph, leptanillomorph and poneromorph genera, and a third with formicomorph genera. Each genus treatment contains brief taxonomic and bionomic overviews, a list of the known Vietnamese species, and the localities where each species have been found (referring to place names in Table 1). These generic overviews will be complemented with our image database of Vietnamese ants, "Diversity of Ants in Vietnam" (<http://www.antist2007.com/Diversity/main.html>). The website is still under construction but parts are available to the public.

Study area

Vietnam, located in the easternmost part of the Indo-Chinese Peninsula, spans a range of latitudes between ca. 8°24'N and ca. 23°23'N. Broad lowlands occur in the north (the basin of the Hong River) and in the south (Mekong Delta). The Hoang Lien Son Range lies in the northwestern Vietnam and represents the southeasternmost extension of the Himalayas. Vietnam's highest peak, Fan Xi Pan, is found here, rising to 3,143 m alt. Central Vietnam's highland areas are part of the Truong Son Range, which stretches for 1,200 km from around 20°N, along Vietnam's western border with Laos, ending south of the Da Lat Plateau in south-central Vietnam (Sterling et al. 2006). The monsoonal climate in Vietnam can be classified into six types based on temperature, rainfall and their seasonality (Nguyen et al. 2000). Vietnam's terrestrial vegetation falls into four main categories: lowland evergreen, lowland semi-evergreen, and lowland deciduous, montane evergreen forests. Evergreen forests are found in consistently wet and humid conditions, whereas deciduous forests occur in regions with long (more than five months) dry seasons. The transition from lowland to montane forests occurs at 1,100–1,200 m alt. in southern and central Vietnam and at 700–900 m alt. in northern Vietnam. In colder regions, evergreens are generally conifers. Scrub, grasslands and wetlands make up the remaining major vegetation categories (Sterling et al. 2006).

Such complexity of topology, climate and vegetation undoubtedly maintains an extremely high diversity of ants. It is no wonder that the total number of ant species in Vietnam reaches several hundreds.

As listed in Table 1 and Fig. 1 we have conducted our sampling in various types of habitats from lowland to highland. However, we have not yet explored the central highland area.

Materials and Methods

This article does not contain descriptions of new taxa or other taxonomic changes. The majority of species are tentatively recognized based on external morphology of the worker and assigned species codes (e.g., *Aphaenogaster* sp. eg-1). Species codes assigned by Yamane (e.g., sp. 25 of SKY) are also shown if needs arose.

We adopt the classification of Bolton (2003) and Bolton et al. (2007) with a few exceptions. Fernández (2004) placed *Afroxydris*, *Oligomyrmex* and *Paedalgus* as junior synonyms of *Carebara*, but surprisingly he made this decision without sufficient examination of Old World species of *Oligomyrmex*. The type locality of *Oligomyrmex concinnus* Mayr, the type species of *Oligomyrmex*, is Indonesia, and that of *Carebara lignata* Westwood, the type species of *Carebara*, is also Indonesia (Java). *Oligomyrmex* is species-rich and morphologically diversified in the Oriental tropics and both *O. concinnus* and *C. lignata* were described based on the queen. Thus, we refrain from accepting Fernández's decision until the synonymy is confirmed based on intensive examination of colony-based material of Old World taxa, and here we treat *Oligomyrmex* as a separate genus belonging to the *Carebara* genus group sensu Bolton (2003). The genus *Paratrechina* sensu Bolton (2003) was recently subdivided into *Paratrechina*, *Nylanderia* and *Paraparatrechina* by Lapolla et al. (2010) based on both molecular and morphological data. We follow their concept. *Yunodorylus*, which was originally established by Xu 2000 under the subfamily Dorylinae, was later synonymized with *Cerapachys* by Bolton (2003), and it was redefined as the *Cerapachys sex-spinus* group by Borowiec (2009). However, recent molecular phylogenetic studies including "*Yunodorylus*" (Moreau et al. 2006; Brady et al. 2006) show that *Cerapachys* sensu Bolton (2003) is non-monophyletic. Despite this, we provisionally accept Borowiec's decision.

Mounting and sorting specimens obtained from Binh Chau-Phuoc Buu (2008), Nui Ong (2008) and Bach Ma (2009) is still being ongoing. The distributions of species given in the present paper are, therefore, preliminary, and will be updated and uploaded in "Diversity of Ants in Vietnam (<http://www.antist2007.com/index.html>)".

Multi-focused, montage images were produced using Helicon Focus 4.30 or 5.1 Pro (MP) from a series of source images taken by a Nikon Coolpix 8400 digital camera attached to a Nikon AZ100 microscope. Fine hairs and other features that were not recognized automatically were copied from the focused parts from the source images on to the montage image using the retouching function of Helicon Focus. Artifacts (ghost images) and unnecessary parts (unfocused appendages, etc.) surrounding or covering target objects were erased and cleaned up using the retouching function of Helicon Focus. Finally, the background was cleaned up, and the color balance, contrast and sharpness were adjusted using Adobe Photoshop CS2. Supplementary images will be uploaded to the website.

The following published keys were used during the development of the present keys: Bolton (1994), Shattuk (1999), Terayama (1999, 2009), the Japanese Society of Myrmecology (ed.) (1989, 1991, 1992).

Subfamilies and genera known from Vietnam

DOLICHODERINAE (8 genera): *Chronoxenus*, *Dolichoderus*, *Iridomyrmex*, *Liometopum*, *Ochetellus*, *Philidris*, *Tapinoma*, *Technomyrmex*

FORMICINAE (18 genera): *Acropyga*, *Anoplolepis*, *Camponotus*, *Cladomyrma*, *Echinopla*, *Gesomyrmex*, *Lasius*, *Lepisiota*, *Myrmoteras*, *Nylanderia*, *Oecophylla*, *Paratrechina*, *Paraparatrechina*, *Plagiolepis*, *Polyrhachis*, *Prenolepis*, *Pseudolasius*, Undescribed genus "eg-2"

PSEUDOMYRMECINAE (1 genus: 7 spp.): *Tetraponera* (7 spp.)

CERAPACHYINAE (2 genera): *Cerapachys*, *Simopone*

AENICTINAE (1 genus): *Aenictus*

DORYLINAE (1 genus): *Dorylus*

LEPTANILLINAE (2 genera): *Leptanilla*, *Protanilla*

AMBLYOPONINAE (5 genera): *Amblyopone*, *Myopopone*, *Mystrium*, *Opamyрма*, *Prionopelta*

PONERINAE (12 genera): *Anochetus*, *Centromyrmex*, *Cryptopone*, *Diacamma*, *Harpegnathos*, *Hypoponera*, *Lep-togenys*, *Odontomachus*, *Odontoponera*, *Pachycondyla*, *Platythyrea*, *Ponera*

ECTATOMMINAE (1 genus): *Gnamptogenys*

PROCERATIINAE (3 genera): *Discothyrea*, *Probolomyrmex*, *Proceratium*

MYRMICINAE (38 genera: 208 spp.): *Acanthomyrmex* (2 spp.), *Anillomyrma* (1 spp.), *Aphaenogaster* (12 spp.), *Calyptomyrmex* (1 sp.), *Cardiocondyla* (5 spp.), *Cataulacus* (1 sp.), *Crematogaster* (16 spp.), *Dacatria* (1 sp.), *Dilobocondyla* (3 spp.), *Gauromyrmex* (1 sp.), *Kartidris* (1 sp.), *Lasiomyrma* (1 sp.), *Liomyrmex* (1 sp.), *Lophomyrmex* (1 sp.), *Lordomyrma* (1 sp.), *Mayeriella* (1 sp.), *Meranoplus* (1 sp.), *Monomorium* (12 spp.), *Myrmecina* (5 spp.), *Myrmica* (5 spp.), *Myrmecaria* (2 spp.), *Oligomyrmex* (15 spp.), *Paratopula* (1 sp.), *Parvimyrma* (1 sp.), *Pheidole* (42 spp.), *Pheidologeton* (5 spp.), *Pristomyrmex* (5 spp.), *Proatta* (1 sp.), *Pyramica* (8 spp.), *Recurvidris* (3 spp.), *Rhopalomastix* (1 sp.), *Rhoptromyrmex* (3 spp.), *Solenopsis* (4 spp.), *Strumigenys* (10 spp.), *Temnothorax* (2 spp.), *Tetramorium* (25 spp.), *Vollenhovia* (7 spp.), *Vombisidris* (1 sp.)

Key to subfamilies of Vietnamese ants based on the worker caste

- 1 Pygidium (abdominal tergite VII) flattened or impressed, posterolaterally with a single pair of spines (Fig. 2) or a series of peg-like spines (Fig. 3) 2
 - Pygidium convex, unarmed (Fig. 4), but hypopygium (abdominal sternite VII) rarely armed with a series of spines posteriorly 3
- 2 Pygidium posterolaterally with a single pair of spines (Fig. 2); promesonotal suture distinct dorsally (Fig. 5)
 - Pygidium posterolaterally with a series of peg-like spines (Fig. 3); promesonotal suture absent dorsally (Fig. 6) Dorylinae (*Dorylus*)
 - Cerapachyinae
- 3 A single reduced and isolated segment, i.e. petiole (= abdominal segment II), present between mesosoma and gaster (Figs. 7, 8) 4
 - Two reduced and isolated segments, i.e. petiole and postpetiole (= abdominal segments II and III), present between mesosoma and gaster (Fig. 9) 11
- 4 Gastral segment II (= abdominal segment IV) arched and down-curved (Fig. 10) 5
 - Gastral segment II neither arched nor down-curved (Figs. 11, 12) 6
- 5 In full-face view antennal sockets mostly to entirely exposed, located a little in front of the line across mandibular bases (Fig. 13) or on a shelf-like frontoclypeal region overhanging mandibles (Fig. 14) Proceratiinae (part)
 - In full-face view antennal sockets mostly to entirely covered by frontal lobe, located a little behind the line across mandibular bases (Fig. 15) Ectatomminae (*Gnamptogenys*)
- 6 Petiole broadly attached to gastral segment I (= abdominal segment III); gastral segment I above helcium without a free anterior face (Fig. 16) Amblyoponinae (part)
 - Petiole narrowly attached to gastral segment I; gastral segment I above helcium with a free anterior face (Fig. 17) 7
- 7 Antennal sockets located on shelf-like frontoclypeal region that overhangs the mandibles; frontal lobes fused to each other and forming a vertical plate (Fig. 18) Proceratiinae (*Probolomyrmex*)
 - Antennal sockets located behind clypeus; shelf-like frontoclypeal region absent; frontal lobes variable in size and shape, but never forming a vertical plate (Fig. 19) 8
- 8 Petiole extremely large and long; pygidium longer than gastral segment I (Fig. 20) Amblyoponinae (*Opamyrma*)
 - Petiole relatively small and short; pygidium shorter than gastral segment I (Fig. 21) 9
- 9 Sting present and functional (even if the sting fully retracted, it may be seen through sternites of the abdominal apex); gastral tergite I (= abdominal tergite III) fused with gastral sternite I, but the suture present (Fig. 22) Ponerinae
 - Sting absent; gastral tergite I largely or entirely separated from gastral sternite I (Fig. 23) 10
- 10 Apex of hypopygium forming acidopore which appears usually as a short nozzle surrounded by hairs (Fig. 24), or at least as a semicircular to circular emargination of the apical margin of the hypopygium (Fig. 25) Formicinae
 - Apical margin of hypopygium truncated, never forming acidopore (Fig. 26); hypopygium sometimes folded along its midline, and so apical margin of hypopygium showing a U- or V-shaped appearance but never forming a semicircular to circular emargination Dolichoderinae
- 11 Pronotum and mesonotum completely separated by promesonotal suture (Fig. 27) 12
 - Pronotum and mesonotum completely fused; promesonotal suture either entirely absent across dorsum of mesosoma (Fig. 28) or present as a weak transverse furrow 13
- 12 Eye well-developed (Fig. 29) Pseudomyrmecinae (*Tetraponera*)
 - Eye absent (Fig. 30) or, in intercastes of some *Protanilla* species, eye often present but consisting of only one or a few ommatidia Leptanillinae
- 13 Postpetiole (= abdominal segment III) relatively massive, not much reduced in comparison with gastral segment I (= abdominal segment IV) (Fig. 31) Proceratiinae (part of *Proceratium*)
 - Postpetiole much smaller than gastral segment I (Fig. 32) 14
- 14 When mouthparts fully closed, prementum (prm in Fig. 33) largely visible between stipites of maxillae (stp); antennal socket in full-face view usually (but not always) concealed, partly or entirely, by frontal lobe; antennal socket usually far from anterior margin of head; eye usually (but not always) present (Fig. 34) Myrmicinae
 - When mouthparts fully closed, prementum (prm in Fig. 35) not visible, or largely concealed behind labrum (lbr) and stipites of maxillae (stp) that meet along the midline (Fig. 35); antennal socket in full-face view fully exposed; clypeus narrow from front

to back especially in front of antennal insertion, bringing the antennal sockets very close to the anterior margin of the head; eye always absent (Fig. 36) Aenictinae (*Aenictus*)

Key to Vietnamese genera of the subfamily Myrmicinae based on the worker caste

The following key to genera includes the following genera which have been known from Thailand, southern China and/or Taiwan, but not yet been found from Vietnam: *Eurhopalothrix*; *Formosimyрма*; *Leptothorax*; *Metapone*; *Perissomyrmex*; *Rotastruma*; *Rostromyrmex*; *Stenammina*.

- 1 Postpetiole attached to the dorsum of abdominal segment IV (= gastral segment I) (Fig. 37); petiole flattened dorsoventrally. *Creumatogaster*
- Postpetiole attached to the anterior face or ventrum of abdominal segment IV (Fig. 38), or, in *Anillomyrma*, postpetiole attached to the top of anterior face but not the dorsum of abdominal segment IV (Fig. 39); petiole variable in shape, but never flattened dorsoventrally. 2
- 2 Antennal scrobe running below eye (Fig. 40). 3
- Antennal scrobe absent or running above eye (Fig. 41); in some genera both eye and antennal scrobe absent. 4
- 3 Antenna 11-segmented; first gastral tergite greatly expanded, comprising the whole of the dorsum of gaster in dorsal view *Cataulacus*
- Antenna 7-segmented; first gastral tergite never comprising the whole of the dorsum of gaster in dorsal view *Eurhopalothrix* (not yet found from Vietnam)
- 4 Antenna with 4–6 segments 5
- Antenna with 7–12 segments. 7
- 5 Mandible with a series of teeth on its masticatory margin (Fig. 42). *Pyramica* (part)
- Mandible without a series of teeth on its inner margin except apical teeth (Fig. 43). 6
- 6 Mandibular bases located closely (Fig. 44); labrum not forming exaggerated distal processes. *Strumigenys*
- Mandibular bases broadly separated (Fig. 45); labrum forming exaggerated distal processes (Fig. 46) *Pyramica* (*argiola*- and *murphyi*-groups: not yet found from Vietnam)
- 7 Antenna with 7 segments *Myrmecaria*
- Antenna with 8–12 segments 8
- 8 Median portion of clypeus with a thin longitudinal wall which is produced well anteriorly in full-face view (Fig. 132) 9
- Median portion of clypeus round, angulately produced, truncate, bicarinate or with a bilobed projection, but never with a thin longitudinal wall 10
- 9 Antenna with 8 segments *Formosimyрма* (not yet found from Vietnam)
- Antenna with 9 segments *Rostromyrmex* (not yet found from Vietnam)
- 10 Dorsum of mesonotum flattened and forming flanges laterally and posteriorly (Fig. 47) *Meranoplus*
- Dorsum of mesonotum sometimes flattened and margined laterally but never forming flanges laterally and posteriorly (Fig. 28) 11
- 11 Promesonotum with 8 digitiform tubercles (4 pairs) (Fig. 48). *Proatta*
- Promesonotum usually without digitiform tubercles (Fig. 49), but sometimes with a spine or denticle on each humerus (Fig. 50), or with a large prominence on each humerus and a tubercle in front of metanotal groove. 12
- 12 Median portion of clypeus forming a bilobed projection near the highest point (Figs. 51, 52) 13
- Median portion of clypeus not armed with a bilobed projection near the highest point (Figs. 53) 14
- 13 Antenna 12-segmented; eye small and round (Fig. 54) *Calyptomyrme*
- Antenna 10-segmented; eye large and elongate (Fig. 55). *Mayriella*
- 14 Antenna terminating in a conspicuous 2-segmented club (Fig. 56) 15
- Antenna terminating in a 3-segmented (Fig. 57) or 4-segmented club, or without a conspicuous club (Fig. 58) 19
- 15 Frontal lobes touching or separated only by a narrow longitudinal impression (Fig. 59); postpetiole broadly attached to gaster *Rhopalomastix*
- Frontal lobes distinctly separated by median portion of clypeus (Fig. 60); postpetiole narrowly attached to gaster. 16
- 16 Anterior margin of clypeus with an unpaired long seta at the midpoint (Fig. 61). (because the median seta often absent in the major worker of polymorphic *Solenopsis* species, the minor worker may be needed for identification). 17
- Anterior margin of clypeus without an unpaired median seta, instead either with a pair of long setae straddling the midpoint (Fig. 62), or with an unbroken row of setae 18
- 17 Antenna 9- or 10- segmented; masticatory margin with apical tooth followed by 2 distinct teeth and then one or more small or inconspicuous denticles (Fig. 63) *Solenopsis* (part)
- Antenna 11 segmented; masticatory margin with 5 distinct teeth (Fig. 64) *Parvimyрма*
- 18 Minor worker with median part of clypeus margined laterally with carinae (Fig. 65). *Oligomyrmex*
- Minor worker with median part of clypeus never margined laterally with carinae (Fig. 66). *Pheidologeton*
- 19 Eyes completely absent. 20
- Eyes present, usually well developed but sometimes consisting of only one or a few ommatidia. 21
- 20 Subpetiolar process well developed (Fig. 67); antenna 11-segmented; frontal lobes widely separated (Fig. 68) *Liomyrmex*
- Subpetiolar process absent (Fig. 69); antenna 10-segmented; frontal lobes very closely approximated (Fig. 70). *Anillomyrma*

21	Antenna with 9 segments	<i>Perissomyrmex</i> (not yet found from Vietnam)	22
-	Antenna with 11–12 segments.		23
22	Antenna with 11 segments.		23
-	Antenna with 12 segments.		36
23	Antennal scrobe very deep and capable of largely concealing scapes	<i>Metapone</i> (not yet found from Vietnam)	
-	Antennal scrobe absent, or present but incapable of concealing scapes (Fig. 41)		24
24	Head below eye with a longitudinal ridge that is distinguishable from the background sculpture (Fig. 71).	<i>Myrmecina</i> (part)	
-	Head below eye without a longitudinal ridge that is distinguishable from the background sculpture (Fig. 72).		25
25	Antennal socket fully exposed; anterior margin of clypeus with three or more denticles (Fig. 73).	<i>Pristomyrmex</i> (part)	
-	Antennal socket partly or completely concealed by frontal lobe; anterior margin of clypeus at most with two denticles or angles (Fig. 74).		26
26	Lateral portion of clypeus in front of antennal socket raised into a sharp-edged ridge (Fig. 75); sting with a spatulate to triangular, lamellate appendage that projects from the dorsum of the shaft close to its apex	<i>Tetramorium</i> (part)	
-	Lateral portion of clypeus in front of antennal socket not raised into a sharp-edged ridge (Fig. 76); sting simple, without a lamellar appendage that projects from the dorsum of the shaft		27
27	Propodeal spine recurved at least weakly (Fig. 77)	<i>Recurvidris</i>	
-	Propodeal spine, if present, straight or down-curved (Fig. 78).		28
28	Posterodorsal margin of petiole produced posterodorsad as a rim which is distinctly (or at least a little) higher than the dorsal outline of helcium of petiole when waist segments stretched posteriad (Fig. 79)	<i>Vollenhovia</i> (part)	
-	Posterodorsal margin of petiole not forming a rim mentioned above (Fig. 80).		29
29	Dorsa of head and mesosoma without distinct standing hairs; postpetiole in dorsal view at least twice as broad as petiolar node (Fig. 81).	<i>Cardiocondyla</i> (part: species with 11-segmented antenna have not yet been found from Vietnam)	
-	Dorsa of head and mesosoma with standing hairs; postpetiole in dorsal view less than twice as broad as petiolar node (Fig. 82)		30
30	Petiole in lateral view without a distinct anterior peduncle, but with triangular node the dorsolateral corners of which form acute angles or denticles; subpetiolar process large (Fig. 133).	<i>Gauromyrmex</i>	
-	Petiole in lateral view pedunculate, with a round node; subpetiolar process absent or present as a tiny denticle or angle		31
31	Anterior margin of clypeus with a single long seta at the midpoint (Fig. 83).	<i>Monomorium</i> (part)	
-	Anterior margin of clypeus without a single median seta, instead either with a pair of long setae straddling the midpoint, or with an unbroken row of setae (Fig. 84)		32
32	Promesonotum in lateral view distinctly raised from the dorsum of propodeum (Figs. 85, 86).		33
-	Promesonotum in lateral view not or only weakly raised from the dorsum of propodeum (Fig. 87).		34
33	Masticatory margin of mandible with 5 conspicuous teeth (Fig. 88)	<i>Pristomyrmex</i> (part: <i>P. profundus</i>)	
-	Masticatory margin of mandible with apical and one preapical tooth, followed by an enlarged denticle; these then followed by a series of small denticles (Fig. 89).	<i>Lophomyrmex</i>	
34	Masticatory margin of mandible with 7 or more teeth; anterior clypeal margin forming an obtuse median angle		
- <i>Lasiomyrma</i> (part: species with 11-segmented antennae have not yet been found from Vietnam)		
-	Masticatory margin of mandible with 5 or 6 teeth; anterior clypeal margin not forming an obtuse median angle		35
35	Median clypeal carina absent; mouthparts with stipes of the maxilla with a transverse crest present at about its midlength	<i>Leptothorax</i> (not yet found from Vietnam)	
-	Median clypeal carina present (Fig. 90); mouthparts with stipes of the maxilla without a transverse crest at about its midlength	<i>Temnothorax</i> (part: species with 11-segmented antennae have not yet been found from Vietnam)	
36	Head in lateral view below eye with a longitudinal ridge (Fig. 71) or groove (Fig. 91) that is distinguishable from the background sculpture		37
-	Head in lateral view below eye without a longitudinal ridge or groove that is distinguishable from the background sculpture (Fig. 92).		38
37	Longitudinal ridge on the ventrolateral part of head never touching the eye; petiole short and sessile, lacking a node (Fig. 93).	<i>Myrmecina</i> (part)	
-	Longitudinal groove on the lateral part of head touching the ventral margin of eye; petiole elongate and weakly pedunculate, with a low node (Fig. 94)	<i>Vombisidris</i>	
38	Petiole elongate and cylindrical (Fig. 95); posterolateral corner of head with a small acute angle or denticle exterior to preoccipital carina	<i>Dilobocondyla</i>	
-	Petiole variable in shape (Fig. 96, 97); posterolateral corner of head usually round, or sometimes forming a vertexal lobe, but lacking a small acute angle or denticle		39
39	Tergo-sternal suture of gastral segment I in anterior view describing a parabola on each side of the articulation with postpetiole (Fig. 98).	<i>Acanthomyrmex</i>	
-	Tergo-sternal suture of gastral segment I in anterior view transverse or bending downwards on each side of the articulation with postpetiole (Fig. 99).		40
40	Lateral portion of clypeus in front of antennal socket raised into a conspicuous vertical ridge or wall (Figs. 75, 100)		41
-	Lateral portion of clypeus in front of antennal socket not raised into a ridge or wall (Fig. 101)		44
41	Promesonotum in lateral view strongly raised as a dome (Fig. 102: pm); each humerus of promesonotum forming a high and blunt mound (Fig. 102: hp).	<i>Dacatria</i>	
-	Promesonotum in lateral view not or slightly higher than anterodorsal border of propodeum; each humerus of promesonotum not forming a high and blunt mound (Fig. 103)		42

42	Head in full-face view roughly heart-shaped, with posterolateral corners relatively strongly produced (Fig. 104); propodeal lobe reduced to a low carina	<i>Rhoptromyrmex</i> (part)
-	Head in full-face view roughly oval or subrectangular, with posterolateral corners not or weakly produced (Fig. 105); propodeal lobe well developed usually as a triangular lamella or spinose projection but sometimes as a subrectangular or round lamella	43
43	Tibial spurs of middle and hind legs pectinate (Fig. 106); sting simple; palp formula (number of segments in maxillary palp and labial palp) 6,4	<i>Myrmica</i> (part: species in which lateral portion of clypeus is raised as ridge have not yet been found from Vietnam)
-	Tibial spurs of middle and hind legs simple or absent (Fig. 107); apex of sting with a small lamellate appendage; palp formula 4,3 or less.	<i>Tetramorium</i> (part)
44	Middle part of masticatory margin without teeth or denticles (Fig. 108)	<i>Pheidole</i> (major workers)
-	Middle part of masticatory margin with teeth or denticles (Fig. 109)	45
45	Frontal carina distinct, in full-face view extending close to posterolateral corner of head; antennal scrobe moderately to strongly developed (Fig. 110)	<i>Lordomyrma</i> (part)
-	Frontal carina and antennal scrobe absent (Fig. 111), or present but weak	46
46	Posterodorsal margin of petiole produced posterodorsad as a rim which is distinctly (or at least a little) higher than the dorsal outline of helcium of petiole when waist segments stretched posteriad (Fig. 79)	<i>Vollenhovia</i> (part)
-	Posterodorsal margin of petiole not forming a rim mentioned above (Fig. 112)	47
47	Mesosoma marginate dorsolaterally, especially on mesonotum and propodeum (Fig. 134)	<i>Rotastruma</i> (not yet found from Vietnam)
-	Mesosoma not marginate dorsolaterally.	48
48	Head in full-face view roughly heart-shaped, with posterolateral corners relatively strongly produced (Fig. 104); apical part of sting dorsally with a triangular to pennant-shaped appendix projecting upwards from the shaft (visible only when the sting is extended)	<i>Rhoptromyrmex</i> (part)
-	Head in full-face view roughly oval or rounded-rectangular (Figs. 113, 114), rarely with a long neck; posterolateral corners not or weakly produced; apical part of sting without a dorsal appendix.	49
49	Antenna terminating in a 3-segmented club	50
-	Antenna terminating in a 4-segmented club, or without a conspicuous club	57
50	Anteromedian part of vertex with a conspicuous depression (Fig. 115)	<i>Kartidris</i>
-	Anteromedian part of vertex without a conspicuous depression (Fig. 116)	51
51	Both median and lateral part of clypeus well produced anteriorly and forming a shelf which largely overhangs mandibles (Fig. 117); dorsum of head and mesosoma without standing hairs	<i>Cardiocondyla</i> (part)
-	Median part of clypeus more or less produced anteriorly, but not forming a shelf which largely overhangs mandibles (Fig. 118); dorsum of head and mesosoma usually (but not always) with standing hairs	52
52	Anterior margin of clypeus with a single long seta at the midpoint (Fig. 83); propodeal spines absent	<i>Monomorium</i> (part)
-	Anterior margin of clypeus without a single median seta, instead either with a pair of long setae straddling the midpoint (Fig. 119), or with an unbroken row of setae; propodeal spines usually developed, but rarely reduced to tiny denticles.	53
53	Masticatory margin of mandible with 5–6 teeth (Fig. 120).	<i>Temnothorax</i> (part)
-	Masticatory margin of mandible with 7 or more teeth/denticles (Fig. 121)	54
54	Promesonotum distinctly higher than anterior border of propodeal dorsum (Fig. 122)	<i>Pheidole</i> (part)
-	Promesonotum not or only a little higher than anterior border of propodeal dorsum (Fig. 123)	55
55	Anterior margin of clypeus round with a slight emargination medially; petiolar node in lateral view cuboidal, long (Fig. 124); postpetiole in lateral view compressed dorsoventrally, longer than high	<i>Paratopula</i>
-	Anterior clypeal margin forming an obtuse angle; petiolar node in lateral view round or blunt-triangular (Fig. 125); postpetiole in lateral view not compressed dorsoventrally, higher than long	56
56	Petiole in lateral view blunt-triangular and thin	<i>Lasiomyrma</i> (part)
-	Petiole in lateral view round and thick	<i>Lordomyrma</i> (species with antennal scrobes completely absent, have not yet been found from Vietnam)
57	Promesonotum slightly raised (Fig. 126); propodeal lobe well developed as a triangular or sharp lamella (Fig. 127)	<i>Myrmica</i> (part)
-	Promesonotum strongly raised as a dome (Fig. 128); propodeal lobe round or subtriangular with blunt angles (Fig. 129).	58
58	Posteromedian portion of clypeus, where it is inserted between the frontal lobes, narrower than one of the frontal lobes; median portion of clypeus defined laterally by weak clypeal carinae	<i>Stenamamma</i> (not yet found from Vietnam)
-	Posteromedian portion of clypeus, where it is inserted between the frontal lobes, broader than one of the frontal lobes; median portion of clypeus not defined laterally by clypeal carinae	59
59	Masticatory margin of mandible with 1 or 2 small denticles between the preapical tooth and 3rd large tooth (Fig. 130); palp formula 3,2 or less.	<i>Pheidole</i> (part)
-	Masticatory margin of mandible without small teeth/denticles between the preapical tooth and 3rd large tooth (Fig. 131); palp formula 5,3 or 4,3	<i>Aphaenogaster</i>

SYNOPSIS OF VIETNAMESE MYRMICINE GENERA

Acanthomyrmex Emery, 1893

Taxonomy. The genus *Acanthomyrmex* is assigned to the tribe Myrmecini together with *Myrmecina*, *Perisomyrmex* and *Pristomyrmex* (Bolton 2003). Workers of Vietnamese species have the following features (see also Moffett 1986; Eguchi et al. 2008).

