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A Generic and Subgeneric Synopsis of the United States Ants, Based on the Workers (Hymenoptera: Formicidae)

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The first comprehensive key for determining the ants of the United States to families and genera was published by E. T. Cresson in 1887, on pages 92-104 of the Supplementary Volume of The Transaction of The American Entomological Society. According to him the characters used in it were "compiled chiefly from the second volume of Andre's admirable 'Species des Hymenopteres d' Europe' which was published in 1882-1883." The five families treated were the Poneridae, Odontomachidae, Dorylidae, Myrmicidae, and Formicidae. All except the Odontomachidae are now recognized as subfamilies, the Odontomachidae having been dropped from consideration as either a family or subfamily and the genus *Odontomachus* transferred to the Ponerinae. Cresson stated that approximately 200 forms of ants had been described from our fauna at that time. In 1902 W. M. Wheeler presented in the American Naturalist (46[429]:702-725) an English translation of Carlo Emery's "An Analytical Key to the Genera of the Family Formicidae, for the Determination of the Workers." In this key to the ants of the world Wheeler set off the Nearctic genera by means of boldface type. Both Cresson's key and Wheeler's translation of Emery's key were of inestimable value in that they furnished a basis for the development of future keys. In the 1910 edition of his noted book, "Ants," Wheeler produced a key of his own (Appendix B, pp. 557-560) for identifying our worker ants to subfamilies, genera, and subgenera. Fifty-one genera were dealt with, or 12 more than in Emery's key. Only 5 subfamilies were treated, as the Pseudomyrminae and the Cerapachyinae had not been recognized. The key had some distinct advantages over Emery's: First, it was supplemented by a list of all the ants known to occur in the United States together with the general distribution of each; second, throughout the book there were figures that could be considered more or less illustrative of the genera; and finally, at the end of the volume there was a bibliography of the ant literature of the world through the year 1908. At this time, however, the ant fauna of the United States was still very poorly known as was also the range of each form. The bibliography, although very helpful, had the disadvantage of being arranged alphabetically according to authors rather than having all important literature pertaining to a genus grouped under that genus. Regardless of these criticisms, the key and the information sup-

plementing it represented a great advance in the improvement of our knowledge of the ants of the United States. Besides the key mentioned there also have been published during the past 40 years a number of articles dealing with the ants of a single state or of a restricted area. Many have contained keys for identifying ants to subfamilies, genera, subgenera or even species. Though satisfactory for the identification of the forms of these areas, the papers have not been comprehensive enough to satisfy one interested in the ant fauna of the entire United States. There also has been much change in ant taxonomy since the publication of Wheeler's book. This has involved the recognition of 2 additional subfamilies (Cerapachyinae and Pseudomyrmacinae), 10 additional genera, 291 additional forms, these having increased from 451 to 742, and considerable changes with regard to synonymy, and generic and subgeneric concepts.

For years there has been a definite need for a taxonomic publication on the ants of the United States that would be up-to-date, comprehensive, and readily workable. This article represents an earnest effort to meet that demand. Although designed primarily for beginners in formicology and for those who are more or less casually interested in the subject, the publication should also prove helpful to others.

A member of the worker caste is the individual to which we commonly apply the name "ant." Its functions are primarily fighting, foraging, nursing, and caring for the nest. The worker ant differs from the female (queen) in that it is usually smaller, normally lacks wings, seldom bears ocelli except in certain restricted groups of ants, and has a thorax that appears to be composed of three divisions but which in reality is composed of four, the first abdominal segment of the embryo having fused with the metathorax to form a region known as the epinotum. Workers are designated as monomorphic when they are of similar size, dimorphic when there are two sizes, and polymorphic when there are more than two sizes. The major worker of both the dimorphic and polymorphic forms is commonly called soldier. Polymorphic workers are divided still further according to size into minor workers, intermediate workers, and major workers.

With certain exceptions, as in *Eciton* where all females are wingless, female ants are winged on reaching maturity, but lose or shed their wings later. An individual that has lost its wings can be readily distinguished from a normal worker by the extra sclerites composing the thorax.

This article is confined to a treatment of workers, except that females are considered in the case of those genera containing parasitic forms, in which workers are unknown. Major workers, or so-called soldiers, are especially treated in those genera that contain dimorphic or polymorphic workers. The keys to the subfamilies, genera, and subgenera are constructed for simplicity rather than for indication of phylogenetic affinities. They are supported by numerous illustrations representing one form of nearly every genus or subgenus. In many points in the keys there are statements pertaining to the distribution or abundance of certain ants, or even remarks on the biology. Each subfamily, genus, and subgenus is characterized, and the genotype or subgenotype is cited, as is also the reference to the original description. Should

the reader wish to determine specimens beyond genera or subgenera he will find the important literature, whether taxonomic or biological, listed chronologically under the groups in which he is working. The articles containing keys to species are designated by an asterisk, and those which include illustrations are marked "illus."

The present work contains a list of explanations of both taxonomic and biological terms, and also a general index. All subfamilies, genera, subgenera, and forms are listed both in the general index and under each genus or subgenus to which they belong.

Anyone who has studied biological material extensively is always impressed by the extent of variation that occurs among individuals composing the same taxonomic unit. Because of such variation a given specimen may not fully agree with all the characters in a key or in a generic or specific description. In the genus *Pogonomyrmex*, for example, workers are usually considered as having no promesonotal or mesoepinotal sutures dorsally, yet specimens that have such sutures are often encountered definitely belonging to the genus. One also has the impression, after having examined thousands of specimens belonging to various species of *Aphaenogaster*, that epinotal spines are one character that is common to them all, yet there are a few species in this group whose workers have no spines or only faint tubercles in place of spines. The genus *Pheidole* normally has dimorphic workers, and one can look at specimens in species after species where this holds true, yet there are a few species such as *instabilis* and *rhea* that have polymorphic workers. The possibility of such discrepancies must be taken into account.

Although most ants are free-living forms, a few have become parasites on others of their kind. The genera *Anergates*, *Epoecus*, and *Sympheidole* possessing this habit have apparently lost their worker caste and are now represented only by males and females. There are also some genera which, although they are comprised mostly of free-living forms, contain a few parasitic species, as for example, *Leptothorax* (*Mychothorax*) with *emersoni* and *diversipilosus*, *Crematogaster* (*Acrocoelia*) with *kennedyi* and *creightoni*, and *Myrmica* (*Manica*) with *parasitica*.

Sixty-one genera of ants are recognized in this publication, these being distributed among the subfamilies as follows: Dorylinae, 1; Cerapachyinae, 2; Ponerinae, 11; Pseudomyrminae, 1; Myrmicinae, 32; Dolichoderinae, 6; Formicinae, 8. The 743 forms are distributed among the subfamilies as follows: Dorylinae, 20; Cerapachyinae, 3; Ponerinae, 31; Pseudomyrminae, 5; Myrmicinae, 385; Dolichoderinae, 27; and Formicinae, 272.

The genera new to our country since the publication of Wheeler's "Ants," in 1910 are *Anergates*, *Cardiocondyla*, *Ectatomma*, *Triglyphothrix*, and *Wasmannia*. All have apparently been introduced except one of the subgenera of *Ectatomma*, which evidently is native. Since *Anergates atratulus*, a parasite of the introduced *Tetramorium caespitum*, has recently been discovered in the United States, it is only natural to infer that one or possibly more forms of *Strongylognathus*, which are also parasites on *T. caespitum*, may be found eventually. Undoubtedly there are many undescribed ants. As indicative of this, only 8 forms of *Strumigenys* had been recorded prior to 1931, when

the discovery of additional forms (mostly new to science) enlarged the list to 16. At present there are 27 described forms or approximately three and one-half times as many as were known before 1931. The number of forms comprising our entire ant fauna is now approximately one and two-thirds times as great as in 1910. Probably the best opportunities for future collecting will be in the extreme northern, southeastern, and southwestern parts of the country.

Although more formicologists have worked on our ants during the past 30 years than during any similar previous period an immense amount of work still remains to be done in revising genera, and in determining the distributional ranges and the preferred ecological habitats of the various forms.

This article is based on a study of specimens in the United States National Museum, in the personal collection of W. M. Mann, and in that of the Museum of Comparative Zoology of Harvard University. The forms actually studied are indicated by a dagger (†). The illustrations were drawn by Sara H. DeBord and Arthur D. Cushman. The DeBord figures bearing the numeral '31 were originally made for the author when he was employed by The Mississippi State Plant Board.

The measurements given for the workers under each genus and subgenus include the range in length from the smallest known worker to the largest known worker in the same group. In many genera the range is so great that the measurements can mean very little, but in some the length of the worker is of aid in determination, as in the genus *Brachymyrmex*. The following explanations are offered for the various measurements mentioned throughout the article. The length of the head is the median length from the anterior border of the clypeus to the posterior border of the head. The length of the antennal scape is the distance from its insertion in the antennal fossa to the tip of the scape. The amount the scape surpasses the posterior border of the head is the distance from the antennal fossa to the posterior border of the head through the most direct line deducted from the length of the scape. The position the eye occupies with relation to the midlength of the side of the head is obtained by measuring on the side of the head from the posterior border of the clypeus to the posterior border of the head and determining if most or all of the eye is anterior or posterior to a point midway between these two. Reference to tibial spurs applies to the spur near the apex of each middle and hind tibia.

KEY TO SUBFAMILIES

1. Abdominal pedicel composed of two segments, the petiole and postpetiole. Pl. 6, fig. 23 2
- Abdominal pedicel composed of a single segment, the petiole. Pl. 22, fig. 84 4
2. (1) Frontal carinae located very close to each other and not covering the antennal insertions. Pl. 5, fig. 17 3
- Frontal carinae not placed close to each other and each often bearing a lobe which more or less conceals the antennal insertion. Pl. 5, fig. 18. (Clypeus almost always prolonged back between the frontal carinae. One of the largest subfamilies.) *Myrmicinae* Lepelletier, p. 543
3. (2) Eye remarkably large, reniform or subelliptical, occupying approximately half

- the length of the side of the head. Ocelli usually present. (Clypeus not prolonged back between the frontal carinae. Pl. 5, fig. 17. Median spur of each middle and hind tibia pectinate.) *Pseudomyrminae* Emery, p. 542
- Eye either absent or else vestigial, ocellus-like. No ocelli. Pl. 1, fig. 2.
..... *Dorylinae* Leach, p. 525
4. (1) Cloacal orifice circular, terminal, surrounded by a fringe of hairs. (Gaster without a pronounced constriction between the first and second segments. Pl. 21, fig. 80. Antennal fossa not always touching the posterior border of the clypeus. One of the largest subfamilies.) *Formicinae* Lepeletier, p. 599
- Cloacal orifice not as described 5
5. (4) No constriction between the first and second gastric segments. Pl. 17, fig. 65. Integument usually soft, flexible. Sting rudimentary or absent. (Anal glands present which produce a characteristic, disagreeable "tapinoma odor." Antennal fossa touching posterior border of clypeus. Eye located well toward the median line of the head.) Pl. 17, fig. 65 *Dolichoderinae* Forel, p. 592
- A pronounced constriction between the first and second gastric segments. Pl. 4, fig. 14. Integument firm, highly sclerotized. Sting well-developed. 6
6. (5) With a pygidium bearing distinct spines on its lateral and posterior borders. Pl. 1, fig. 3. (Pettiole subcylindrical. Antenna located exceedingly close to the border of the mouth; funiculus much incrassated.) Extremely rare ants. Habitus not antlike. Texas and Arizona *Cerapachyinae* Forel, p. 528
- Without a pygidium. Pl. 4, fig. 14. More common ants. Habitus usually antlike. One or more representatives in every state *Ponerinae* Lepeletier, p. 529

Subfamily Dorylinae Leach

Dorylida Leach, 1815, in Brewster's Edinb. Encycl. 9:147.
Dorylinae Dalla Torre, 1893, Catal. Hymen. 7:1.

Cloacal orifice ventral, slit-shaped. Sting developed. Pedicel consisting of 2 segments, the petiole and postpetiole. Frontal carinae very close to each other, almost vertical, not covering the antennal insertions. Compound eyes absent or extremely small (vestigial), ocelluslike. No ocelli. Antenna inserted exceedingly close to the mouth, 12-segmented; often short and much incrassated. Clypeus remarkably short. In some species, posterior corner of head extended as an angular process. Promesonotal suture obsolescent or absent. Pupae of workers apparently never borne in cocoons. Nests commonly constructed in rotten logs and stumps or in the soil beneath stones and other objects. Colonies usually very large. Ants highly predaceous on termites, on the brood of other ants, and on various other insects. Workers travel in distinct files while foraging or moving nests. Twenty forms; these distributed mainly south of the 40th degree of latitude with a slight northward extension in the Mississippi Valley region. Uncommon.

1. Tarsal claw with a median tooth. Pl. 1, fig. 1. *Eciton*, subg. *Labidus* Jurine, p. 525
- Tarsal claw simple, without a tooth. Pl. 1, fig. 2.
..... *Eciton*, subg. *Neivamyrmex* Borgmeier, p. 527

ECITON, subgenus LABIDUS Jurine

Pl. 1, Fig. 1

Labidus Jurine, 1807, Nouvelle Méthode de Classer les Hyménoptères et les Dip-tères, p. 282.

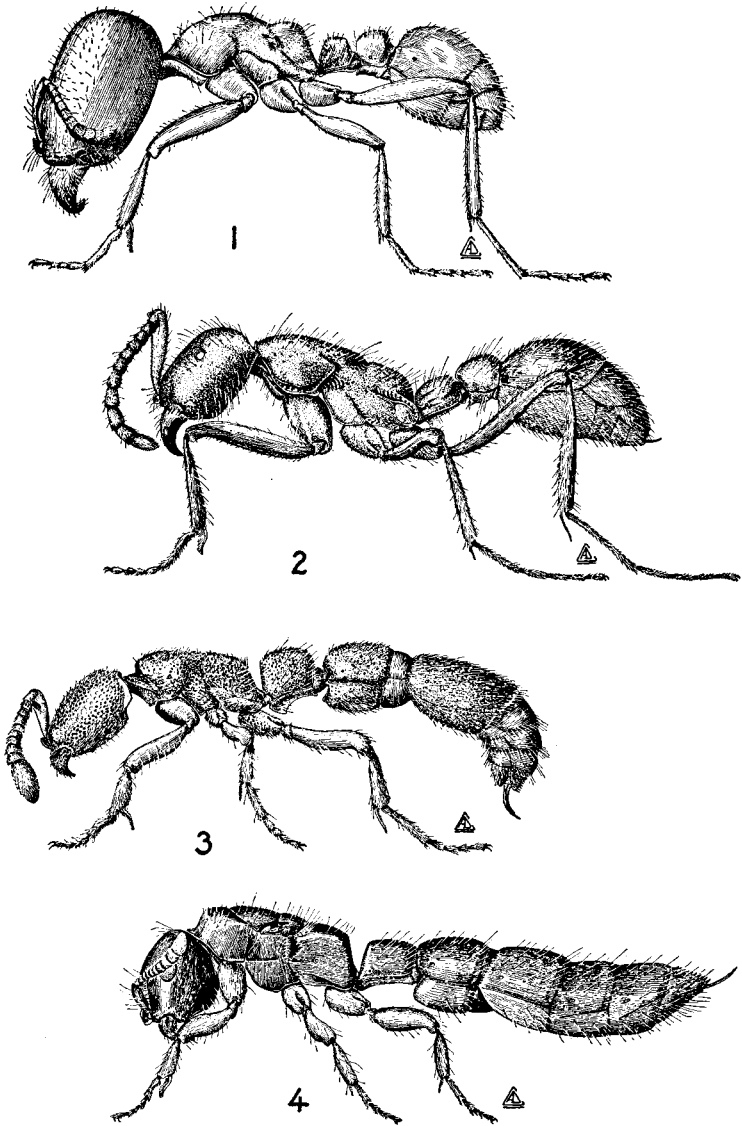


PLATE 1

- Fig. 1. *Eciton (Labidus) coecum* (Latreille), major worker.
 Fig. 2. *Eciton (Neivamyrmex) nigrescens* (Cresson), worker.
 Fig. 3. *Cerapachys (Parasyscia) augustae* Wheeler, worker.
 Fig. 4. *Acanthostichus (Ctenopyga) texanus* Forel, female.

Subgenotype, (*Labidus latreillei* Jurine) = *Formica coeca* Latreille (by designation of Latreille, 1810).

Latreille, 1802, Hist. Nat. Fourmis 9:270, illus.

Mayr, 1886, Wien. Ent. Ztg. 5:119.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:409.

Length 2.5-7 mm. Characters similar to those of *Eciton*, subg. *Neivamyrmex* except for toothed claws and the presence of a tooth on each frontal carina. Two forms, †*coecum* (Latreille) and *esenbeckii* (Westwood). *E. coecum* occurs in Texas, Louisiana, and Oklahoma, *esenbeckii* only in southern Texas. The worker of *esenbeckii* is not known but it is thought to be *crassicornis* (F. Smith). The description above applies only to *coecum*.

ECITON, subgenus NEIVAMYRMEX Borgmeier

Pl. 1, Fig. 2

Eciton, subg. *Acamatus* Emery, 1894, Soc. Ent. Ital. Bol. 26:181. (*Acamatus* Emery preoccupied by *Acamatus* Schoenherr, 1833.)

Neivamyrmex Borgmeier, 1940, Rev. de Ent. 11:606.

Subgenotype, (*Eciton (Acamatus) schmitti* Emery) = *Labidus nigrescens* Cresson (by designation of Wheeler, 1911).

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:969.

*Emery, 1894, Soc. Ent. Ital. Bol. 26:183, 184.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:258.

Emery, 1900, Mem. Real. Accad. Sci. Bologna 8:522.

Emery, 1901, Soc. Ent. Ital. Bol. 33:55, illus.

Wheeler, 1903, Psyche 10:93, illus.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:410-413, illus.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:392.

*Smith, 1942, Amer. Midl. Nat. 27:537, illus.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:280.

Polymorphic. Length 1.75-6 mm. Frontal carinae closely approximate, almost vertical, and not covering antennal insertions. Cheek longitudinally carinate. Eye absent or extremely small to small, often not easily discernible. Posterior corner of head usually produced and angular. Antenna 12-segmented; scape short, robust, usually not extending much beyond posterior border of eye; funicular segments often incrossated. Dorsum of thorax without promesonotal suture; mesoepinotal suture generally represented by a broad impression. Epinotum unarmed. Tarsal claw simple. Petiole longer than postpetiole, usually produced beneath into a spine or tubercle. Eighteen forms, *arizonense* Wheeler, †*californicum* Mayr, †*carolinense* Emery, †*commutatatum* Emery, †*fuscipennis* Wheeler, *harrisii* (Haldeman), †*leonardi* Wheeler, †*melanocephalum* Emery, *melsheimeri* (Haldeman), *minus* (Cresson), *mojave* M. R. Smith, †*nigrescens* (Cresson), †*opacithorax* Emery, *oslari* Wheeler, †*pauxillum* Wheeler, †*pilosum* F. Smith, *pilosum mandibulare* M. R. Smith, †*wheeleri* Emery. Only the male is known for *arizonense*, *fuscipennis*, *harrisii*, *melsheimeri*, *minus*, *mojave*, *oslari*, *pilosum mandibulare*. The ants are distributed mainly south of the 40th degree of latitude with a slight northward extension in the Mississippi Valley region. They have nomadic, predatory habits, colonizing for temporary periods in the ground or in rotten logs and stumps. The colonies are large to very large. In this subgenus there doubtless is a great deal of synonymy which cannot be

ascertained until associated workers, males, and females are collected from the same colony.

Subfamily Cerapachyinae Forel

Cerapachysii Forel, 1893, Soc. Ent. de Belg. Ann. 37:162.

Cerapachyinae Wheeler, 1920, Psyche 27:51.

Cloacal orifice ventral, slit-shaped. Sting well-developed. Pedicel consisting of a single segment, the petiole. Gaster with a very pronounced constriction between the first and second segments. Pygidium margined laterally and posteriorly by distinct spines. Legs short. Each middle and hind tibia with a well-developed pectinate spur. Tarsal claw simple. Dorsal sutures of thorax absent or obsolescent. Antenna located exceedingly close to the border of the mouth; 11- or 12-segmented, heavily incrassated. Clypeus remarkably short. Eyes apparently absent. Integument firm, highly sclerotized. Nests constructed in the soil. Colonies exceedingly small, consisting of a dozen or so individuals. Predaceous and carnivorous. Extremely rare. Not antlike. Only 3 forms are known, these having been recorded from Arizona and Texas.

1. Antenna 11-segmented, the last segment unusually enlarged forming a club which is approximately as long as the combined length of the 5 preceding segments.

(Eye apparently absent.) Carina laterad of antennal fossa well-developed, sharp. Frontal carinae closely approximate, high, projecting, not concealing antennal insertions. Texas and Arizona. Pl. 1, fig. 3.

.....*Cerapachys*, subg. *Parasyscia* Emery, p. 528

Antenna 12-segmented, last segment not forming a distinct club such as the one described above. (Eye presumably absent.) No carina laterad of antennal fossa. Frontal carina partly concealing antennal insertion by the extension of its lobe.

Texas. Pl. 1, fig. 4.*Acanthostichus*, subg. *Ctenopyga* Ashmead, p. 529

CERAPACHYS, subgenus PARASYSCIA Emery

Pl. 1, Fig. 3

Parasyscia Emery, 1882, Andre's Species des Hyménoptérés d'Europe et d'Algerie 2:235.

Subgenotype, *Parasyscia piochardi* Emery (monobasic).

Wheeler, 1902, Biol. Bul. 3:181, illus.

Wheeler, 1903, Psyche 10:205, illus.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:401.

Wheeler, 1926, Ants, Columbia Univ. Press, 2nd ed., p. 226, illus.

Length 2.5-3.5 mm. Eyes apparently absent. Posterior border of head distinctly emarginate; posterior corners sharply angular, projecting. Antenna 11-segmented; scape short, curved, stout, greatly enlarged apically, not extending much beyond the middle of the head; all funicular segments except the first and last broader than long, last segment unusually enlarged forming a club which is approximately as long as the 5 preceding segments combined. Carina laterad of antennal fossa well-developed, sharp. Frontal carinae closely approximate, high, projecting, not concealing the antennal insertions. Mandible subtriangular, with indistinctly crenated masticatory border. Thorax subcylindrical, with dorsal sutures obsolescent or absent. Legs rather short; spur of each middle and hind tibia distinctly pectinate. Tarsal claw simple.

First gastric segment separated from the second by an unusually strong constriction; second gastric segment flattened dorsally and occupying approximately half of the gaster. Apical segment of the gaster (pygidium) with small but distinct spines on its lateral and posterior borders. Two forms, †*augustae* Wheeler and *davisi* M. R. Smith. The former has been recorded from Texas and Arizona, the latter only from Texas. The worker caste of *davisi* is not yet known. Extremely rare. Nests in the soil, usually beneath stones or other objects. Colonies unusually small. Predaceous, also carnivorous.

ACANTHOSTICHUS, subgenus CTENOPYGA Ashmead

Pl. 1, Fig. 4

Ctenopyga Ashmead, 1905, *Canad. Ent.* **37**: 382 (nomen nudum); 1906, *Ent. Soc. Wash. Proc.* **8**:29.

Subgenotype, *Ctenopyga townsendi* Ashmead (by original designation).

Wheeler, 1902, *Biol. Bul.* **3**:187, illus.

Forel, 1904, *Soc. Ent. de Belg. Ann.* **48**:168.

Wheeler, 1908, *Amer. Mus. Nat. Hist. Bul.* **24**:400.

Worker unknown. The females of *texanus* Forel and *townsendi* Ashmead are respectively 5.6 and 5 mm. each. The workers of this subgenus can be expected to have most or all of the following characters: Body slender. Head subrectangular. Antenna 12-segmented; scape stout, flattened, not extended beyond the midlength of the head; funiculus short, clavate. Frontal carinae partly concealing antennal insertions. Mandible large, subtriangular, strongly concave beneath; masticatory border apparently without teeth or denticulae. Thorax apparently not marginate, with the dorsal sutures obsolescent or absent. Legs short, each tibia with a well-developed, pectinate spur. Tarsal claws simple. Petiole, from above, subcylindrical, also not marginate, much narrower than the first gastric segment and separated from it by a strong constriction. First gastric segment separated from the second by a very pronounced constriction. Fifth gastric segment (pygidium) with a declivous surface margined laterally and posteriorly by distinct spines. One form, *texanus* Forel, which has been collected in Brownsville and Rio Grande City, Tex. Extremely rare. Nests in the soil. Colonies unusually small. Predaceous, also carnivorous.

Subfamily Ponerinae Lepeletier

Ponerites Lepeletier, 1836, *Hist. Nat. Ins. Hymen.* **1**:185.

Ponerinae Dalla Torre, 1893, *Catal. Hymen.* **7**:13.

Cloacal orifice ventral, slit-shaped. Sting well-developed. Pedicel with a single segment, the petiole. Gaster with a pronounced constriction between the first and second segments. Frontal carinae separated or close together, when close together they are usually dilated to form oblique or horizontal lobes, partly covering the antennal insertions. Integument firm, strongly sclerotized. Pupae always enclosed in cocoons. Nests constructed in the soil or in rotting wood. Many of the forms have vestigial eyes and to a greater or less extent avoid the light. Colonies small, consisting of a few hundred individuals or less. Almost exclusively flesh eating; both predaceous

and carnivorous. Thirty-one forms. More common in the southern half of the United States, but a few genera, such as *Ponera* and *Stigmatomma*, apparently occur in every state. None of the forms is considered inimical to man's welfare.

1. Apex of gaster directed ventrally or anteroventrally. (Dorsal sutures of thorax absent or obsolescent. Eye extremely small, not easily discernible. Extremely rare or rare.) Pl. 2, fig. 6 2
 Apex of gaster not directed ventrally or anteroventrally. Pl. 2, fig. 8 3
2. (1) Petiole scalelike. Anterior border of clypeus not projecting in the middle. Rare. Distributed mainly over the southeastern fourth of the United States. Pl. 2, fig. 6 *Proceratium* Roger, p. 535
 Petiole more or less nodiform. Anterior border of clypeus projecting in the middle. Extremely rare. Distributed over approximately the eastern half of the United States. Pl. 2, fig. 7 *Sysphincta* Roger, p. 536
3. (1) Mandible with a row of coarse, bidenticulate teeth. Anterior border of clypeus denticulate. (Inferior angle of head usually with a pronounced tooth. Eye unusually small and inconspicuous, placed in the posterior half of the side of the head. Uncommon. Distributed over the entire United States.) Pl. 2, fig. 5 *Stigmatomma* Roger, p. 531
 Mandible and clypeus not as described above 4
4. (3) Tarsal claw very distinctly pectinate. Pl. 4, fig. 15a. (Clypeus extended in the middle of its anterior border as an acute point. A sharp median carina throughout the length of the clypeus. Antennal scape extending approximately one-third its length beyond the posterior corner of the head. Frontal carinae closely approximate, each without a well-developed lobe, thus exposing most of the antennal insertion. Texas, Louisiana and Florida.) Pl. 4, fig. 15 *Leptogenys*, subg. *Lobopelta* Mayr, p. 540
 Tarsal claw either simple or toothed, never pectinate 5
- 5(4) Mandibles linear, attached to the middle of the anterior margin of the head, so that when closed they lie subparallel to each other. Each section of head with a groove between eye and frontal carina extending posteromesially to converge above near the vertex. Another strong groove posterior to eye, running obliquely from the ventral to the dorsal surface of the head. Petiole extended above as a conical or spine-shaped structure. (Florida, Georgia, Louisiana, Texas and Arizona.) Pl. 4, fig. 16 *Odontomachus* Latreille, p. 541
 Not the above combination of characters 6
6. (5) Cheek with a prominent carina extending from the eye to the clypeus. (Pronotum marginate on each side. Length 12-13 mm. Southern Texas.) Pl. 3, fig. 11 *Neoponera*, subg. *Neoponera* Emery, p. 536
 Cheek without a carina 7
7. (6) Pronotum marginate on each side. (Length 7-8.5 mm. Texas and Louisiana.) Pl. 2, fig. 8 *Pachycondyla*, subg. *Pachycondyla* F. Smith, p. 537
 Pronotum not marginate on each side 8
8. (7) Tarsal claw simple 10
 Tarsal claw toothed or bifid. (Frontal carinae remote from each other.) 9
9. (8) Tarsal claw toothed. (Each middle and hind tibia with 2 spurs. Clypeus flat. Posterior border of petiole with an angle or tubercle on each side, mesad of which there is a broad but gentle convexity. Body covered with fine, dense, closely appressed, pruinose pubescence, and coarse, pitlike impressions. Southern Florida, Southern Texas.) Pl. 3, fig. 9 *Platythyrea* Roger, p. 533
 Tarsal claw bifid. Pl. 3, fig. 10a *Ectatomma* F. Smith
 a. Posterior coxa with a dorsal spine. Apex of antennal scale almost reaching the

- posterior corner of the head. Length approximately 3 mm. Sculpture for the most part longitudinally rugulose. One form, *hartmanni* Wheeler of Texas.
*Ectatomma*, subg. *Parectatomma* Emery, p. 535
- Posterior coxa without a dorsal spine. Apex of antennal scape extending considerably beyond the posterior corner of the head. Length 7-9.5 mm. Sculpturing on head and thorax mostly rugulose or rugulose-reticulate. (Posterior border of clypeus forming a smooth, somewhat hemispherical convexity over the antennal socket.) An introduced form, *tuberculatum* (Olivier) of Victoria County, Tex.; probably extinct there. Pl. 3, fig. 10
*Ectatomma*, subg. *Ectatomma* F. Smith, p. 533
10. (8) Tibiae of middle and hind legs each with a single spur. (Eye extremely small, often scarcely perceptible. Mesonotum not strongly protuberant or surrounded by a deeply impressed suture. Metatarsus of middle leg without stiff bristles on its extensor surface. Entire United States.) Pl. 4, fig. 14
*Ponera* Latreille, p. 540
- Tibiae of middle and hind legs each with 2 spurs, the smaller of which is not always easily seen*Euponera* Forel
- a. Metatarsus of middle leg without stiff bristles on its extensor surface. Mesonotum strongly protuberant, surrounded by a deeply impressed suture. Most of meso- and metapleura usually smooth and shining. One form, *solitaria* (F. Smith), accidentally introduced into several towns in Georgia, North Carolina, and Virginia. Pl. 3, fig. 12
*Euponera*, subg. *Brachyponera* Emery, p. 537
- Metatarsus of middle leg with strong bristles on its extensor surface. Mesonotum not strongly protuberant or surrounded by a deeply impressed suture. Meso- and metapleura not always smooth and shining. (Uncommon.) Two forms, *stigma* (Fabricius) of Florida, and *gilva* (Roger) of Alabama, Mississippi, Louisiana, Tennessee and Texas. Pl. 4, fig. 13
*Euponera*, subg. *Trachymesopus* Emery, p. 539

STIGMATOMMA Roger

Pl. 2, Fig. 5

Stigmatomma Roger, 1859, Berlin. Ent. Ztschr. 3:250.

Genotype, *Stigmatomma denticulatum* Roger (by designation of Bingham, 1903).

Haldeman, 1844, Acad. Nat. Sci. Phila. Proc. 2:54.

Wheeler, 1900, Biol. Bul. 2:56, illus.

Santschi, 1913, Soc. Ent. de Belg. Ann. 57:429.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:389.

Haskins, 1928, N. Y. Ent. Soc. Jour. 36: 179.

Cole, 1940, Amer. Midl. Nat. 24:35.

*Creighton, 1940, Amer. Mus. Novitates No. 1079, p. 1, illus.

Length approximately 4-6.5 mm. Mandible linear, the inner border with a row of coarse, bidentulate teeth, the apex ending in a long curved tooth. Anterior border of clypeus denticulate. Inferior angle of head usually with a pronounced tooth. Antenna 12-segmented, the scape short, lacking approximately one-half its length of reaching the posterior border of the head. Eye unusually small and inconspicuous, placed in the posterior half of the side of the head. Each middle and hind tibia with a pair of spurs. Mesonotum forming a narrow strip of almost uniform width across the dorsum of the thorax. Petiole flattened above, beneath with a prominent protuberance. Head subopaque, the sculpture consisting mostly of dense punctures. Four forms, †*pallipes* (Haldeman), †*pallipes montigena* Creighton, †*pallipes ore-gonense* Wheeler, †*pallipes subterranea* Creighton. One or more of these

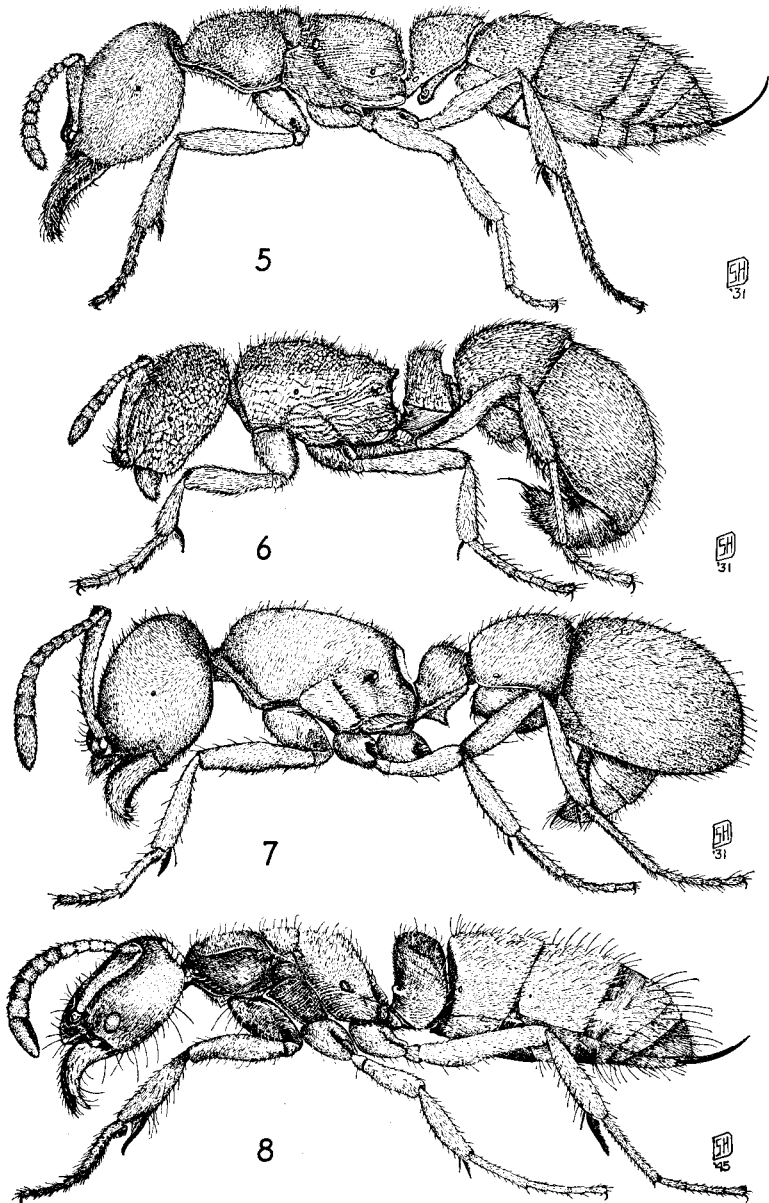


PLATE 2

Fig. 5. *Stigmatomma pallipes* (Haldeman), worker.

Fig. 6. *Proceratium croceum* (Roger), worker.

Fig. 7. *Sysphincta pergandei* Emery, worker.

Fig. 8. *Pachycondyla* (*Pachycondyla*) *harpax* (Fabricius), worker.

occur in every state. Uncommon. Usually found nesting in the soil of woodland areas beneath objects lying on the soil surface. Colonies small. Predaceous, also carnivorous. For a more detailed account of the biology see Wheeler 1900 and Haskins 1928.

PLATYTHYREA Roger

Pl. 3, Fig. 9

Platythyrea Roger, 1863, Berlin. Ent. Ztschr. 7:172.

Genotype, *Pachycondyla punctata* F. Smith (by designation of Bingham, 1903).

F. Smith, 1858, Catalogue of Hymenopterous Insects in the Collection of the British Museum, pt. 6, p. 108.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:80, illus.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:401.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:824.

*Mann, 1916, Harvard Univ. Mus. Compar. Zool. Bul. 60:403.

Length 6.65 mm. Antennal insertions remote. Antenna 12-segmented, not clubbed. Scape robust, most of funicular segments as broad as long or broader than long. Frontal carina with a prominent lobe which helps to conceal the base of the antenna. Clypeus flat. Mandible subtriangular. Eye unusually large, with numerous ommatidia, placed nearer to the anterior half of the side of the head than the posterior half. Promesonotal suture pronounced, other sutures on dorsum of thorax apparently effaced. Epinotum with a pair of tubercles. Each middle and hind tibia with 2 spurs. Tarsal claw toothed. Posterior border of petiole with a lateral angle or tubercle, mesad of which there is a broad but gentle convexity. Body practically devoid of erect or suberect hair except at the apex of the gaster, but covered however with a fine, dense, closely appressed, pruinose pubescence. Coarse, pitlike impressions visible over most of the body. One form, †*punctata* (F. Smith) of extreme southern Florida, southern Texas. Uncommon. Nests in logs, stumps and under the bark of trees. Colonies small. Predaceous, also carnivorous.

ECTATOMMA, subgenus ECTATOMMA F. Smith

Pl. 3, Fig. 10

Ectatomma F. Smith, 1858, Catalogue of Hymenopterous Insects in the Collection of the British Museum, pt. 6, p. 102.

Subgenotype, *Formica tuberculata* Olivier (by designation of Bingham, 1903).

Olivier, 1791, Encycl. Meth. Ins. 6:498.

Norton, 1868, Amer. Nat. 2:61, illus.

Cook, 1904, Science N. S. 19:862.

Cook, 1904, Science N. S. 20:611.

Cook, 1904, U. S. Dept. Agr. Div. Ent. Bul. 49:5-15.

Wheeler, 1904, Science N. S. 20:437.

Wheeler, 1904, Science N. S. 20:766-768.

Wheeler, 1905, Science N. S. 21:706.

Length 7.95 mm. Eye with numerous ommatidia, prominent, very strongly convex; located posterior to the middle of the side of the head. Frontal carinae remote from each other, subparallel behind. Clypeus with curved anterior border, with a median carina extending throughout its length, posterior border forming on each side a smooth, somewhat hemispherical convexity over the antennal socket. Mandible unusually large, subtriangular,

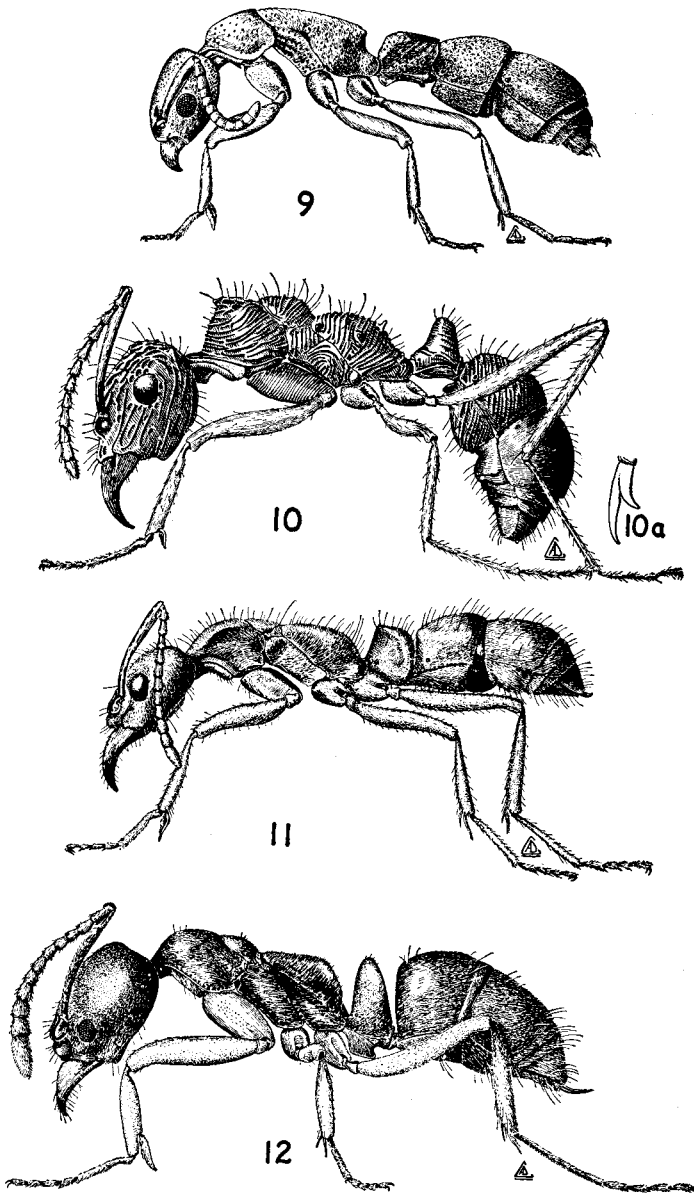


PLATE 3

- Fig. 9. *Platythyrea punctata* (F. Smith), worker.
 Fig. 10. *Ectatomma (Ectatomma) tuberculatum* (Olivier), worker; fig. 10 a, tarsal claw.
 Fig. 11. *Neoponera (Neoponera) villosa* (Fabricius), worker.
 Fig. 12. *Euponera (Brachyponera) solitaria* (F. Smith), worker.

strongly convex above, masticatory border exceptionally long. Antennal scape slender, extending considerably beyond the posterior border of the head. Pronotum with a median tubercle and also a pair of lateral tubercles. Promesonotal suture distinct. Mesoepinotal suture represented by a prominent constriction. Epinotum usually with a pair of tubercles. Posterior coxa without a dorsal spine. Each middle and hind tibia with a single spur. Tarsal claw bifid. Petiole scalelike. Gaster with a strong constriction between the first and second segments. Head and thorax with mostly coarse, rugulose or rugulose-reticulate sculpturing; rugulae on first and second segments finer. One form, †*tuberculatum* (Olivier). This was imported from Guatemala in 1904 to control the cotton boll weevil, *Anthonomus grandis* Boh., in Victoria County, Tex. The experiments were not a success and the ants are thought to have become extinct. Nests in the soil. Predaceous, also carnivorous.