Worker dimorphic; frontal lobe reduced, in full-face view only partially concealing the torulus; frontal carina present, usually conspicuous; antennal scrobe present, usually conspicuous; anteromedian margin of clypeus weakly convex with a shallow median emargination in major; anteromedian margin of clypeus always armed with 2 to several processes in minor; median clypeal seta reduced or absent in major, but always present in minor; lateral portions of clypeus not forming a conspicuous ridge in front of torulus in major, but raised into a ridge in front of torulus in minor; mandible in major massive, edentate or armed with a few indistinct teeth on masticatory margin; mandible in minor broadly triangular, and armed with 5–10 small to tiny teeth in addition to relatively conspicuous apical and preapical teeth; antenna 12-segmented, with 3-segmented club; eye moderately developed; mesosoma short and robust especially in major; promesonotal suture absent dorsally; metanotal groove obsolete or shallow dorsally; propodeum armed with a pair of long spines; propodeal lobe well developed, angulately produced posterodorsad; petiole pedunculate anteriorly and with distinct node; postpetiole much shorter than petiole; suture between first gastral tergite and sternite basally in the form of a rounded M-shape; postpetiole articulated at base of the M.

The minor worker of *Acanthomyrmex* is similar to the worker of *Pristomyrmex*, but in the latter the antenna is 11-segmented, the masticatory margin of the mandible is almost vertical to the basal margin and 3-, 4- or 5-toothed, and the suture between first gastral tergite and sternite is not in the form of a rounded M-shape.

Vietnamese species. One species described from Vietnam: *humilis* Eguchi, Bui & Yamane (type locality: Nam Cat Tien) and a second species recognized by us from Vietnam: *glabfemoralis* Zhou & Zheng (Chua Yen Tu, Cuc Phuong, Ky Thuong, Pu Mat, Tay Yen Tu, Van Ban).

Bionomics. *Acanthomyrmex* species nest in dead twigs and wood fragments, and under or between stones. Colonies of *A. glabfemoralis* contain a single dealate normal queen, or instead contain single or multiple dwarf queens, while colonies of *A. humilis* contain ergatoids only (Eguchi et al. 2008). *Acanthomyrmex glabfemoralis* and *A. humilis* gather seeds (Eguchi et al. 2004, Eguchi pers. observ.).

Anillomyrma Emery, 1913

Taxonomy. The genus *Anillomyrma* was classified in the *Solenopsis* genus group of the tribe Solenopsidini by Bolton (2003). Workers of Vietnamese species have the following features (see Bolton 1981, Eguchi et al. 2010).

Worker monomorphic; body extensively depigmented, weakly sclerotized; frontal lobe in full-face view only partially concealing torulus, not extending posteriorly as frontal carina; antennal scrobe absent; median portion of clypeus not bicarinate laterally below antennal insertion, narrowly inserted between frontal lobes; median clypeal seta well developed; mandible elongate-triangular, with 4 teeth on masticatory margin (with 3–4 teeth if the world species are included); a short diastema present between preapical and 3rd teeth; antenna 10-segmented with 3-segmented club; eye completely absent; mesosoma in lateral view low, almost flat or very weakly convex dorsally; promesonotal suture completely absent dorsally; metanotal groove present dorsally as a weak transverse striation; propodeum neither armed posterodorsally nor carinate posterolaterally; propodeal lobe absent; fore coxa robust, and much longer than middle and hind coxa; petiolar peduncle long, without any anteroventral process; petiolar node long, low and dorsally broadly convex in lateral view; postpetiole in lateral view broadly attached to top of anterior face of first gastral segment; gaster elongate; gastral shoulder absent; sting strongly developed.

The worker of *Anillomyrma* is most similar to *Monomorium*, but in the latter the antenna is 11- or 12-segmented, the postpetiole is attached to the center of the anterior face of the gaster, and gaster is not elongate.

Vietnamese species. Only one species has been found from Vietnam: *decamera* (Emery) (Binh Chau - Phuoc Buu, Van Phu [type locality of “*A. decamera continentis* Wheeler”]).

Bionomics. We collected workers of *Anillomyrma decamera* in a well-developed dry forest in the southern coastal part of Vietnam, by underground bait-trapping. Baits (pork sausage) were buried in sandy soil (for details see Eguchi & Bui 2009).

Aphaenogaster Mayr, 1853

Taxonomy. The genus *Aphaenogaster* is assigned to the tribe Pheidolini (Bolton 2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view oval or elliptical, often with extremely elongate neck; frontal carina, if distinct, not extending beyond the level of eye in full-face view; antennal scrobe absent; parafrontal ridge or carina(e) often present; median portion of clypeus convex anteriorly, sometimes with a shallow emargination at midpoint; posteromedian portion of clypeus moderately or relatively broadly inserted between frontal lobes; masticatory margin with apical and 2 distinct preapical teeth followed by several smaller teeth or denticles; palp formula 5,3 or 4,3; antenna 12-segmented, gradually incrassate toward apex or with an indistinct 4-segmented club; eye medium sized; mesosoma elongate; promesonotum forming a dome; promesonotal suture weakly present or absent dorsally; metanotal groove moderately or strongly impressed dorsally; propodeal spines varying in size and shape (rarely reduced to tiny denticles or rounded angles); propodeal lobe round or subtriangular with blunt angles; petiole consisting of an anterior peduncle and a node (separation between peduncle and node sometimes indistinct); gastral shoulder absent.

The worker of *Aphaenogaster* is similar to the minor worker of *Pheidole* (larger species) and the worker of *Kartidris* and *Myrmica*. In the minor worker of *Pheidole* the masticatory margin of the mandible bears 1 or 2 small teeth between the preapical tooth and the 3rd large tooth. In the worker of *Kartidris* the vertex has a broad depressed area between eyes, the masticatory margin of the mandible has 5 distinct teeth, the antennal club is distinctly 3-segmented, and the propodeum is unarmed. In the worker of *Myrmica* the promesonotum is only slightly raised and the propodeal lobe is well-developed as a triangular or sharp lamella. In addition, the palp formula is always 6,4 in *Myrmica* as opposed to 5,3 or 4,3 in *Aphaenogaster*.

Vietnamese species. Twelve species have been recognized by us from Vietnam: *exasperata* Wheeler [= sp. eg-22] (Ba Be, Cuc Phuong, Pu Mat, Tay Yen Tu, Van Ban); **sp. eg-1** (Sa Pa); **sp. eg-2** (Sa Pa); **sp. eg-3** (Sa Pa); **sp. eg-4** (Sa Pa); **sp. eg-6** [= sp. eg-15 in Eguchi et al. 2005] (Ba Vi, Sa Pa); **sp. eg-10** (Phu Quoc); **sp. eg-17** [= sp. 25 of SKY in Yamane et al. 2003] (Cuc Phuong, Ky Thuong, Pu Mat, Tay Yen Tu); **sp. eg-18** [= sp. 22 of SKY in Yamane et al. 2003; = sp. eg-6 and sp. eg-15 in Eguchi et al. 2005] (Ba Vi, Cuc Phuong, Pu Mat, Tam Dao, Tay Yen Tu); **sp. eg-21** (Tam Dao); **sp. eg-25** (Nui Chua); **sp. eg-26** (Van Ban).

Bionomics. The majority of species inhabit well-developed forests but some occur in sparse forests, dwarf forests and areas with low bushes. Nests are usually found in the soil, under stones and in rotting logs (Bui & Eguchi 2003, Eguchi et al. 2004).

Calyptomyrmex Emery, 1887

Taxonomy. The genus *Calyptomyrmex* is assigned to the tribe Stenammini (Bolton 2003). The Oriental species were revised by Baroni Urbani (1975) and the Ethiopian species by Bolton (1981). Workers of Vietnamese species have the following features.

Worker monomorphic; frontal lobe strongly expanded and overhanging anterolateral margin of clypeus; frontal carina extremely strongly developed horizontally, in full-face view overhanging antennal scrobe; antennal scrobe extremely deep, bounded above by frontal carina and below by a ridge running above eye, capable of accommodating whole antenna; median portion of clypeus behind anterior margin vertical or nearly vertical, terminating in a projecting biramous appendage (clypeal fork); clypeal fork projecting anteriorly over mandibles and partially concealing them in full-face view; mandible triangular, with distinct apical tooth and single preapical tooth followed by several teeth or denticles; antenna 12-segmented, with 3-segmented club; scape curved, somewhat flattened, strongly widened distally, with a narrow projecting lamella on the leading edge of the widened part; eye present but small; mesosoma roundly convex dorsally; promesonotal suture absent dorsally; metanotal groove indistinct or shallowly impressed dorsally; dorsum of propodeum declining posteriorly; propodeal spiracle located very close to

or at posterolateral margin of propodeum; propodeal spine triangular; propodeal lobe well developed; petiole pedunculate anteriorly and with a large node; subpetiolar process absent; postpetiole shorter than high; dorsal surfaces of body with short, broad and blunt hairs.

The worker of the Vietnamese species is somewhat similar to that of *Mayriella*, but in the latter the antenna is 10-segmented, the eye is large and elongate, and the dorsa of the head and mesosoma bear sparse, long, standing hairs.

Vietnamese species. Only one species has been described from Vietnam: *rectopilosus* Dlussky & Radchenko [= sp. eg-1] (type locality: Bai Tu Long; other localities: Ba Be, Chua Yen Tu, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban).

Bionomics. *Calyptomyrmex rectopilosus* nests in rotting twigs and wood fragments on the floor of well-developed forests. Colonies are usually small, consisting of dozens of workers.

***Cardiocondyla* Emery, 1869**

Taxonomy. The genus *Cardiocondyla* is assigned to the tribe Formicoxenini by Bolton (1994, 2003). The Afrotropical species were revised by Bolton (1982), and the *elegans*-, *bulgarica*-, *batesii*-, *nuda*-, *shuckardi*-, *stambuloffii*-, *wroughtonii*-, *emeryi*- and *minutior*-groups were revised by Seifert (2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view subrectangular; frontal lobe small and narrow; frontal carina and antennal scrobe absent; median portion of clypeus prominently extended forward, and fused to the flattened lateral portions to form a shelf which hides basal part of mandibles in full-face view but is elevated away from the dorsal surface of mandibles in lateral view; posteromedian portion of clypeus relatively broadly inserted between frontal lobes; median clypeal seta present; mandible triangular, with 5 teeth which decrease in size from apex to base; palp formula 5,3; stipes of maxilla with a transverse crest at about midlength; antenna 12-segmented, with 3-segmented club; eye generally large and conspicuous; promesonotal dorsum in lateral view flattened to slightly convex; promesonotal suture absent dorsally; metanotal groove absent or distinctly impressed dorsally; propodeum nearly unarmed to strongly bispinose; propodeal lobe roundly extended posteriad; petiole pedunculate anteriorly and with distinct node; subpetiolar process present but small; postpetiole in lateral view dorsoventrally flattened, in dorsal view very broad, much broader than petiolar node; gastral shoulder indistinct or distinct; dorsa of head, mesosoma, waist and gaster lacking standing hairs.

The worker of *Cardiocondyla* is similar to *Monomorium* and *Temnothorax*, but in the latter two genera the postpetiole is as broad as or only a little broader than the petiolar node, and the dorsa of head, mesosoma, waist and gaster bear at least a few standing hairs.

Vietnamese species. Five species have been recognized by us from Vietnam: *kagutsuchi* Terayama [= sp. eg-3; = *nuda* (Mayr) in Eguchi et al., 2005] (Cuc Phuong, Tam Dao); *minutior* Forel [= sp. eg-2; = *emery* Forel in Eguchi et al., 2005] (Ba Vi, Cuc Phuong, Tam Dao); *wroughtonii* Forel [= sp. eg-1] (Tam Dao); **sp. eg-4** (Tay Yen Tu); **sp. eg-5** (Binh Chau-Phuoc Buu).

Bionomics. *Cardiocondyla* species inhabit open and man-made habitats such as around settlements and in gardens. Workers are frequently found on the ground surface.

***Cataulacus* F. Smith, 1853**

Taxonomy. The genus is assigned to the tribe Cataulacini (Bolton 2003). The genus was revised by Bolton (1974, 1982). The worker of the single Vietnamese species (*C. granulatus*) has the following features.

Worker monomorphic; head posteroventrally with an acute angle; frontal lobe and frontal carina extremely developed horizontally; frontal carina touching the ventral margin of eye and reaching to the posterolateral corner of head, and overhanging sides of head; antennal scrobe extremely deep, running below eye, capable of accommodating whole antenna; clypeus with anterolateral corners forming triangular points; posteromedian portion of clypeus widely inserted between frontal lobes; mandible small, triangular, with apical tooth, single preapical tooth and a small blunt denticle followed by a long edentate or bluntly crenulate edge which ends at the basal angle; antenna 11-segmented, with 3-segmented club; scape weakly curved, strongly widened distally and somewhat flat-

tened with a very narrow lamella on the leading edge; eye large, located dorsolaterally behind midlength of sides of head; mesosoma in lateral view flattened dorsally; promesonotum marginate, anterodorsally with a sharp edge and dorsolaterally with a dentate edge; promesonotal suture absent dorsally; katepisternum anteriorly with an anterolaterally directed, triangular projection; metanotal groove inconspicuous or almost absent dorsally but conspicuous laterally; propodeal spine well developed as a posterolateral projecting horn; propodeal lobe well developed, blunt-triangular; petiole in lateral view somewhat globular or cuboidal, without distinct anterior peduncle, with distinct subpetiolar process; postpetiole shorter than height, with distinct anteroventral angle; first gastral tergite greatly expanded, comprising whole of gastral dorsum in dorsal view; remaining gastral segments very small, visible only apically and apicoventrally; body strongly sclerotized and sculptured, bearing short, broad and blunt hairs.

Cataulacus is easily distinguished from other myrmicine genera known from Vietnam by antennal scrobe running below eye, frontal lobe and frontal carina extremely developed horizontally, and first gastral tergite greatly expanded, comprising whole of gastral dorsum in dorsal view.

Vietnamese species. One species is known from Vietnam: *granulatus* Latreille [= sp. eg-1] (BaVi, Cuc Phuong, Nui Chua, My Yen, Tam Dao, Tay Yen Tu, Van Ban).

Bionomics. *Cataulacus granulatus* nests in hollows within living and dead twigs of trees, and workers forage on vegetation.

***Crematogaster* Lund, 1831**

Taxonomy. The genus *Crematogaster* is assigned to the tribe Crematogastrini (Bolton 2003). Workers of Vietnamese species have the following features.

Worker monomorphic, but sometimes varying widely in size; head round, subrectangular or subtrapezoidal; frontal carina and antennal scrobe absent; median portion of clypeus roundly expanded anteriorly, partly overhanging basal part of mandibles when fully closed; posteromedian portion very broadly inserted between frontal lobes; no isolated, median seta on anterior clypeal margin; mandible narrow; masticatory margin oblique, with 4 teeth; antennae 11-segmented, with a 2-, 3-, or 4-segmented club, or gradually incrassate; eye medium sized or rarely consisting of a few ommatidia; promesonotum more or less raised; promesonotal suture absent or weakly present dorsally; metanotal groove usually distinctly impressed, sometimes margined laterally by a longitudinal carina or lamella; propodeal spine usually (but not always) present, varying in size and shape; propodeal spiracle located well posteriorly on posterolateral margin of propodeum, just below base of propodeal spine; petiole depressed dorsoventrally, without node; postpetiole with rounded node which often bears median longitudinal impression, attached to dorsal surface of gaster; gaster in dorsal view triangular or cordate; sting spatulate.

Crematogaster is easily distinguished from all other myrmicine genera known from Vietnam by the morphology of the waist and gaster. The worker of species belonging to the subgenus *Orthocrema* of *Crematogaster* is a little similar to that of *Recurvidris*, but in the latter the propodeal spines are weakly to strongly recurved, the propodeal spiracle is located far in front of the base of the propodeal spine, the postpetiole, in dorsal view, is broadly attached to the first gastral segment, and the first gastral segment behind the postpetiole is extremely dorsoventrally compressed in lateral view. Antennal club is 2-segmented in *Orthocrema*, but 3-segmented in *Recurvidris*.

Vietnamese species. Three species have been described from Vietnam: *agniae* Karavaiev (type locality: Lien Chieu, Col de Nuage [Hai Van Pass, Hue Province]); *brunnea* subsp. *latipetiolata* Karavaiev (type locality: Cau Da); *walshi* st. *bouvardi* Santschi (type locality: Lang Bian). Furthermore, thirteen species have been recognized by us from Vietnam: *aurita* Karavaiev [= sp. eg-13] (Nui Chua); *sewardi* Forel [= sp. eg-14] (Nam Cat Tien); **sp. eg-1** [= *C. (Orthocrema)* sp. 36 of SKY in Eguchi et al. 2005] (Ba Vi, Chua Yen Tu, Nam Cat Tien, Pu Mat, Sa Pa, Tam Dao, Tay Yen Tu, Van Ban); **sp. eg-4** (Chua Yen Tu); **sp. eg-6** (Ba Be, Ba Vi, Binh Chau-Phuoc Buu, Chua Yen Tu, Sa Pa, Nui Chua, Pu Mat, Tay Yen Tu); **sp. eg-7** (Chua Yen Tu); **sp. eg-8** (Ba Be); **sp. eg-9** (Ba Be, Tay Yen Tu); **sp. eg-10** (Sa Pa); **sp. eg-12** (Van Ban); **sp. eg-15** (Nam Cat Tien); **sp. eg-16** (Nam Cat Tien); sp. eg-17 (Pu Mat).

Bionomics. Many species are arboreal foragers, and nest in decayed parts of standing trees and hollows of tree trunks and branches or build carton nests. Some species nest in soil or rotting logs on the ground. Species of the subgenus *Orthocrema* forage both on and under the ground.

Dacatria Rigato, 1994

Taxonomy. The genus *Dacatria* was established under the tribe Proattini by Rigato (1994b), and was assigned to Stenammini by Bolton (1994, 2003). The worker of the single species in the genus has the following features.

Worker monomorphic; head in full-face view subrectangular, with a shallow central longitudinal furrow; preoccipital region forming a distinct carina which surrounds the pronotal neck; frontal lobe well developed and raised; frontal carina and antennal scrobe absent; median portion of clypeus raised, with nearly vertical anterior face; median clypeal seta absent; lateral portion of clypeus modified into a distinct ridge or wall in front of antennal insertion; posteromedian portion of clypeus narrowly inserted between frontal lobes; antenna 12-segmented with indistinct 3-segmented club; eye small, convex well laterad, located before midlength of side of head in full-face view; mandible triangular; masticatory margin of mandible with apical and two preapical teeth, followed by two small teeth (5 teeth in total); promesonotum domed, with a pair of rounded and low humeral tubercles; promesonotal suture absent dorsally; metanotal groove well defined, with a small prominence in front of groove; propodeal spine long; propodeal lobe developed, round; petiole with long peduncle and low node; postpetiole short and high; gastral shoulder absent; sting simple; standing hairs absent from dorsum of body (simple standing hairs present at apex of gaster and on mandible, and slightly clavate hairs on third segment of gaster).

The worker of *Dacatria* is easily distinguished from that of other myrmicine genera known from Vietnam by the morphology of lateral portion of clypeus and humeral tubercles of the promesonotum.

Vietnamese species. One species is known from Vietnam: *templaris* Rigato (Pu Mat, Van Ban).

Bionomics. *Dacatria templaris* is a ground-dwelling species in well-developed forests, and nests in litter and underground. Workers are brick red and dull and are clad in dirt, and similar to *Proatta butteli* Forel. When their nests are exposed, the cryptic workers freeze for a while, making them very difficult to detect.

Dilobocondyla Santschi, 1910

Taxonomy. The genus *Dilobocondyla* is assigned to the tribe Formicoxenini (Bolton 1994, 2003). A key to the described species was given by Wheeler (1924). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view subrectangular; preoccipital carina distinct laterally; posterolateral corner of head with a small acute angle or denticle exterior to preoccipital carina; frontal carina distinct; antennal scrobe shallow but distinct; median portion of clypeus broadly inserted between frontal lobes; anterior clypeal margin weakly convex and with a weak emargination at midpoint; median clypeal seta, if present, indistinct; mandible triangular, with 6 teeth on masticatory margin; antenna 12-segmented, with conspicuous 3-segmented club; eye relatively large; promesonotum in lateral view hardly or weakly raised; promesonotal suture absent dorsally; metanotal groove weakly impressed dorsally; propodeum in lateral view weakly swollen posterodorsad, unarmed; propodeal lobe well developed; femora strongly and abruptly incrassate in distal two thirds; petiole elongate, cylindrical, slightly arcuate in lateral view; subpetiolar process distinct, tooth-like, located anteroventrally near articulation with mesosoma; postpetiole in lateral view with acute anteroventral angle; gaster short, oval in dorsal view.

The worker of *Dilobocondyla* is easily distinguished from that of other myrmicine genera known from Vietnam by posterolateral corner of head with a small acute angle or denticle exterior to preoccipital carina, propodeum unarmed, femora strongly and abruptly incrassate, and petiole elongate and cylindrical.

Vietnamese species. One species has been described from Vietnam: *fouqueti* Santschi (type locality: Ha Noi). Two additional species have been recognized by us from Vietnam: **sp. eg-1** (Da Lat); **sp. eg-2** (Tay Yen Tu).

Bionomics. We have rarely encountered foraging workers of *Dilobocondyla* on leaves in undergrowth of natural and man-made forests.

Gauromyrmex Menozzi, 1933

Taxonomy. *Gauromyrmex* was treated as a junior synonym of *Vollenhovia* by Brown (1973b) and subsequent authors, but was reinstated as a distinct genus and assigned to the *Nesomyrmex* genus group of the Formicoxenini by Bolton (2003). The following description is based on Bolton 2003 with minor modification.

Worker variable in size or weakly polymorphic; head in full-face view subrectangular with round posterior corner, in lateral view flattened dorsoventrally; frontal carina and antennal scrobe absent; median portion of clypeus extends anteriorly as a short truncated lobe that overlaps and is closely applied to mandiblar dorsum, anterior margin of lobe shallowly evenly concave, angulate anterolaterally; posteromedian portion of clypeus relatively broadly inserted between frontal lobes; mandible short, with 6 teeth; antenna 11-segmented, with 3-segmented club; eye medium sized; promesonotum very weakly convex dorsally, a little higher than anterior border of propodeum; promesonotal suture absent dorsally; metanotal groove impressed dorsally; propodeal spine triangular; propodeal spiracle positioned high on side, at about midlength of sclerite; middle and hind femora incrassate; petiole in lateral view without distinct anterior peduncle, but with triangular node with dorsolateral corners forming acute angles or denticles, ventral face of petiole with a large process; gastral shoulder present.

Vietnamese species. A single Vietnamese species, *acanthina*, was described by Karavaiev (1935) as the non-inotypical species of “*Solenomyrmex*” [junior synonym of *Gauromyrmex*: Brown 1953]. The type localities are: Bana, 1400 m alt. [Mt. Ba Na, Da Nang Province] and Col de Nuage, 600-700 m alt. [Hai Van Pass, Hue Province].