ECTATOMMA, subgenus PARECTATOMMA Emery

Ectatomma, subg. *Parectatomma* Emery, 1911, in Wytzman's *Genera Insect.*, fasc. 118:44.

Subgenotype, *Ectatomma* (*Gnamptogenys*) *triangulare* Mayr (by original designation). Wheeler, 1915, *Amer. Mus. Nat. Hist. Bul.* 34:390.

Length approximately 3 mm. Eye placed slightly posterior to the middle of the side of the head. Clypeus short, rather convex, anterior border straight and entire in the middle. Mandible rather long, subtriangular; masticatory border longer than the superior border, not denticulate. Antennal scape reaching almost to the posterior corner of the head. A weak transverse impression between the pronotum and mesonotum but no suture. Base and declivity of epinotum subequal in length. Epinotum with a small protuberance on each side, which is neither dentate nor tuberculate. Petiole shorter than high, convex and rounded dorsally. Posterior coxa with a dorsal spine. Body for the most part longitudinally rugulose. One form, *hartmanni* Wheeler of Huntsville, Tex. Presumably native. Nothing known of its biology. Probably nests in the soil. Worker thought to be predaceous and carnivorous.

PROCERATIUM Roger

Pl. 2, Fig. 6

Proceratium Roger, 1863, Berlin. *Ent. Ztschr.* 7:171.

Genotype, *Proceratium silaceum* Roger (monobasic).

Roger, 1860, Berlin. *Ent. Ztschr.* 4:288.

Roger, 1863, Berlin. *Ent. Ztschr.* 7:172.

Mayr, 1886, *Zool.-Bot. Gesell. Wien, Verh.* 36:437.

Emery, 1895, *Zool. Jahrb., Abt. f. System.* 8:264, illus.

Emery, 1896, *Soc. Ent. de France Bul.*, p. 101, illus.

Wheeler, 1915, *Amer. Mus. Nat. Hist. Bul.* 34:390.

Haskins, 1930, *N. Y. Ent. Soc. Jour.* 38:121.

Kennedy, 1939, *Ind. Acad. Sc. Proc.* 48:202, illus.

Length approximately 2-4 mm. Antenna 12-segmented, without a funicular club. Antennal scape narrow at base, much enlarged apically. Clypeus very short. Frontal carinae closely approximate anteriorly, more divergent posteriorly. Anterior border of clypeus not projecting in the middle. Eye extremely small, not easily discernible. Mandible subtriangular. Dorsal

sutures of thorax absent or obsolescent. Each middle and hind tibia with 1 spur. Tarsal claw simple. Petiole erect, scalelike. Epinotum often with a pair of lateral teeth or tubercles. Second gastric segment occupying a great deal of the gaster. Apex of gaster directed ventrally or anteroventrally. Five forms, †*crassicornis* Emery, †*crassicornis* var. *vestitum* Emery, †*croceum* (Roger), †*silaceum* Roger, *silaceum rugulosum* Wheeler. Members of the genus are apparently distributed over approximately the southeastern fourth of the United States. The ants nest by preference in well-rotted stumps and logs, especially those in a moist condition. Colonies small. For further information on biology see Haskins 1930.

SYPHINCTA Roger

Pl. 2, Fig. 7

Symphincta Roger, 1863, Berlin. Ent. Ztschr. 7:175.
 Genotype, *Symphincta micrommata* Roger (monobasic).
 Roger, 1860, Berlin. Ent. Ztschr. 4:291.
 Mayr, 1886, Zool.-Bot. Gesell. Wien. Verh. 36:438.
 Emery, 1895, Zool. Jahrb., Abt. f. System. 8:263, illus.
 Emery, 1896, Soc. Ent. de France Bul., p. 101.

Length 4.4-25 mm. Antenna 12-segmented; funiculus without a club. Clypeus very short, its anterior border projecting in the middle. Eye extremely small, scarcely discernible. Frontal carinae closely approximate, each noticeably elevated and failing to cover most of the base of the antenna. Thorax without dorsal sutures. Posterior surface of epinotum with a thin carina or lamella on each side. Each middle and hind tibia with 1 spur. Tarsal claw simple. Petiole small, nodiform. First gastric segment separated from the second by an unusually strong constriction. Second gastric segment very large, occupying a great deal of the gaster. Apex of gaster directed ventrally or anteroventrally. Extremely rare. Two forms, *melina* (Roger), †*pergandei* Emery. *S. pergandei* is distributed over approximately the eastern half of the United States. It usually nests in the soil beneath stones, logs or other objects. The colonies are exceedingly small.

S. melina was described by Roger as *Ponera melina* from worker, female and male collected in "Carolina." No one since has succeeded in collecting or recognizing the species.

NEOPONERA, subgenus NEOPONERA Emery

Pl. 3, Fig. 11

Neoponera Emery, 1901, Soc. Ent. de Belg. Ann. 45: 40, 43.
 Subgenotype, *Formica villosa* Fabricius (by original designation).
 *Emery, 1890, Soc. Ent. de France Ann. (6) 10:74.
 Emery, 1901, Soc. Ent. de Belg. Ann. 45:47.
 Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:403.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 235, illus.

Length 12-13 mm. Check with a prominent carina extending from the eye to the clypeus. Eye large, with numerous ommatidia, placed approximately at the middle or slightly anterior to the middle of the side of the head. Mandible large, subtriangular, strongly convex above, masticatory

border much longer than the superior border and bearing approximately 14 teeth. Clypeus convex in the middle, with a slight impression or emargination on the anterior border. Frontal carina with a well-developed lobe. Antennal scape stout, long, extending past posterior border of head. Pronotum marginate on each side. Promesonotal and mesoepinotal sutures distinct. Legs rather long. Middle and hind tibiae each with 2 spurs. Tarsal claws simple. Petiole unusually stout, in profile with approximately straight anterior surface and convex dorsal and posterior surfaces, the two surfaces fusing into each other without any perceptible demarcation; from behind, the upper half of the two combined surfaces appearing somewhat semicircular. Pile and pubescence golden or yellow. Uncommon. One form, †*villosa* (Fabricius) of southern Texas. Nests in the soil and also in logs and stumps. Predaceous, also carnivorous. Workers with a pronounced sting. Our largest species of ponerine ant.

PACHYCONDYLA, subgenus PACHYCONDYLA F. Smith

Pl. 2, Fig. 8

Pachycondyla F. Smith, 1858, Catalogue of Hymenoptery Insects in the Collection of the British Museum, pt. 6, p. 105.

Subgenotype, *Formica crassinoda* Latreille (by designation of Emery, 1901).

Fabricius, 1804, Syst. Piez., p. 401.

Emery, 1890, Soc. Ent. de France Ann. (6) 10:71.

Wheeler, 1900, Biol. Bul. 2:4, illus.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:401.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 234, illus.

Haskins and Enzmann, 1938, N. Y. Acad. Sci. Ann. 37:150.

Length 7-8.5 mm. Eye moderately large, with numerous ommatidia; placed anterior to the middle of the side of the head. Frontal carina with well-developed lobe. Clypeus convex in the middle, the anterior border rounded. Antennal scape robust, not quite reaching the posterior corner of the head. Cheek without a longitudinal carina between the eye and the clypeus. Mandible subtriangular, convex above, masticatory border longer than the superior border and with approximately 10 teeth. Pronotum marginate on each side. Promesonotal suture distinct. Mesoepinotal suture usually absent or obsolescent. Base of epinotum and declivity meeting in a well-rounded, obtuse angle. Legs stout, middle and hind tibia each with 2 spurs. Tarsal claws simple. Petiole stout, though higher than long, broader than the epinotum, and also broader posteriorly than anteriorly; from above, the combined front and sides appearing more or less semicircular. One form, †*harpax* (Fabricius) of Texas and Louisiana. Nests usually constructed in the soil beneath stones and logs. Predaceous, also carnivorous. Wheeler, 1900, found individuals, similar to workers in size and structure, which laid and cared for eggs. *P. harpax*, however, has a normal female.

EUPONERA, subgenus BRACHYPONERA Emery

Pl. 3, Fig. 12

Euponera, subg. *Brachyponera* Emery, 1901, Soc. Ent. de Belg. Ann. 45:43.

Subgenotype, *Ponera sennaarensis* Mayr (by original designation).

F. Smith, 1874, London Ent. Soc. Trans., p. 404.

Forel, 1900, Schweiz. Ent. Gesell. Mitt. 10:267.

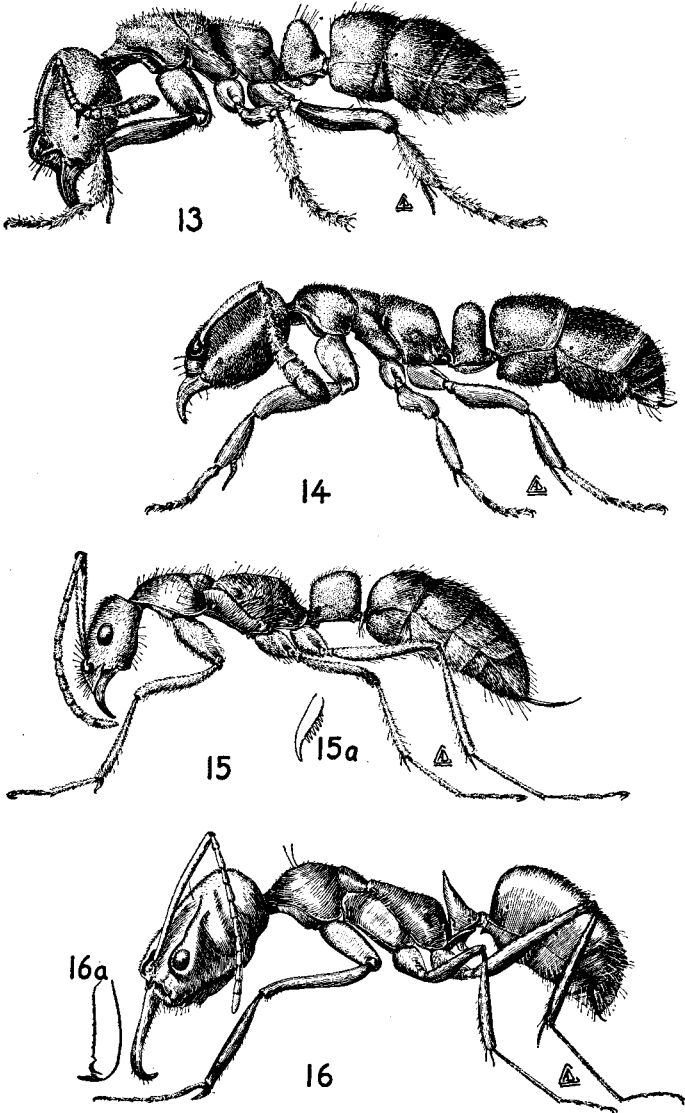


PLATE 4

Fig. 13. *Euponera (Trachymesopus) gilva* (Roger), worker.

Fig. 14. *Ponera coarctata pennsylvanica* Buckley, worker.

Fig. 15. *Leptogenys (Lobopelta) elongata* (Buckley), worker; fig. 15 a, tarsal claw.

Fig. 16. *Odontomachus haematoda desertorum* Wheeler, worker; fig. 16 a, left mandible.

Wheeler, 1906, Amer. Mus. Nat. Hist. Bul. 22:306, illus.

Emery, 1909, Deut. Ent. Ztschr., p. 366, illus.

*Smith, 1934, Ent. Soc. Amer. Ann. 27:557-564, illus.

Length 3.3-3.5 mm. Eye not large, with 9 or 10 ommatidia in its greatest diameter; placed about its greatest width from the base of mandible. Mandible rather large, subtriangular, masticatory border with at least 6 to 10 teeth. Antennal scape extending considerably beyond posterior border of head. Cheek without a longitudinal carina between eye and clypeus. Thorax stout. Mesonotum convex, appearing rather protuberant because of the distinct and deeply impressed sutures surrounding it. Epinotum, from above, narrower anteriorly than posteriorly, sides of declivity rather strongly margined. Most of meso- and metapleura smooth and shining. Middle and hind tibiae each with 2 spurs. Metatarsus of middle leg without stiff hairs or bristles on its extensor surface. Tarsal claws simple. Petiole higher than epinotum, also higher than long, shorter dorsally than ventrally. Body blackish or black with lighter mandibles, funiculi and legs. One form, †*solitaria* (F. Smith) which has been accidentally introduced into a number of towns in Georgia, North Carolina and Virginia. The small colonies nest in rotten logs and also in the soil beneath objects. Predaceous, also carnivorous. This ant is not known to be of any economic importance.

EUPONERA, subgenus TRACHYMESOPUS Emery

Pl. 4, Fig. 13

Euponera, subg. *Trachymesopus* Emery, 1911, in Wytzman's Genera Insect., fasc. 118, p. 84.

Subgenotype, *Formica stigma* Fabricius (by original designation).

Fabricius, 1804, Syst. Piez., p. 400.

Roger, 1863, Berlin. Ent. Ztschr. 7:170.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:266, illus.

Wheeler and Gaige, 1920, Psyche 27:69.

Smith, 1929, Ent. Soc. Amer. Ann. 22:543.

Creighton and Tulloch, 1930, Psyche 37:71, illus.

Haskins, 1931, N. Y. Ent. Soc. Jour. 39:507.

*Smith, 1934, Ent. Soc. Amer. Ann. 27:561.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:824.

Length 3-4.75 mm. Eye extremely small, varying from an almost ocellus-like spot to an unusually small compound eye, with only a few ommatidia; placed in the anterior half of the side of the head, much more than its greatest diameter from the base of the mandible. Thorax short, stout. Mesonotum not surrounded by a deeply impressed suture or strongly protuberant. Middle and hind tibiae each with 2 spurs. Metatarsus of middle leg with strong bristles on its extensor surface. Tarsal claw simple. Sides of epinotum near base usually much compressed. Two forms, †*gilva* (Roger) of Florida, Alabama, Mississippi, Tennessee and Texas, and †*stigma* (Fabricius) of Florida. The former nests by preference in moist frass beneath the bark of pine log and stumps; the latter lives in logs and also in the soil beneath stones or other objects. Predaceous, also carnivorous. For further information on the biology of *gilva* see Haskins, 1931.

PONERA Latreille

Pl. 4, Fig. 14

- Ponera* Latreille, 1804, Nouv. Dict. Hist. Nat. 24:179.
 Genotype, *Formica coarctata* Latreille (by designation of Latreille, 1805).
 Buckley, 1866, Ent. Soc. Phila. Proc. 6:171.
 Mayr, 1887, Zool.-Bot. Gesell. Wien, Verh. 37:536.
 Forel, 1893, London Ent. Soc. Trans., pp. 363, 365-367.
 Wheeler, 1900, Biol. Bul. 2:44, illus.
 Wheeler, 1903, Psyche 10:94, illus.
 Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:404-406.
 Smith and Haug, 1931, Ent. Soc. Amer. Ann. 24:507, illus.
 *Smith, 1936, Ent. Soc. Amer. Ann. 29:420.
 Smith, 1939, Ent. Soc. Wash. Proc. 41:76, illus.
 Buren, 1944, Iowa State Col. Jour. Sci. 18:279.

Length approximately 2-3.75 mm. Eye extremely small, often scarcely perceptible, consisting of one or several ommatidia; placed distinctly anterior to middle of the side of head. Funiculus very perceptibly enlarged toward the apex, the last 4 or 5 segments forming an indefinite club. Frontal carina with a well-developed lobe, which covers antennal insertion. Promesonotal and mesoepinotal sutures distinct. Mesonotum not surrounded by a deeply impressed suture or strongly protuberant as in *Euponera*, subgenus *Brachyponera*. Legs short or moderately long, middle and hind tibiae each with a single spur. Metatarsus of middle leg without stiff bristles on its extensor surface. Tarsal claw simple. Petiole higher than long and often shorter dorsally than ventrally. Six forms, †*coarctata pennsylvanica* Buckley, †*ergatandria* Forel, †*mexorata* Wheeler, †*oblongiceps* M. R. Smith, †*opaciceps* Mayr, †*trigona* var. *opacior* Forel. More common in the southern half of the United States but one or more forms will probably be found in every state. The genus includes some of our smallest and most common ponerine ants. There are occasionally individuals in a colony that are intermediate between the worker and female. These wingless forms can be distinguished from the workers by their ocelli, larger eyes and differently shaped petiole. Ergatoid males occur in *ergatandria*, *oblongiceps*, *opaciceps* and *trigona* var. *opacior*. These worker-like males can be distinguished from workers by their genital appendages, different number of segments in the antenna, and differently shaped head and thorax. *P. coarctata pennsylvanica*, *opaciceps* and *trigona* var. *opacior* have normal males but no normal males are yet known for *ergatandria* and *oblongiceps*. The ants of this genus form small colonies which nest in rotten logs and stumps or in the soil beneath objects. Predaceous; also carnivorous.

LEPTOGENYS, subgenus LOBOPELTA Mayr

Pl. 4, Fig. 15

- Lobopelta* Mayr, 1862, Zool.-Bot. Gesell. Wien, Verh. 12:733.
 Subgenotype, *Ponera diminuta* F. Smith (by designation of Bingham, 1903).
 Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:438.
 Buckley, 1866, Ent. Soc. Phila. Proc. 6:172.
 Wheeler, 1900, Biol. Bul. 2:7, illus.
 Wheeler, 1904, Biol. Bul. 6:251, illus.
 Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:406.

*Wheeler, 1923, Amer. Mus. Novitates No. 90: 14, 15.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 239, illus.

Length 5-6.5 mm. Middle of the anterior border of the clypeus extended as an acute point; a sharp median carina extending throughout the length of the clypeus. Eye large, prominent, with numerous ommatidia; located a little anterior to the middle of the side of the head. Antennal scape robust, unusually long, extending approximately one-third its length beyond the posterior corner of the head; funiculus slender, the second segment longer than any other segment. Frontal carinae short, rather closely approximate, each carina without a well-developed lobe, thus exposing most of the base of the antenna. Mandible slender, strongly curved dorsally, ending in a narrow toothless or almost toothless masticatory border. Thorax with well-developed promesonotal and mesoepinotal sutures. Base of epinotum very distinctly longer than the declivity. Legs long. Middle and hind tibiae each with a pair of spurs. Tarsal claw pectinate. Petiole, in profile, almost subrectangular except for its dorsal border which is higher posteriorly than anteriorly. Ventral surface of petiole and first gastric segment each with a prominent protuberance. Uncommon. Two forms, †*elongata* (Buckley) and its subspecies *manni* Wheeler. The former is confined to Texas, Louisiana and Florida; the latter was described from Florida. Nests are usually constructed in the soil. The ants feed largely on pill bugs, *Oniscus* spp. and *Armadillidium* spp. The female bears a striking resemblance to the worker but differs from this caste mainly in the more rounded epinotum, shorter and higher petiolar node, and larger gaster. The author has seen specimens of *elongata* labeled "Stone Mt., Decatur, Georgia." For biological information on *elongata* see Wheeler 1904.

ODONTOMACHUS Latreille

Pl. 4, Fig. 16

Odontomachus Latreille, 1804, Nouv. Dict. Hist. Nat. 24:179.

Genotype, *Formica haematoda* Linnaeus (monobasic).

Guérin, 1844, Icon. Règne Anim. Ins. 7:423.

Roger, 1861, Berlin. Ent. Ztschr. 5:26.

Wheeler, 1900, Biol. Bul. 2:1.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:497.

Wheeler, 1911, Harvard Univ. Mus. Compar. Zool. Bul. 54:482.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:391.

*Smith, 1939, N. Y. Ent. Soc. Jour. 47:125.

Haskins and Enzmann, 1938, N. Y. Acad. Sci. Ann. 37:149.

Length 6-10 mm. Mandibles linear, articulated to the middle of the anterior border of the head in such a manner that when closed they lie subparallel to each other; inner border of each mandible with a row of denticulae, apex with 3 large teeth. Eye rather large, with numerous ommatidia; placed anterior to the middle of the side of the head. Head widest in the region of the eyes. Antenna slender, scape extending approximately to, or slightly beyond, posterior border of head. Head often with vestigial ocelli or ocellar pits. Each section of head with a groove which starts between eye and frontal carina and extends both posteriorly and mesially to converge above near vertex; another strong hollow or constriction posterior to the eye runs

obliquely from the ventral to the dorsal surface. Promesonotal suture well-developed. Mesoepinotal suture represented by a distinct constriction in this region. Base of epinotum distinctly longer than declivity. Petiole with a conical or spine-shaped elevation above. Middle and hind tibiae each with 2 spurs. Tarsal claw simple. Constriction between first and second gastric segments not pronounced. Thorax, not including most of mesopleura, covered with longitudinal or transverse rugulae, or both. Dorsal surface of head with very fine, dense, longitudinal rugulae. Four subspecies of *haematoda* (Linnaeus), namely, †*clarus* Roger in Texas and Louisiana, †*coninodis* Wheeler and †*desertorum* Wheeler in Arizona, and †*insularis* Guérin in Florida and Georgia. Nest in the soil and also in logs and stumps. Predaceous, also carnivorous. For information on biology see Wheeler 1900.

Subfamily Pseudomyrminae Emery

Pseudomyrminae Emery, 1899, Mem. R. Accad. Sc. Ist. Bologna (5) 8:6.

Pseudomyrminae Wheeler, 1920, Psyche 27:46.

Cloacal orifice ventral, slit-shaped. Pedicel consisting of 2 segments, the petiole and postpetiole. Sting well-developed. Body elongate, slender. Not antlike. Integument firm, highly sclerotized. Frontal carinae placed close to each other and not covering antennal insertions. Anterior border of clypeus with a median lobe, posterior border not extending back between frontal carinae. Eye remarkably large, occupying approximately half the length of side of head; reniform or subelliptical. Ocelli present. Antenna 12-segmented. Pronotum marginate or submarginate. Dorsum of thorax with distinct sutures. Epinotum unarmed. Middle and hind tibiae each with 2 spurs. Pupae naked. Colonies small, usually consisting of only a few hundred individuals. Arboreal. Nests constructed in plant cavities, insect galls, etc. Workers very fond of honeydew but no doubt also predaceous and carnivorous. Five forms. Distributed mostly south of the 35th degree of latitude but possibly extending farther north in the Mississippi Valley region. None is inimical to man's interest.

Pseudomyrma Guérin is the only genus in this subfamily.

PSEUDOMYRMA Guérin

Pl. 5, Fig. 17

Pseudomyrma Guérin, 1844, in Cuvier, Icon. Règne Anim. Ins., p. 427.

Genotype, *Formica gracilis* Fabricius (by designation of Wheeler, 1911).

F. Smith, 1855, London Ent. Soc. Trans. 3:160.

F. Smith, 1858, Catalogue of Hymenopterous Insects in the Collection of the British Museum, pt. 6, p. 157.

Roger, 1863, Berlin. Ent. Ztschr. 7:178.

Mayr, 1870, Sitz. Akad. Wiss. Wien, p. 408, 413.

F. Smith, 1877, London Ent. Soc. Trans., p. 63.

Emery, 1890, Soc. Ent. Ital. Bol. 22:60, illus.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:269.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:83.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:419-421.

Length 2.5-7.5 mm. Body extremely slender. Frontal carinae very closely approximated, not concealing the antennal insertions. Antenna 12-segmented, short, without a differentiated club. Middle of the anterior border of the clypeus with a lobe. Eye unusually large, reniform or subelliptical, occupying approximately one-half of the length of the side of the head. Ocelli present. Dorsum of thorax with distinct sutures. Pronotum marginate or submarginate. Epinotum unarmed. Petiole and postpetiole much broader posteriorly than anteriorly. Middle and hind tibiae each with 2 spurs. Five forms, †*brunnea* F. Smith, †*elongata* Mayr, †*flavidula* F. Smith, †*gracilis mexicana* Roger, †*pallida* F. Smith. These ants are distributed mainly south of the 35th degree of latitude from North Carolina to California. They may possibly extend farther north in the Mississippi Valley region. The small colonies are formed within cavities of plants. Arboreal. Workers very fond of honeydew but no doubt also predaceous and carnivorous.

Subfamily Myrmicinae Lepeletier

Myrmicites Lepeletier, 1836, Hist. Nat. Ins. Hymen. 1:169.

Myrmicinae Dalla Torre, 1893, Catal. Hymen. 7:53.

Cloacal orifice ventral, slit-shaped. Pedicel consisting of 2 segments, the petiole and postpetiole. Sting well-developed. Clypeus usually extended back between the frontal carinae. Frontal carinae usually well separated, each bearing a lobe which more or less conceals the antennal insertion. Integument firm, strongly sclerotized. Eye rarely vestigial or absent. Antenna composed of a variable number of segments ranging from 6 to 12, usually 12. Funiculus often with a club of from 1 to 5 segments. Body usually much sculptured, the sculpture often very characteristic in certain genera and species. Mesopinotal region generally with a distinct to very pronounced impression or constriction. Epinotum seldom bare, more commonly with a single pair of spines, these sometimes represented by a pair of small tubercles. Monomorphic, dimorphic or polymorphic. Pupae naked. One of our most diverse groups of ants with respect to size, shape, structure and habits. Colonies, according to form, may contain from a few dozen individuals to many thousands. Nests are constructed in the soil, in wood, crevices in trees and plants, plant debris, insect galls, buildings, ships and other protected places. Feeding habits are especially diverse and include such substances as fungi, plants or plant products, flesh of animals, honeydew, human eatables, etc. Some forms have restricted diets, others are general feeders. This is the largest and most common subfamily with 385 forms. Although representatives occur in every state, myrmicine ants are much more abundant in the southern section of the country than in northern areas. The subfamily also contains more forms inimical to man's interest than any other group. The ants may affect man by causing annoyance through their nesting habits, by biting and stinging, by feeding on plants or plant products, by gnawing into cloth, woollens and linen, and removing rubber insulation from telephone wires, by acting as intermediate hosts for animal parasites, and even by carrying dysentery germs on their bodies.

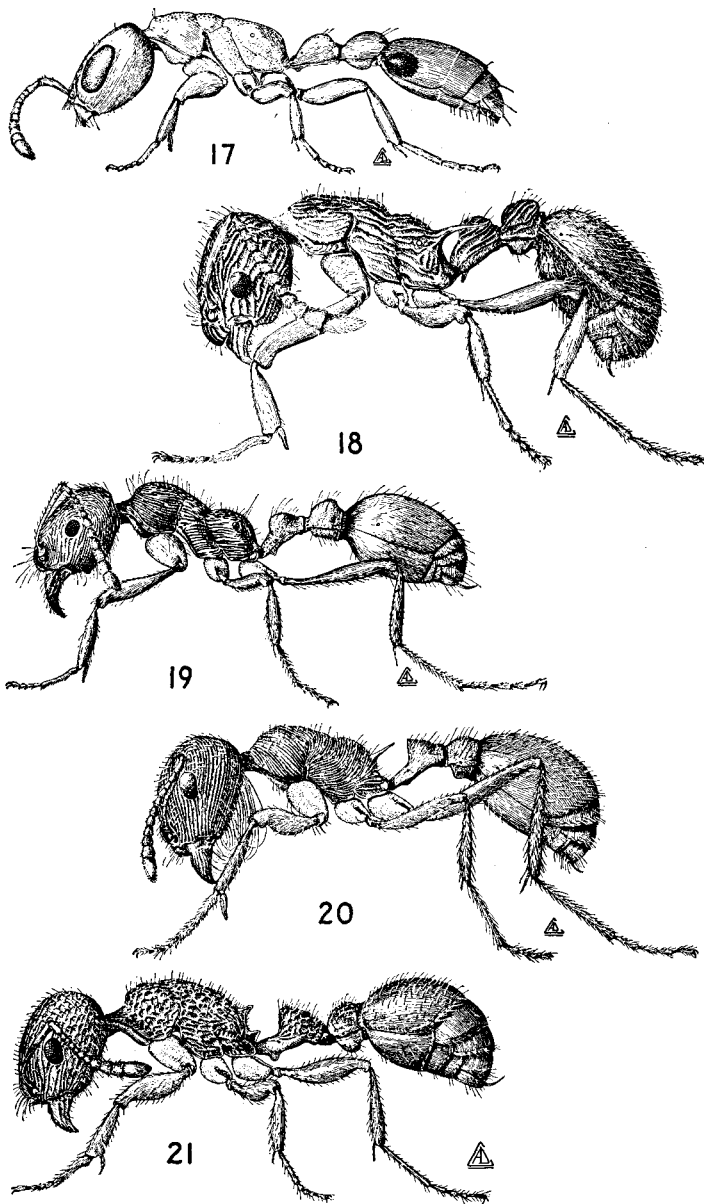


PLATE 5

Fig. 17. *Pseudomyrma flavidula* F. Smith, worker.

Fig. 18. *Myrmica (Myrmica) punctiventris* Roger, worker.

Fig. 19. *Myrmica (Manica) mutica* Emery, worker.

Fig. 20. *Pogonomyrmex (Pogonomyrmex) occidentalis* (Cresson), worker.

Fig. 21. *Pogonomyrmex (Ephebomyrmex) imberbiculus* Wheeler, worker.

1. Workers either extremely rare or absent, strictly inquiline or parasitic forms 2
 Workers always present, free-living forms with a few exceptions 3
2. (1) Workers extremely rare. (One form, *inquilina* Wheeler, which is parasitic in colonies of *Pheidole ptilifera* (Roger) and its subspecies *coloradensis* Emery. Nebraska and Colorado. Extremely rare.) Pl. 7, fig. 27
Epipheidole Wheeler, p. 560
- Workers absent.
- a. Base of gaster of female with a prominent impression or furrow dorsally b
 Base of gaster of female without a prominent impression or furrow dorsally.
 (A single parasitic form, *elecebra* Wheeler, which has been found in colonies of *Pheidole ceres* Wheeler in Colorado. Only soldiers and workers of the host ant are known to occur in parasitized colonies.)
Sympheidole Wheeler, p. 561
- b. Base of gaster of female with a broad impression dorsally. Epinotum unarmed.
 A single form, *pergandei* Emery, found on only one occasion in a nest of *Monomorium minimum* (Buckley) at Washington, District of Columbia. Pl. 10, fig. 37
Epoecus Emery, p. 569
- Gaster of female with a longitudinal furrow dorsally. Epinotum bituberculate. Parasitic in colonies of the introduced pavement ant, *Tetramorium caespitum* (Linnaeus). Extremely rare. Found on one occasion each in New Jersey, Connecticut, Delaware and Virginia. Parasitized colonies of the host are always devoid of all castes except workers. Pl. 10, fig. 38
Anergates Forel, p. 571
- 3 (1) Antenna with 6 segments. (Last segment of antenna approximately as long as, or longer than, the combined lengths of the remaining funicular segments. Body hairs of diverse shape, usually clavate or spatulate. Petiole and post-petiole usually with spongiform processes. Rare.) Pl. 14, fig. 53
Strumigenys F. Smith
- a. Mandible slender, porrect, subparallel, longer than one-half the length of the head; apex with 2 prominent teeth. Pl. 14, fig. 53
Strumigenys, subg. *Strumigenys* F. Smith, p. 585
- Mandible of diverse shape but never as described above. Pl. 14, fig. 54
Strumigenys, subg. *Trichoscapa* Emery, p. 585
- Antenna with more than 6 segments 4
4. (3) Antenna with 10 segments. (The last 2 segments of the funiculus forming a very distinct club. Clypeus bicarinate. Epinotum unarmed.) Pl. 9, fig. 34
Solenopsis Westwood
- a. Polymorphic. (Length 1.6-6 mm. Eye well-developed, never with less than 20 ommatidia and usually with 30 or more.) Pl. 9, fig. 34
Solenopsis, subg. *Solenopsis* Westwood, p. 566
- Monomorphic or feebly polymorphic b
- b. Eye very small, with 15 ommatidia or less, often not more than 2 or 3. Monomorphic. (Largest subgenus with the most widely distributed forms.) Pl. 9, fig. 36
Solenopsis, subg. *Diplorhoptrum* Mayr, p. 569
- Eye larger with 18-22 ommatidia. Monomorphic or feebly polymorphic (*globularia littoralis* Creighton can be recognized by the unusually large, sub-globular postpetiolar node.) Pl. 9, fig. 35
Solenopsis subg. *Euophthalma* Creighton, p. 567
- Antenna with more than 10 segments 5
5. (4) Antenna with 11 segments 6
 Antenna with 12 segments 18
6. (5) Postpetiole attached to dorsal surface of the base of the gaster. Gaster subcordate, more convex ventrally than dorsally and with an acute apex
Creumatogaster Lund
- a. Antennal club 3-segmented. Postpetiole with an impression or longitudinal furrow dividing it into 2 more or less distinct lobes. (Petiole very distinctly

- broader anteriorly than posteriorly.) Pl. 8, fig. 30
*Crematogaster*, subg. *Acrocoelia* Mayr, p. 563
- Antennal club 2-segmented. Postpetiole without an impression or longitudinal furrow. Pl. 7, fig. 29*Crematogaster*, subg. *Orthocrema* Santschi, p. 562
- Postpetiole attached to basal surface of gaster. Gaster not as above 7
- 7.(6) Body much flattened. Frontal carinae distant, continuing backward above eyes on the side of the head, each forming a prominent, more or less horizontal lobe under which the antenna can be concealed. Thorax more or less marginate. Thorax, petiole and postpetiole with irregular spines or tubercles. Hairs short, silvery or grayish, closely appressed to body. Dimorphic. Soldier with a prominent, saucer-shaped concavity on the dorsal surface of the head. Florida, Texas and Arizona*Cryptocerus* Fabricius
- a. Saucer-shaped concavity on head of soldier with the rim broken or interrupted anteriorly and very poorly formed posteriorly. Arizona and Texas. Pl. 14, fig. 51*Cryptocerus*, subg. *Cryptocerus* Fabricius, p. 583
- Saucer-shaped concavity on head of soldier completely rimmed, the concavity deep within. (Mandibles concealed from above. Gaster elongate.) Florida. Pl. 14, fig. 52*Cryptocerus*, subg. *Cyathomyrmex* Creighton, p. 583
- Body not flattened, and otherwise not the above combination of characters 8
8. (7) Scape stout, strongly flattened, lacking a great deal of reaching the posterior border of the head; last 4 funicular segments enlarged but not forming a well-defined club. Frontal carina approximately as long as the antennal scape and forming a scrobe for the reception of the scape. Anterior border of clypeus with a very distinct median emargination. Clypeus not elevated as a carina in front of the antennal socket. Slave-making forms with members of *Leptothorax* as slaves. Pl. 12, fig. 46*Harpagoxenus* Forel, p. 578
- Not agreeing entirely with the above characterization 9
9. (8) Eye very coarsely faceted, with the border nearest the mandible forming a rather acute point which is directed anteroventrally. Frontal carina extending almost to the posterior border of the head and forming a more or less distinct scrobe for the reception of the scape. Prothorax with angular humeri. Petiolar node, in profile, subrectangular. Length approximately 1.5 mm. Florida. Pl. 13, fig. 50*Wasmannia* Forel, p. 582
- Differing in one or more characters 10
10. (9) Region between mandible and inner border of eye with a longitudinal carina which extends either posteriorly or postero-mesially 11
- Region between mandible and inner border of eye without a longitudinal carina 14
- 11.(10) Mesonotum with from 1 to 2 pairs of spines which are either bare or else covered with tubercles. Monomorphic to polymorphic. Length 1.5-12 mm. 12
- Mesonotum without spines as described above, at best with either blunt tubercles or blunt carinae. Monomorphic. Length 1.8-2.5 mm.*Cyphomyrmex* Mayr
- a. Body above apparently without erect hairs (hairs short, very closely appressed, scale-like). Lobe over antennal scape not forming a rather acute, anterolateral angle. Protuberance on humeral angle of prothorax not spiniform. Pl. 15, fig. 55*Cyphomyrmex*, subg. *Cyphomyrmex* Mayr, p. 587
- Dorsal surface of head, at least, with erect hairs. Lobe over antennal scape forming a rather acute, anterolateral angle. Protuberance on humeral angle of prothorax distinctly spiniform. Pl. 15, fig. 56
*Cyphomyrmex*, subg. *Mycetosoritis* Wheeler, p. 588
- 12.(11) Thoracic dorsum with 3 pairs of acute spines. Polymorphic. Length 1.5-12 mm. (A single form, *texana* Buckley of Texas and western Louisiana.) Pl. 15, fig. 58*Atta* Fabricius, p. 591
- Thoracic dorsum with more than 3 pairs of spines which may be of diverse shapes 13

13. (12) Frontal carinae distinct, extended almost to the posterior border of the head. Lobe covering antennal insertion without a pair of spines or a pair of tubercles. Head not strongly widened behind nor with a deeply emarginate posterior border. Monomorphic. Length 2.5-4 mm. Pl. 16, fig. 59 *Trachymyrmex* Forel, p. 588
- Frontal carinae rather indistinct, and not extended almost to the posterior border of the head. Lobe covering the antennal insertion with a pair of spines or a pair of tubercles. Head (in largest workers, at least) greatly widened behind and with a deeply emarginate posterior border, giving it a subcordate appearance. Polymorphic. Length 2.3-6 mm., *versicolor* (Pergande) of Arizona and its subspecies *chisosensis* Wheeler of Texas. Pl. 15, fig. 57 *Acromyrmex*, subg. *Moellerius* Forel, p. 589
14. (10) Clypeus elevated in the form of a carina in front of each antennal socket. (Frontal carina extended approximately to the posterior border of the head and forming a more or less distinct scrobe for the reception of the flat antennal scape. Metasternum with a pair of distinct angles or spines. Arid regions of Texas and Arizona.) Pl. 13, fig. 49 *Xiphomyrmex* Forel, p. 582
- Clypeus not elevated in the form of a carina in front of each antennal socket 15
15. (14) Antennal club prominent, 2-segmented, longer than the remainder of the funiculus. (Eye extremely small. Postpetiole, from above, subcampanulate. One form, *longii* Wheeler of Texas.) Pl. 11, fig. 39 *Erebomyrmex* Wheeler, p. 571
- Antennal club not as above 16
16. (15) Epinotum unarmed. Integument smooth or very weakly sculptured. (Length 1.7 mm. Florida. Petiole not pedunculate. Middle of the anterior border of the clypeus with a bidentate lobe.) Pl. 8, fig. 33 *Xenomyrmex* Forel, p. 566
- Epinotum armed. Part of the integument, at least, with well-developed sculpture 17
17. (16) Inquilinous in the nest of *Myrmica mutica* Emery. (Utah. Ocelli often present. Clypeus large, convex, longitudinally impressed in the middle, with entire, rounded anterior border. Body, antennae and legs with abundant, coarse, suberect hairs which are often frayed at the ends. Rare.) *Symmyrmica* Wheeler, p. 578
- Mostly free-living forms; if inquilinous, then not occurring in the nest of *Myrmica mutica* Emery *Leptothorax* Mayr
- a. Petiole and postpetiole armed with spines or tubercle-like protuberances. Prothorax with very distinct humeral angles. (Body hairs obtuse or clavate. One form, *wilda* M. R. Smith of extreme southern Texas.) Pl. 11, fig. 42 *Leptothorax*, subg. *Goniothorax* Emery, part, p. 575
- Petiole and postpetiole unarmed. Prothorax seldom with humeral angles; if with angles, then the angles are not sharply produced as in the subgenus *Goniothorax* b
- b. Mesoeipinotal constriction usually distinct or pronounced. Prothorax without angular humeri. (Petiole not strongly pedunculate. Epinotum usually with short, blunt spines. Hairs on body usually obtuse or clavate.) Pl. 12, fig. 45 *Leptothorax*, subg. *Mychothorax* Ruzsky, p. 577
- Mesoeipinotal constriction usually absent, if present, scarcely perceptible. Prothorax occasionally subangular. Pl. 12, fig. 43 *Leptothorax*, subg. *Leptothorax* Mayr, part, p. 575
18. (5) Epinotum with 2 pairs of spines (exclusive of the pair of spines or angles that often occur on the metasternum of some ants). Petioles not pedunculate. Frontal carina not forming a scrobe for the reception of the antennal scape. Hairs simple. Legs short, with incrassated femora and tibiae. Native forms. Pl. 11, fig. 40 *Myrmecina* Curtis, p. 573