Bionomics. All known species of *Gauromyrmex* are arboreal (Bolton 2003). Brühl (2003) reported that an undetermined Bornean species used resin to build nests on tree trunks at a height of about 15 to 18 m from the ground. The nests had a grayish, hard surface and were smoothly attached to the bark of the trees. A few tiny holes about one millimetre wide led inside the nest. Within the nest were many hollows and recognizable tunnels. There were between two and four nests of varying sizes on a tree trunk, suggesting a possible polydomous colony structure.

***Kartidris* Bolton, 1991**

Taxonomy. The genus *Kartidris* was established under the tribe Pheidolini by Bolton (1991). The worker of the single known Vietnamese species has the following features.

Worker monomorphic; head in full-face view oval, with posterior margin slightly concave medially; frontal lobe in full-face view partly concealing torulus; frontal carina and antennal scrobe absent; median portion of clypeus with anterior margin roundly convex bearing a row of stout setae but lacking an isolated median seta; posteromedian portion of clypeus relatively broadly inserted between frontal lobes; mandible triangular; masticatory margin with 5 sharp teeth which decrease in size from apex to base; antennae 12-segmented, with conspicuous 3-segmented club; eye well developed; vertex with a broad depressed area between eyes; promesonotum highly raised, with a long posterior slope; promesonotal suture vestigial dorsally; metanotal groove conspicuous; propodeum unarmed; propodeal spiracle elliptical, opening posterolaterad; propodeal lobe very small and low, round; petiole pedunculate, with relatively high node; postpetiole much higher than long, relatively strongly swollen dorsad.

The worker of *Kartidris* is easily distinguished from that of other myrmicine genera known from Vietnam by the depressed area of the vertex (also see notes under *Aphaenogaster* and *Pheidole*).

Vietnamese species. Only one species has been found from Vietnam: **sp. eg-1** (Chua Yen Tu).

Bionomics. Foragers swarming around a dead cicada were found on the ground within a bamboo forest (720–845 m alt.).

***Lasiomyrma* Terayama & Yamane, 2000**

Taxonomy. The genus *Lasiomyrma* is assigned to the tribe Stenammini by Terayama & Yamane (2000). The worker of the single known Vietnamese species has the following features.

Worker probably monomorphic; head in lateral view subrectangular; frontal carina and antennal scrobe absent; median portion of clypeus forming steep anterior face, with weak submedian carinae; anteromedian portion of clypeus forming a transverse strip with anterior margin weakly pointed in middle, lacking an isolated median seta; posteromedian portion of clypeus relatively narrowly inserted between frontal lobes; mandible elongate-triangular, with 8 teeth that decrease in size from apex to base; antenna 12-segmented, with inconspicuous 3-segmented club; eye well developed; promesonotum in lateral view slightly convex, only a little higher than anterior border of

propodeum, in dorsal view with obtusely angulate humeri; promesonotal suture absent dorsally; metanotal groove distinct; propodeal spine distinct; propodeal lobe present as a small angulate lobe; petiole pedunculate, with high and thin node; postpetiole higher than long, in lateral view roundly convex dorsally; gastral shoulder absent.

All of the described species of *Lasiomyrma* have 11-segmented antennae (Terayama & Yamane 2000, Jaitrong 2010). However, a single worker of *Lasiomyrma* collected from northern Vietnam (*L. sp. eg-1*) has 12-segmented antennae, thus the worker diagnosis of the genus given in Terayama & Yamane (2000) should be widened as “antenna 11- or 12-segmented”. The worker of *Lasiomyrma* is morphologically very similar to those of *Lordomyrma bhutanensis* (Baroni Urbani) and *L. sinensis* (Ma, Xu, Makio & DuBois) which were recently transferred to *Lordomyrma* from *Stenamma* by Branstetter (2009). These *Lordomyrma* species completely lack antennal scrobes and have the apex of anterior clypeal margin with a small projecting tooth. We provisionally accept *Lasiomyrma* as a valid genus but suggest that a comprehensive re-examination of *Lordomyrma* and *Lasiomyrma* is needed.

Vietnamese species. A single specimen of *Lasiomyrma* has been found from Vietnam: **sp. eg-1** (Ba Vi).

Bionomics. The single specimen of *Lasiomyrma sp. eg-1* was collected near the top of Mt. Ba Vi, ca. 1,100 m alt. (Eguchi et al. 2005).

***Liomyrmex* Mayr, 1865**

Taxonomy. The genus *Liomyrmex* was recently revised by Rigato and Bolton (2001) and assigned to the tribe Liomyrmecini by Bolton (2003). The worker of the single known species has the following features.

Worker monomorphic but size-variable: head in full-face view subrectangular, with round posterolateral corners; frontal carina and antennal scrobe absent; median portion of clypeus raised well, margined at each side by a well defined carina, with straight anterior margin; median clypeal seta absent, but a pair of distinct setae present in the middle; frontal lobes widely separated by posteromedian portion of clypeus; antenna 11-segmented with distinct 3-segmented club; eye absent; masticatory margin short, 4-toothed; promesonotum in lateral view almost flat or only weakly convex; promesonotal suture absent; metanotal groove distinct; propodeum unarmed; propodeal spiracle large; metapleural gland bulla large, elongate toward propodeal spiracle; propodeal lobe well developed, not produced posteriad but in lateral view filling the concave outline of posterior slope of propodeum; petiolar peduncle short but distinct; petiolar node well developed, in lateral view squarish, and in dorsal view transversely elongate; subpetiolar process lamelliform, directing anteroventrad; sternite of postpetiole distinctly produced anteroventrad; gastral shoulder indistinct; sting extremely developed, long.

The worker of *Liomyrmex* is somewhat similar to eyeless worker (or minor) of *Anillomyrma*, *Oligomyrmex*, *Parvomyrma* and *Solenopsis*. However, frontal lobes are not so widely separated by the posteromedian portion of clypeus and antennal segmentation is not “11-segmented with distinct 3-segmented club” in the worker (minor) of the latter genera.

Vietnamese species. After their critical reexamination of relevant type-material and other specimens, Rigato & Bolton (2001) concluded that *Liomyrmex* Mayr is monotypic. The single species, *Liomyrmex gestroi* (Emery), is widespread in the Indo-Chinese, Indo-Malayan, and Austro-Malayan subregions: ***gestroi*** (Emery) [= *sp. eg-1*] (“Muong Moun” (see Rigato & Bolton)).

Bionomics. According to Rigato & Bolton (2001), *Liomyrmex gestroi* is a species of forest leaf-litter and top-soil and may be a specialised predator of isopteran. Eguchi found a mass of workers under bark of large fallen log in W. Bali (unfortunately he did not take account of the presence of other insects).

***Lophomyrmex* Emery, 1892**

Taxonomy. The genus *Lophomyrmex* was placed in the tribe Solenopsidini by Emery (1895), and in the *Pheidologeton* genus group by Ettershank (1966). More recently the genus was revised by Rigato (1994a), and transferred into the tribe Pheidolini. The worker of the single known Vietnamese species has the following features.

Worker monomorphic; head in full-face view oval with a relatively straight posterior margin; frontal carina and antennal scrobe absent; median portion of clypeus convex anteriorly, with a protruding blunt tooth at the midpoint of

its anterior margin; frontal lobes moderately separated by posteromedian portion of clypeus; antenna 11-segmented with distinct 3-segmented club; eye oval with a weak anteroventral point, located at about midlength of head in full-face view; masticatory margin of mandible with apical tooth and one preapical tooth, followed by an enlarged denticle, this then followed by a series of small denticles; basal margin of mandible finely serrated; promesonotum forming a single dome, flattened dorsally, with a pair of horizontal flat spines those are formed by the lateral and anterolateral edges of the dorsum and directed anteriorly; promesonotal suture absent; metanotal groove well defined; propodeal spine long; propodeal lobe reduced to a weak carina; petiole with a distinct peduncle and a high node; gastral shoulder distinct.

The worker of *Lophomyrmex* is similar to the minor workers of *Pheidole* and *Pheidologeton*. However, in the minor worker of Oriental species of *Pheidole*, the antenna is 12-segmented and basal margin of the mandible is never serrated. In the worker of *Pheidologeton* the antennal club is 2-segmented and the basal margin of mandible is never serrated.

Vietnamese species. The genus *Lophomyrmex* occurs in the Oriental and Indo-Australian regions, and in Vietnam only one species has been found from the central and southern regions: *birmanus* Emery [= sp. eg-1] (Binh Chau-Phuoc Buu, Nam Cat Tien, Nui Chua).

Bionomics. *Lophomyrmex birmanus* nests in the soil, usually under stones and logs or around the bases of trees. Workers are active ground-foragers. We have collected workers by underground bait-trapping, suggesting they workers forage both on and under the ground.

***Lordomyrma* Emery, 1897**

Taxonomy. The genus *Lordomyrma* is assigned to the tribe Stenammini (Bolton 1994, 2003). The genus was recently overviewed by Taylor (2009). Although *Lordomyrma* as recognised by Taylor (2009) is morphologically heterogeneous, the worker of the single known Vietnamese species has the following features.

Worker monomorphic; head in full-face view subrectangular; frontal lobe large; antennal scrobe very deep, surrounded dorsally by frontal carina and ventrally by genal carina; posteroventral face of head laterally margined by a weak carina; median portion of clypeus forming steep anterior face, with distinct submedian carinae; postero-medial part of clypeus relatively narrowly inserted between frontal lobes; mandible triangular; masticatory margin with 7 or more teeth decreasing in size from apex to base; antenna 12-segmented, with 3-segmented club; eye medium sized; promesonotum in lateral view weakly elevated above anterior border of propodeal dorsum, in dorsal view with angulate humeri; promesonotal suture absent dorsally; metanotal groove distinct dorsally; propodeal spine long and slender; propodeal lobe well developed, triangular, expanding posterodorsad; petiole consisting of short peduncle and moderately elevated node; petiole higher than long; gastral shoulder absent; head, mesosoma and waist segments heavily sculptured.

Lordomyrma bhutanensis (Baroni Urbani) and *L. sinensis* (Ma, Xu, Makio & DuBois) which were recently transferred to *Lordomyrma* from *Stenamma* by Branstetter (2009) represent the named species of *Lordomyrma* known from mainland Asia. The two species differ in several important ways from other Asian species: (1) frontal carinae and scrobes absent; (2) apex of the anterior clypeal margin with a small tooth; (3) ventrolateral margin of the head not delineated by a short carina; (4) propodeal spines short; and (5) petiolar peduncle relatively long and slender. Thus, the generic limits between *Lordomyrma* and *Lasiomyrma* need re-examination (see notes under *Lasiomyrma*).

Vietnamese species. A single colony of *Lordomyrma* has been found from Vietnam: **sp. eg-1** (Sa Pa).

Bionomics. The single known colony of *Lordomyrma* sp. eg-1 was found in the soil under stone in a relatively well-developed lower montane forest (1,600–1,700 m alt.).

***Mayriella* Forel, 1902**

Taxonomy. The genus *Mayriella* was established under the tribe Meranoplini by Forel (1902), but was placed in the *Carebara* genus group of the tribe Solenopsidini by Bolton (2003). The genus was recently revised by Shattuck & Barnett (2007). The worker of the single known Vietnamese species has the following features.

Worker monomorphic; head in full-face view subtrapezoidal; frontal lobe large; antennal scrobe very deep, surrounded dorsally by frontal carina and ventrally by genal carina; both carinae well developed and meeting at posterior end of antennal scrobe; median portion of clypeus behind anterior margin vertical or nearly vertical, terminating above in a projecting, bidentate appendage; median clypeal seta absent; posteromedian portion of clypeus inserted relatively broadly between frontal lobes; mandible with 4 teeth; antenna 10-segmented, with 2-segmented club; eye large and elongated, narrowed anteroventrally; mesosoma short and high; promesonotal dome flattened, slightly higher than anterior border of propodeal dorsum; humerus bluntly expanded anterolaterad; promesonotal suture absent dorsally; ventrolateral margin of promesonotum and anterior margin of mesopleuron forming flanges partly overhanging forecoxa; metanotal groove shallowly impressed dorsally; dorsum of propodeum declining posteriorly; propodeal spine elongate-triangular; propodeal lobe strongly expanded posterodorsad; petiole short but pedunculate, with high node; subpetiolar process well developed; postpetiole short; gastral shoulder well developed; dorsa of head and mesosoma with sparse, long, standing hairs.

The worker of *Mayriella* is somewhat similar to that of the Vietnamese species of *Calypatomyrmex* (for distinguishing features see notes under *Calypatomyrmex*).

Vietnamese species. Only one species has been described from Vietnam: *granulata* Dlussky & Radchenko [= sp. eg-1; = sp. 1 of SKY: Yamane et al. 2005] (type locality: Bai Tu Long; other localities: Ba Be, Cuc Phuong, Phu Quoc, Tay Yen Tu, Van Ban).

Bionomics. Nests of *M. granulata* are found in rotting twigs, under stones and in the litter layer.

***Meranoplus* Smith, 1853**

Taxonomy. The genus *Meranoplus* is assigned to the tribe Meranoplini by Emery (1914a). The Oriental species were revised by Schödl (1998). The worker of the single known Vietnamese species (*M. bicolor*) has the following features.

Worker monomorphic; head in full-face view subtrapezoidal, posteroventrally with an acute angle; frontal lobe and frontal carina well developed horizontally, reaching near posterolateral corner of head and overhanging sides of head in frontal view; antennal scrobe extremely deep, running above eye; median portion of clypeus anterolaterally with an angle or denticle; posteromedian portion of clypeus widely inserted between frontal lobes; mandible triangular, with 4 teeth; antenna 9-segmented, with 3-segmented club; eye large and strongly convex laterad, located behind midlength of sides of head in full-face view; mesosoma in lateral view short and high; promesonotum laterally margined with flange which in dorsal view overhangs sides of mesosoma; lateral margin indented at level of promesonotal suture; anterolateral corner of promesonotal dorsum forming an acute, laterally projecting tooth; posterolateral corner of dorsum forming a long, posteriorly projecting spine; posterior margin of dorsum forming a translucent lamella between spines; ventral margin of promesonotum forming a lamella which partly covers base of forecoxa; promesonotal suture and metanotal groove absent dorsally; dorsum of propodeum sloping posteriad; propodeal spine well developed as a posterolaterally projecting horn; propodeal lobe poorly developed; petiole in lateral view triangular, without distinct anterior peduncle; subpetiolar process absent; postpetiole in lateral view much higher than long, extremely swollen dorsad; gaster in dorsal view elongate-cordiform.

The worker of *Meranoplus* is easily separated from that of other Vietnamese myrmicine genera by the morphology of head and mesosoma.

Vietnamese species. One species has been recognized by us from Vietnam: *bicolor* (Guérin-Méneville) [sp. eg-1] (Nui Chua, Tam Dao, Pu Mat).

Bionomics. *Meranoplus bicolor* inhabits bare lands, grasslands and sparse forests, and nests in soil. Workers forage on the ground.

***Monomorium* Mayr, 1855**

Taxonomy. The genus *Monomorium* is assigned to the *Solenopsis* genus group of the tribe Solenopsidini (Bolton 2003). The concept of the genus was revised by Bolton (1987), and was recently widened by Heterick (2003) and Fernández (2007). Workers of Vietnamese species have the following features.

Worker caste monomorphic or polymorphic; head in full-face view subrectangular, with rounded posterior corners; frontal lobe in full-face view narrow, just concealing antennal insertion, not extending posteriorly as a frontal carina, moderately or narrowly separated by posteromedian part of clypeus; antennal scrobe absent; median portion of clypeus expanded anteriorly, with a straight anteromedian margin, usually defined laterally by clypeal carinae; median clypeal seta present; mandible narrow; masticatory margin with apical and 2 subapical teeth usually followed by a small or inconspicuous tooth, but sometimes by 1 or 2 distinct teeth (thus the margin 3- to 5-toothed); antenna 11- or 12-segmented, with 3-segmented club; eye medium to small in size (rarely reduced to a single ommatidium); promesonotum in lateral view usually weakly raised; promesonotal suture completely absent dorsally; metanotal suture usually a deeply impressed groove on dorsum; propodeum unarmed, but rarely with posterodorsal angles; propodeal lobe absent or indistinct, but sometimes roundly expanded; petiole pedunculate anteriorly and with distinct node; postpetiole much shorter than petiole, in dorsal view almost as broad as or a little broader than petiolar node; gastral shoulder weak or indistinct, but sometimes well developed; first gastral tergite largely overlapping first gastral sternite.

The worker of *Monomorium* is similar to those of *Anillomyrma* (see under *Anillomyrma*), *Cardiocondyla* (see under *Cardiocondyla*) and *Solenopsis*, and to the minor workers of *Pheidole* and *Pheidologeton*. However, in the worker of *Solenopsis* the antennal club is 2-segmented. In the minor of *Pheidole* the median clypeal seta is absent, the masticatory margin of mandible has 6 or more teeth/denticles, and propodeal spines are usually (but not always) present. In the minor of *Pheidologeton* the antennal club is 2-segmented, the median clypeal seta is absent, and propodeum is always armed with spines or denticles.

Vietnamese species. Two species have been described from Vietnam: *annamense* Donisthorpe (type locality: Da Lat) and *silvestrii* Wheeler (type locality: Yen Bay; other locality: Van Phu). Ten additional species have been recognized by us from Vietnam: *chinense* Santschi [= sp. eg-6] (Ba Vi, Cuc Phuong, Tam Dao); *floricola* (Jerdon) [= sp. eg-7] (Que Phong, Pu Mat); *hiten* Terayama [= sp. eg-3] (Ba Be, Ba Vi, Cuc Phuong, Tam Dao, Tay Yen Tu, Van Ban); *pharaonis* (Linnaeus) [= sp. eg-4] (Ba Be, Ba Vi, Cuc Phuong, Nui Chua, Pu Mat, Quang Tri, Tam Dao); *sechellense* Emery [= sp. eg-5] (Ba Vi, Binh Chau-Phuoc Buu, Cuc Phuong, Pu Mat); **sp. eg-1** [= sp. 9 of SKY: Eguchi et al. 2005] (Ba Vi, Cuc Phuong, Pu Mat, Tam Dao, Tay Yen Tu, Van Ban); **sp. eg-2** [= sp. 1 of SKY: Yamane et al., 2003] (Ba Be, Cuc Phuong, Tay Yen Tu); **sp. eg-8** (Nam Cat Tien, Phu Quoc, Pu Mat); **sp. eg-9** (Nui Chua); **sp. eg-10** (Nui Chua, Phu Quoc).

Bionomics. *Monomorium* species are found in various habitats such as bare lands, grasslands, forest edges and well-developed forests. Their nests are usually found under stones and in soil. Most species forage on the ground, but some, such as *M. sechellense*, forage both on and under the ground (Eguchi & Bui 2009).

Myrmecina Curtis, 1892

Taxonomy. The genus *Myrmecina* is assigned to the tribe Myrmecini together with *Acanthomyrmex*, *Pristomyrmex* and *Perissomyrmex* (Bolton 2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view rectangular, with rounded posterior corners; preoccipital carina extending to ventral surface of head and then forming a longitudinal carina which runs anteriorly; frontal carina inconspicuous; antennal scrobe absent; frontal lobe large, covering antennal insertion; median margin of clypeus raised above dorsal surface of mandibular bases, with truncate anterior margin, laterally with a submedian carina from anterior end of frontal lobe to anterior margin of clypeus; carina often forming a submedian tooth; median clypeal tooth often present but not accompanied by an isolated median seta; posteromedian portion of clypeus very broadly inserted between frontal lobes; lateral portion of clypeus often (but not always) modified into a narrow and low ridge or wall in front of antennal insertion; mandible triangular; masticatory margin with 2 distinct apical teeth followed by several teeth or denticles; antennae 11- or 12-segmented, with 3-segmented club; eye small to medium in size; mesosoma short, stout with slightly convex promesonotal dome; promesonotal suture absent dorsally; humeral angle distinct; anterior part of mesopleuron with a well developed flange projecting over base of fore coxa; metanotal groove weak or absent; propodeal spine more or less developed; an additional process or tooth sometimes present in front of each propodeal spine; propodeal lobe present only as a low carina; petiole sessile and lacking distinct node, in lateral view usually (but not always) dorsally with a triangular point or angles at or behind midlength of petiole; postpetiole in dorsal view rectangular; gastral shoulder distinct.

The worker of *Myrmecina* is easily separated from those of other Vietnamese myrmicine genera by the presence of longitudinal carina on the ventrolateral side of head and a sessile petiole.

Vietnamese species. Five species have been recognized by us from Vietnam: **sp. eg-1** (Ba Be, Tay Yen Tu, Van Ban); **sp. eg-2** (Ba Be); **sp. eg-3** [= sp. 48 of HO: Eguchi et al., 2005] (Cuc Phuong, Pu Mat, Tay Yen Tu); **sp. eg-4** (Nam Cat Tien); **sp. eg-5** (Van Ban).

Bionomics. Colonies of *Myrmecina* species are found in litter and soil.

***Myrmica* Latreille, 1804**

Taxonomy. The genus *Myrmica* is assigned to the tribe Myrmicini (Bolton 2003). The Vietnamese species were recently revised by Radchenko & Elmes (2001) and Radchenko et al. (2006), and the workers have the following features.

Worker monomorphic; head in full-face view oval; preoccipital carina distinct dorsally and laterally; frontal carina and antennal scrobe absent; anteromedian margin of clypeus weakly convex, lacking an isolated median seta; posteromedian portion of clypeus broadly inserted between frontal lobes; antennae 12-segmented, without distinct club; eye medium sized, convex well laterad; palp formula 6,4; mandible triangular; masticatory margin with apical and 1–2 distinct preapical teeth followed by several smaller teeth or denticles; promesonotum in lateral view slightly raised; promesonotal suture absent or vestigial dorsally; metanotal groove more or less distinctly impressed dorsally; propodeal spine long and sharp; propodeal lobe well developed as a triangular or spinose projection; middle and hind tibiae usually each with a single pectinate spur; petiole pedunculate, with low node; subpetiolar process present as a small tooth anteroventrally; dorsal part of postpetiole in lateral view leaning posterodorsad; gastral shoulder absent; sting well developed, without any apical appendage; head and mesosoma usually strongly reticulate or rugoso-reticulate.

The worker of *Myrmica* is somewhat similar to those of *Aphaenogaster* (see under *Aphaenogaster*) and *Tetramorium*. However, in the worker of *Tetramorium*, the tibial spurs of the middle and hind legs are simple or absent, and the apex of sting bears a small lamellate appendage.

Vietnamese species. Five species have been known from Vietnam: *angulata* Radchenko & Elmes (Sa Pa); *schoedli* Radchenko, Elmes & Bui (Sa Pa); *serica* Wheeler (Sa Pa); *titanica* Radchenko & Elmes (Sa Pa); *yamanei* Radchenko & Elmes (Sa Pa).

Bionomics. *Myrmica* species have so far been found exclusively in the mountains of Fan Si Pan above approximately 1,700 m alt. They inhabit sparse to well-developed forests and nest in rotting logs, wood fragments, under stones, in soil around tree bases, etc. Workers forage on the ground and lower vegetation.

***Myrmicaria* Saunders, 1842**

The genus *Myrmicaria* is assigned to the tribe Myrmicariini (Bolton 2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view oval or subrectangular with round posterior corners and straight posterior margin; frontal lobe in full-face view relatively large, completely concealing torulus; frontal carina indistinct or absent; antennal scrobe absent; median portion of clypeus with roundly convex anterior margin; posteromedian portion of clypeus broadly inserted between frontal lobe; median clypeal seta absent; mandible relatively narrow, with 4 teeth; antenna 7-segmented, gradually incrassate or with indistinct 3-segmented club; eye large and strongly convex laterad, located behind midlength of side of head in full-face view and relatively high on side in lateral view; mesosoma in lateral view short and high; promesonotum in lateral view a little higher than anterodorsal border of propodeum; promesonotal suture a weak or faint dorsal impression; anteroventral corner of promesonotum forming an acute angle or spine; metanotal groove weakly impressed; posterior slope of promesonotum and dorsum of propodeum margined laterally with a carina that connects with a well-developed propodeal spine; propodeal lobe absent; legs slender and long; petiole with long anterior peduncle and well-developed node; subpetiolar process absent; postpetiole in lateral view relatively long; gastral shoulder present; sting well developed.

The worker of *Myrmicaria* is easily separated from those of other Vietnamese myrmicine genera by 7-segmented antennal segments, short and high mesosoma, and elongate petiolar peduncle.

Vietnamese species. Two species have been recognized by us from Vietnam: *brunnea* Saunders [sp. eg-1] (Bac Can, Ba Vi, Cuc Phuong) and *vidua* F. Smith [sp. eg-2] (Da Lat, Que Phong, Nui Chua, Pu Mat, Van Ban).

Bionomics. *Myrmecaria brunnea* and *M. vidua* inhabit various habitats such as fruit gardens, sparse forests, forest edges and well-developed forests, and nest in soil, often building big mounds with soil particles. Workers scavenge dead animals and also tend homopterans.

Oligomyrmex Mayr, 1867

Taxonomy. The genus *Oligomyrmex* is assigned to the tribe Solenopsidini (Bolton 2003). Fernández (2004) placed *Afroxydriis*, *Oligomyrmex* and *Paedalgus* as junior synonyms of *Carebara*, but here we do not follow Fernández's treatment because of his insufficient consideration of Old World taxa. Workers of Vietnamese species have the following features (see Bolton 2003; Ettershank 1966).

Worker dimorphic; head in full-face view subrectangular or subtrapezoidal; major with posterolateral corners more or less produced into preoccipital lobes; minor with round posterolateral corners; frontal carina and antennal scrobe absent; median portion of clypeus margined laterally by conspicuous carinae in minor (median portion of clypeus usually but not always margined laterally in major); posteromedian portion of clypeus narrowly to relatively broadly inserted between frontal lobes; median clypeal seta absent; mandible triangular, with 5–6 teeth on masticatory margin (teeth often rounded or worn in major); antenna with 9- or 11-segments, with 2-segmented club; eye small to much reduced, or rarely absent; major of some species with mesosomal segmentation developed to a fairly high degree; promesonotum in lateral view usually weakly to strongly raised, but sometimes dorsal outline of mesosoma almost straight; promesonotal suture completely absent dorsally in minor, but sometimes well developed in major; metanotal groove conspicuous, usually impressed deeply on dorsum; propodeum unarmed or armed with a pair of propodeal spines or angles; propodeal lobe slightly to strongly roundly expanded, or present as a carina or lamella attaining the base of propodeal spine or angle; petiole pedunculate and with node, often with subpetiolar process; gastral shoulder usually conspicuous.