- Differing in one or more characters from the above 19
- 19.(18) Clypeus elevated in the form of a carina or ridge in front of the antennal socket. Introduced forms usually found in greenhouses or in urban districts 20
- Clypeus otherwise. Native forms. If clypeus appears somewhat similar to that described above, then the spurs of each middle and hind tibia are pectinate, the mesoepinotal constriction on the dorsal surface of the thorax is usually absent or obsolescent, and the ventral surface of the head may bear a psammophore 21
- 20.(19) Body covered with dense, soft, erect hairs which are branched or trifid. Thorax strongly arched dorsally and without promesonotal and mesoepinotal sutures. A single introduced form, *striatidens* Emery, which has been found in a few towns in the Southern States. Pl. 13, fig. 47 *Triglyphothrix* Forel, p. 579
- Body hairs simple. Thorax not strongly arched. Introduced forms, most common in restricted localities in the Southern States or the states bordering the Atlantic Ocean and Gulf of Mexico. Pl. 13, fig. 48 *Tetramorium* Mayr, p. 581
- 21.(19) Spurs of each middle and hind tibia very distinctly pectinate 22
- Spurs of each middle and hind tibia simple or absent 23
- 22.(21) Mesoepinotal constriction usually obsolescent or absent. Anterior border of the clypeus often with a pair of teeth, mesad of which there may or may not be a distinct emargination. Ventral surface of head usually with a psammophore. (Forms occurring mostly west of the 95th degree of longitude.) Pl. 5, fig. 20 *Pogonomyrmex* Mayr
- a. Small forms, length 3.5-4.8 mm. Ventral surface of head without a psammophore. Body very roughly sculptured. Hairs on dorsal surface rather short. Oklahoma, Texas, New Mexico and Arizona. Pl. 5, fig. 21 *Pogonomyrmex*, subg. *Ephebomyrmex* Wheeler, p. 553
- Large forms, length 4.5-10 mm. Ventral surface of head with a psammophore. Sculpture diverse but usually not so coarse as that of *Ephebomyrmex*. Hairs usually longer. (Anterior border of clypeus with a faint to distinct emargination, on each side of which there is an angle or a tooth.) Pl. 5, fig. 20 *Pogonomyrmex*, subg. *Pogonomyrmex* Mayr, p. 552
- Mesoepinotal constriction pronounced. Anterior border of clypeus not as described. Ventral surface of head without a psammophore. (Antennal scape often with a lobe or keel at the base.) *Myrmica* Latreille
- a. Epinotum either unarmed or else with a pair of extremely short, blunt protuberances. Last 5 segments of the funiculus enlarged to form a more or less distinct club. Apparently distributed in the mountainous areas west of the 105th degree of longitude. Pl. 5, fig. 19 *Myrmica*, subg. *Manica* Jurine, p. 551
- Epinotum with a pair of spines. Last 3 or 4 segments of the funiculus enlarged to form a club. Distributed over the entire United States but apparently uncommon or absent in the extreme South. (Head and thorax usually with coarse, longitudinal rugulae.) Pl. 5, fig. 18 *Myrmica*, subg. *Myrmica* Latreille, p. 550
- 23.(21) Epinotum unarmed. (Antennal club 3-segmented. Clypeus usually with a pair of longitudinal carinae which are extended on the anterior border as more or less distinct teeth. If the clypeal teeth and carinae are obsolescent or absent then the ants are somewhat dimorphic and the posterior border of the head and epinotum are transversely rugulose.) Pl. 8, fig. 31 *Monomorium* Mayr
- a. Antennal club with the first 2 segments subequal. Clypeal teeth and carinae obsolescent or absent. Posterior border of head and epinotum with transverse rugulae. Workers variable in size with a tendency to dimorphism. (A single introduced form, *destructor* (Jerdon) which has been introduced into several localities in Florida and Tennessee.) Pl. 8, fig. 32 *Monomorium*, subg. *Parholcomyrmex*, p. 566

- Antennal club not as described. Clypeus with a pair of longitudinal carinae which are extended on the anterior border as more or less distinct teeth. Posterior border of head and epinotum without transverse rugulae. Workers monomorphic. Pl. 8, fig. 31*Monomorium*, subg. *Monomorium* Mayr, p. 565
- Epinotum usually armed (if the epinotum is unarmed or appears to be unarmed then the ant lacks one or more of the characters given in the alternative)24
- 24.(23) In profile, clypeus strongly projecting above mandibles. Petiole very distinctly pedunculate. Each middle and hind tibia without spurs. Body clothed with closely appressed pubescence. Erect hairs almost, if not entirely absent from the dorsal surface of body except on the clypeus, mandibles and apex of gaster. Monomorphic. Small (1.6-2.5 mm.), apparently introduced forms recorded from a number of localities in Florida. Pl. 7, fig. 28
.....*Cardiocondyla* Emery, p. 561
- Differing in one or more characters25
- 25.(24) Petiole (also postpetiole) armed with spines or tubercle-like protuberances. (Prothorax with very distinct humeral angles. Body hairs obtuse or clavate.) Pl. 11, fig. 42*Leptothorax*, subg. *Goniothorax* Emery, part, p. 575
- Petiole without spines or tubercle-like protuberances26
- 26.(25) Antenna without a 3-segmented club (in this case there are more than 3 segments in the club or else no definite club is indicated)27
- Antenna with a distinct 3-segmented club30
- 27.(26) Clypeus with a pair of longitudinal carinae. Petiole distinctly pedunculate. Eye variable, usually ranging from vestigial to small. Last 4 segments of the funiculus enlarged but not forming a clearly defined club. Small, slender ants 2.4-4 mm. Pl. 6, fig. 22*Stenamma* Westwood, p. 553
- Differing in one or more characters from the above28
- 28.(27) Legs and antennae extremely long. Large ants (6-8.5 mm.) with a slender body. Hairs coarse, grayish. Epinotum not clearly set apart from the mesonotum by a well-defined suture, but often this region is marked by a broad impression. Arid regions of Texas, New Mexico and Arizona. Pl. 6, fig. 24
.....*Novomessor* Emery, p. 556
- Without all of the above-mentioned characters29
- 29.(28) Head subrectangular to subquadrate. Mesoepinotal region with an impression varying from moderately broad to broad. Body ordinarily not slender. Legs and antenna also not particularly slender or long. Middle of anterior border of clypeus in some species with a tooth or even a longitudinal groove. Psammophore occasionally present. Colorado, Nevada, Arizona and California. Pl. 6, fig. 25
.....*Veromessor* Forel, p. 557
- Head usually not subrectangular or subquadrate. Epinotum usually set apart from the mesonotum by a distinct suture; if there is an impression it is not very broad or deep. Body usually slender, with rather long legs and antennae. Anterior border of clypeus emarginate but without a longitudinal groove or a tooth. Psammophore absent. One or more forms present in every state. Pl. 6, fig. 23
.....*Aphaenogaster*, subg. *Attomyrma* Emery, p. 555
- 30.(26) Mesoepinotal impression on dorsal surface of thorax obsolescent or absent31
- Mesoepinotal impression on dorsal surface of thorax distinct, pronounced32
- 31.(30) Thorax short, longitudinally arched. Promesonotal and mesoepinotal sutures faintly indicated or absent. Femora incrassated, those of the posterior pair of legs very noticeably so. Epinotal spines prominent. Postpetiole not constricted posteriorly. Florida, Texas, Louisiana and Arizona. Uncommon. Pl. 11, fig. 41
.....*Macromischa* Roger, p. 575
- Differing from the above in one or more characters. Common. Pl. 12, fig. 43.....
.....*Leptothorax*, subg. *Leptothorax* Mayr, part, p. 575

32. (30) Dimorphic forms (a few forms polymorphic), the soldier with an abnormally large head. The head may be subrectangular, subquadrate, subcordate, or of different shape, but is usually characterized by a prominent, emarginate posterior border which forms 2 more or less pronounced occipital lobes. Often there is also a very distinct frontal groove. A very large genus with one or more forms present in every state. Pl. 7, fig. 26 *Pheidole* Westwood, p. 557
- Monomorphic forms which lack the abnormally large-headed soldier. Present known distribution, Maryland, and Florida westward into Nebraska and Texas. Pl. 12, fig. 44 *Leptothorax*, subg. *Dichothorax* Emery, p. 576

MYRMICA, subgenus MYRMICA Latreille

Pl. 5, Fig. 18

- Myrmica* Latreille, 1804, Nouv. Dict. Hist. Nat. 24:179.
- Subgenotype, *Formica rubra* Linnaeus (by designation of Latreille, 1810).
- Nylander, 1846, Act. Soc. Sc. Fennicae 2:927, illus.
- Meinert, 1861, Naturf. Afd. Dansk. Vid. Selsk. (5 R.) 5:273.
- Roger, 1863, Berlin. Ent. Ztschr. 7:190.
- Emery, 1895, Zool. Jahrb., Abt. f. System. 8:312.
- Forel, 1904, Soc. Ent. Belg. Ann. 48:154.
- Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:384.
- Wheeler, 1906, Psyche 13:38.
- Wheeler, 1907, Wis. Nat. Hist. Soc. Bul. 5:73-78.
- Emery, 1908, Deut. Ent. Ztschr., p. 176, illus.
- Wheeler, 1908, Jour. Econ. Ent. 1:337.
- Forel, 1914, Deut. Ent. Ztschr., p. 617.
- Wheeler, 1914, N. Y. Ent. Soc. Jour. 22:52.
- Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:502-506.
- Forel, 1922, Suisse Zool. Rev. 30:92.
- Smith, 1930, Ent. Soc. Amer. Ann. 23:566, illus.
- Weber, 1939, Lloydia 2:144.
- Donisthorpe, 1927, British Ants, Geo. Routledge and Sons, London, 2d ed., pp. 118-123, illus.
- *Buren, 1944, Iowa State Col. Jour. Sci. 18:281.

Length 3-6.2 mm. Head usually longer than broad, with rounded posterior corners. Antenna 12-segmented; scape usually curved or bent at the base and often bearing a prominent lobe or keel; last 3 or 4 segments of the funiculus forming a club, the last 3 segments of this club shorter than the remainder of the funiculus. Eye convex, prominent, placed near the middle or slightly anterior to the middle of the side of the head. Frontal carina short, usually with a lobe which sometimes conceals most of the antennal insertion. Clypeus convex, anterior border often emarginate. No psammophore beneath the head. Promesonotal suture often obsolete. Thorax with a constriction in the mesoepinotal region which is usually well-defined. Epinotum armed with a pair of spines, which are highly variable in size and shape. Spurs pectinate. Petiole usually rather weakly pedunculate, generally with a distinct anteroventral tooth or spine. Gaster oval, armed with a sting. Sculpturing of head and thorax often coarse, largely of a rugulose or rugulose reticulate nature. Twenty-seven forms, one or more occurring in every State. More common in the northern half of the United States, uncommon or absent in the extreme southern parts. The forms are †*brevinodis* Emery, *brevinodis*

var. *brevispinosa* Wheeler, †*brevinodis* var. *canadensis* Wheeler, *brevinodis* var. *decedens* Wheeler, *brevinodis* *discontinua* Weber, †*brevinodis* var. *subalpina* Wheeler, †*brevinodis* var. *sulcinodoides* Emery, †*laevinodis* Nylander, *laevinodis* var. *bruesi* Wheeler, †*mexicana* Wheeler, †*punctiventris* Roger, *punctiventris* var. *isfahani* Forel, *punctiventris* *pinetorum* Wheeler, †*scabrinodis* var. *detrinodis* Emery, †*scabrinodis* var. *fracticornis* Emery, †*scabrinodis* var. *glacialis* Forel, †*scabrinodis* *sabuleti* Meinert, †*scabrinodis* *sabuleti* *americana* Weber, *scabrinodis* *sabuleti* *hamulata* Weber, *scabrinodis* *sabuleti* *nearctica* Weber, *scabrinodis* *schencki* Emery, *scabrinodis* *schencki* *emeryana* Forel, *scabrinodis* *schencki* *monticola* Wheeler, †*scabrinodis* *schencki* *spatulata* M. R. Smith, †*scabrinodis* *schencki* *tahoensis* Wheeler, †*scabrinodis* *schencki* *trullicornis* Buren, *wheeleri* Weber. The moderate-sized colonies usually nest in the soil. The workers commonly attend honeydew-excreting insects but are also carnivorous. No group of ants is more badly in need of revision than the subgenus *Myrmica*.

Forel's *laevinodis* *neolaevinodis* is not listed above because there is some doubt that his type specimens came from the United States.

MYRMICA, subgenus MANICA Jurine

Pl. 5, Fig. 19

Manica Jurine, 1807, Nouvelle Méthode de Classer les Hyménoptères et les Diptères, p. 276.

Subgenotype, *Formica rubida* Latreille (by designation of Wheeler, 1911).

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:311-312.

Wheeler, 1909, N. Y. Ent. Soc. Jour. 17:77.

*Wheeler, 1914, Psyche 21:118, illus.

Wheeler, 1915, Psyche 22:50.

Creighton, 1934, Psyche 41:185.

Length 4-6 mm. Head subrectangular, varying from slightly longer than broad to approximately as broad as long. Eye prominent, placed near the middle of the side of the head. Antennal fossa prominent. Antenna 12-segmented: scape curved at base, without a lobe, last 5 segments of funiculus enlarged but not forming a very well developed club. Mandible large, subtriangular, with 2 large apical teeth and 12-14 smaller teeth. Frontal carinae short, spaced well apart, subparallel. Promesonotal suture poorly defined or absent, mesoepinotal constriction usually broad and deep. Epinotum unarmed. Legs long. Femora somewhat incrassated toward their apices. Spurs pectinate. Petiole with a small ventral tooth. Postpetiole of some species with a pointed or rounded protuberance beneath. Gaster oval, not truncate basally, with well-developed sting. Head and thorax largely rugulose. Five forms, †*aldrichi* Wheeler, †*bradleyi* Wheeler, †*hunteri* Wheeler, †*mutica* Emery, and †*parasitica* Creighton. One or more of these occur in the mountainous areas of those states west of the 105th degree of longitude. The most common is *mutica*. According to Wheeler 1914, p. 118, this form "usually nests in sandy creek bottoms under stones or in small crater nests." The workers can sting severely. *Symmyrmica chamberlini* Wheeler is inquilinous in the nests of *mutica*. *M. (M.) parasitica*, which is known only from workers, is parasitic in colonies of *bradleyi*.

POGONOMYRMEX, subgenus POGONOMYRMEX Mayr

Pl. 5, Fig. 20

Pogonomyrmex Mayr, 1868, Soc. dei Nat. di Modena Ann. 3:169.Subgenotype, *Formica badia* Latreille (by designation of Wheeler, 1911).

Pergande, 1893, Calif. Acad. Sci. Proc. (2) 4:33.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:308.

*Wheeler, 1902, Amer. Nat. 36:85, illus.

*Wheeler, 1902, Psyche 9:387.

Wheeler, 1914, Psyche 21:149.

Forel, 1914, Soc. Vaud. des Sci. Nat. Bul. 50:269.

Smith, 1929, Ent. Soc. Amer. Ann. 22:546.

*Olsen, 1934, Harvard Univ. Mus. Compar. Zool. Bul. 77:493-514, illus.

Cole, 1936, Ent. News 47:120.

Cole, 1938, Amer. Midl. Nat. 19:240-241.

Length 4.5-10 mm. Head subrectangular or subquadrate, broad in proportion to its length. Eye prominent, often placed nearer to the posterior border than the anterior border of the head. Antenna 12-segmented; last 4 funicular segments enlarged but not forming a well-defined club. Mandible with distinct teeth (sometimes edentate in the largest workers of *badius*). Anterior border of clypeus with a shallow to deep margination on each side of which there is a more or less distinct tooth or angle. Ventral surface of head and mandible with psammophore. Mesoepinotal constriction on thorax vestigial or absent. Promesonotal and mesoepinotal sutures usually obsolescent or absent. Epinotum usually with a pair of spines, the spines vestigial or absent in a few forms. Petiole usually distinctly pedunculate. Spurs pectinate. Gaster oval, without truncate base, with a well-developed sting capable of inflicting a painful wound. Head and thorax usually with numerous rugulae, which are often interspersed with fine to coarse punctuations. Hairs coarse, light yellowish or grayish. *P. badius* has polymorphic workers, the largest of which have enormous heads. The thorax of the large worker also has more than the usual number of sclerites. Twenty-eight forms, †*apache* Wheeler, †*badius* (Latreille), *barbatus* (F. Smith), †*barbatus curvispinosus* Cole, †*barbatus* var. *fuscatus* Emery, †*barbatus* var. *marfensis* Wheeler, †*barbatus* var. *molefaciens* (Buckley), †*barbatus* var. *nigrescens* Wheeler, †*barbatus rugosus* Emery, †*californicus* (Buckley), †*californicus barnesi* M. R. Smith †*californicus estebanius* Pergande, *californicus* var. *hindleyi* Forel, †*californicus longimodis* Emery, †*californicus maricopa* Wheeler, †*comanche* Wheeler, †*desertorum* Wheeler, *desertorum* var. *ferrugineus* Olsen, *desertorum* var. *tenuispina* Forel, †*huachucanus* Wheeler, †*occidentalis* (Cresson), *occidentalis owyheeii* Cole, †*occidentalis* var. *utahensis* Olsen, *salinus* Olsen, †*sancti-hyacinthi* Wheeler, *similis* Olsen, †*subdentatus* Mayr, †*subnitidus* Emery. Most of the forms occur west of the 95th degree of longitude, the group being most common in the Southwest. A single form, *badius*, is found in the states bordering the Gulf of Mexico and the Atlantic Ocean from Louisiana to New Jersey. The ants of this subgenus form large colonies in the soil, often constructing characteristic mounds of notable size. Some of the forms are of considerable economic importance because of their painful sting, the stealing of seeds from seed beds, and occupation of large tracts of land by their nesting and foraging activities.

POGONOMYRMEX, subgenus EPHEBOMYRMEX Wheeler

Pl. 5, Fig. 21

Pogonomyrmex, subg. *Epehebomyrmex* Wheeler, 1902, *Psyche* 9:390.Subgenotype, *Pogonomyrmex naegelii* Forel (by designation of Wheeler, 1911).*Wheeler, 1902, *Amer. Nat.* 36:85, illus.Wheeler, 1909, *N. Y. Ent. Soc. Jour.* 17:79.*Olsen, 1934, *Harvard Univ. Mus. Compar. Zool. Bul.* 77:493, illus.

Approximately monomorphic. Length 3.5-4.8 mm. Head almost as broad as long. Antenna 12-segmented; last 4 funicular segments enlarged but not forming a well-defined club. Clypeus on each side projecting forward in front of antennal fossa as a weak to usually prominent tooth or lobe. Hairs beneath head although often long, not arranged in a psammophore as with the subgenus *Pogonomyrmex*. Thorax short, arched anteroposteriorly. Promesonotal and mesoepinotal sutures obsolescent or absent. Epinotum with a pair of short spines which are usually connected by a transverse ridge or carina. Metasternum extended posteriorly as a pair of short spines or tubercles. Femora rather incrassated. Spurs pectinate. Gaster oval, not truncate at the base, provided with a sting. Head, thorax and petiole rather coarsely sculptured, especially the thorax, where the sculpturing is more irregular and of a rugose reticulate nature. Hairs on dorsal surface of body rather short, usually much shorter than with the subgenus *Pogonomyrmex*. Three forms, †*imberbicus* Wheeler of Texas, Oklahoma, and New Mexico, †*pima* Wheeler of Arizona, and †*townsendi* Wheeler of Arizona and Mexico. The ants form small colonies in the soil. Wheeler found that *imberbicus* nests beneath stones. The workers seem to lack the aggressive disposition of those of the subgenus *Pogonomyrmex*. Very little is known about the biology of members of this group.

STENAMMA Westwood

Pl. 6, Fig. 22

Stenamma Westwood, 1840, *An Introduction to the Modern Classification of Insects*, Suppl., 2:83.Genotype, *Stenamma westwoodi* (Stephens, ms.) Westwood (monobasic).Mayr, 1886, *Zool.-Bot. Gesell. Wien, Verh.* 36:447, 454.Emery, 1895, *Zool. Jahrb., Abt. f. System.* 8:298.Forel, 1901, *Soc. Ent. de Belg. Ann.* 45:347.*Wheeler, 1903, *Psyche* 10:164.Wheeler, 1915, *Amer. Mus. Nat. Hist. Bul.* 34:410.Wheeler, 1917, *Amer. Acad. Arts and Sci. Proc.* 52:520.Smith, 1930, *Ent. Soc. Amer. Ann.* 23:564, illus.*Buren, 1944, *Iowa State Col. Jour. Sci.* 18:284.

Slender ants. Length 2.4-4 mm. Antenna 12-segmented; scape not attaining the posterior border of the head; funiculus noticeably enlarged toward the apex, the last 4 segments larger than the others but not forming a very clearly defined club. Mandibles rather large, subtriangular. Eyes usually vestigial or very small, with only a few ommatidia (some of the southern species, at least, have eyes larger than as described). Clypeus with a pair of longitudinal carinae. Promesonotal suture indistinct or absent.

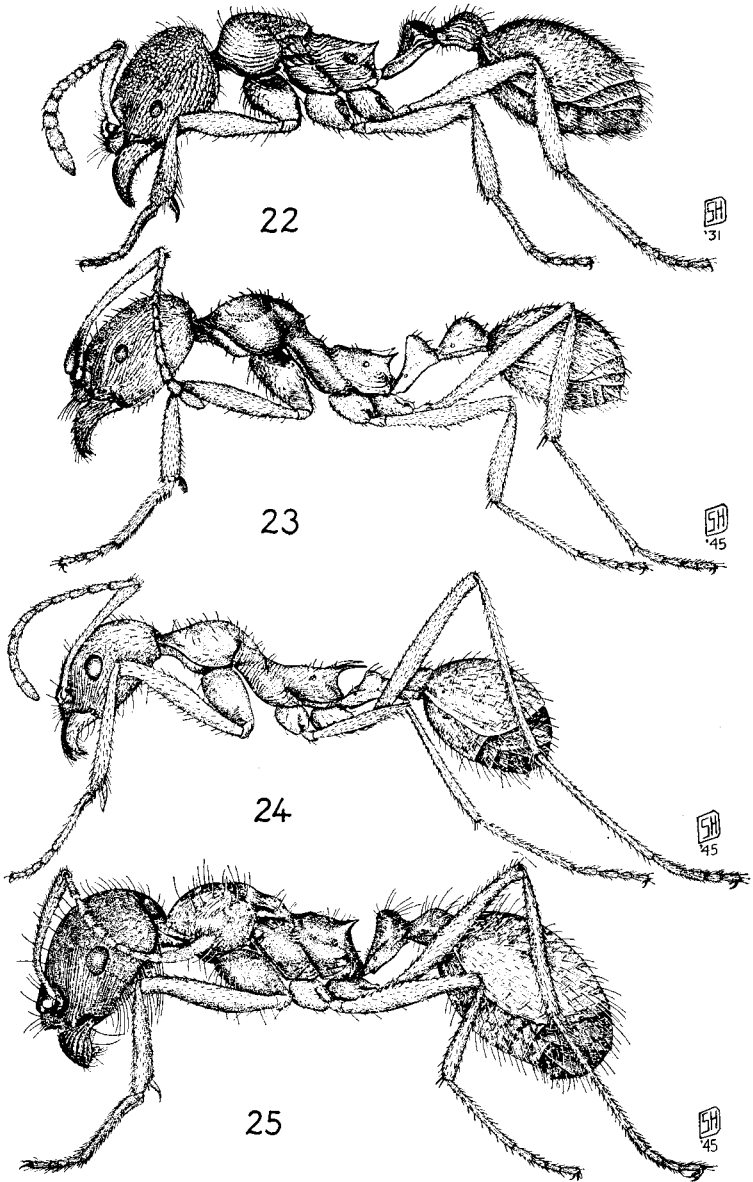


PLATE 6

- Fig. 22. *Stenammina foveolocephalum* M. R. Smith, worker.
 Fig. 23. *Aphaenogaster (Attoomyrma) treatae* Forel, worker.
 Fig. 24. *Novomessor cocherelli* (André), worker.
 Fig. 25. *Veromessor pergandei* (Mayr), worker.

Promesonotum rather strongly convex and prominent. Meseopinotal region with a distinct to a very pronounced constriction. Epinotum usually with a pair of short spines, these sometimes almost tuberculate. Petiole very distinctly pedunculate. Postpetiole larger than petiole but not very strikingly so. Postpetiole separated from gaster by a rather pronounced constriction. Gaster oval, not truncate basally, the first segment occupying most of the gaster. Body, exclusive of gaster, largely covered with a rugulose to rugulose reticulate sculpture, which often gives a subopaque appearance. Color usually ranging from light brown through reddish brown to blackish. Nine forms, †*brevicornis* (Mayr), †*brevicornis diecki* Emery, †*brevicornis diecki impressum* Emery, †*brevicornis heathi* Wheeler, †*brevicornis impar* Forel, *brevicornis schmitti* Wheeler, †*brevicornis sequoiarum* Wheeler, †*foveolocephalum* M. R. Smith, *neoarcticum* Mayr. Distributed over the entire United States with the possible exception of the extreme southern parts. Colonies found east of the Mississippi River generally belong to *brevicornis* (Mayr) or are variants of it. Although not rare, these ants are not common in many collections. The various forms produce small colonies usually in the soil beneath logs, stones or debris. The workers are thought to be largely carnivorous.

APHAENOGASTER, subgenus ATTOMYRMA Emery

Pl. 6, Fig. 23

Aphaenogaster, subg. *Attomyrma* Emery, 1915, *Accad. delle Sci. dell' Ist di Bologna Rend. (N. S.)* 19:70.

Subgenotype, *Formica subterranea* Latreille (by original designation).

Mayr, 1862, *Zool.-Bot. Gesell. Wien, Verh.* 12 (Abt. 2): 743.

*Mayr, 1886, *Zool.-Bot. Gesell. Wien, Verh.* 36:444.

Forel, 1886, *Soc. Ent. de Belg. Bul. (C. R.)* 30:40.

Emery, 1895, *Zool. Jahrb., Abt. f. System.* 8:301.

Pergande, 1895, *Calif. Acad. Sci. Proc. (2)* 5:891.

Wheeler, 1915, *Amer. Mus. Nat. Hist. Bul.* 34:411.

Wheeler, 1917, *Amer. Acad. Arts and Sci. Proc.* 52:517.

Wheeler, 1932, *N. Y. Ent. Soc. Jour.* 40:4.

Creighton, 1934, *Psyche* 41:189-193.

*Wheeler and Wheeler, 1934, *Psyche* 41:6, illus.

Smith, 1941, *Great Basin Nat.* 2:118.

*Buren, 1944, *Iowa State Col. Sci.* 18:284.

Smith, 1945, *Ent. Soc. Amer. Ann.* 27:386, illus.

Monomorphic. Medium-sized (3.25-7 mm.), slender ants. Head usually distinctly longer than broad; in some forms very noticeably narrowed posteriorly (when the head is much narrowed posteriorly the antennae are usually long and slender). Eye generally prominent, usually not placed far from the middle of the side of the head. Frontal carinae short, not distant from each other. Anterior border of clypeus usually with a distinct median emargination. Antenna 12-segmented, the last 4 segments enlarged but not forming a very definite club, the last 3 segments shorter than the rest of the funiculus. Base of the scape with a prominent lobe in some forms (*tratae* Forel and its variants). Thorax usually with a distinct promesonotal suture. Anterior portion of mesonotum sometimes protuberant. Posterior third or more of mesonotum often very noticeably depressed. Meseopinotal suture distinct. Epinotum usually with a pair of spines of variable length (in only a few

forms are the spines vestigial or almost absent). Petiole generally pedunculate anteriorly, sometimes very much so. Gaster oval, not truncate basally, rather shining except for the sculpturing at base in a few forms. The subgenus includes some of our most common ants. Many of the forms prefer to nest in wooded areas. There are 37 forms, †*boulderensis* M. R. Smith, †*floridana* M. R. Smith, †*fulva* Roger, †*fulva aquia* (Buckley), †*fulva aquia picea* Emery, †*fulva aquia pusilla* Emery, †*fulva aquia rudis* Emery, *huachucana* Creighton, †*lamellidens* Mayr, †*lamellidens* var. *nigripes* M. R. Smith, †*mariae* Forel, †*mutica* Pergande, *patruelis bakeri* Wheeler, *patruelis willowsi* Wheeler, †*subterranea borealis* Wheeler, †*subterranea occidentalis* Emery, †*subterranea valida* Wheeler, †*subterranea valida manni* Wheeler, †*tennesseensis* (Mayr), *tennesseensis* var. *ecalcarata* Emery, †*texana* Emery, †*texana* var. *carolinensis* Wheeler, †*texana flemingi* M. R. Smith, †*texana* var. *fulvescens* Wheeler, †*texana macrospina* M. R. Smith, *texana* var. *miamiana* Wheeler, *texana nana* Wheeler, *texana punctithorax* Cole, *texana* var. *silvestrii* Menozzi, †*treatae* Forel, †*treatae* var. *ashmeadi* Emery, †*treatae barnedi* Wheeler, †*treatae pluteicornis* G. C. and E. W. Wheeler, *treatae pluteicornis alabamensis* G. C. and E. W. Wheeler, †*treatae pluteicornis oklahomensis* G. C. and E. W. Wheeler, *treatae wheeleri* Mann, †*uinta* Wheeler. One or more of these occur in every state; most of them, however, are found in the Southern and Eastern States. The ants form small to moderately large colonies in both soil and wood. So far as the author is aware workers are not known to attend honeydew-excreting insects; the workers are largely, if not almost entirely, carnivorous.

NOVOMESSOR Emery

Pl. 6, Fig. 24

Novomessor Emery, 1915, Accad. della Sci. dell' 1st. di Bologna Rend. (N. S.) 19:73. Genotype, *Aphaenogaster* (*Ischnomyrmex*) *cockerelli* André (by original designation).

*Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:443, 446.

André, 1893, Rev. Ent., p. 150.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 280-282, illus.

*Wheeler and Creighton, 1934, Amer. Acad. Arts and Sci. Proc. 69:343-353, illus.

Large (6-8.5 mm.), slender ants with unusually long legs and antennae. Antenna 12-segmented; scape with an abrupt but weak enlargement toward the apex, funiculus without a well-defined club. Eye strongly convex, prominent. Promesonotal suture rather obsolescent. Mesopinotal region without a well-defined suture separating the mesonotum and epinotum, as in *Aphaenogaster*. Epinotal spines rather closely placed basally, long and acute, as long as, or longer than, the space between their apices. Petiole either without a spine beneath or else with a very vestigial one. Hairs coarse, grayish, suberect to erect, moderately abundant to rather abundant on body; often curved beneath the head. Gaster very smooth and shining. Head largely longitudinally rugulose with punctate interspaces. Two forms, †*albisetosus* (Mayr) and †*cockerelli* (André), which are known from the arid regions of Texas, New Mexico and Arizona. *N. cockerelli* seems to be the more common. Both forms construct large crater nests in the soil, with an unusually conspicuous central opening leading into them. The colonies of *cockerelli*, at least, are

rather populous. Wheeler 1926, p. 282, says that the ants of this genus are not well-developed harvesters like those of *Veromessor*.

VEROMESSOR Forel

Pl. 6, Fig. 25

Novomessor, subg. *Veromessor* Forel, 1917, Soc. Vaud. des Sci. Nat. Bul. 51:235.

Genotype, *Aphaenogaster andrei* Mayr (by designation of Emery, 1921).

*Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:443, 448-449.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:306, 307.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:410.

Andrews, 1916, Psyche 23:81.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 280, illus.

*Wheeler and Creighton, 1934, Amer. Acad. Arts and Sci. Proc. 69:354-368, 371-382, 385, illus.

Length 4-7 mm. (The smallest worker of the highly polymorphic *pergandei* measures 2.5 mm.). Head subrectangular to subquadrate. Middle of anterior border of clypeus often with an impression, groove, or even a tooth. Antenna 12-segmented; scape usually not reaching or surpassing the posterior border of the head, the base of the scape in some forms trumpet-shaped or spatulate; funiculus gradually enlarging toward the apex with the last 4 or 5 segments somewhat larger than the others but not forming a well-defined club. Eye usually well-developed. Promesonotal suture often obsolete. Mesoepinal region with an impression varying from moderate to broad and deep. Epinotal spines highly variable in length, ranging from shorter than the interbasal space to considerably longer than this distance. Legs not unusually long as in *Novomessor*, the femore sometimes incrassated. Hairs usually rather abundant on the body; ventral surface of head in *pergandei* with well-developed psammophore. Sculpturing highly variable, most often largely rugulose or rugulose reticulate on head and thorax (very feeble sculpturing on *pergandei* thus giving the regions mentioned a shining effect). Seven forms, †*andrei* (Mayr), *andrei castaneus* Wheeler and Creighton, *andrei flavus* Wheeler and Creighton, *chamberlini* (Wheeler), †*lobognathus* (Andrews), †*pergandei* (Mayr), and †*stoddardi* (Emery). The most common are *pergandei* and *andrei*. One or more forms occur in Colorado, Nevada, Arizona and California. All 7 forms, except perhaps *lobognathus*, occur in California. These harvesting ants nest in the soil. Their food consists largely of seeds supplemented by the flesh of arthropods. Such species as *pergandei* are markedly xerophytic.

PHEIDOLE Westwood

Pl. 7, Fig. 26

Pheidole Westwood, 1841, Ann. and Mag. Nat. Hist. 6:87.

Subgenotype, (*Atta providens* Sykes) = *Pheidole indica* Mayr (by designation of Bingham, 1903).

Fabricius, 1793, Ent. System. 2:361.

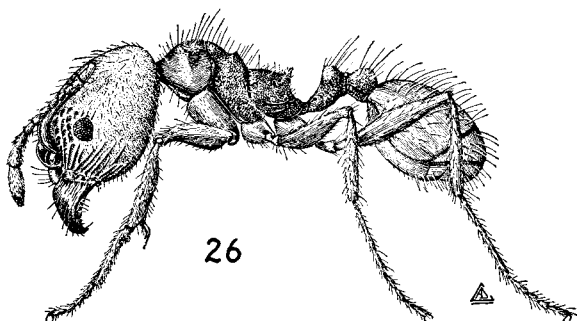
Roger, 1863, Berlin. Ent. Ztschr. 7:180, 199.

*Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:987, 989.

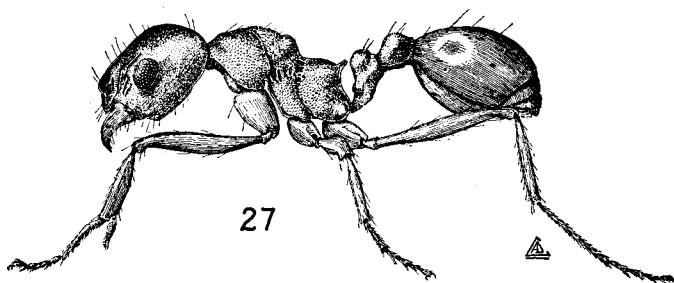
Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:455.

Forel, 1886, Soc. Ent. de Belg. Bul. (C. R.) 30:45-46.

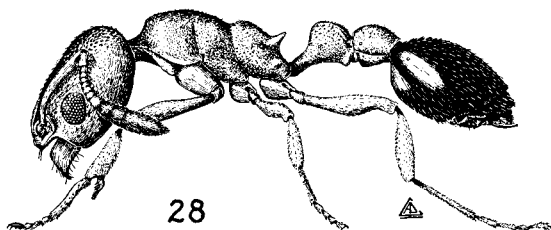
Mayr, 1887, Zool.-Bot. Gesell. Wien, Verh. 37:596-598.



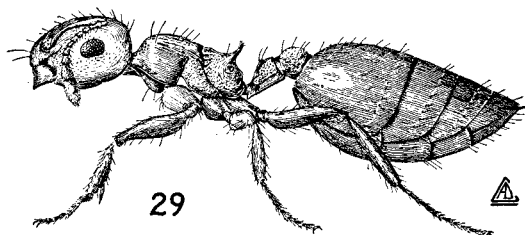
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PLATE 7

Fig. 26. *Pheidole hyatti* Emery, soldier.Fig. 27. *Epipheidole inquilina* Wheeler, worker.Fig. 28. *Cardiocondyla emeryi* Forel, worker.Fig. 29. *Crematogaster (Orithocrema) minutissima missouriensis* Emery, worker.

- *Emery, 1895, Zool. Jahrb., Abt. f. System. 8:288.
 Pergande, 1895, Calif. Acad. Sci. Proc. (2) 5:885.
 Emery, 1896, Soc. Ent. Ital. Bol. 28:76.
 Emery, 1901, Soc. Ent. de France Bul., p. 120.
 Forel, 1901, Soc. Ent. de Belg. Ann. 45:348-352.
 Wheeler, 1901, Amer. Nat. 35:534, illus.
 Wheeler, 1903, Psyche 10:95, illus.
 Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:10.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:379.
 Wheeler, 1906, Amer. Mus. Nat. Hist. Bul. 22:336.
 Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. 23:18.
 Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:431, illus.
 Forel, 1908, Soc. Vaud. des Sci. Nat. Bul. 44:55.
 Santschi, 1909, Soc. Ent. Ital. Bol. 41:3, illus.
 Wheeler, 1914, N. Y. Ent. Soc. Jour. 22:49-51.
 Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:397.
 Wheeler, 1916, New Engl. Zool. Club Proc. 6:29, illus.
 Wheeler, 1916, Psyche 23:40.
 Forel, 1922, Rev. Suisse Zool. 30:92.
 Smith, 1924, Ent. News 35:251.
 Smith, 1927, Ent. News 37:310.
 Cole, 1933, Ent. Soc. Amer. Ann. 26:616.
 Smith, 1934, Ent. Soc. Amer. Ann. 27:385.
 Cole, 1936, Canad. Ent. 68:35.
 Smith, 1943, Ent. Soc. Wash. Proc. 45:5.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:285.