The minor worker of *Oligomyrmex* is similar to that of *Pheidologeton*, and the workers of *Parvimyrmex* and *Solenopsis*. However, the minor of *Pheidologeton* does not have the median part of clypeus laterally margined by carinae. The workers of *Parvimyrmex* and *Solenopsis* have a median clypeal seta. *Oligomyrmex* and *Pheidologeton* are hardly distinguishable from each other by the morphology of the major worker but the body is much larger in the latter genus.

Vietnamese species. Three species of *Oligomyrmex* have been described from Vietnam: *bouvardi* Santschi (type locality: Mi Tho, Ho Chi Minh City); *capreolus* Wheeler (type locality: Van Phu); *cribriceps* (Wheeler) (type locality: Dong Mo). Twelve additional species have been recognized by us from Vietnam: **sp. eg-1** (Chua Yen Tu, Cuc Phuong, Tay Yen Tu, Van Ban); **sp. eg-2** (Sa Pa); **sp. eg-3** [= sp. 23 of SKY: Yamane et al., 2003] (Cuc Phuong, Nam Cat Tien, Van Ban); **sp. eg-4** [= sp. 22 of SKY: Yamane et al., 2003] (Cuc Phuong, Nam Cat Tien, Phu Quoc, Pu Mat, Sa Pa, Van Ban); **sp. eg-5** [= sp. A: Eguchi et al. 2005] (Ba Be, Sa Pa, Tay Yen Tu); **sp. eg-6** (Ba Be, Binh Chau-Phuoc Buu, Nam Cat Tien); **sp. eg-7** [= sp. 24 of SKY: Eguchi et al., 2005] (Cuc Phuong, Tam Dao, Tay Yen Tu); **sp. eg-8** (Binh Chau-Phuoc Buu, Phu Quoc); **sp. eg-9** (Nam Cat Tien); **sp. eg-10** (Van Ban); **sp. eg-11** (Phu Quoc); **sp. eg-12** (Nam Cat Tien, Phu Quoc).

Bionomics. Species richness and colony density of *Oligomyrmex* seems to be highest in humid forests. Nests are found in rotten twigs, wood fragments and logs, inside the outer walls of termite mounds and in the soil. Most species probably forage both on and under the ground (Eguchi & Bui 2009).

Paratopula Wheeler, 1919

Taxonomy. The genus *Paratopula* is assigned to the tribe Paratopulini by Bolton (2003). The genus was revised by Bolton (1988b). The worker of the single Vietnamese species has the following features.

Worker monomorphic; head in full-face view subrectangular; frontal carina indistinct or absent; antennal scrobe absent; anterior clypeal margin feebly emarginated medially, lacking an isolated median seta; posteromedian portion of clypeus very broadly inserted between frontal lobes; mandible triangular; masticatory margin with 9 teeth decreasing in size from apex to base; antennae 12-segmented, with distinct 3-segmented club; eye large, in

full-face view strongly convex laterad; mesosoma in lateral view elongate and low; promesonotum in lateral view not domed; promesonotal suture absent dorsally; metanotal groove distinctly impressed dorsally; propodeal spine long and spinose; propodeal lobe extending well posteriad; petiole consisting of elongate peduncle and cubic node, with small anteroventral process; postpetiole in lateral view compressed dorsoventrally, lower than long; gastral shoulder absent; sting simple and strong; head and mesosoma strongly sculptured with rugation or rugoreticulation; body bearing moderately dense hairs that are short and blunt apically.

The worker of *Paratopula* is somewhat similar to that of *Tetramorium*. However, in the latter, the lateral portion of clypeus is modified into a distinct ridge or wall in front of antennal insertion, the apex of sting bears a small lamellate appendage, and the body is much smaller.

Vietnamese species. Only one species is known from Vietnam: **sp. eg-1** (Nam Cat Tien).

Bionomics. *Paratopula* sp. eg-1 seems to be an arboreal nester and forager, and so it is rarely found on the ground and lower vegetation.

***Parvimyrma* Eguchi & Bui, 2007**

Taxonomy. The genus *Parvimyrma* was established for a single species, *P. sangi*, is placed in the *Solenopsis* genus group (*sensu* Bolton 1987, 2003). The 11-segmented antenna and the distinctly 5-toothed triangular mandible are the only features that distinguish *Parvimyrma* from *Solenopsis*, the morphologically closest genus.

Worker monomorphic; frontal lobe in full-face view only partially concealing torulus, not extending posteriorly as a frontal carina; antennal scrobe absent; posteromedian portion of clypeus narrowly inserted between frontal lobes; median clypeal seta well developed; 1st paracarinial seta well developed; mandible triangular, overlapping but not crossing over at full closure, with 5 distinct teeth on masticatory margin but without any teeth/denticles on basal margin; trulleum open; hypostoma with a conspicuous lateral tooth just mesal to each mandibular base; anterior margin of labrum broadly concave medially; palpal formula 2,2; antenna 11-segmented, with 2-segmented club; apical antennal segment much longer than preapical segment; eye completely absent; promesonotum in lateral view low and almost flat or very weakly convex dorsally; promesonotal suture completely absent dorsally; metanotal groove relatively shallowly impressed dorsally; meso- and metatibial spur absent; propodeum unarmed but with a narrow cuticular rim on each posterolateral corner of dorsum; rim running downward and connecting with propodeal lobe; propodeal lobe low and round; propodeal spiracle small; metapleural gland large; petiole pedunculate anteriorly and with distinct node; peduncle with a small anteroventral process; postpetiole much shorter than petiole, in dorsal view a little broader than petiolar node, narrowly attached to anteriormost end of gaster; abdominal tergite IV (= gastral tergite I) broadly overlapping sternite IV on ventral surface of abdomen; gastral shoulder present; sting poorly developed.

The worker of *Parvimyrma* is similar to those of *Solenopsis* and *Oligomyrmex* (see distinguishing characters under *Oligomyrmex*). However, in the worker of *Solenopsis* the masticatory margin of the mandible bears an apical tooth followed by 2 distinct teeth and then one or more small or inconspicuous denticles, and the antenna is 9- or 10-segmented.

Vietnamese species. Only one species has been described from Vietnam: *sangi* Eguchi & Bui (Type locality: Tay Yen Tu).

Bionomics. The type series of *Parvimyrma sangi* was collected with a bait trap (small plastic tubes with several entrances containing powdered cheese as bait) buried approximately 10 cm underground in a well-developed forest at around 435 m alt. This circumstantial evidence as well as the species morphological features (depigmentation, a flat body and no eyes) suggests that this species is a subterranean nester and forager (Eguchi & Bui 2007).

***Pheidole* Westwood, 1839**

Taxonomy. The genus *Pheidole* is placed in the tribe Pheidolini (for its complete taxonomic history see Bolton (2003) and Bolton et al. (2006)). North Vietnamese species of the genus were recently revised and 31 species were recognized by Eguchi (2008). Workers of Vietnamese species have the following features.

Worker dimorphic; major with head in full-face view subrectangular, subtrapezoidal or cordate, with posterolateral corner developed as preoccipital lobe; minor with head in full-face view oval, elliptical or subrectangular;

frontal lobes far apart so that posteromedian portion of clypeus, where it projects between frontal lobes, is usually broader than one of the lobes; midpoint of anterior clypeal margin without an unpaired median seta; mandible of major massive, with 2 large apical and 1 or 2 conspicuous basal teeth, and margin between these groups of teeth edentate or irregularly and bluntly crenulate; mandible of minor triangular; masticatory margin with 7 or more teeth/denticles; 1 or 2 small denticles present between preapical tooth and 3rd large tooth; in major hypostoma always bearing a large or reduced “lateral” process just mesal to each mandibular base, and often bearing a “median” process and/or a pair of “submedian” processes, i.e. middle of hypostoma bearing 0–3 processes; palp formula 2,2; antenna 12-segmented, with 3- or 4-segmented club, or without a conspicuous club (3-segmented club the dominant condition); eye always present but varying in size, rarely consisting of only a few ommatidia; promesonotum forming a dome which is well raised above level of dorsum of propodeum; promesonotal suture absent or indistinct dorsally; posterior slope of promesonotal dome sometimes with a mound or prominence; metanotal groove weakly to strongly impressed dorsally; propodeal spine usually present (rarely vestigial or almost absent), and variable in size and shape; propodeal lobe inconspicuous, or present as a low lamella, or moderately roundly expanded; petiole in lateral view consisting of slender anterior peduncle and raised posterior node, or petiole gradually rising from base to summit of node; postpetiole in lateral view hemispherical, globular or highly domed, sometimes with anteroventral angle or projection.

The minor worker of *Pheidole* is similar to the worker of *Aphaenogaster* (for distinguishing characters see under *Aphaenogaster*), *Kartidris* and *Lophomyrmex* (see under *Lophomyrmex*). However, in the worker of *Kartidris*, the masticatory margin of the mandible bears 5 sharp teeth which decrease in size from the apex to the base, and a broad depressed area is present on the vertex between the eyes.

Vietnamese species. Forty-two species have been recognized by us from Vietnam: *aspidata* Eguchi & Bui (Nam Cat Tien); *binghamii* Forel (Binh Chau-Phuoc Buu, Nam Cat Tien, Phu Quoc); *capellinii* Emery (Ba Vi, Nam Cat Tien); *colpigaleata* Eguchi (Ba Vi, Sa Pa, Tay Yen Tu); *dugasi* Forel (Ba Vi, Cuc Phuong, Nam Cat Tien); *elongicephala* Eguchi (Ba Vi, Cuc Phuong, My Yen, Tay Yen Tu, Van Ban); *fervens* F. Smith (Ha Noi, My Yen, Nui Chua); *fervida* F. Smith (Sa Pa); *fortis* Eguchi (Sa Pa, Tam Dao); *foveolata* Eguchi (Sa Pa); *gatesi* (Wheeler) (Ba Vi, Cuc Phuong, Tam Dao); *hongkongensis* Wheeler (Ba Be, My Yen, Pu Mat, Tam Dao, Tay Yen Tu, Van Ban); *indosinensis* Wheeler (Ba Vi, Tam Dao); *laevicolor* Eguchi (Ba Be, Ba Vi, Chua Yen Tu, My Yen, Tay Yen Tu, Van Ban); *laevithorax* Eguchi (Ba Vi, Chua Yen Tu, Tay Yen Tu); *magna* Eguchi (Ba Vi, Sa Pa); *megacephala* (Fabricius) (Ha Noi, Quang Ninh, Vinh Long); *noda* F. Smith (Ba Be, Ba Vi, Chua Yen Tu, Cuc Phuong, Sa Pa, Tam Dao, Van Ban); *ochracea* Eguchi (Ba Vi, Nam Cat Tien, Sa Pa, Tam Dao, Tay Yen Tu); *parva* Mayr (Cuc Phuong, Ho Chi Minh City, My Yen); *pieli* Santschi (Ba Be, Ba Vi, Chua Yen Tu, Cuc Phuong, Hoa Binh, Ky Thuong, Phu Quoc, Pu Hoat, Pu Mat, Tam Dao, Tay Yen Tu, Van Ban); *plagiaria* F. Smith (Ba Vi, My Yen, Tam Dao, Phu Quoc); *planidorsum* Eguchi (Nam Cat Tien); *planifrons* Santschi (Nam Cat Tien, Pu Mat, Tam Dao, Tay Yen Tu, Van Ban); *rabo* Forel (Ba Vi, Chua Yen Tu, Cuc Phuong, Ky Thuong, Nam Cat Tien, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban); *rinae* Emery (Nam Cat Tien); *rugithorax* Eguchi (Pu Mat, Nam Cat Tien, Nui Chua, Phu Quoc); *smythiesii* Forel (Ba Vi, Pu Hoat, Tam Dao); *taipoana* Wheeler (Ky Thuong, Pu Mat); *tandjongensis* Forel (Phu Quoc); *tjibodana* Forel (Ba Be, Chua Yen Tu, Cuc Phuong, Nam Cat Tien, Ky Thuong, Pu Mat, Tay Yen Tu, Van Ban); *tumida* Eguchi (Ba Be, Ba Vi, Chua Yen Tu, Cuc Phuong, Ky Thuong, Nam Cat Tien, Nui Chua, Pu Mat, Tay Yen Tu, Van Ban); *vieti* Eguchi (Ba Vi, Tam Dao); *vulgaris* Eguchi (Ba Vi, Chua Yen Tu, Cuc Phuong, Ky Thuong, My Yen, Sa Pa, Tam Dao, Tay Yen Tu); *yeensis* Forel (Ba Be, Ba Vi, Cuc Phuong, Ky Thuong, My Yen, Nam Cat Tien, Pu Hoat, Pu Mat, Tam Dao, Tay Yen Tu); *zoceana* Santschi (Pu Hoat, Sa Pa); **sp. eg-165** (Lam Dong); **sp. eg-170** (Nam Cat Tien); **sp. eg-179** (Nam Cat Tien); **sp. eg-187** (Nui Chua); **sp. eg-188** (Van Ban); **sp. eg-189** (Nui Chua).

Bionomics. *Pheidole* inhabits various habitats such as bare lands, grasslands, forest edges and well-developed forests. Their nests are usually found in rotting logs, twigs, wood fragments, under stones and in soil. The majority of species forage on the ground, but some such as *P. vulgaris* forage both on and under the ground.

***Pheidologeton* Mayr, 1862**

Taxonomy. The genus *Pheidologeton* is assigned to the *Carebara* genus group of the tribe Solenopsidini (Bolton 2003). The genus was preliminarily reviewed by Yamane (2000). Workers of Vietnamese species have the following features.

Worker polymorphic; head in full-face view oval or subrectangular in minor, subrectangular or subtrapezoidal with roundly expanded vertexal lobe in media and major; frontal carina and antennal scrobe absent; median portion of clypeus not margined laterally by conspicuous carinae; posteromedian portion of clypeus relatively broadly inserted between frontal lobes; median clypeal seta absent; mandible triangular, 4–6 teeth on masticatory margin (teeth more rounded or worn in major); antenna 11-segmented, with 2-segmented club; eye small to moderate in size, sometimes consisting of only a few ommatidia; mesosoma in lateral view relatively slender in minor, but short and robust in major; promesonotum in lateral view usually well raised as a dome, much higher than anterodorsal border of propodeum; promesonotal suture completely absent dorsally in minor, but often conspicuous in major; posterior slope of promesonotal dome often with a prominence in major; metanotal suture weakly impressed dorsally; propodeal spine always present, but variable in size and shape; propodeum lobe low or almost absent; petiole consisting of anterior peduncle and node (but anterior peduncle ill defined from node in major); gastral shoulder distinct to indistinct.

The minor worker of *Pheidologeton* is similar to the minor of *Oligomyrmex* (for distinguished characters see under *Oligomyrmex*) and the worker of *Lophomyrmex* (see under *Lophomyrmex*).

Vietnamese species. One species has been described from Vietnam: *varius* Santschi (type locality: Ho Chi Minh City). Four additional species have been recognized by us from Vietnam: *diversus* (Jerdon) [= sp. eg-3] (Nam Cat Tien, Ninh Thuan, Pu Mat, Quang Tri, Tam Dao); *trechideros* Zhou et Zheng [= sp. eg-1] (Chua Yen Tu, Pu Mat, Tay Yen Tu, Van Ban); *vespillo* Wheeler [= sp. eg-2] (Ba Vi, Cuc Phuong, Tay Yen Tu); **sp. eg-4** [= cf. *affinis* (Jerdon)] (Binh Chau-Phuoc Buu, Cuc Phuong, Nam Cat Tien, Pu Mat).

Bionomics. *Pheidologeton diversus* usually inhabits urban areas, bare lands, grasslands, forest edges and sparse forests. In contrast, the other Vietnamese species of *Pheidologeton* inhabit rather developed forests. *Pheidologeton* colonies are extremely large and usually occur in soil under logs and stones. Permanent foraging trails, galleries and tunnels extend outward from the nests. A mass of foragers gather various kinds of food such as living and dead invertebrates, honeydew of homopterans and plant matter (nectar, fruits, seeds, etc).

***Pristomyrmex* Mayr, 1866**

Taxonomy. The genus *Pristomyrmex* is assigned to the tribe Myrmecini together with *Acanthomyrmex*, *Myrmecina* and *Perissomyrmex* (Bolton 2003). The genus was recently revised by Wang (2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view rounded, or rarely subtrapezoidal (as in *P. profundus*); frontal lobe reduced or vestigial; frontal carina usually developed; antennal scrobe absent or indistinct, but rarely well developed (as in *P. profundus*); anterior clypeal margin with three or more denticles; median clypeal seta absent; lateral portion of clypeus reduced; posteromedian portion of clypeus broadly inserted between frontal lobes; antenna 11-segmented with distinct 3-segmented club; eye medium sized; masticatory margin of mandible almost vertical to basal margin, 3-, 4- or 5-toothed; mesosoma short and high; promesonotum not domed, but rarely raised above anterodorsal border of propodeum (as in *P. profundus*), unarmed or armed with a pair of humeral teeth or spines; promesonotal suture absent dorsally; anterior part of mesopleuron forming a flange projecting over basal part of fore coxa; metanotal groove usually absent, but rarely marked weakly (as in *P. profundus*); propodeum armed with a pair of teeth or spines; propodeal lobe triangular, blunt-triangular, or semicircular, but rarely absent (as in *P. profundus*); petiole with peduncle and node; postpetiole relatively short and high.

The worker of *Pristomyrmex* is similar to the minor worker of *Acanthomyrmex* (for distinguishing characters see under *Acanthomyrmex*).

Vietnamese species. Five species have been recognized by us from Vietnam: *profundus* Wang [= sp. eg-4] (Phu Quoc); *punctatus* (F. Smith) [= sp. eg-1] (Ba Be, Pu Mat, Tam Dao); *rigidus* Wang [= sp. eg-2; = sp. 20 of SKY: Eguchi et al. 2005] (Ba Vi, Tay Yen Tu, Van Ban); *sulcatus* Emery [= sp. eg-5; = sp. 13 of SKY: Eguchi et al. 2005] (Ba Vi, Cuc Phuong, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban); **sp. eg-3** [cf. *occultus* Wang; = sp. 16 of SKY: Eguchi et al. 2005] (Tam Dao).

Bionomics. The thelytokous *Pristomyrmex punctatus* is nomadic, but the other Vietnamese species live in rather stable nests in rotting twigs and wood fragments and under stones. The colony size of Vietnamese species, except *P. punctatus*, is relatively small; colonies consisting of less than 100 workers may produce reproductives.

***Proatta* Forel, 1912**

Taxonomy. The genus *Proatta* is assigned to Stenammini by Bolton (1994, 2003). It contains a single species, *Proatta butteli*.

Worker monomorphic; head in full-face view elongate-pentagonal, with a shallow central longitudinal depression; preoccipital region forming four tubercles dorsally and a bilobate lobe laterally; frontal lobe very large and raised; frontal carina and antennal scrobe absent; median portion of clypeus protruded anteriorly, in lateral view forming a steep anterior face; median clypeal seta absent; lateral portion of clypeus modified into a ridge or wall in front of antennal insertion; posteromedian portion of clypeus narrowly inserted between frontal lobes; antenna 12-segmented with indistinct 3-segmented club; eye small, convex well laterad; mandible triangular; masticatory margin with apical and two preapical teeth, followed by an inconspicuous tooth (4 teeth in total); promesonotum domed, with 3 pairs of tubercles dorsally, a tubercle anterolaterally, and a forked tubercle on posterior slope; promesonotal suture absent; metanotal groove well defined; a small tubercle present on dorsum of propodeum behind groove; propodeal spine long; propodeal lobe well developed as a round lamella; petiole with long peduncle and low node which has tubercles anterodorsally and posterodorsally; postpetiole short and high; gastral shoulder absent; standing hairs absent from dorsum of body (simple standing hairs present at apex of gaster and on mandible, slightly clavate hairs on second and third segments of gaster).

The worker of *Proatta butteli* is easily separated from that of other known Vietnamese myrmicine genera by the tuberculate head and mesosoma.

Vietnamese species. The single described species in the genus is known from Vietnam: *butteli* Forel (Nam Cat Tien, Phu Quoc).

Bionomics. *Proatta butteli* is found in lowland forests of southern Vietnam, and nests under stones and wood fragments and in soil around tree bases. Adults are brick red and dull and are clad in dirt. When their nests are exposed, the cryptic workers freeze for a while, making them very difficult to detect.

***Pyramica* Roger, 1862**

Taxonomy. *Pyramica* was synonymized with *Strumigenys* by Roger (1863), but it was revived and revised by Bolton (1999 and 2000), and assigned to the tribe Dacetini. We follow Bolton's concept of the genus (but see also Baroni Urbani & De Andrade 2007). Workers of Vietnamese species have the following features. Species belonging to the *argiola*- and *murphyi*-groups of *Pyramica* are characterized by linear mandibles, like those in *Strumigenys*, but representatives of these groups have not yet been found from Vietnam.

Worker monomorphic; head in full-face view elongate-triangular or elongate-cordiform; frontal lobe horizontal, covering antennal insertion; frontal carina distinct; antennal scrobe usually distinct but sometimes weak; median portion of clypeus expanded well anteriorly; posteromedian part of clypeus broadly inserted between frontal lobes; mandible usually elongate-triangular, with serially dentate masticatory margin; labrum with a pair of large distal lobes which arise from across entire width of labrum; antenna 4- or 6-segmented, with two apical elongate segments forming a club; eye small to medium, located ventrolaterally below antennal scrobe; promesonotum often raised; promesonotal suture absent dorsally; metanotal groove usually impressed weakly or absent, but rarely remarkably stringly impressed; propodeal spine present or absent; posterior slope of propodeum often marginate laterally with lamelliform appendage; propodeal spiracle located high on side of propodeum and very close to, or at the posterior margin of the side; forecoxa basally with a rim or carina; petiole pedunculate, with low node; postpetiole with broad elliptical dorsal mound; spongiform appendages usually (but not always) well developed ventrally and laterally on both petiole and postpetiole.

The worker of *Pyramica* is similar to that of *Strumigenys*. In all *Pyramica* species so far known from Vietnam the mandible is elongate-triangular with a serially dentate masticatory margin, and so they are easily distinguished from *Strumigenys* species. However, for precise identification, the morphology of labrum needs to be examined.

Vietnamese species. Eight species has been recognized by us from Vietnam: *canina* (Brown & Boisvert) [= sp. eg-2] (Tay Yen Tu); *dohertyi* (Emery) [= sp. eg-1] (Ba Vi, Sa Pa, Tay Yen Tu, Tam Dao, Van Ban); *kichijo* (Terayama, Lin et Wu) [= sp. eg-5] (Cuc Phuong); *japonica* (Ito) [= sp. eg-6] (Sa Pa); *mitis* Brown [= sp. eg-3] (Ba Vi, Cuc Phuong, Nam Cat Tien); *nepalensis* (De Andrade) [= sp. eg-4] (Ba Be); **sp. eg-7** (My Yen, Van Ban); **sp. eg-8** (Nam Cat Tien).

Bionomics. The majority of species of *Pyramica* are litter dwellers in well-developed forest. Nests are often found in and under rotting twigs and wood fragments on the forest floor. Because we have not yet employed Winkler bags, used to extract small soil animals from litter, our collection of *Pyramica* species may be under-represented.

***Recurvidris* Bolton, 1992**

Taxonomy. The genus was first described by Forel (1890) as *Trigonogaster*, but the name was preoccupied by a pteromalid chalcid, so the new name *Recurvidris* was proposed by Bolton (1992). It was classified in the tribe Crematogastrini by Bolton (2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view oval or subrectangular; frontal carina and antennal scrobe absent; median portion of clypeus in lateral view relatively steeply sloping anteriorly; anterior clypeal margin lacking an isolated median seta; posteromedian portion of clypeus relatively broadly inserted between frontal lobes; mandible relatively narrow; masticatory margin oblique, with 4–5 teeth; antennae 11-segmented, with distinct 3-segmented club; eye well developed, weakly pointed anteroventrally; mesosoma long; promesonotal dome raised above anterodorsal border of propodeum, with a long posterior slope to propodeum; promesonotal suture absent dorsally; metanotal groove weakly impressed dorsally; propodeal spine curving upwards and forwards from base; propodeal spiracle located close to dorsal face of propodeum, far in front of base of propodeal spine; propodeal lobe vestigial; petiole pedunculate, with a tiny to large, triangular subpetiolar process; petiolar node low and weakly conical in lateral view; postpetiole in lateral view dorsoventrally narrowed posteriorly, in dorsal view broadly attached to first gastral segment; first gastral segment behind postpetiole in lateral view extremely dorsoventrally compressed; gastral shoulder absent.

The worker of *Recurvidris* is somewhat similar to that of *Crematogaster* (*Orthocrema*) species (for distinguishing characters see under *Crematogaster*).

Vietnamese species. Three species has been found from Vietnam: ***glabriceps*** Zhou [= sp. eg-1; = sp. 6 of SKY: Eguchi et al. 2005] (Tam Dao, Van Ban); **sp. eg-2** (Ba Be, My Yen, Pu Mat, Van Ban); **sp. eg-3** (Van Ban).

Bionomics. Vietnamese *Recurvidris* species inhabit forest edges and woody habitats, but rarely grasslands. They nest in the soil and build a chimney-shaped mound on the nest entrance with soil particles.

***Rhopalomastix* Forel, 1900**

Taxonomy. The genus *Rhopalomastix* is assigned to the tribe Melissotarsini (Bolton 2003). The worker of the single Vietnamese species has the following features.

Worker monomorphic; head subrectangular; frontal carina and antennal scrobe absent; frontal lobes touching or separated only by a narrow longitudinal impression; median portion of clypeus weakly convex anteriorly, lacking median clypeal seta but bearing a pair of thick and short submedian setae; mandible small, with 4 teeth; antenna 10-segmented, with 2-segmented club; scape very short, extending a little beyond midlength of head when laid backwards; eye relatively large, located well in front of midlength of side of head; mesosoma box-shaped; promesonotal suture absent dorsally; metanotal groove absent; propodeum unarmed; metapleural gland bulla large; propodeal lobe absent; fore- and hindfemora extremely widened and flattened distally; petiole nodiform, with relatively high node, anteroventrally with well-developed subpetiolar process; postpetiole much shorter than high, broadly attached to anteriormost portion of gaster; gastral shoulder absent.

The worker of *Rhopalomastix* is easily separated from those of other known Vietnamese myrmicine genera by a combination of the following characters: frontal lobes closely approximated; eye relatively large; mesosoma box-shaped; fore- and hindfemora extremely widened and flattened distally; postpetiole broadly attached to gaster.