Length 1.3-8 mm. Normally dimorphic; a few forms however, such as *rhea* and *kingi instabilis*, polymorphic. Head unusually large, often enormous in proportion to the remainder of the body; subrectangular, subquadrate, or subcordate with emarginate posterior border and prominent occipital lobes. Occipital lobes usually separated by a prominent frontal groove which often extends anteriorly almost to the clypeus. Anterior border of the clypeus usually with a median emargination. Mandibles well-developed, sometimes rather large, usually with 2 apical teeth, a basal tooth and some smaller teeth or no teeth between these. Frontal carinae variable in shape but seldom forming a scrobe for the reception of the scape. Antenna 12-segmented, with a distinct, 3-segmented club. Scape variable in regard to length and shape, usually slender or else much flattened at the base. Promesonotum usually larger and more convex than the remainder of the thorax. Mesonotum in some forms marked by a conspicuous transverse furrow. Mesoeipinotal region with a very distinct constriction. Eipinotum with a pair of spines which are seldom vestigial. Petiole pedunculate anteriorly. Postpetiole often angulate or conulate on the side. Sculpturing of head, thorax, petiole and postpetiole very diverse, often forming a pattern which is more or less distinctive in each form.

Worker smaller and more slender than the soldier. Head not so remarkably large or strikingly out of proportion to the remainder of the body. Occipital lobes either lacking or weakly developed. Promesonotal region not so stout or prominent as in the soldier. Worker of some forms with the general habitus of a *Monomorium*, *Aphaenogaster* or *Leptothorax* (*Dichothorax*). One of our largest genera with 85 forms. One or more forms are believed to occur in every state; most of them, however, are found in the Southwest

and South, especially in the Southwest. The ants usually form small to moderately large colonies in the soil either beneath objects or free of cover. They may also nest in well-rotted wood such as logs and stumps. The workers feed mainly on seeds and the flesh of small arthropods. Some forms are strongly predaceous. The workers are not so fond of honeydew as are the workers of such genera as *Myrmica*, *Solenopsis* and *Crematogaster*. Our forms are *anastasioi* Emery, †*anastasioi* var. *cellarum* Forel, *barbata* Wheeler, †*bicarinata* Mayr, †*californica* Mayr, †*californica* var. *hagermani* Cole, *californica* var. *incenata* Wheeler, *californica micula* Wheeler, †*californica oregonica* Emery, *californica pyramidentis* Wheeler, *californica* var. *satura* Wheeler, *californica* var. *shoshoni* Cole, †*casta* Wheeler, †*ceres* Wheeler, †*cockerelli* Wheeler, †*constipata* Wheeler, †*crassicornis* Emery, †*crassicornis* var. *diversipilosa* Wheeler, †*crassicornis porcula* Wheeler, †*crassicornis porcula tetra* Wheeler, *crassicornis vallicola* Wheeler, *davisi* Wheeler, †*dentata* Mayr, †*dentata* var. *commutata* Mayr, *dentata* var. *faisonica* Forel, †*dentigula* M. R. Smith, †*desertorum* Wheeler, †*desertorum* var. *comanche* Wheeler, †*desertorum* var. *maricopa* Wheeler, †*floridana* Emery, †*grallipes* Wheeler, †*hayesi* M. R. Smith, *humeralis* Wheeler, †*hyatti* Emery, †*hyatti* var. *ecitonodora* Wheeler, *hyatti solitanea* Wheeler, †*kingi instabilis* Emery, *kingi torpescens* Wheeler, †*lamia* Wheeler, †*lauta* Wheeler, *macclendonii* Wheeler, *marcidula* Wheeler, †*megacephala* (Fabricius), †*metallescens* Emery, †*metallescens splendidula* Wheeler, †*militicida* Wheeler, †*morrisi* Forel, †*morrisi* var. *impexa* Wheeler, †*morrisi* var. *vanceae* Forel, *nuculiceps* Wheeler, †*pilifera* (Roger), †*pilifera artemisia* Cole, †*pilifera coloradensis* Emery, *pilifera* var. *neomexicana* Wheeler, *pilifera septentrionalis* Wheeler, *pilifera* var. *simulans* Wheeler, *pinealis* Wheeler, *proserpina* Wheeler, †*rhea* Wheeler, *ridicula* Wheeler, †*sciophila* Wheeler, †*sciophila* var. *semilaevicéphala* M. R. Smith, †*sitarches* Wheeler, †*sitarches rufescens* Wheeler, *sitarches rufescens campestris* Wheeler, *sitarches* var. *transvarians* Wheeler, †*soritis* Wheeler, *spadonia* Wheeler, *tepicana cavigenis* Wheeler, †*texana* Wheeler, *titanis* Wheeler, †*tysoni* Forel, †*vashti subdentata arizonica* Santschi, †*vinelandica* Forel, †*vinelandica buccalis* Wheeler, *vinelandica cerebrosior* Wheeler, †*vinelandica laeviuscula* Emery, †*vinelandica longula* Emery, *vinelandica longula castanea* Wheeler, *vinelandica* var. *nebrascensis* Forel, *virago* Wheeler, †*xerophila* Wheeler, *xerophila pacifica* Wheeler, †*xerophila tucsonica* Wheeler, *xerophila tucsonica gilvoscens* Wheeler.

EPIPHEIDOLE Wheeler

Pl. 7, Fig. 27

- Epipheidole* Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:14.
 Genotype, *Epipheidole inquilina* Wheeler (monobasic).
 Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:15, illus.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 497, illus.
 Smith, 1940, Ent. Soc. Wash. Proc. 42:104, illus.

Length 2 mm. Head subquadrate, with deeply emarginate posterior border; occipital lobes subangular. Eye prominent, strongly convex, placed somewhat anterior to the middle of the side of the head. Frontal carinae subparallel. Frontal groove weak but distinct, extending from the frontal area towards the posterior border of the head. Antenna 12-segmented; scape

slender, slightly enlarged apically; funiculus with a 3-segmented club, the last segment of which exceeds the combined length of the 2 preceding segments. Mesoepinotal region with a broad and deep constriction. Epinotum with a pair of large, bluntly tipped, fingerlike spines. Petiolar node, from behind, with horizontal, entire, blunt, superior border. Postpetiole, from above, approximately as broad as long, subangular near the middle of each side. Spurs of middle and hind tibiae apparently lacking. Gaster oval, subtruncate at base, without well-defined, angular humeri. Cheeks, region between eyes, frontal carinae, and front, with a few weak, longitudinal rugulae. Epinotum somewhat rugulose, especially in the region of the mesoepinotal constriction. Posterior dorsal surface of head with a few scattered foveolae. Hairs suberect to erect, sparse. One form, *†inquilina* Wheeler, which is parasitic in colonies of *Pheidole pilifera* (Roger) and its subspecies *coloradensis* Emery. Extremely rare. Previous to 1940 (Smith, above citation) the genus *Epipheidole* was thought to be without workers. The discovery of a single worker however, proves that the worker caste has not been entirely lost. It seems quite evident that the ants of this genus must have arisen from a *Pheidole* ancestor like that of the host or of a closely related species.

SYMPHEIDOLE Wheeler

Sympheidole Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:7.

Genotype, *Sympheidole elecebra* Wheeler (monobasic).

Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:8, illus.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 497, illus.

The female of *S. elecebra* can be distinguished by the following characters: Habitus of a *Pheidole*. Length 2.75-3 mm. Head as broad as long with rounded anterior and posterior corners and convex sides, thus giving it a rounded appearance. Antenna 12-segmented, with 3-segmented club, scape extending to the posterior corner of the head. Prothorax with rounded humeri. Epinotal spines small and acute. Postpetiole very broad and short, with unusually prominent lateral angles which are directed somewhat posteriorly. Body and appendages with abundant, long, reclinate hairs which appear obtuse at the ends under low magnification, and frayed into short, acute processes when examined under high magnification.

The ants of this genus which are closely allied to *Pheidole* are parasitic in colonies of *Pheidole ceres* Wheeler. The single form, *elecebra* Wheeler, is known only from type material collected in Colorado (near Boulder, and Ute Pass near Manitou). Only males and females have been found; hence it is assumed that the worker caste is lacking. Since parasitized colonies contain only workers and soldiers of *ceres* it is believed that the parasite does not permit males and females of the host to exist.

CARDIOCONDYLA Emery

Pl. 7, Fig. 28

Cardiocondyla Emery, 1869, Accad. degli Aspiranti, Naples Ann. (2) 2:21.

Genotype, *Cardiocondyla elegans* Emery (monobasic).

Forel, 1881, Mitt. Muenchen. Ent. Ver. 5:5, illus.

André, 1881, Soc. Ent. de France Ann. (6) 1:69, illus.

Forel, 1899, Fauna Hawaiiensis, Formicid. 1(1):120.

*Emery, 1909, Deut. Ent. Ztschr., p. 19, illus.

Arnold, 1916, So. Afr. Mus. Ann. 14:200, illus.

Smith, 1930, Fla. Ent. 14:4.

Wheeler, 1929-1931, Bol. Lab. Zool. Gen. e. Agr. R. Scuola Super. Agr. Portici 24:43.

Wheeler, 1932, N. Y. Ent. Soc. Jour. 40:7.

Borgmeier, 1937, Rev. de Ent. 7:129, illus.

*Smith, 1944, Ent. Soc. Wash. Proc. 46:30, illus.

Monomorphic. Slender ants. Length 1.6-2.5 mm. Habitus of *Leptothorax*. Head subrectangular, longer than broad. Antenna 12-segmented; funiculus with a 3-segmented club, funicular segments 3 through 5 as broad as, or broader than, long. Eye prominent, placed less than its greatest diameter from the base of the mandible. Frontal carinae short, scarcely divergent posteriorly. Clypeus projecting above mandibles (best seen in profile). Prothorax usually with pronounced humeri. Promesonotal suture obsolescent or absent. Mesoeipinotal constriction sometimes absent but more often weakly to strongly defined. Epinotum with a pair of short or moderately long, rather blunt spines (spines occasionally almost tuberculate). Petiole very distinctly pedunculate, especially anteriorly. Postpetiole very noticeably broader than the petiole, much broader than long, with subparallel anterior and posterior borders and rounded sides. First segment comprising most of gaster. Head and thorax usually subopaque, reticulate punctate. Body clothed with very closely appressed pubescence. Erect hairs almost, if not entirely, absent except on mandibles, clypeus, and apex of gaster. Four forms, †*emeryi* Forel, †*nuda* var. *minutior* Forel, †*venustula* Wheeler, and †*wroughtoni* var. *bimaculata* Wheeler. These are known to occur only in Florida and are very probably introduced. Specimens are not found in many American collections. Nests are constructed in the soil and also within the cavities of plants such as sedges. The colonies are small. The food of the worker is thought to be honeydew and the flesh of small arthropods. There are both normal and ergatoid males in this genus. The ergatoid males are of two types, (a) and (b). The (a) type has an 11-segmented antenna, a long, curved, tapering mandible without masticatory border, an emarginate clypeus and an apterous thorax; the (b) type has a 12-segmented antenna, an apterous thorax, a mandible with 4 or 5 teeth, the eye not as large as in normal male, and more pronounced prothoracic humeri than the worker. *C. emeryi* and *bimaculata* have the (a) type ergatoid male, and *minutior* and *venustula* the (b) type. So far as the author is aware normal males have not been observed in any of the species except *emeryi* and with this species they seem to occur more frequently than ergatoid males.

CREMATOGASTER, subgenus ORTHOCREMA Santschi

Pl. 7, Fig. 29

Crematogaster, subg. *Orthocrema* Santschi, 1918, Soc. Ent. de France Bul., p. 182.

Subgenotype, *Myrmica sordidula* Nylander (by original designation).

*Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:991, 995.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:288.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:482, illus.

*Creighton, 1939, Psyche 46:137.

Length 2.3-5 mm. Antennae 11-segmented. Differing from *Crematogaster* (*Acrocoelia*) mainly as follows: Funiculus with a 2-segmented club. Basal surface of epinotum vestigial or lacking. Epinotal spines short, much shorter than their interbasal space. Petiolar node as long as broad or longer than broad, subrectangular or subelliptical. Postpetiole broader than long, convex above, without an impression or longitudinal furrow. General color yellowish in all forms except *arizonensis*. Four forms, †*arizonensis* Wheeler, †*minutissima minutissima* Mayr, †*minutissima missouriensis* Emery, *minutissima thoracica* Creighton. The ants of this subgenus are largely southern in distribution. Colonies nest in the soil or in wood. The biology is not well-known. The workers no doubt attend honeydew-excreting insects and feed on flesh like those of the subgenus *Acrocoelia*. *C. minutissima missouriensis* is one of the most common forms.

CREMATOGASTER, subgenus ACROCOELIA Mayr

Pl. 8, Fig. 37

Crematogaster, subg. *Acrocoelia* Mayr, 1852 [1853], Zool. Bot. Gesell. Wien, Verh. 2:146.

Subgenotype, (*Acrocoelia ruficeps* Mayr) = *Formica scutellaris* Olivier (by designation of Bingham, 1903).

Say, 1836, Boston Jour. Nat. Hist. 1:290.

Fitch, 1854, N. Y. State Agr. Soc. Trans. 14:835.

Mayr, 1866, Zool.-Bot. Gesell. Wien, Verh. 16:901, illus.

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:989-993.

Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:462.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:280.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:478.

Wheeler, 1919, Psyche 26:107, illus.

Wheeler, 1930, Psyche 37:55.

Wheeler, 1932, N. Y. Ent. Soc. Jour. 40:8.

Wheeler, 1933, Psyche 40:83.

Monomorphic. Length 2.5-4.5 mm. Head usually subquadrate or subrectangular. Antenna 11-segmented; funiculus with a 3-segmented club. Eye prominent. Frontal carinae short, subparallel, well-separated. Clypeus well-developed. Mandible with short masticatory border. Thorax short, stout. Mesoeipinotal region with a pronounced constriction. Promesonotum often with a longitudinal carina. Epinotum bearing a pair of spines of variable length and size. Petiole trapezoidal, broadest anteriorly. Postpetiole with an impression or longitudinal furrow, which forms 2 more or less distinct lobes. Postpetiole attached to dorsal surface of base of gaster. Gaster subcordate, more convex ventrally than dorsally, and with acute apex. Sculpturing of head and thorax highly variable, especially that of the latter. Nineteen forms, †*ashmeadi* Mayr, †*ashmeadi* var. *matura* Wheeler, †*atkinsoni* Wheeler, *atkinsoni* var. *helveola* Wheeler, †*coarctata* Mayr, †*coarctata* var. *mormonium* Emery, *creightoni* Wheeler, *kennedyi* Wheeler, †*laeviuscula* Mayr, †*laeviuscula* var. *californica* Emery, †*laeviuscula* var. *clara* Mayr, †*lineolata* (Say), †*lineolata* var. *cerasi* (Fitch), †*lineolata* var. *lutescens* Emery, †*lineolata* var. *subopaca* Emery, *opaca* var. *depilis* Wheeler, †*opaca* var. *punctulata* Emery, †*pilosa* Emery, †*vermiculata* Emery. One or more forms occur in every state. Two of these, *creightoni* and *kennedyi*, are parasitic and apparently

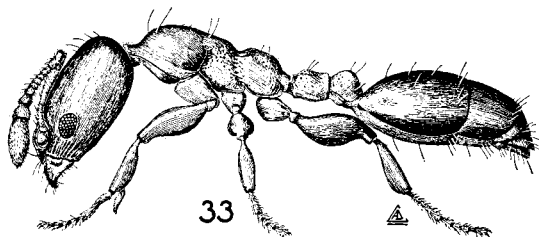
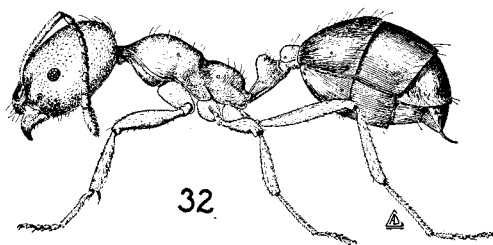
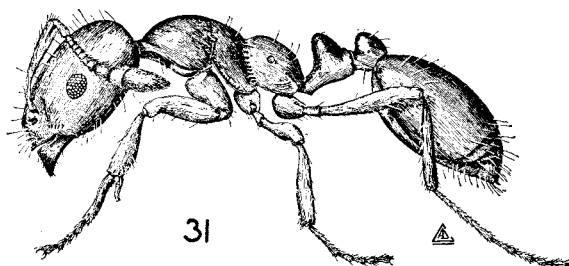
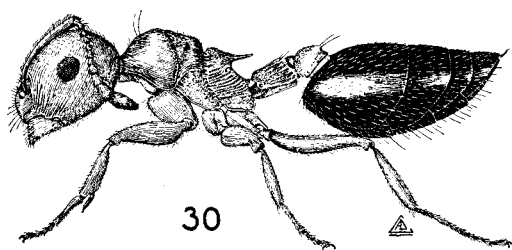


PLATE 8

- Fig. 30. *Crematogaster (Acrocoelia) laeviuscula* var. *clara* Mayr, worker.
 Fig. 31. *Monomorium (Monomorium) minimum* (Buckley), worker.
 Fig. 32. *Monomorium (Parholcomyrmex) destructor* (Jerdon), worker.
 Fig. 33. *Xenomyrmex stollii floridanus* Emery, worker.

workerless. The former is found in colonies of *pilosa*, and the latter in colonies of *lineolata* var. near *cerasi*. Members of this subgenus are some of our most common ants. Colonies nest in the soil, in wood, crevices of plants, insect galls, and carton nests of their own making (*atkinsoni* and its var. *helveola*). The workers are noted for their attendance on honeydew-excreting insects. Some forms such as *lineolata*, *laeviuscula*, and *ashmeadi* nest in houses and infest human foods. The worker's habit of elevating the gaster in such a way that it resembles the action of a scorpion has earned for the ant, the name, acrobatic ant. Although the ants are easy to recognize generically and subgenerically, their identification to species or subspecies is often very difficult because of the numerous intergrading forms.

MONOMORIUM, subgenus MONOMORIUM Mayr

Pl. 8, Fig. 31

Monomorium Mayr, 1855, Zool.-Bot. Gesell. Wien, Verh. 5:452.

Subgenotype, *Monomorium minutum* Mayr (monobasic).

Buckley, 1867, Ent. Soc. Phila. Proc. 6:338.

*Bingham, 1903, Fauna Brit. India Hymen. 2:201, 202, 211.

Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:269.

Emery, 1908, Deut. Ent. Ztschr., pp. 664, 682, 684.

*Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:584.

*Smith, 1919, Ohio Jour. Sci. 19:290.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 95, illus.

*Donisthorpe, 1927, British Ants, Geo. Routledge and Sons, London, 2d ed., p. 103.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:831, 833-834.

*Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 770.

Brown, 1943, Ent. News 54:243.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:289.

Monomorphic. Length 1.5-2.5 mm. Head noticeably longer than broad. Antenna 12-segmented, with a well-defined 3-segmented club. Clypeus with a pair of longitudinal carinae which are extended on the anterior border as more or less distinct teeth (the carinae are sometimes difficult to see). Mandible with short masticatory border bearing 3 or 4 distinct teeth. Frontal carinae short. Eye well-developed. Prothorax with rounded humeri. Pronotum with suture obsolete or absent. Meseopinal region with pronounced constriction. Epinotum unarmed. Gaster with distinct basal angles. Body largely smooth and shining except that of *pharaonis* which is densely punctate and subopaque on the head, thorax, petiole and postpetiole. Hairs simple, scattered. This subgenus contains 5 forms, †*minimum* (Buckley), of the entire United States, and its variety *ergatogyna* Wheeler of California, †*floricola* (Jerdon) of Florida, the introduced †*pharaonis* (Linnaeus) of many of our towns and cities, especially those of commercial importance, and *viridum* Brown of New Jersey. Colonies may nest in the soil, in wood, crevices of plants, or (*pharaonis*) even in houses and buildings. Such forms as *minimum* and *pharaonis* are important house-infesting ants. *M. ergatogyna* and *M. floricola* have ergatoid females, that is, workerlike females with ocelli, large eyes, and a thorax more or less like that of the female but without vestiges of wings. The supposedly parasitic ant, *Epoecus pergandei* Emery, which has only males and females, was found in a nest of *Monomorium minimum* at Washington, District of Columbia.

MONOMORIUM, subgenus PARHOLCOMYRMEX Emery

Pl. 8, Fig. 32

Monomorium, subg. *Parholcomyrmex* Emery, 1915, Soc. Ent de France Bul., p. 190.

Genotype, *Myrmica gracillima* F. Smith (by original designation).

*Bingham, 1903, Fauna British India Hymen. 2:201, 209.

Wheeler, 1906, Ent. News 17:23.

*Emery, 1908, Deut. Ent. Ztschr., pp. 665, 671.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 10, 153, 221.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:831, 833.