Vietnamese species. One species has been found from Vietnam: **sp. eg-1** [= sp. 3 of SKY: Eguchi et al., 2005] (Pu Mat, Tam Dao).

Bionomics. *Rhopalomastix* nests in spaces under the bark of standing tree trunks.

***Rhoptromyrmex* Mayr, 1901**

Taxonomy. The genus *Rhoptromyrmex* is assigned to the tribe Tetramoriini (Bolton 2003). The genus was revised by Bolton (1986). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view cordate; frontal carina and antennal scrobe absent; anteromedian margin of clypeus broadly convex without any emargination at its midpoint, overhanging basal border of mandibular blade when mandibles closed, lacking an isolated median seta; posteromedian portion of clypeus very broadly inserted between frontal lobes; lateral portion of clypeus modified into a narrow and low ridge or wall in front of antennal insertion; mandible triangular; masticatory margin with apical and 1 or 2 larger preapical teeth followed by some smaller teeth or minute denticles; palp formula 3,2; antennae 12-segmented, with distinct 3-segmented club; eye relatively large; mesosoma relatively short and high; promesonotum in lateral view not or hardly raised; promesonotal suture absent dorsally; metanotal groove weakly impressed dorsally; mesopleuron marginate anteriorly with a carina that never develops into distinct flange projecting over basal part of forecoxa; propodeal spine long and spinose; propodeal lobe reduced to a low carina; petiole consisting of short and stout peduncle and relatively high node; gastral shoulder indistinct or absent; apex of sting with a small lamellate appendage; body bearing a few standing hairs which are short and blunt apically; head and mesosoma only weakly and finely rugose.

The worker of *Rhoptromyrmex* is similar to that of *Tetramorium*, but in the latter the head in full-face view is roughly oval or subrectangular, with posterolateral corners which are not or weakly produced and the propodeal lobe is well developed. In Vietnamese species of *Tetramorium* the palp formula is 4,3.

Vietnamese species. Three species have been found from Vietnam: *wroughtonii* Forel [= sp. eg-2; = sp. 1 of SKY: Eguchi et al. 2005] (Ba Vi, Cuc Phuong, Sa Pa, My Yen, Tam Dao, Tay Yen Tu, Van Ban); **sp. eg-1** [= sp. 2 of SKY: Eguchi et al. 2005] (Cuc Phuong, Sa Pa, Tam Dao, Tay Yen Tu); **sp. eg-3** [= sp. 3 of SKY: Eguchi et al., 2005] (Tam Dao).

Bionomics. Vietnamese *Rhoptromyrmex* species inhabit forest edges and woody habitats, but sometimes open habitats. They nest in soil and build a large caldera-shaped entrance mound with soil particles.

***Solenopsis* Westwood, 1840**

Taxonomy. The genus *Solenopsis* is assigned to the *Solenopsis* genus group of the tribe Solenopsidini by Bolton (1987). Workers of Vietnamese species have the following features.

Worker monomorphic or polymorphic (worker of the introduced *S. geminata* polymorphic); head in full-face view subrectangular; frontal carina and antennal scrobe absent; median portion of clypeus expanded anteriorly, usually defined laterally by clypeal carinae which form clypeal teeth; median clypeal seta present (sometimes absent in major of *S. geminata*); posteromedian portion of clypeus moderately or narrowly inserted between frontal lobes; mandible usually narrow and subtriangular, with apical tooth followed by 2 distinct teeth and then one or more small or inconspicuous denticles on masticatory margin (major of *S. geminata* with massive mandible lacking teeth on masticatory margin); antenna 9- or 10-segmented, with 2-segmented club; apical antennal segment much longer than preapical segment; eye moderately developed, reduced or absent; promesonotum in lateral view usually weakly or strongly domed; promesonotal suture absent or weak dorsally; metanotal groove conspicuous dorsally, usually a deeply impressed groove on dorsum; propodeum unarmed; propodeal lobe roundly expanded, or reduced to a carina; petiole pedunculate with distinct node; gastral shoulder inconspicuous to well developed; sting well developed.

Solenopsis sp. eg-3 (Vietnam), sp. eg-4 (W. Malaysia) and sp. eg-5 (Vietnam and Thailand) show characteristics seen in the minor worker of the *Carebara lignata* species complex *sensu* Fernández (2004): antenna 9-segmented, with 2-segmented club; eye completely absent; median portion of clypeus in profile roundly and strongly swollen; clypeal carina evanescent or absent; clypeal teeth completely absent; promesonotum in profile rather flat dorsally. However, *Solenopsis* sp. eg-3, sp. eg-4 and sp. eg-5 have a median clypeal seta which is distinguishable from the background hairs on the anterior clypeal margin.

The worker of *Solenopsis* is similar to the minor worker of *Oligomyrmex*, and the worker of *Parvomyrma* and *Monomorium* (for distinguishing characters see under the relevant genera).

Vietnamese species. Four species are known from Vietnam: *geminata* (Fabricius) (Ha Noi, Nam Cat Tien, Nui Chua, Phu Quoc), **sp. eg-2** [= sp. 12 of SKY: Eguchi et al., 2005] (Binh Chau - Phuoc Buu, Cuc Phuong, Nam Cat

Tien, Pu Mat), **sp. eg-3** [= sp. 3 of SKY: Eguchi et al., 2005] (Cuc Phuong, Tay Yen Tu), **sp. eg-5** (Binh Chau - Phuoc Buu, Nam Cat Tien, Phu Quoc).

Bionomics. *Solenopsis* sp. eg-2 and sp. eg-3 are found in the soil or under stones. Their reduced or absent eyes and pale body color suggest that they are subterranean nesters and foragers or even lestopibiotic in the nest of other ants or termites. *Solenopsis geminata* is an introduced species from the Neotropics. Commerce has accidentally introduced the species to urban and rural areas and other open habitats (including agricultural fields) in North America, South America, Asia, Australia, Oceania and Africa. The species is omnivorous and nests in the soil often beneath objects such as stones, concrete blocks, etc. This is one of the notorious pest ants in Asia (named the tropical fire ant) because well-developed colonies include a huge number of aggressive workers armed with a powerful sting. Detailed bionomics of *S. geminata* and other fire ants are provided by Taber (2000).

***Strumigenys* Smith, 1860**

Taxonomy. The genus *Strumigenys* is assigned to the tribe Dacetini (Bolton 2003). The genus was recently revised by Bolton (2000), and we follow his concept of the genus (but see also Baroni Urbani & De Andrade 2007). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view elongate-cordiform; posterior margin deeply emarginate in middle; frontal carina and antennal scrobe usually distinct, running dorsolaterally above eye; frontal lobe horizontal, covering antennal insertion; clypeus forming a flat shelf which overhangs basal portion of mandible; mandible sub-linear to linear (but rarely shortened and basally thickened), straight or curved, terminating in an apical fork of 2 spiniform teeth; one or two small intercalary teeth or denticles usually present between or below spiniform apical teeth; mandible usually with one preapical tooth; labrum with distal lobes reduced to papillae or vestigial, not arising from across entire width of labrum; antenna 6-segmented, with two apical elongate segments together forming a club; eye small, located ventrolaterally; promesonotum usually more or less raised; promesonotal suture absent dorsally; metanotal groove absent; propodeal spine present or absent; posterior slope of propodeum often marginate laterally with lamelliform appendage; propodeal spiracle located high on side of propodeum and close to or at margin of posterior slope of propodeum; fore coxa with a basal rim or carina; petiole pedunculate, with low node; postpetiole with broad elliptical dorsal mound; spongiform appendages well developed ventrally and laterally on both petiole and postpetiole.

The worker of *Strumigenys* is similar to that of *Pyramica* (for distinguishing characters see under *Pyramica*).

Vietnamese species. Ten species are known from Vietnam: *feae* Emery [= sp. eg-3; = sp. 44 of SKY: Eguchi et al., 2005] (Ba Vi, Nam Cat Tien, Phu Quoc, Pu Mat, Tay Yen Tu); *lewisi* Cameron [= sp. eg-6; = sp. 33 of SKY: Yamane et al., 2003] (Ba Vi, Sa Pa, Tam Dao, Van Ban); *rallarhina* Bolton [= sp. eg-7; = sp. 39, 46 of SKY: Yamane et al., 2005] (Ba Vi, Chua Yen Tu, Cuc Phuong, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban); *sydorata* Bolton [= sp. eg-9] (Cuc Phuong, Nam Cat Tien, Phu Quoc, Pu Mat); **sp. eg-1** [cf. *nanzanensis* Lin et Wu] (Cuc Phuong, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban); **sp. eg-2** (Tay Yen Tu); **sp. eg-5** [cf. *heteropha* Bolton] (Tay Yen Tu); **sp. eg-8** (Cuc Phuong, Pu Mat); **sp. eg-10** (Pu Mat); **sp. eg-11** (Nam Cat Tien).

Bionomics. The majority of species of *Strumigenys* are litter dwellers in well-developed forest. Nests are often found in and under rotting twigs and wood fragments on the forest floor. Because we have not yet employed Winkler bags, used to extract small soil animals from litter, our collection of *Strumigenys* species may under-represented.

***Temnothorax* Mayr, 1861**

Taxonomy. Although the genus *Temnothorax* was synonymized with *Leptothorax*, *Temnothorax* was recently revived as an independent genus by Bolton (2003) and assigned to the *Temnothorax* genus group of the tribe Formicoxenini. Workers of Vietnamese species have the following features.

Worker monomorphic. Head subrectangular with round posterior corners; frontal carina and antennal scrobe absent; median portion of clypeus moderately convex anteriorly, but never forming an anteriorly projecting shelf and never distinctly overlapping basal portion of mandibular blades; median clypeal carina weak but present; median

clypeal seta absent; posteromedian portion of clypeus broadly inserted between frontal lobes; mandible triangular, with 5 teeth; palp formula 5,3; stipes of maxilla without a transverse crest at about its midlength; antenna 12-segmented, with 3-segmented antennal club; eye moderate to large in size; promesonotum in lateral view only weakly raised; promesonotal suture absent dorsally; metanotal groove shallowly impressed or almost absent dorsally; propodeal spine present; propodeal lobe roundly expanded; middle and hind tibiae without distinct spurs apically; petiole pedunculate, with low node, with a tiny process or angle on ventral face of anterior part of peduncle; gastral shoulder weakly present; sting simple, without any appendix apically.

The worker of *Temnothorax* is similar to that of *Vombisidris* and *Cardiocondyla* (for distinguished characters see under the latter genera).

Vietnamese species. Two species are known from Vietnam: **sp. eg-1** (Sa Pa); **sp. eg-2** (Tam Dao).

Bionomics. *Temnothorax* species are rare in Vietnam where they have been collected around or above 1000 m alt. in northern Vietnam.

***Tetramorium* Mayr, 1855**

Taxonomy. The genus *Tetramorium* is assigned to the tribe Tetramoriini (for a complete taxonomic history see Bolton 2003). The Oriental species were revised by Bolton (1976, 1977). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view subrectangular, with rounded posterior corners; frontal carina usually (but not always) long and distinct; antennal scrobe weak or absent; anteromedian margin of clypeus weakly convex, often with a weak emargination at midpoint, lacking any denticles or teeth; an isolated median seta absent; posteromedian portion of clypeus very broadly inserted between frontal lobes; lateral portion of clypeus modified into a distinct ridge or wall in front of antennal insertion; mandible triangular; masticatory margin with apical and 1 or 2 larger preapical teeth followed by some smaller teeth or minute denticles; palp formula 4,3; antennae 11- or 12-segmented, with 3-segmented club; basal rim of shaft of antennal scape often forming an enlarged lobe expanding ventrad; eye medium to large in size; mesosoma in lateral view weakly convex dorsad; promesonotal suture absent dorsally; metanotal groove absent; anterior part of mesopleuron forming a flange projecting over basal part of fore coxa; propodeal spine present, varying in size and shape; propodeal lobe well developed usually as a triangular lamella or spinose projection but sometimes as a subrectangular or round lamella; petiole pedunculate, with distinct node; a tiny denticle or process present on the anteriormost part of ventral face of peduncle (it is often concealed by mesopleuron and/or hind coxa in lateral view); gastral shoulder distinct to absent; apex of sting with a small lamellate appendage; head and mesosoma usually strongly reticulate or rugoso-reticulate.

The worker of *Tetramorium* is similar to those of *Rhoptromyrmex* and *Myrmica* (for distinguished characters see under the latter genera)

Vietnamese species. Four species have been described from Vietnam: *indosinense* Wheeler [= sp. eg-13] (Type locality: Ha Noi; other locality: Ba Vi); *infraspinosum* Karaviev (type locality: Cau Da); *kieti* Roncin (type locality: Vietnam); *secure* Roncin (type locality: Vietnam). An additional 21 species have recognized by us from Vietnam: *flavipes* Emery [= sp. eg-4; = sp. 39 of SKY: Yamane et al., 2003] (Ba Vi, Chua Yen Tu, Cuc Phuong, Nam Cat Tien, Phu Quoc, Pu Mat, Tay Yen Tu, Van Ban); *kheperra* (Bolton) [= sp. eg-9] (Ba Vi, Phu Quoc, Tay Yen Tu); *lanuginosum* Mayr [= sp. eg-17] (Ba Vi, Bac Kan, Tam Dao); *nipponense* Wheeler [= sp. eg-5] (Ba Be, Ba Vi, Cuc Phuong, Sa Pa, My Yen, Pu Mat, Tay Yen Tu, Van Ban); **sp. eg-1** (Sa Pa); **sp. eg-2** [= *kraepelini* Forel: Eguchi et al., 2005] (Ba Vi, Nam Cat Tien, Phu Quoc, Pu Mat, Tay Yen Tu); **sp. eg-3** [= sp. 32 of SKY: Eguchi et al., 2005] (Ba Vi, Chua Yen Tu, Tam Dao, Tay Yen Tu, Van Ban); **sp. eg-6** [cf. *pacificum* Mayr] (Sa Pa, Pu Mat); **sp. eg-7** (Sa Pa); **sp. eg-8** (Ba Be); **sp. eg-10** (Tay Yen Tu); **sp. eg-12** (Ba Vi, Pu Mat); **sp. eg-14** (Binh Chau-Phuoc Buu); **sp. eg-15** [= *bicarinatum* (Nylander): Eguchi et al., 2005] (Tam Dao); **sp. eg-16** [= *smithi* Mayr: Eguchi et al., 2005] (Ba Vi); **sp. eg-18** [= *walshi* (Forel): Yamane et al., 2003] (Cuc Phuong, My Yen, Pu Mat); **sp. eg-19** (Ba Be); **sp. eg-21** (Cuc Phuong); **sp. eg-22** (Nam Cat Tien); **sp. eg-23** (Nam Cat Tien, Nui Chua); **sp. eg-24** (Nam Cat Tien).

Bionomics. *Tetramorium* species inhabit various habitats such as open lands, grasslands, forest edges and well-developed forests. Their nests are usually found in rotting logs, twigs, wood fragments, under stones and in soil. Workers forage mainly on the ground.

***Vollenhovia* Mayr, 1865**

Taxonomy. The genus *Vollenhovia* is assigned to the tribe Stenammini (Bolton 2003). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view subrectangular; frontal carina and antennal scrobe absent; median portion of clypeus raised, laterally margined with a slight to conspicuous longitudinal carina; anteromedian portion often forming a transverse strip; an isolated median seta absent; posteromedian portion relatively narrowly inserted between frontal lobes; lateral portion of clypeus never modified into a distinct ridge or wall in front of antennal insertion; mandible triangular; masticatory margin with 6 or more teeth; antennae 11- or 12-segmented, with 3-segmented club; eye always present, small to medium sized; mesosoma in lateral view long and low; promesonotum in lateral view usually not domed; promesonotal suture absent dorsally; metanotal groove weakly to slightly impressed dorsally; posterodorsal portion of propodeum with rounded corners or small teeth; propodeal lobe present as carina or low lamella; petiole nodiform; anterior peduncle short and obscure; posterodorsal margin of petiole produced posterodorsad as a rim which is distinctly (or at least a little) higher than the dorsal outline of helcium of petiole when waist segments stretched posteriad; subpetiolar process usually (but not always) developed as a large lamella; gastral shoulder absent.

The worker of *Vollenhovia* is easily separated from those of other known Vietnamese myrmicine genera by the flattened body and the posterodorsal margin of petiole produced as a rim.

Vietnamese species. Seven species have been recognized by us from Vietnam: **sp. eg-1** [= sp. 40 and sp. 54 of SKY: Eguchi et al., 2005] (Cuc Phuong, Sa Pa, Tam Dao, Tay Yen Tu); **sp. eg-2** [= sp. 34 of SKY: Eguchi et al., 2005] (Ba Vi, Chua Yen Tu, Sa Pa, Pu Mat, Tam Dao, Tay Yen Tu, Van Ban); **sp. eg-5** [= sp. 36 of SKY: Eguchi et al., 2005] (Ba Vi); **sp. eg-6** (Chua Yen Tu); **sp. eg-7** [= sp. 39 of SKY: Eguchi et al., 2005] (Ba Vi, Chua Yen Tu, Cuc Phuong, Tam Dao, Tay Yen Tu); **sp. eg-8** (Pu Mat, Nam Cat Tien); **sp. eg-9** (Nam Cat Tien).

Bionomics. *Vollenhovia* species usually inhabit forest habitats and nest in rotting twigs, wood fragments and logs, and in spaces under the bark of logs.

***Vombisidris* Bolton, 1991**

Taxonomy. The genus *Vombisidris* is assigned to the *Romblonella* genus group of the tribe Formicoxenini (Bolton 2003). The worker of the single Vietnamese species has the following features.

Worker monomorphic; head in full-face view subrectangular, with round posterolateral corners; frontal carina and antennal scrobe absent; median portion of clypeus roundly convex anteriorly; median clypeal seta absent; posterior portion of clypeus broadly inserted between frontal lobes; mandible triangular; masticatory margin with 5 teeth; large apical tooth followed by two smaller teeth, then a long diastema (or very finely serrate margin) and two small basal teeth; antenna 12-segmented, with strongly defined 3-segmented club; eye well developed; sides of head below eye with a strong, sinuate, subocular groove; mesosoma in lateral view elongate and low; promesonotum not convex dorsad; promesonotal suture and metanotal groove absent dorsally; propodeal spine developed well; propodeal lobe roundly expanded; petiole pedunculate, with relatively low node, with a subpetiolar process on anteroventral face of peduncle; gastral shoulder weakly present; sting well developed and simple.

The worker of *Vombisidris* is somewhat similar to that of *Temnothorax*, but in the latter the side of head below the eye lacks a subocular groove.

Vietnamese species. Only one species has been found from Vietnam: **sp. eg-1** (Cuc Phuong).

Bionomics. A single colony was found inside a shoot of *Saraca dives* Pierre (Leguminosae) (Eguchi & Bui, 2007).

SYNOPSIS OF VIETNAMESE PSEUDOMYRMECINE

***Tetraponera* F. Smith 1852**

Taxonomy. The genus *Tetraponera* was recently revised by Ward (2001). Workers of Vietnamese species have the following features.

Worker monomorphic; head in full-face view subrectangular, with round posterolateral corner; frontal lobe weakly developed, not expanding over torulus; frontal carina and antennal scrobe absent; median part of clypeus short anteroposteriorly, steep or vertical; posteromedian portion of clypeus not extended backwards between frontal lobes; mandible narrow, with 3–5 teeth on masticatory margin and 0–2 denticles on basal margin; antenna 12-segmented, not forming club or gradually incrassate; eye very large, located at or a little behind midlength of sides of head; mesosoma elongated; promesonotal suture always present and flexible; metathoracic spiracle sometimes present; metanotal groove deeply impressed dorsally (but rarely present as a weak transverse furrow); propodeum unarmed; propodeal spiracle situated high on side and far forward; pretarsal claws each with a preapical tooth on inner margin; petiole, postpetiole and first gastral segment not fused laterally; postpetiole developed, in dorsal view broadly attached to first gastral segment; sting present, usually well developed.

Vietnamese species. Seven species have been recognized by us from Vietnam: *attenuata* F. Smith [= sp. eg-1] (Nam Cat Tien, Nui Chua, Pu Mat, Tay Yen Tu, Van Ban); *microcarpa* Wu & Wang [= sp. eg-7] (Tay Yen Tu); *modesta* (F. Smith) [= sp. eg-4] (Tay Yen Tu); *nitida* (F. Smith) [= sp. eg-5] (Nui Chua, Pu Mat); *pilosa* (F. Smith) [= sp. eg-6] (Nam Cat Tien); *rufonigra* (Jerdon) [= sp. eg-2] (Tay Yen Tu); **sp. eg-3** [cf. *allaborans* (Walker)] (Nam Cat Tien, Nui Chua, Pu Mat, Van Ban).

Bionomics. Vietnamese *Tetraponera* species are arboreal and nest in living and dead branches of standing trees. We often encountered colonies nesting in or moving from newly fallen branches.

ACKNOWLEDGMENTS

We wish to thank Dr. Le Xuan Canh (Director, Institute of Ecology and Biological Resources, Hanoi), Dr Pham Van Luc (Director, Vietnam National Museum of Nature), the directors and staff of the following National Parks and Nature Reserves, and the relevant authorities for their kind arrangement of official permissions and the provision of every facility for our field surveys: Ba Be NP (Bac Can), Ba Vi NP (Hanoi), Bai Tu Long NP (Quang Ninh), Bach Ma NP (Thua Thien -Hue), Binh Chau-Phuoc Buu NP (Ba Ria-Vung Tau), Cat Ba NP (Hai Phong), Chua Yen Tu (Quang Ninh), Cuc Phuong NP (Ninh Binh), Hanoi (Hanoi), Hoang Lien NP (Lao Cai), Van Ban NR (Lao Cai) Huong Son (Ha Tinh), Ky Thuong NR (Quang Ninh), Mai Chau (Hoa Binh), My Yen (Thai Nguyen), Nam Cat Tien NP (Dong Nai), Nui Chua NP (Ninh Thuan), Nui Ong NR (Binh Thuan), Phu Quoc NP (Kien Giang), Pu Hoat NR (Nghe An), Pu Mat NP (Nghe An), Tam Dao NP (Vinh Phuc) and Tay Yen Tu NP (Bac Giang). We are also thankful to Mr. Barry Bolton (Isle of Wight, UK) and Prof. Alexander Radchenko (Institute of Zoology of Ukrainian National Academy of Science) for reviewing an earlier draft of this paper, two anonymous reviewers for careful corrections and helpful comments, and Prof. Kazuo Ogata (Kyushu Univ., Japan) and Dr. Hirofumi Okido (Fukuoka, Japan) who provided valuable specimens and useful comments and suggestions. Foresters at remote stations and people in local villages always welcomed us and provided facilities for successful and happy days of collecting. All of them were indispensable contributors to our project and our friends. Eguchi's research activities were supported by the Research Fellowships of the Japan Society for the Promotion of Science for Young Scientists. Viet's research activities were supported by the Vietnam's National Foundation for Science and Technology Development (NAFOSTED).

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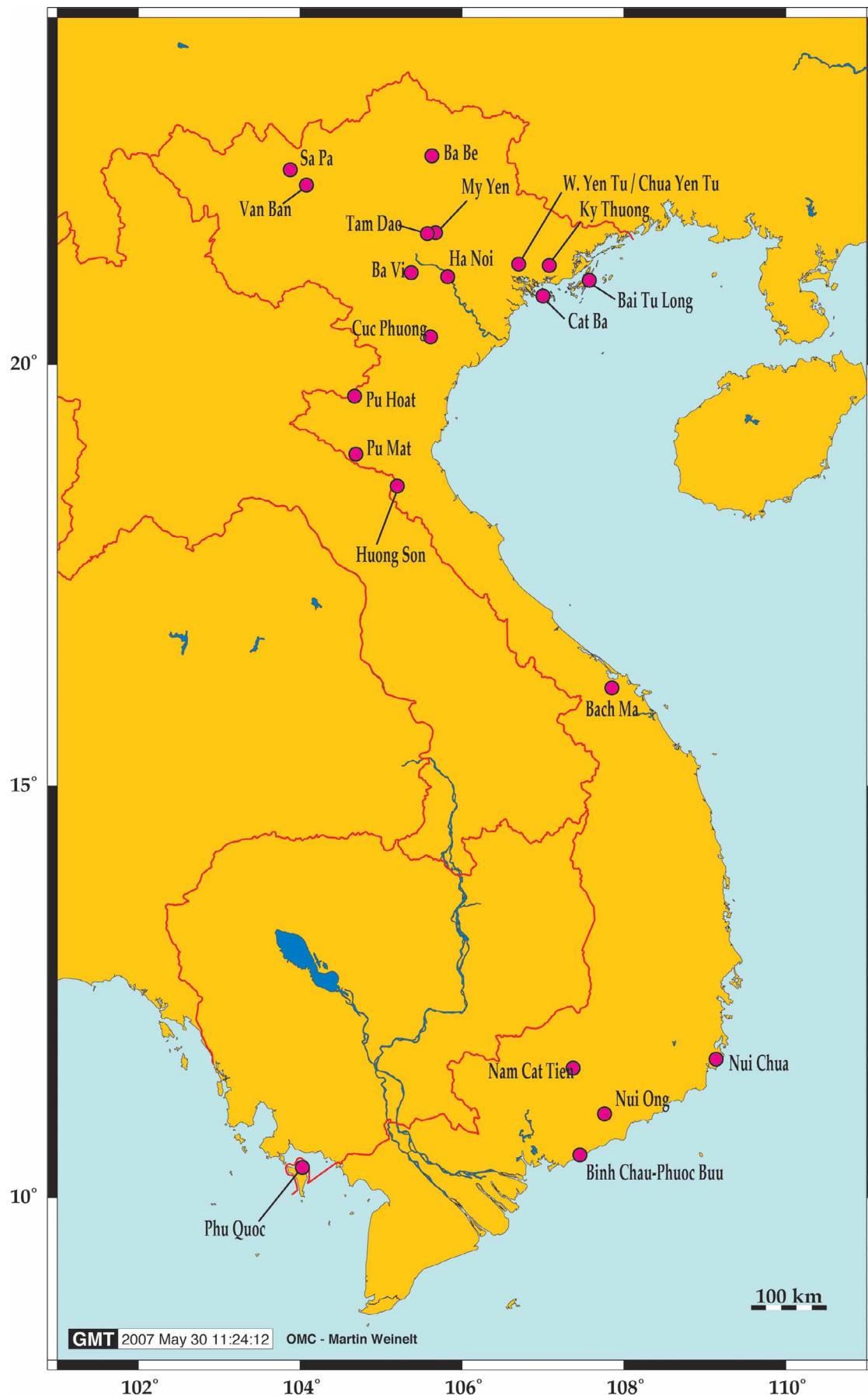


FIGURE 1. Map of Vietnam with with major collecting sites for ants indicated. Specimens from Binh Chau-Phuoc Buu (2008), Nui Ong (2008) and Bach Ma (2009) are still being mounted and sorted, and so only part of them are referred to in this paper.

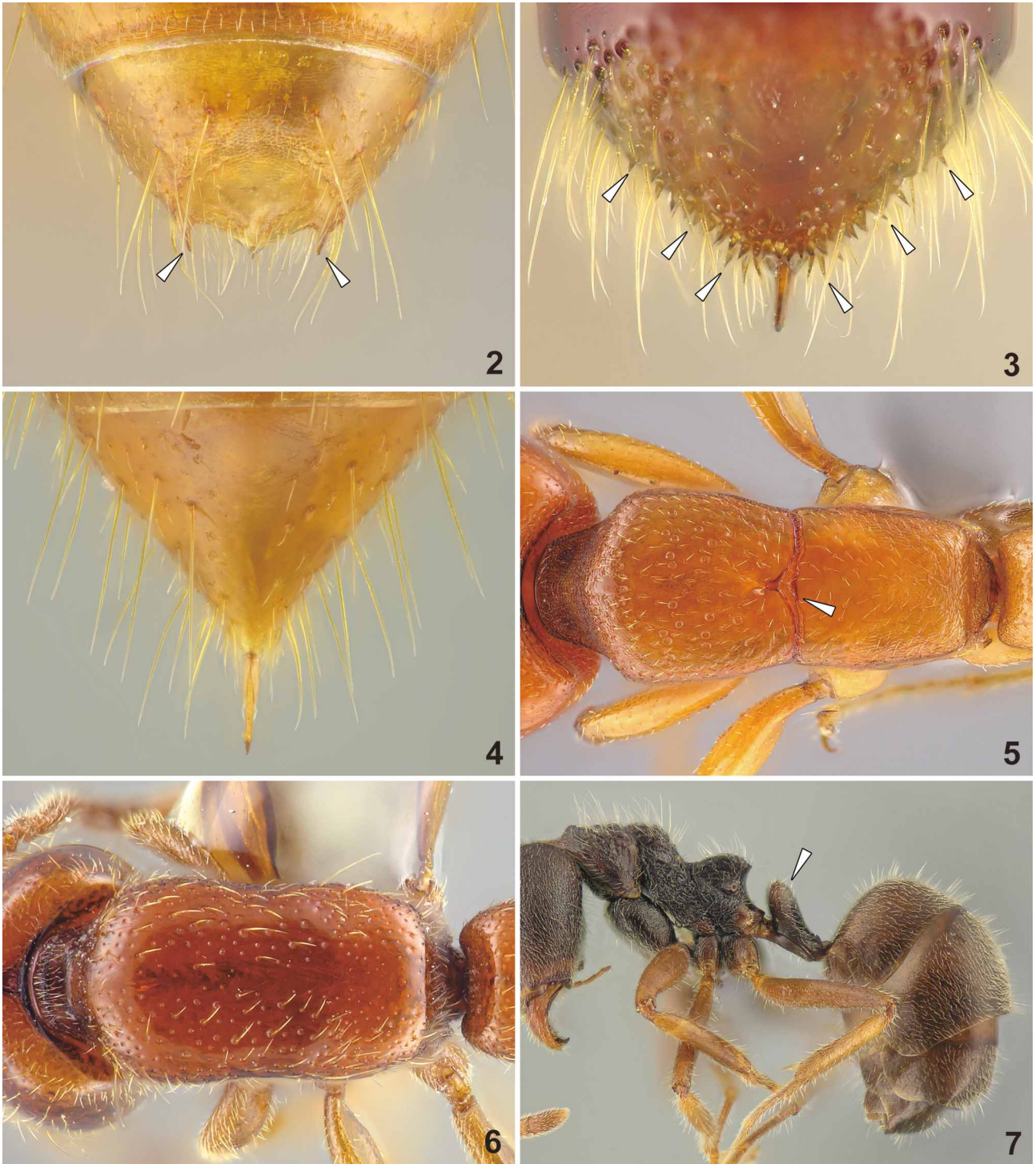


FIGURE 2. *Dorylus orientalis* Westwood, worker (Eg02-VN-148), pygidium
FIGURE 3. *Cerapachys* sp. eg-2, worker (Eg04-VN-091), pygidium
FIGURE 4. *Centromyrmex feae* (Emery), worker (Eg04-VN-1007), pygidium
FIGURE 5. *Dorylus orientalis*, worker (BTN17xii08-20), mesosoma in dorsal view
FIGURE 6. *Yunodorylus eguchii* Borowiec, worker (Eg12v07-03), mesosoma in dorsal view
FIGURE 7. *Dolichoderus thoracicus* (Smith), worker (Eg04-VN-1039), waist in lateral view



FIGURE 8, *Amblyopone* sp. eg-5, worker (Eg03v07-09-1w), waist in lateral view

FIGURE 9, *Kartidris* sp. eg-1, worker (Eg04-VN-062), waist in lateral view

FIGURE 10, *Gnamptogenys bicolor* (Emery), worker (Eg05-VN-018), gaster in lateral view

FIGURE 11, *Centromyrmex feae*, worker (Eg04-VN-1007), gaster in lateral view

FIGURE 12, *Acropyga* sp. eg-2, worker (Eg30iv07-19), gaster in lateral view

FIGURE 13, *Proceratium* sp. eg-10, worker (Eg03v07-12), frons in full-face view

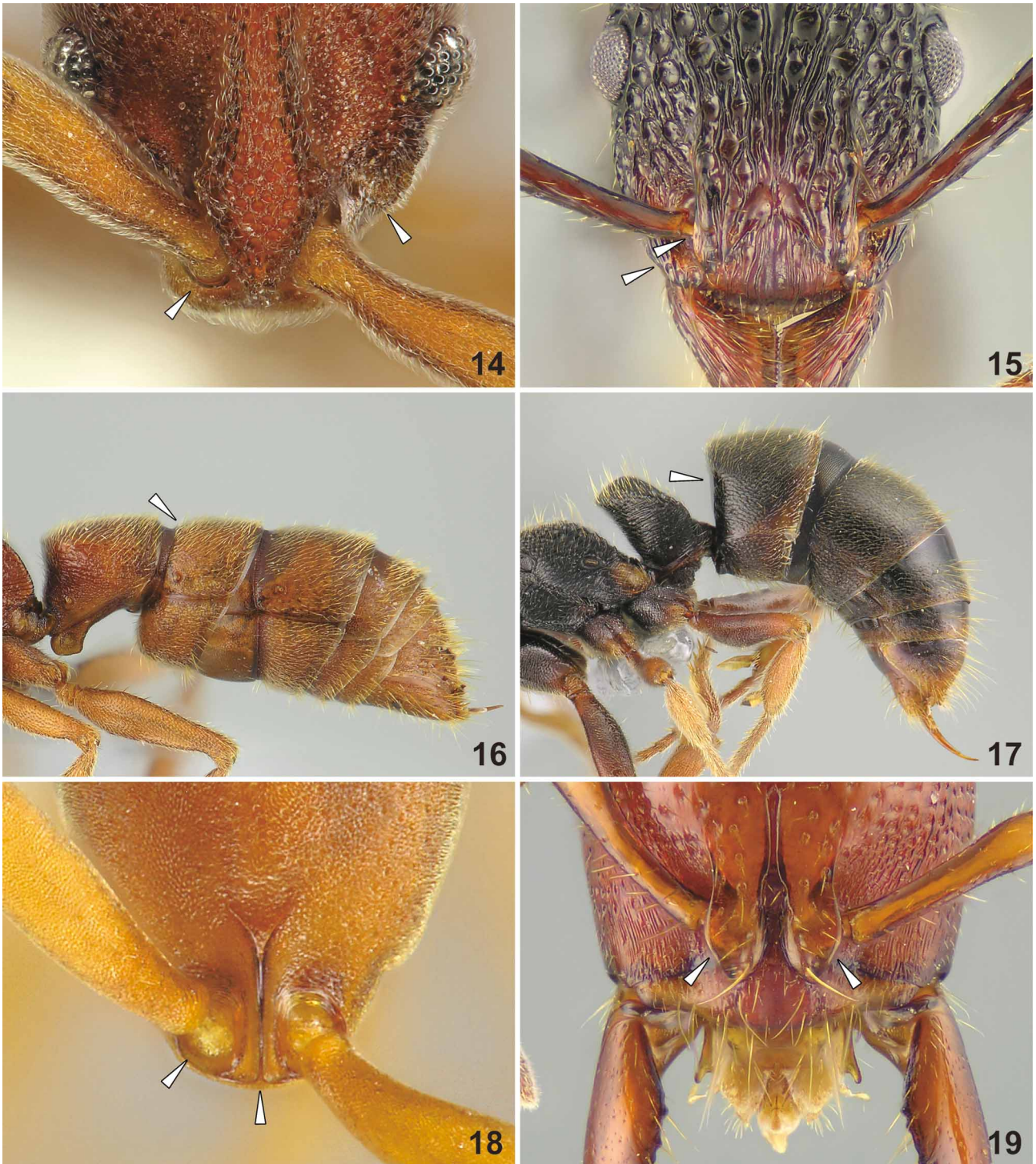


FIGURE 14. *Discothyrea* sp. eg-6, worker (Eg03-VN-243), frons in full-face view
FIGURE 15. *Gnamptogenys bicolor*, worker (Eg05-VN-018), frons in full-face view
FIGURE 16. *Amblyopone* sp. eg-5, worker (Eg03v07-09), waist in lateral view
FIGURE 17. *Pachycondyla* sp. eg-8, worker (Eg25iv07-28), waist in lateral view
FIGURE 18. *Probolomyrmex dammermani* Wheeler, worker (Eg01iv06-08), frons in full-face view
FIGURE 19. *Centromyrmex feae*, worker (Eg04-VN-1007), frons in full-face view

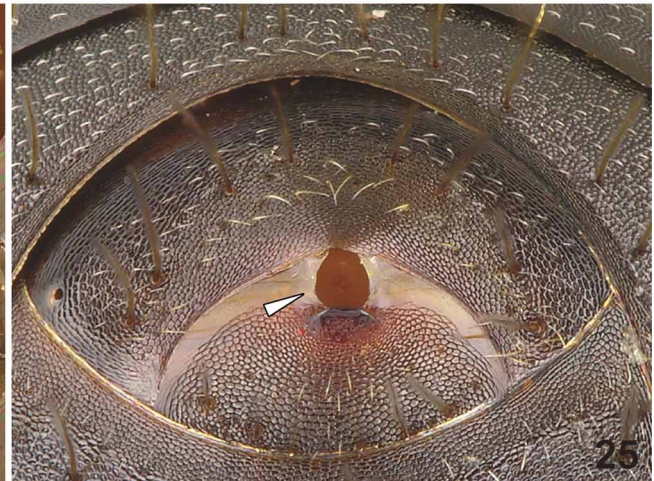
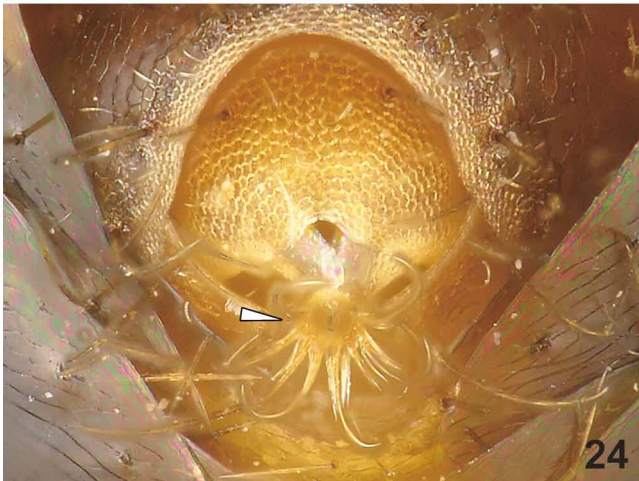


FIGURE 20, *Opamyrra hungvuong* Yamane, Bui & Eguchi, holotype worker, gaster in lateral view
FIGURE 21, *Pachycondyla* sp. eg-8, worker (Eg25iv07-28), gaster in lateral view
FIGURE 22, *Centromyrmex feae*, Eg04-VN-1007, abdominal tergite III
FIGURE 23, *Technomyrmex obscurior* Wheeler, worker (Eg11vi05-06), abdominal tergite III
FIGURE 24, *Prenolepis* sp. eg-1, worker (Eg01x06-04), apex of hypopygium
FIGURE 25, *Polyrhachis armata* (Le Guillou), worker (27/iv/2007, K. Eguchi leg.), apex of hypopygium



FIGURE 26. *Dolichoderus* sp. eg-6, worker (24/v/2004, K. Eguchi leg.), apex of hypopygium
FIGURE 27. *Tetraponera* sp. eg-3, worker (19/v/2007, K. Eguchi leg.), promesonotal suture
FIGURE 28. *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), promesonotal suture
FIGURE 29. *Tetraponera* sp. eg-3, worker (Eg02iv06-11), head in lateral view
FIGURE 30. *Protanilla* sp. eg-1, worker (Eg03-VN-106), head in lateral view
FIGURE 31. *Proceratium* sp. eg-10, worker (Eg03v07-12), waist and gaster in lateral view

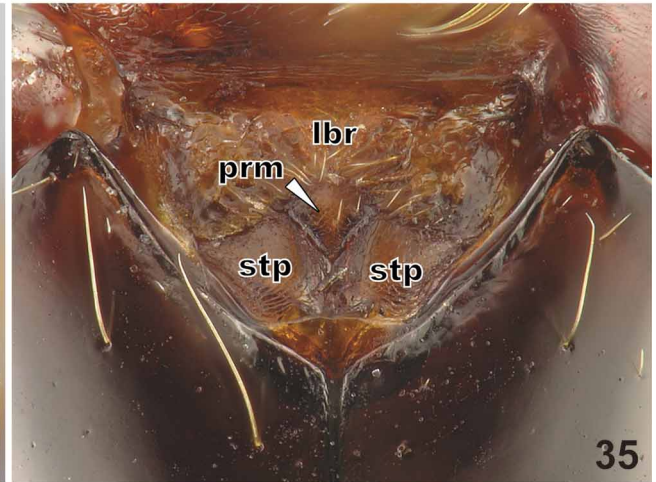
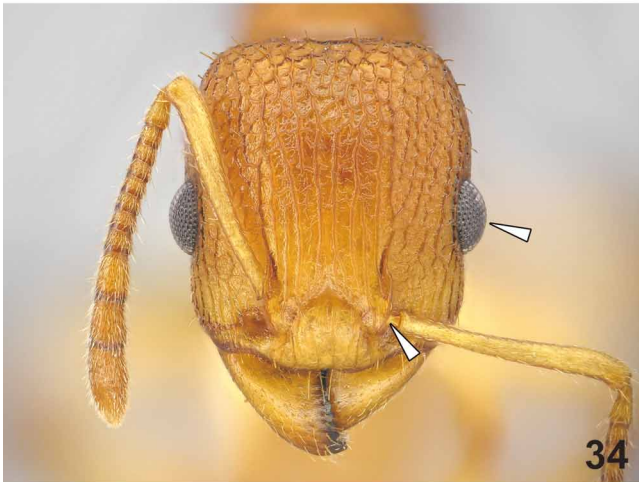
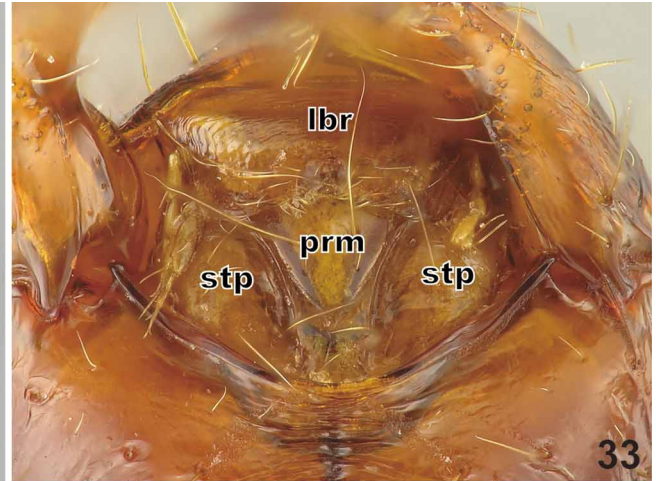


FIGURE 32. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), waist and gaster in lateral view
FIGURE 33. *Aphaenogaster* sp. eg-6, worker (Eg02-VN-284), mouthparts in ventral view
FIGURE 34. *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi), head in full-face view
FIGURE 35. *Aenictus binghami*, worker (Eg04-VN-043), mouthparts in ventral view
FIGURE 36. *Aenictus ceylonicus* (Mayr), worker (Eg99-VN-101), head in full-face view
FIGURE 37. *Crematogaster* sp. eg-1, worker (Eg01v07-14), waist and gaster in lateral view

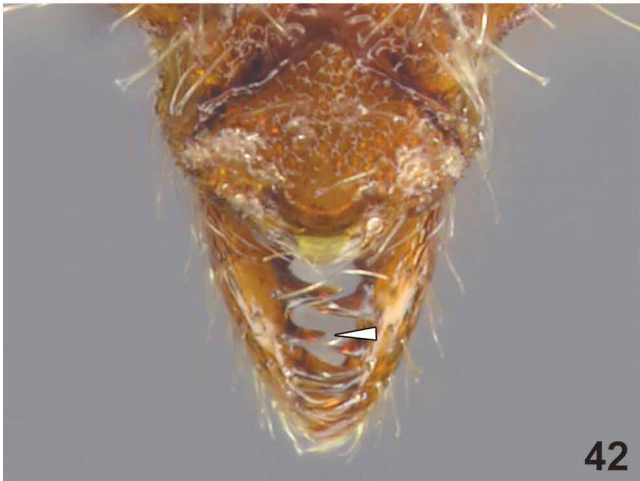


FIGURE 38. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), waist and gaster in lateral view
FIGURE 39. *Anillomyrma decamera*, worker (BTN16xii08-18), waist and gaster in lateral view
FIGURE 40. *Cataulacus granulatus*, worker (Eg15v07-02), antennal scrobe in lateral view
FIGURE 41. *Dilobocondyla* sp. eg-1, worker (04/i/2005, K. Eguchi leg.), antennal scrobe in lateral view
FIGURE 42. *Pyramica kichijo*, worker (Eg14vi05-11), mandible and clypeus
FIGURE 43. *Strumigenys feae*, worker (Eg02v07-12), mandible and clypeus

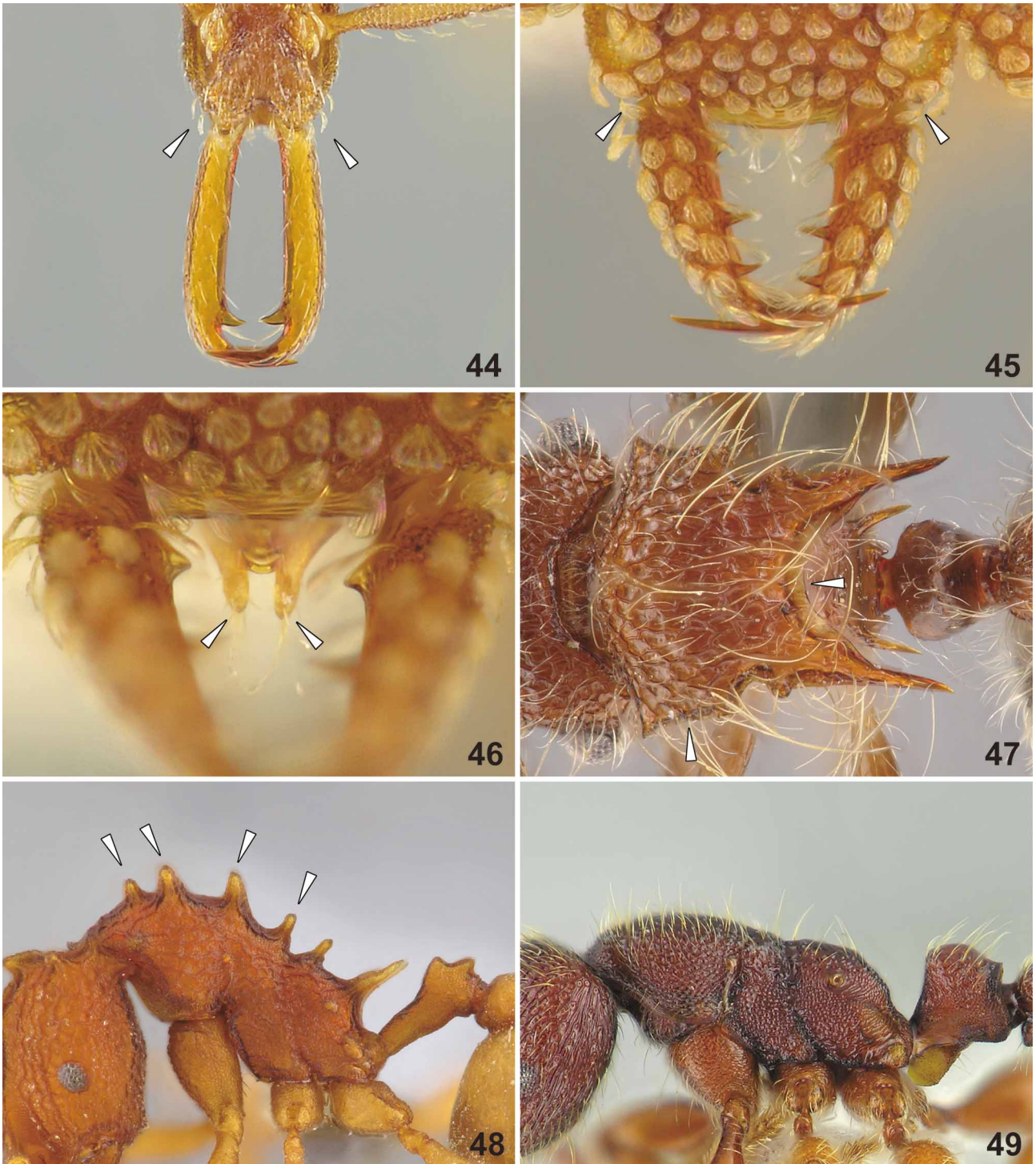


FIGURE 44. *Strumigenys feae*, worker (Eg02v07-12), mandible and clypeus
FIGURE 45. *Pyramica hexamera*, worker (from Kagoshima Pref., Japan), mandible and clypeus
FIGURE 46. *Pyramica hexamera*, worker (from Kagoshima Pref., Japan), labrum
FIGURE 47. *Meranoplus bicolor*, worker (Eg99-VN-076), promesonotum in dorsal view
FIGURE 48. *Proatta butтели*, worker (Eg25iv07-14), mesosoma in lateral view
FIGURE 49. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), mesosoma in lateral view

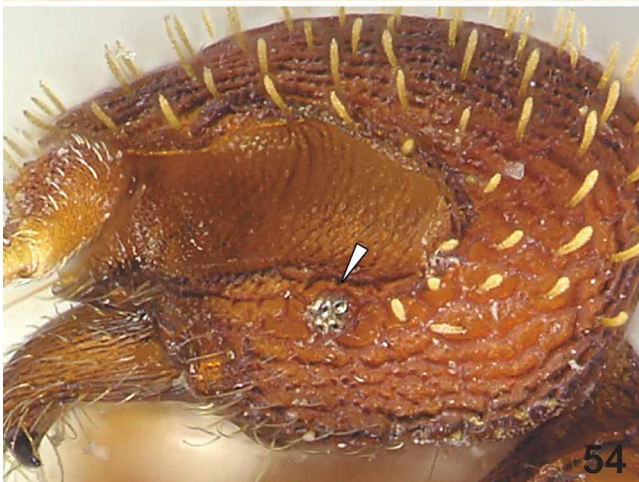
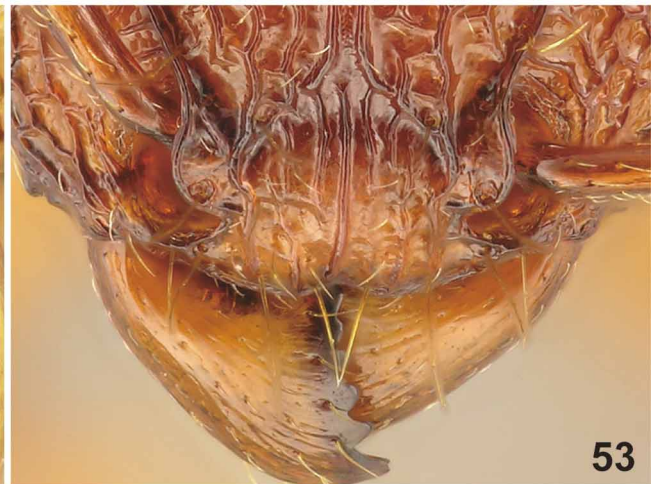
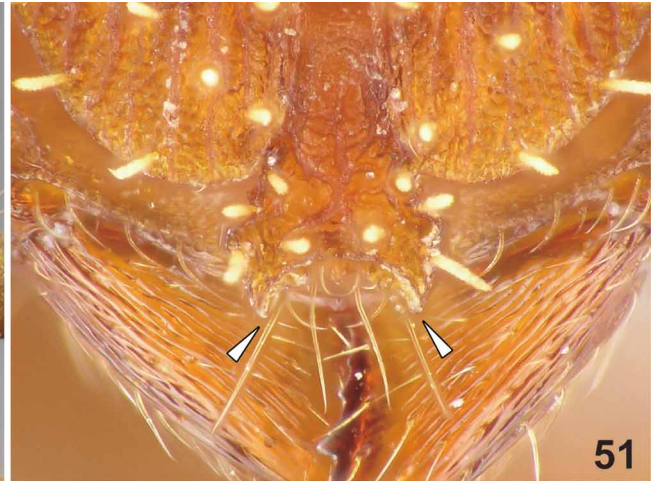


FIGURE 50. *Lophomyrmex birmanus*, worker (BTN20xii08-11), mesosoma in lateral view
FIGURE 51. *Calyptomyrmex* sp. eg-1, worker (Eg03-VN-149), median portion of clypeus
FIGURE 52. *Mayriella granulata*, worker (Eg02v07-13), median portion of clypeus
FIGURE 53. *Tetramorium* sp. eg-3, worker (Eg04-VN-140), median portion of clypeus
FIGURE 54. *Calyptomyrmex* sp. eg-1, worker (Eg03-VN-159), eye
FIGURE 55. *Mayriella granulata*, worker (Eg27ix06-20), eye

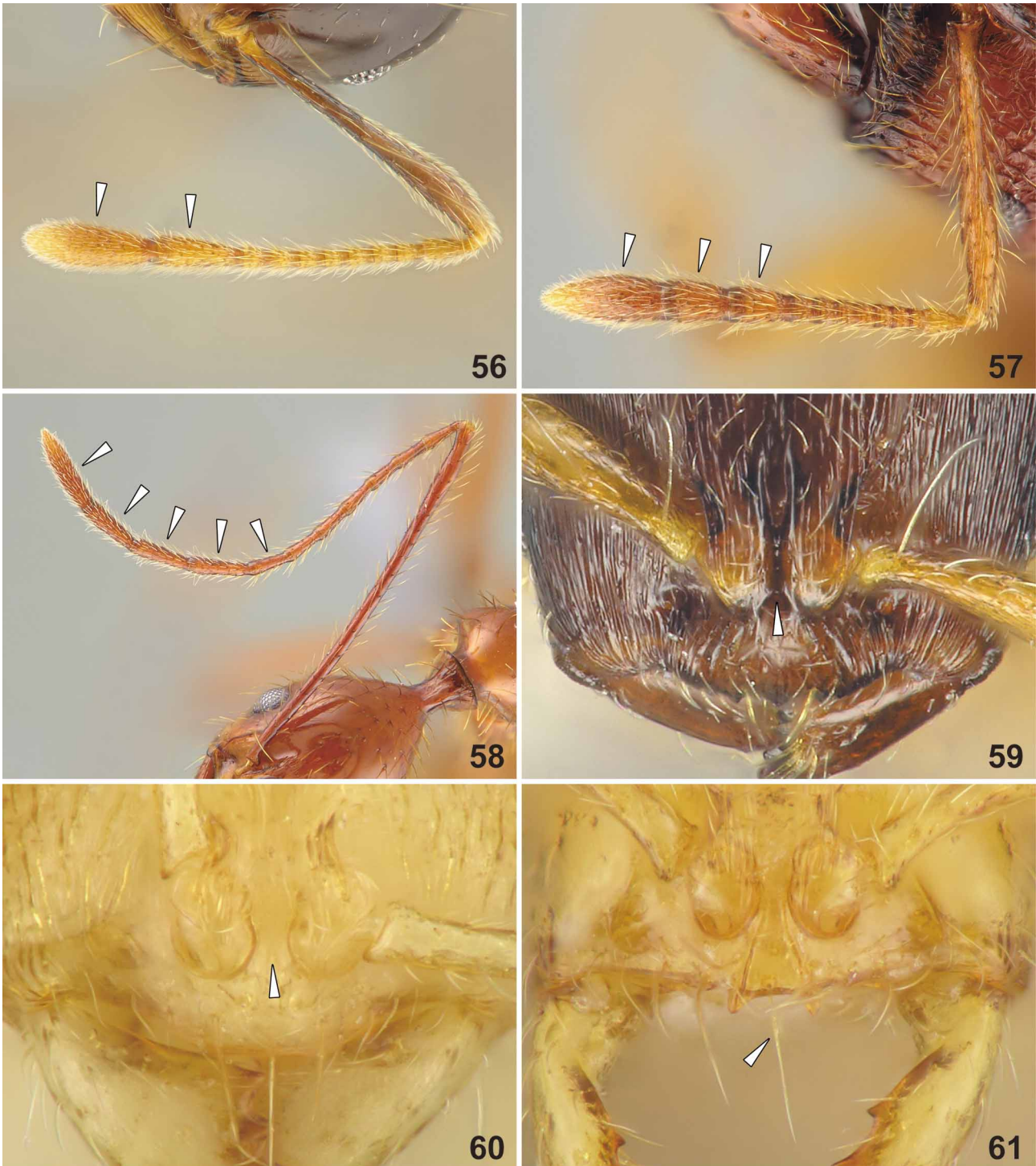


FIGURE 56. *Pheidologeton diversus*, worker (Eg23iii06-14), antennal club
FIGURE 57. *Pheidole laevithorax*, worker (Eg03-VN-122), antennal club
FIGURE 58. *Aphaenogaster* sp. eg-10, worker (Eg30iv07-08), antennal club
FIGURE 59. *Rhopalomastix* sp. eg-1, worker (Eg03iv06-10), frontal lobes
FIGURE 60. *Parvimyrma sangi*, worker (Eg04-VN-138), frontal lobes
FIGURE 61. *Solenopsis* sp. eg-2, worker (BTV16xii08-17), anterior margin of clypeus

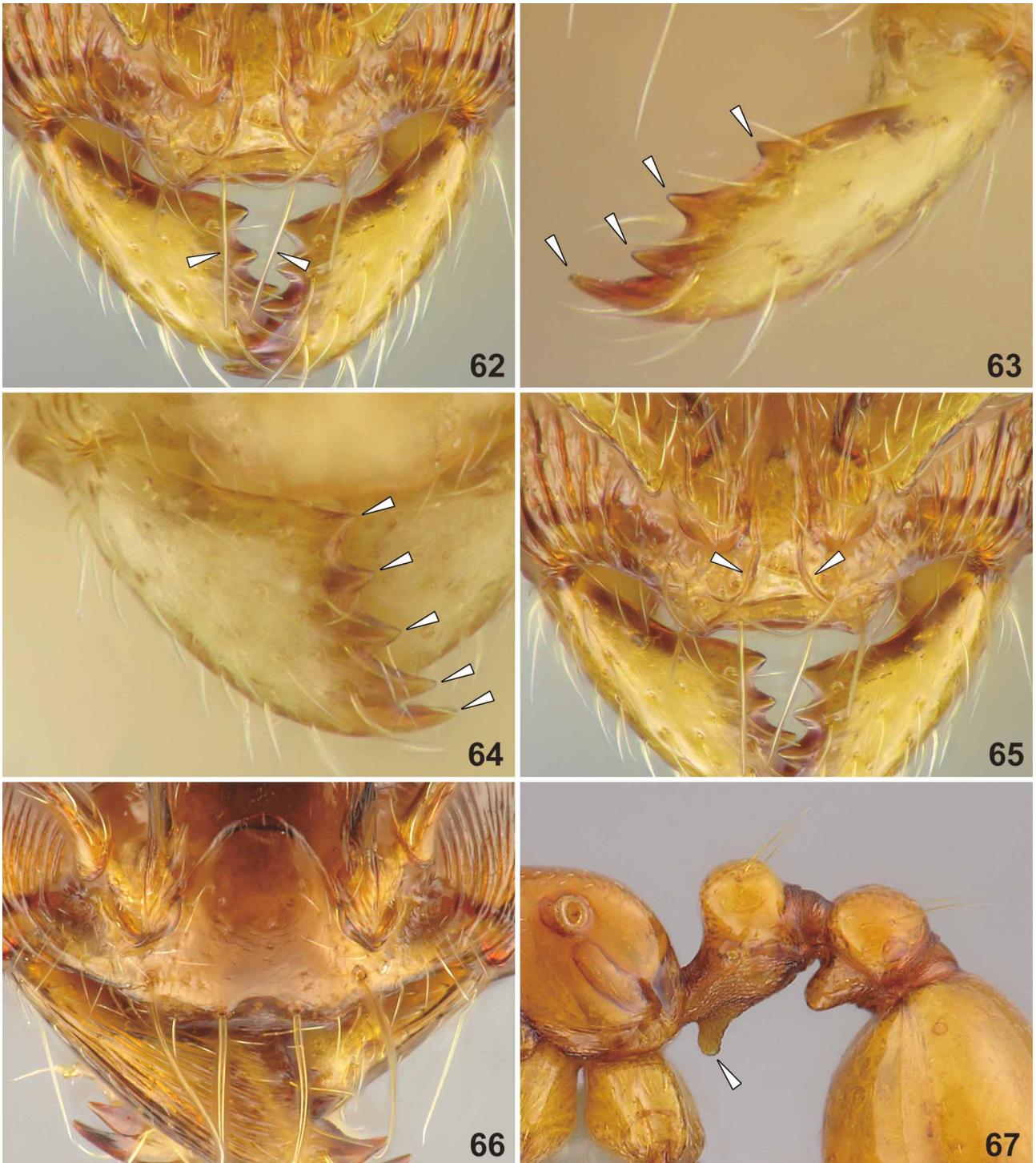


FIGURE 62. *Oligomyrmex* sp. eg-5, worker (Eg02-VN-145), anterior margin of clypeus
FIGURE 63. *Solenopsis* sp. eg-2, worker (BTV16xii08-17), mandible
FIGURE 64. *Parvimyrma sangi*, worker (Eg04-VN-138), mandible
FIGURE 65. *Oligomyrmex* sp. eg-5, worker (Eg02-VN-145), median portion of clypeus
FIGURE 66. *Pheidologeton diversus*, worker (Eg04-VN-507), median portion of clypeus
FIGURE 67. *Liomyrmex* sp. eg-1, worker (Eg98-BALI-1091), waist segments



FIGURE 68. *Liomyrmex* sp. eg-1, worker (Eg98-BALI-1091), frons
FIGURE 69. *Anillomyrma decamera*, worker (BTN16xii08-18), waist segments
FIGURE 70. *Anillomyrma decamera*, worker (BTN16xii08-18), frons
FIGURE 71. *Myrmecina* sp. eg-3, worker (Eg04-VN-102), head in lateral view
FIGURE 72. *Lophomyrmex birmanus*, worker (BTN20xii08-11), head in lateral view
FIGURE 73. *Pristomyrmex* sp. eg-3, worker (Eg99-VN-017), anterior margin of clypeus

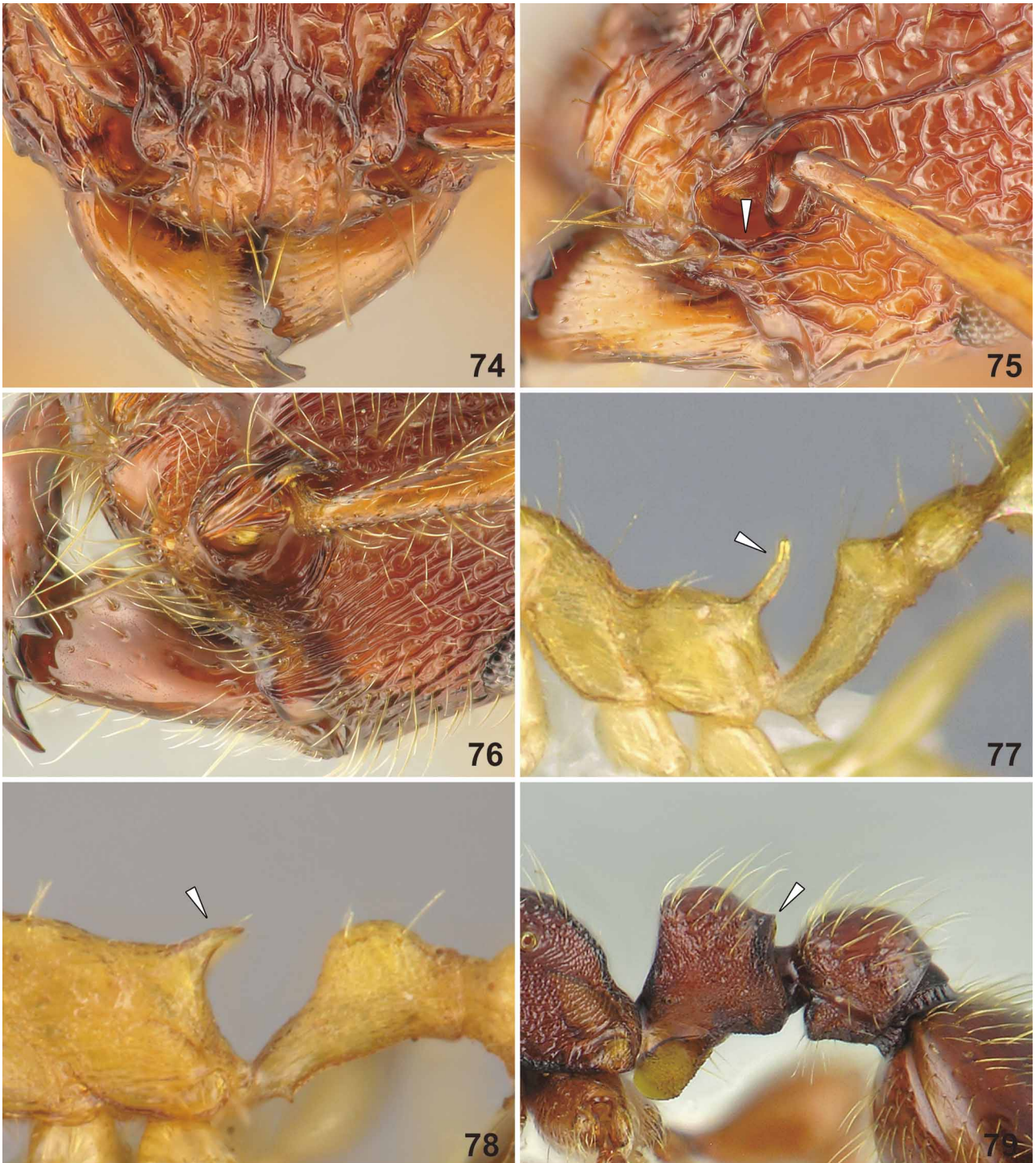


FIGURE 74. *Tetramorium* sp. eg-3, worker (Eg04-VN-140), anterior margin of clypeus
FIGURE 75. *Tetramorium* sp. eg-3, worker (Eg04-VN-140), antennal socket
FIGURE 76. *Vollenhovia* sp. eg-2, worker (Eg26ix06-17), antennal socket
FIGURE 77. *Recurvidris glabriceps*, worker (Eg28ix06-01), propodeum
FIGURE 78. *Temnothorax* sp. eg-2, worker (08/xi/1999, Bui T.V. leg.), propodeum
FIGURE 79. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), petiole in lateral view

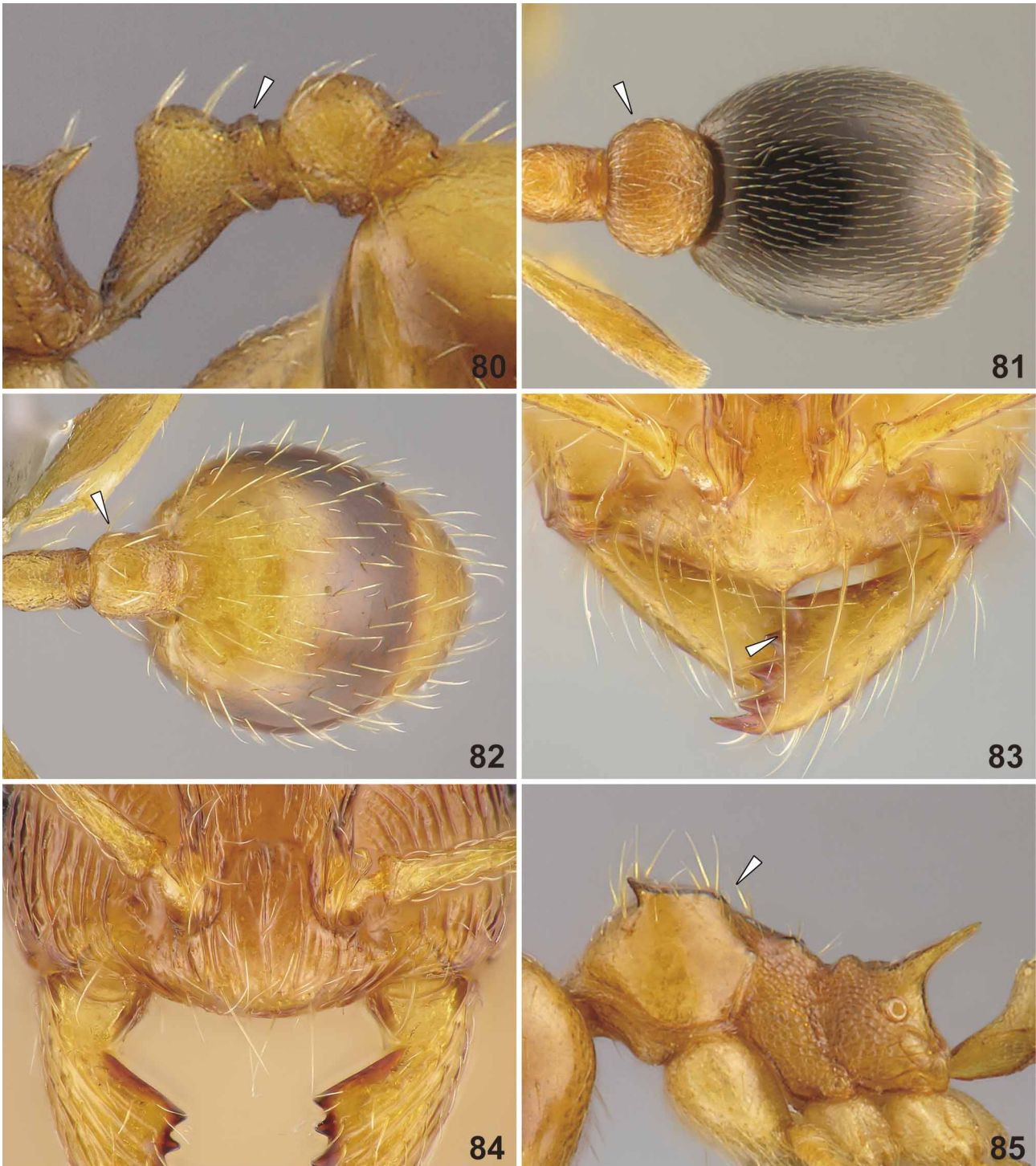


FIGURE 80. *Temnothorax* sp. eg-1, worker (Eg02-VN-307), petiole in lateral view
FIGURE 81. *Cardiocondyla* sp. eg-5, worker (25/xii/2008, K. Eguchi leg.), waist and gaster in dorsal view
FIGURE 82. *Temnothorax* sp. eg-1, worker (Eg02-VN-307), waist and gaster in dorsal view
FIGURE 83. *Monomorium* sp. eg-1, worker (Eg20iii06-06), anterior margin of clypeus
FIGURE 84. *Temnothorax* sp. eg-1, worker (Eg02-VN-307), anterior margin of clypeus
FIGURE 85. *Lophomyrmex birmanus*, worker (BTN20xii08-11), promesonotum in lateral view

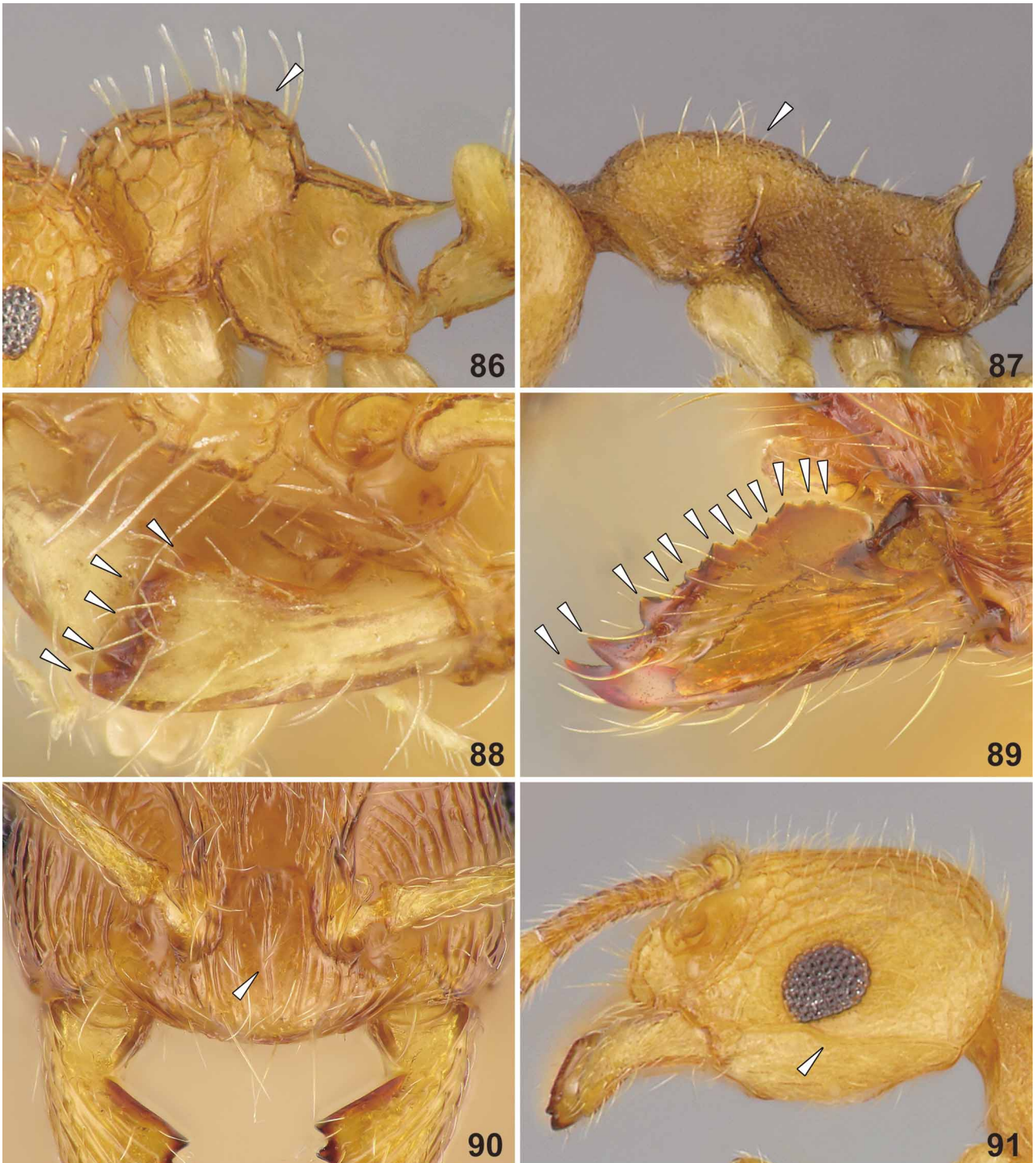


FIGURE 86. *Pristomyrmex profundus*, worker (Eg28iv07-04), promesonotum in lateral view
FIGURE 87. *Temnothorax* sp. eg-1, worker (Eg02-VN-307), promesonotum in lateral view
FIGURE 88. *Pristomyrmex profundus*, worker (Eg28iv07-04), masticatory margin
FIGURE 89. *Lophomyrmex birmanus*, worker (BTN20xii08-11), masticatory margin
FIGURE 90. *Temnothorax* sp. eg-1, worker (Eg02-VN-307), median clypeal carina
FIGURE 91. *Vombisidris* sp. eg-1, worker (BTV16vi05-05), head in lateral view

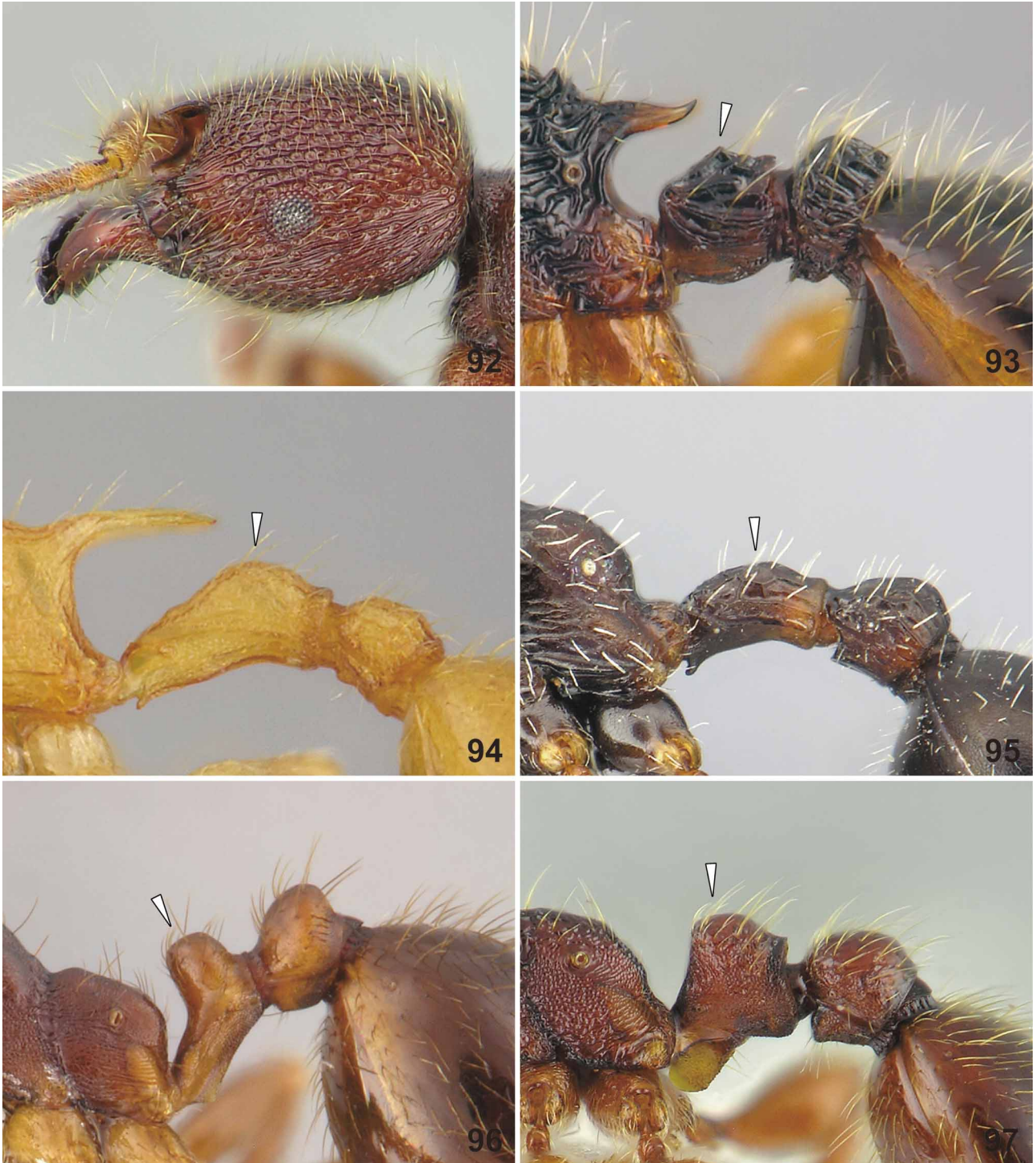


FIGURE 92. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), head in lateral view
FIGURE 93. *Myrmecina* sp. eg-3, worker (Eg04-VN-102), petiole in lateral view
FIGURE 94. *Vombisidris* sp. eg-1, worker (BTV16vi05-05), petiole in lateral view
FIGURE 95. *Dilobocondyla* sp. eg-1, worker (04/i/2005, K. Eguchi leg.), petiole in lateral view
FIGURE 96. *Kartidris* sp. eg-1, worker (Eg04-VN-062), petiole in lateral view
FIGURE 97. *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), petiole in lateral view

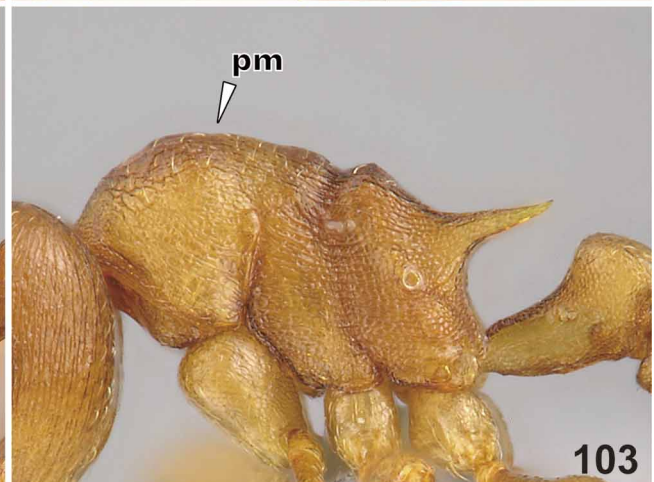
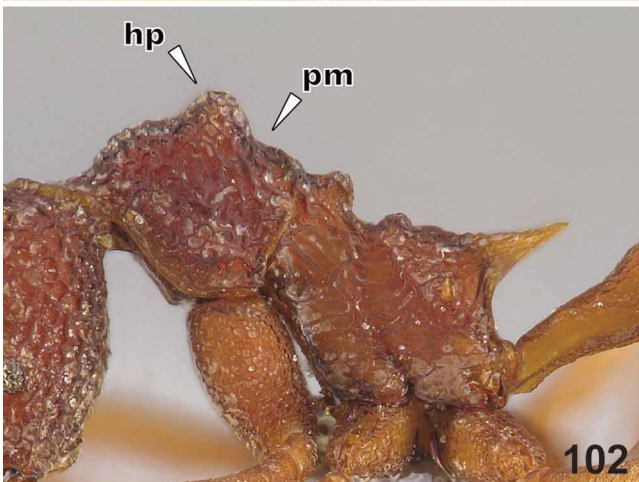


FIGURE 98, *Acanthomyrmex humilis*, worker (Eg04-VN-691), first gastral segment in anterior view

FIGURE 99, *Dacatria templaris*, worker (Eg04x06-01), first gastral segment in anterior view

FIGURE 100, *Dacatria templaris*, worker (Eg04x06-01), antennal socket

FIGURE 101, *Aphaenogaster* sp. eg-10, worker (Eg30iv07-08), antennal socket

FIGURE 102, *Dacatria templaris*, worker (Eg04x06-01), promesonotum in lateral view

FIGURE 103, *Rhoptromyrmex* sp. eg 2, worker (Eg09vi05-10), promesonotum in lateral view

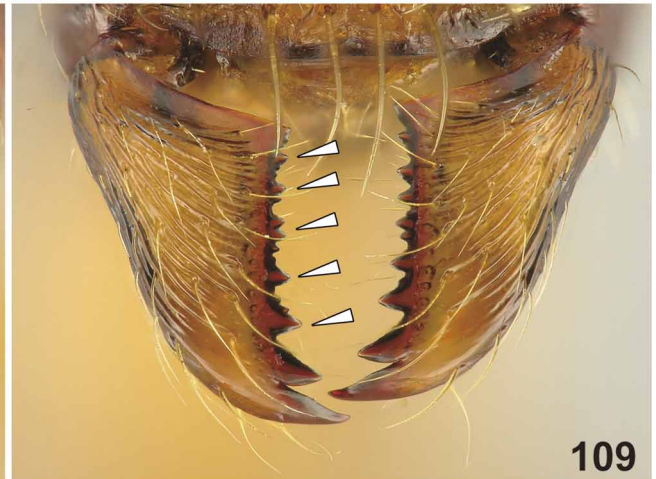
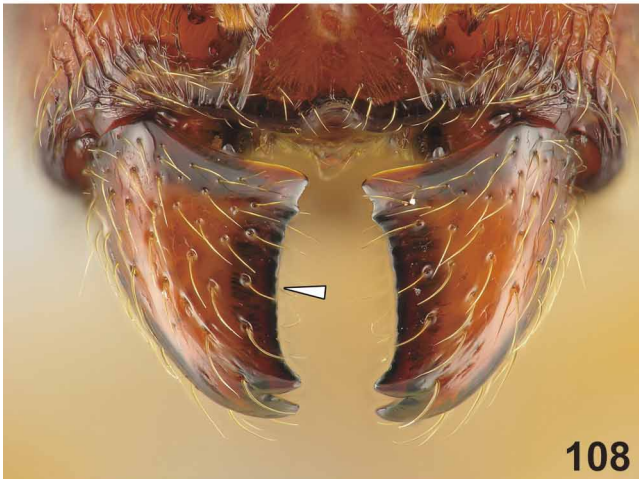
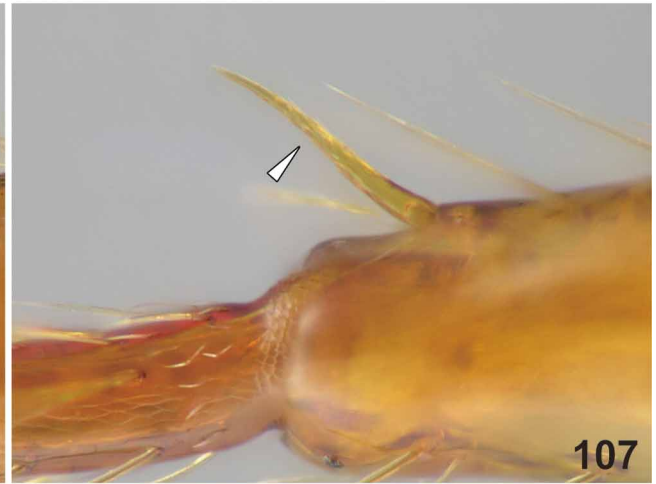


FIGURE 104, *Rhoptomymex* sp. eg-2, worker (Eg09vi05-10), head in full-face view
FIGURE 105, *Tetramorium nipponense*, worker (Eg25iii06-03), head in full-face view
FIGURE 106, *Myrmica serica*, worker (Eg02-VN-239), tibial spur
FIGURE 107, *Tetramorium* sp. eg-3, worker (Eg03-VN-158), tibial spur
FIGURE 108, *Pheidole laevithorax*, worker (Eg03-VN-122), masticatory margin
FIGURE 109, *Aphaenogaster* sp. eg-1, worker (Eg02-VN-120), masticatory margin

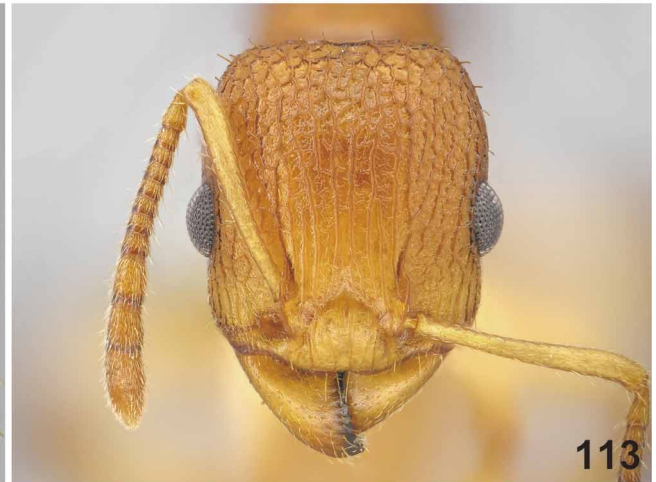


FIGURE 110, *Lordomyrma* sp. eg-1, worker (Eg07x06-09), head in full-face view

FIGURE 111, *Vollenhovia* sp. eg-2, worker (Eg26ix06-06), head in full-face view

FIGURE 112, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), petiole in lateral view

FIGURE 113, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), head in full-face view

FIGURE 114, *Temnothorax* sp. eg-1, worker (Eg02-VN-307), head in full-face view

FIGURE 115, *Kartidris* sp. eg-1, worker (Eg04-VN-062), vertex in lateral view

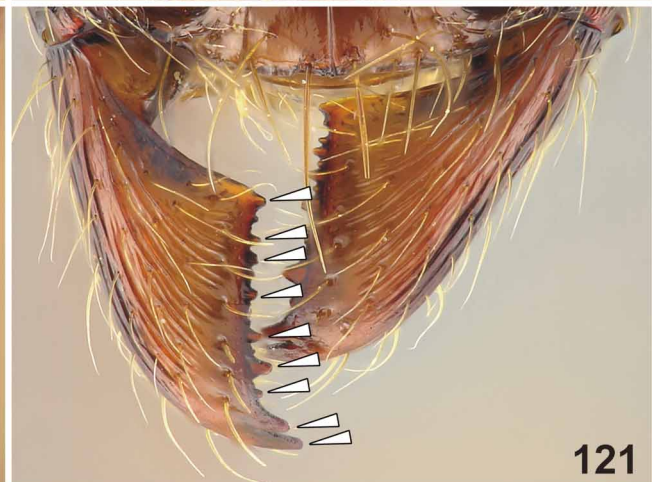
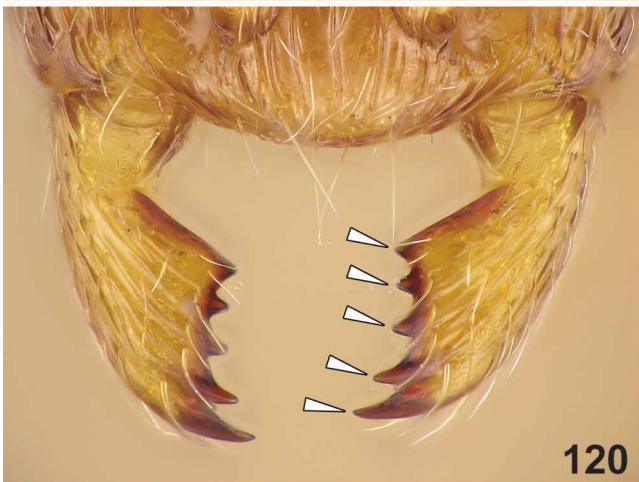
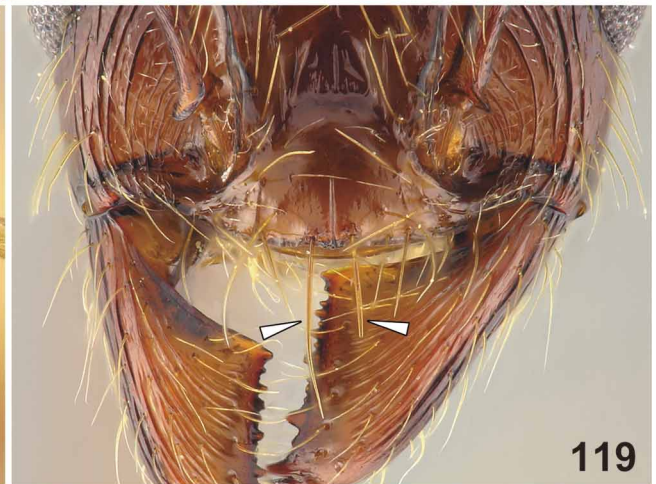
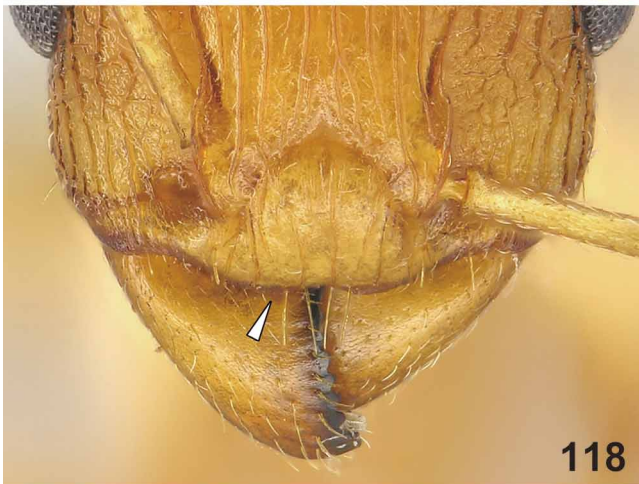
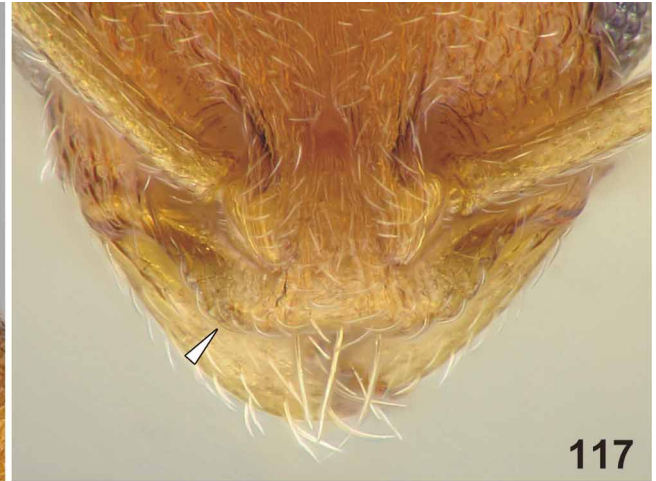


FIGURE 116, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), vertex in lateral view
FIGURE 117, *Cardiocondyla* sp. eg-5, worker (25xii2008, K. Eguchi leg.), clypeus
FIGURE 118, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), clypeus
FIGURE 119, *Pheidole dugasi*, worker (12/xi/2001, K. Eguchi leg.), clypeus
FIGURE 120, *Temnothorax* sp. eg-1, worker (Eg02-VN-307), masticatory margin
FIGURE 121, *Pheidole dugasi*, worker (12/xi/2001, K. Eguchi leg.), masticatory margin

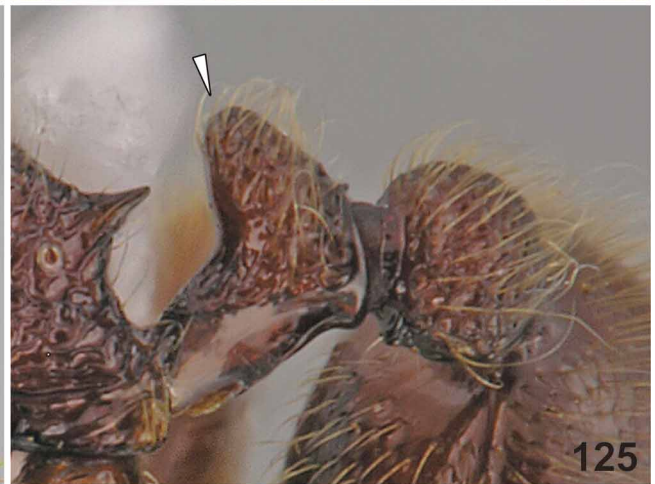


FIGURE 122, *Pheidole binghamii*, worker (Eg30iv07-18), promesonotum in lateral view
FIGURE 123, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), promesonotum in lateral view
FIGURE 124, *Paratopula* sp. eg-1, worker (02/i/2005, K. Eguchi leg.), waist
FIGURE 125, *Lasiomyrma* sp. eg-1, worker (11/xi/2001, K. Ogata leg.), waist
FIGURE 126, *Myrmica serica*, worker (Eg02-VN-239), promesonotum in lateral view
FIGURE 127, *Myrmica serica*, worker (Eg02-VN-239), propodeal lobe

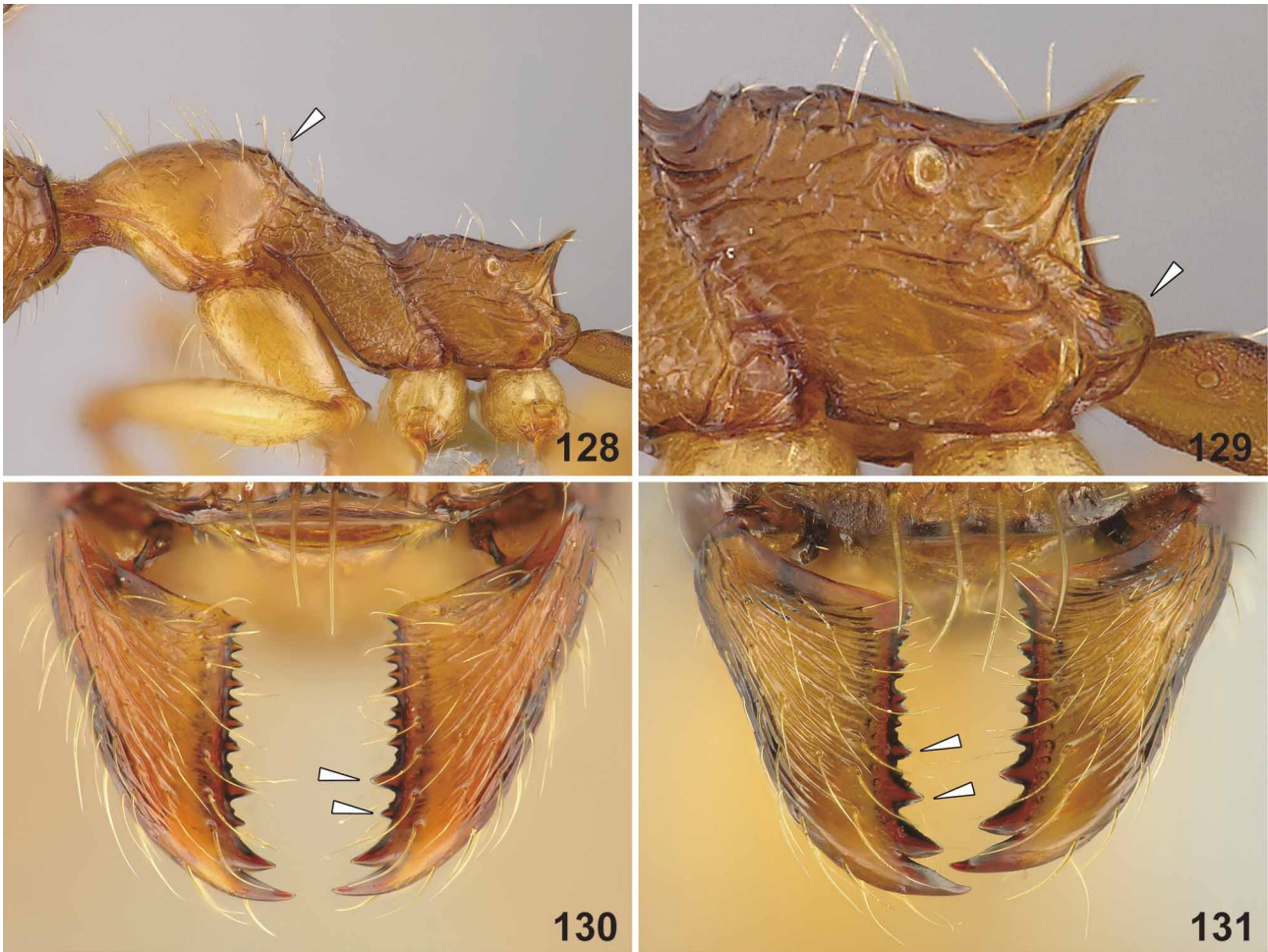
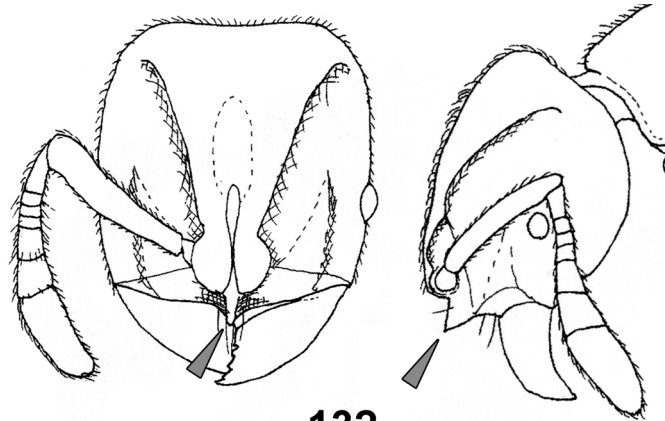


FIGURE 128, *Aphaenogaster exasperata*, worker (B&E03-58), promesonotum in lateral view

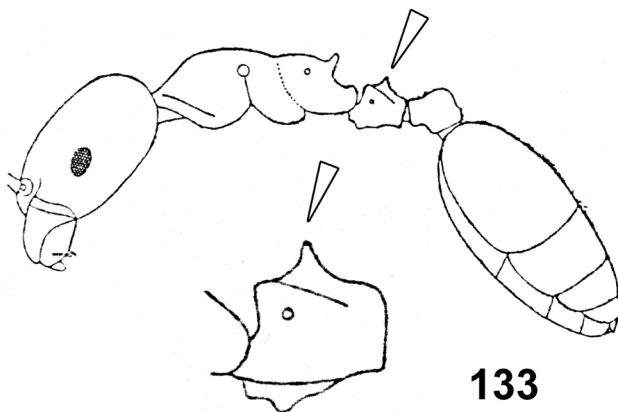
FIGURE 129, *Aphaenogaster exasperata*, worker (B&E03-58), propodeal lobe

FIGURE 130, *Pheidole gatesi*, worker (Eg14vi05-10), masticatory margin

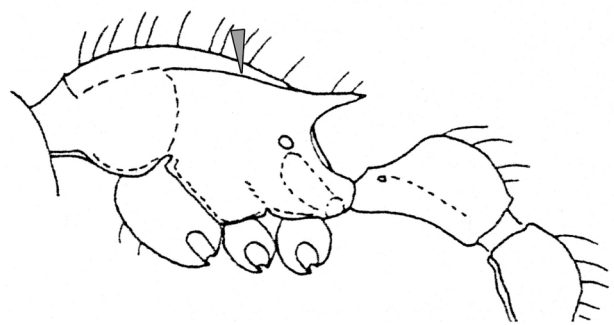
FIGURE 131, *Aphaenogaster* sp. eg-1, worker (Eg02-VN-120), masticatory margin



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FIGURE 132, *Formosimyrmex lanyuensis* Terayama, worker, cited from Terayama (2009)

FIGURE 133, *Gauromyrmex acanthinus*, worker, cited from Karavaiev (1935)

FIGURE 134, *Rostastruma stenoceps*, cited from Bolton (1991)

Table 1. Major collecting sites.

Name of locality	Province	Coordinates	Habitat surveyed
Ba Be National Park	Bac Kan	22°21'–29°N, 105°34'–42°E	Lowland limestone forest
Sa Pa (Hoang Lien Nature Reserve)	Lao Cai	22°08'–23°N, 103°45'–104°00'	evergreen forest on the slope (ca. 1,100–2,200) of Mt. Fan Si Pan (3,143 m alt.)
Van Ban Nature Reserve	Lao Cai	22°05'N, 104°05'E	Hill evergreen forest (ca. 450–1,200 m alt.)
My Yen Commune	Thai Nguyen	21°32'N, 105°40'E	Grassland, tea plantation and forest edge
Tam Dao National Park	Vinh Phuc	21°21'–42°N, 105°23'–44'E	Around settlements, pine plantation, grassland, and hill evergreen forest (ca. 700–1200 m alt.)
Tay Yen Tu National Park	Bac Giang	21°09'–23°N, 106°38'–107°02'E	Lowland and hill evergreen forests (ca. 150–900 m alt.)
Chua Yen Tu	Quang Ninh	21°06'–11°N, 106°37'–106°43'E	Hill evergreen forest (ca. 600–1,100 m alt.)
Ky Thuong Nature Reserve	Quang Ninh	21°05'–12°N, 106°56'–107°13'E	plantation, bamboo forests, and lowland evergreen forest
Ba Vi National Park	Ha Noi (Ha Tay)	21°01'–07°N, 105°18'–25°E	Hill evergreen forest (ca. 400–1,100 m alt.)
Bai Tu Long National Park	Quang Ninh	20°58'–21°08'N, 107°34'–107°38'E	Lowland evergreen forest
Cat Ba National Park	Hai Phong	20°44'–51°N, 106°45'–58'E	Lowland limestone forest and evergreen forest
Cuc Phuong National Park	Ninh Binh	20°14'–24°N, 105°29'–44'E	Lowland limestone forest and evergreen forest
Pu Hoat Nature Reserve	Nghe An	19°52'–20°02'N, 104°58'–105°15'E	Lowland evergreen forest
Pu Mat National Park	Nghe An	18°46'–19°12'N, 104°24'–56'E	Lowland evergreen forest
Huong Son Forest	Ha Tinh	18°34'N, 105°12'E	Lowland evergreen forest
*Bach Ma National Park	Hue	16°05'–16°N, 107°43'–53°E	Lowland and hill evergreen forests (ca. 150–1,400 m alt.)
Nui Chua National Park	Ninh Thuan	11°35'–48°N, 109°03'–14'E	Coastal lowland dry evergreen forest, bush, semi-arid land
Nam Cat Tien National Park	Dong Nai	11°21'–48°N, 107°10'–34'E	Lowland evergreen forest
*Nui Ong Nature Reserve	Binh Thuan	10°59'–11°10'N, 107°41'–53'E	Lowland evergreen forest
*Binh Chau-Phuoc Buu Nature Reserve	Ba Ria-Vung Tau	10°28'–38°N, 107°25'–36'E	Coastal lowland evergreen forest with sandy soil
Phu Quoc National Park	Kien Giang	10°12'–27°N, 103°50'–104°05'E	Lowland evergreen forest

* Specimens from Binh Chau -Phuoc Buu (2008), Nui Ong (2008) and Bach Ma (2009) are still mounting and sorting, and so only part of them are referred in this paper.