Differing from subgenus *Monomorium* mainly as follows: Worker extremely variable in size (length 1.8-3 mm.) with a tendency to dimorphism in the single form, †*destructor* (Jerdon). Head of largest worker not so long in proportion to its breadth as in the smaller workers. First 2 segments of antennal club subequal. Clypeal carinae and teeth obsolescent or absent. Posterior border of head and posterior surface of epinotum with weak to moderately strong, transverse rugulae. *M. destructor* has been introduced into several southern towns and cities (at least in the states of Florida and Tennessee). This important house-infesting ant normally nests in the soil but may also nest in buildings or even ships. The form is readily distinguished by its shining, yellowish-red worker which has the meso- and metapleura and the epinotum sculptured and subopaque, and the apex of the gaster infuscated.

XENOMYRMEX Forel

Pl. 8, Fig. 33

Xenomyrmex Forel, 1884, Soc. Vaud. des Sci. Nat. Bul. 20:369.

Genotype, *Xenomyrmex stollii* Forel (monobasic).

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:275.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 432.

*Wheeler, 1931, Rev. de Ent. 1:129, illus.

Length 1.7 mm. Monomorphic. Head rather large, subrectangular. Eye not large but prominent, located in the anterior half of the side of the head. Middle of the anterior border of the clypeus in the form of a bidentate lobe. Antenna 11-segmented; scape lacking a great deal of attaining the posterior border of the head; funiculus with a 3-segmented club, the last segment of which is longer than the 2 preceding segments combined. Prothorax without humeral angles. Promesonotal suture absent. Mesopinotal region very strongly impressed. Epinotum unarmed. Petiole nonpedunculate. Legs with incrassated femora and tibiae. Gaster perceptibly narrowed at base. Integument smooth or weakly sculptured. Two forms, †*stollii floridanus* Emery and *stollii rufescens* Wheeler, both of Florida. Arboreal. Nests constructed in plant cavities. Uncommon. Habitus somewhat like that of a *Monomorium*.

SOLENOPSIS, subgenus SOLENOPSIS Westwood

Pl. 9, Fig. 34

Solenopsis Westwood, 1841, Ann. and Mag. Nat. Hist. 6:86.

Genotype, (*Solenopsis mandibularis* Westwood) = *Atta geminata* Fabricius (monobasic).

- Fabricius, 1804, Syst. Piez., p. 423.
 Jerdon, 1851, Madras Jour. Lit. Sci. 17:106.
 McCook, 1879, in Comstock's Report on Cotton Insects, p. 188, illus.
 Wheeler, 1906, Amer. Mus. Nat. Hist. Bul. 22:336.
 Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:425.
 Forel, 1909, Deut. Ent. Ztschr., p. 267.
 Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:394, 396.
 *Creighton, 1930, Amer. Acad. Arts and Sci. Proc. 66:59, 66, 87, 98, 102-104, illus.
 Smith, 1936, Jour. Econ. Ent. 29:120.
 Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 771.
 Eagleson, 1940, Jour. Econ. Ent. 33:700.

Polymorphic. Length 1.6-6 mm. Antenna 10-segmented, with a conspicuous 2-segmented club. Clypeus bicarinate, its anterior border usually with from 2 or 3 to as many as 5 teeth; occasionally toothless, however. Frontal carina short. Mandible with a small number of teeth, usually 4 or less, sometimes without teeth (major workers of *geminata* and its subspecies *rufa*). Eye well-developed, never with less than 20 facets and usually with 30 or more. Mesoepinotal region with distinct to well-developed suture or impression. Epinotum unarmed. Most of body smooth and shining. Seven forms, †*geminata* (Fabricius), †*geminata rufa* (Jerdon), †*saevissima* var. *richteri* Forel, †*xyloni* McCook, *xyloni amblychila* Wheeler, *xyloni aurea* Wheeler, †*xyloni* var. *maniosa* Wheeler. East of the Mississippi River ants of this subgenus apparently do not extend very far north of the 35th degree of latitude, although in the West they apparently extend much farther North, reaching at least the Sacramento Valley in California. Colonies usually nest in the soil, most often freely exposed. From a pest standpoint the first four of the forms mentioned and *xyloni maniosa* are among the most important ants in the United States. Workers are known to steal seed from seed beds, infest houses, kill young quail and poultry as they are hatching from the egg, gnaw holes in various types of cloth and clothing, gnaw into vegetables, flowers, and fruits, attend honeydew-excreting insects, sting severely and injure telephone equipment. The ants are especially noted for their aggressiveness. The workers are also predaceous and carnivorous. *S. saevissima richteri* has apparently been introduced into Alabama and Mississippi from South America.

SOLENOPSIS, subgenus EUOPHTHALMA Creighton

Pl. 9, Fig. 35

Solenopsis, subg. *Euophthalma* Creighton, 1930, Amer. Acad. Arts and Sci. Proc. 66:43.

Subgenotype, *Myrmica globularia* F. Smith (by original designation).

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:393.

Creighton, 1930, Amer. Acad. Arts and Sci. Proc. 66:105, 110, 113, 118, illus.

Characters same as for the subgenus *Solenopsis* except as follows: Monomorphic to feebly polymorphic. Length 1.5-2.2 mm. Eye with 18-22 facets. Clypeus bicarinate, terminating on the anterior border in 2 prominent teeth; lateral teeth often poorly developed or absent. (Postpetiole remarkably large, subelliptical in *globularia littoralis*). Two forms, *huachucana* Wheeler and †*globularia littoralis* Creighton. The former was described from speci-

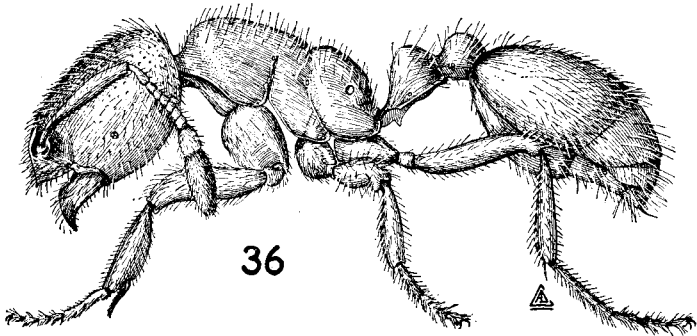
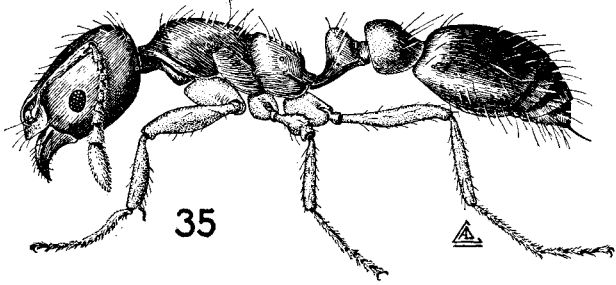
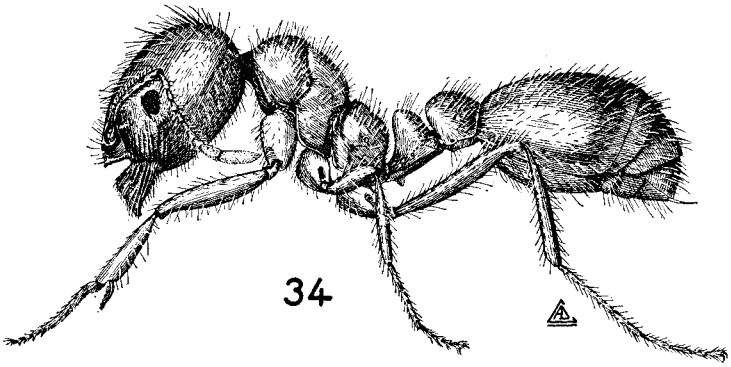


PLATE 9

- Fig. 34. *Solenopsis (Solenopsis) xyloni* McCook, soldier.
 Fig. 35. *Solenopsis (Euophthalma) globularia littoralis* Creighton, worker.
 Fig. 36. *Solenopsis (Diplorhoptrum) pergandei* Forel, worker.

mens collected in the Huachucha Mountains of Arizona. *S. globularia littoralis* is apparently confined largely to the littoral areas from North Carolina to Mississippi, and perhaps even to Texas. The ants of this subspecies seem to prefer to nest in well-rotted logs. Very little is known about their biology.

SOLENOPSIS, subgenus DIPLORHOPTRUM Mayr

Pl. 9, Fig. 36

Diplorhoptrum Mayr, 1855, Zool.-Bot. Gesell. Wien, Verh. 5:449.

Subgenotype, *Formica fugax* Latreille (monobasic).

Say, 1835, Boston Jour. Nat. Hist. 1:293.

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:277.

Forel, 1901, Soc. Ent. de Belg. Ann. 45:343, 345, 346.

Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:269.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:426, illus.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:393.

Hayes, 1920, Kans. Agr. Expt. Sta. Tech. Bul. 5, 55 pp., illus.

Kennedy, 1938, Canad. Ent. 70:232, illus.

Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 770.

Smith, 1942, Ent. Soc. Wash. Proc. 44:209.

Monomorphic. Length 1.2-2.7 mm. Eye very small with 15 facets or less, often not more than 2 or 3. Second and third funicular segments usually as broad as long or broader than long. Antenna with 10 segments. Fifteen forms, †*krockowi* Wheeler, †*longiceps* M. R. Smith, †*molesta* (Say), *molesta* var. *castanea* Wheeler, †*molesta* var. *validiuscula* Emery, †*pergandei* Forel, †*picta* Emery, *picta* var. *moerens* Wheeler, †*pilosula* Wheeler, *rosella* Kennedy, *salina* Wheeler, *texana* Emery, *texana carolinensis* Forel, *texana catalinae* Wheeler, *texana truncorum* Forel. The largest subgenus of *Solenopsis* with one or more forms in every state. Most of these occur in the South and Southwest. Many of the ants of this subgenus nest in the soil but some nest in wood, plant cavities or even in insect galls. *S. molesta* is one of the most widely distributed members of the subgenus. This ant is an important economic form. It is known to infest houses, attack germinating grain in the ground and attend plant lice. For a full account of its biology and economic significance see Hayes, 1920.

EPOECUS Emery

Pl. 10, Fig. 37

Epoecus Emery, 1892, Soc. Ent. de France Ann. (Bul.) 61: cclxxvi.

Genotype, *Epoecus pergandei* Emery (monobasic).

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:273, illus.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 498, illus.

The genus is represented by a single form, *pergandei* Emery, which was collected from a colony of *Monomorium minimum* (Buckley) in Washington, District of Columbia. The host colony contained only winged males and winged females. As only males and females of *Epoecus* were noted, the ants of this genus are supposed to be workerless and parasitic. The biology of *pergandei* is very poorly known since the ant has been collected on only this one occasion. The female of *E. pergandei* can be distinguished from

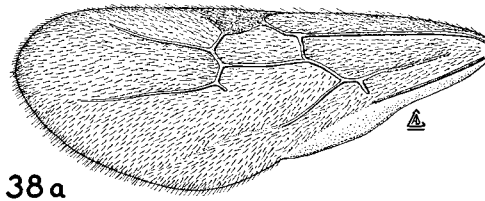
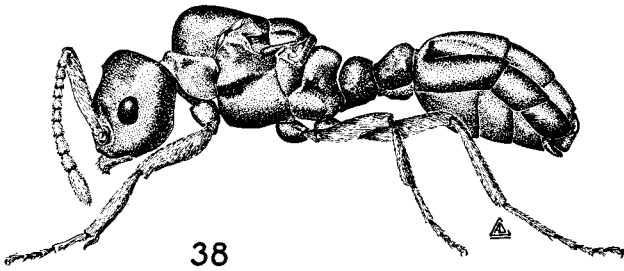
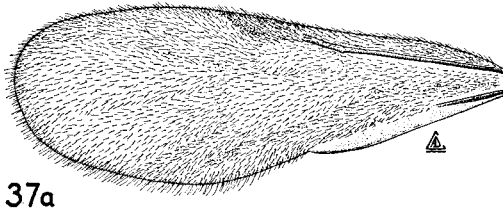
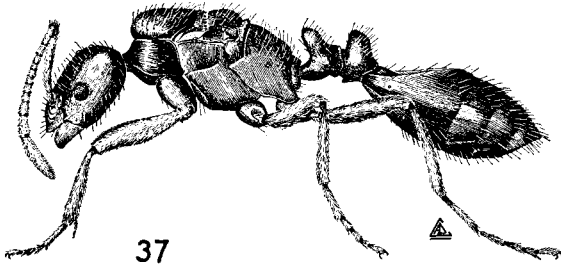


PLATE 10

Fig. 37. *Epoccus pergandei* Emery, female; fig. 37 a, anterior wing.
Fig. 38. *Anergates atratulus* (Schenck), female; fig. 38 a, anterior wing.

the females of forms in other genera by her size (2.2-2.5 mm.), the strong impression on at least the dorsal surface of the first gastric segment, the elongate head, bidentate clypeus, 11- to 12-segmented antenna, very long antennal scape, unarmed epinotum, and the scalelike petiolar node which is directed anterodorsally.

ANERGATES Forel

Pl. 10, Fig. 38

Anergates Forel, 1874, Schweiz. Naturf. Gesell. Denkschr. 26:93.

Genotype, *Myrmica atratula* Schenck (monobasic).

Schenck, 1852, Jahrb. Ver. Naturk. Nassau 8:91.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 498, illus.

Donisthorpe, 1927, British Ants, Geo. Routledge and Sons, London, 2d ed., p. 96, illus.

Creighton, 1934, Psyche 41:193.

Bridwell, 1937, Ent. Soc. Wash. Proc. 39:14.

These ants are parasites of the introduced pavement ant, *Tetramorium caespitum* (Linnaeus). The worker caste of *Anergates* has apparently been lost, only males and females being known. A parasitized colony of the host species contains only workers of *T. caespitum*. The single form, *atratulus* (Schenck) is extremely rare, specimens having been collected on only one occasion each in Delaware, Virginia and Connecticut. The virgin female of *Anergates* which is 2.5 mm. long can be readily distinguished from the female of forms in other genera by the prominent longitudinal furrow on the dorsal surface of the gaster. Other helpful characters are the stout form of the body, 11-segmented antenna, emarginate clypeus, and bituberculate epinotum. Since *Anergates* is now known to occur in the United States another genus of ants, *Strongylognathus*, with forms also parasitic on *T. caespitum*, may eventually be found. For an interesting account of the biology of *atratulus* see Wheeler 1926 and Donisthorpe 1927.

Creighton described the single female collected by Solomon Friedland at Englewood, N. J., as a new species, *friedlandi*. The author has not examined the specimen but after having reviewed the description it appears to him that at most the New Jersey individual can only be a variant of the well-known European *atratulus*. The author is also of the opinion that the host ant, *Tetramorium caespitum*, has been introduced into the United States by the early colonists.

EREBOMYRMA Wheeler

Pl. 11, Fig. 39

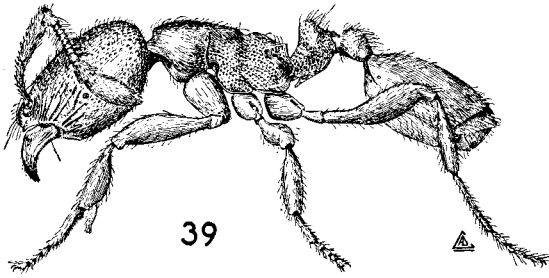
Erebomyrma Wheeler, 1903, Biol. Bul. 4:138.

Genotype, *Erebomyrma longii* Wheeler (monobasic).

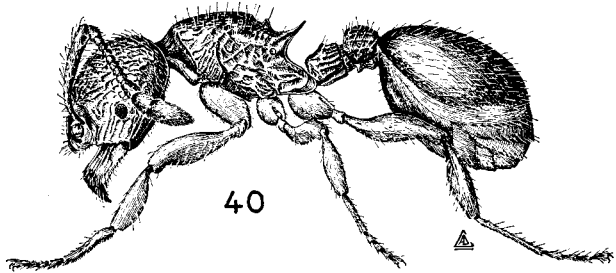
Wheeler, 1903, Biol. Bul. 4:140.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 428, illus.

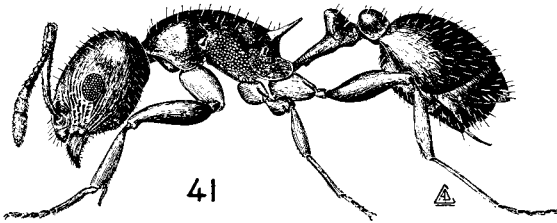
Length 1.5-2.25 mm. Monomorphic. Middle of anterior border of clypeus emarginate, with a tooth on each side of the emargination and a carina extending posteriorly over the clypeus from each tooth. Mandible 4-toothed. Eye extremely small, placed in the middle, or slightly anterior to the middle, of the side of the head. Antenna 11-segmented; scape short,



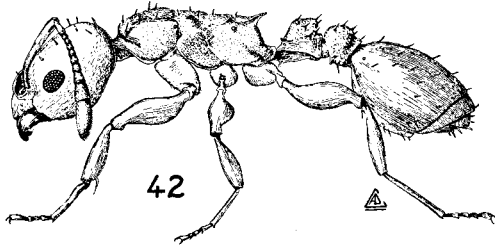
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PLATE 11

Fig. 39. *Erebomyrma longii* Wheeler, worker.Fig. 40. *Myrmecina graminicola americana* Emery, worker.Fig. 41. *Macromischa subditiva* Wheeler, worker.Fig. 42. *Leptothorax* (*Goniothorax*) *wilda* M. R. Smith, worker.

extending posteriorly only a short distance beyond the midlength of the head; funiculus with a prominent 2-segmented club, which is longer than the remaining funicular segments combined. Prothorax with rounded humeri. Promesonotal suture obsolescent or absent. Mesoepinotal region with a very strong constriction. Epinotum armed with a pair of short, tubercle-like spines which are scarcely longer than broad at the base. Petiole, in profile, distinctly larger than postpetiole. Postpetiole, from above, subcampanulate. Legs robust, femora and tibiae incrassated. Middle and hind tibiae without spurs. Mesopleura and epinotum covered with coarse, reticulate-rugose sculpturing. Body with numerous, long, yellowish hairs. Rare. One form, †*longii* Wheeler of northern Texas. Colonies nest in the soil. The ants are apparently strictly subterranean. Very little is known about their biology.

MYRMECINA Curtis

Pl. 11, Fig. 40

Myrmecina Curtis, 1829, Brit. Ent. 6:265.

Genotype, (*Myrmecina latreillei* Curtis) = *Formica graminicola* Latreille (monobasic).

Emery, 1895, Zool. Jahrb., Abt. f. System. 8:271.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:376.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:422.

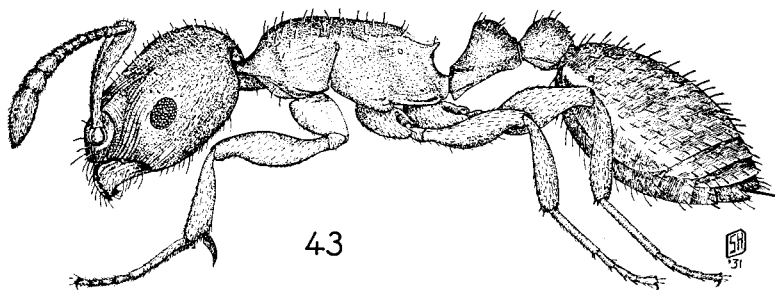
Cole, 1940, Amer. Midl. Nat. 24:39.

Wesson and Wesson, 1940, Amer. Midl. Nat. 24:92.

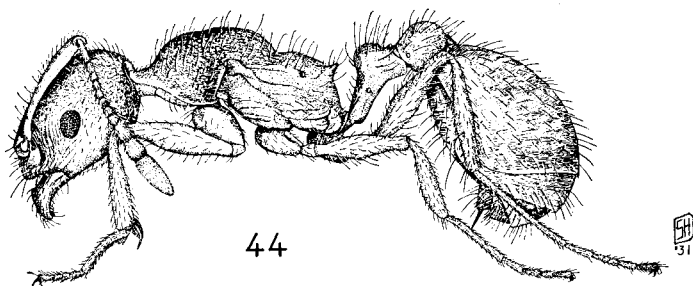
Amstutz, 1943, Ohio Jour. Sci. 43:169.

Buren, 1944, Iowa State Col. Jour. Sci. 18:290.

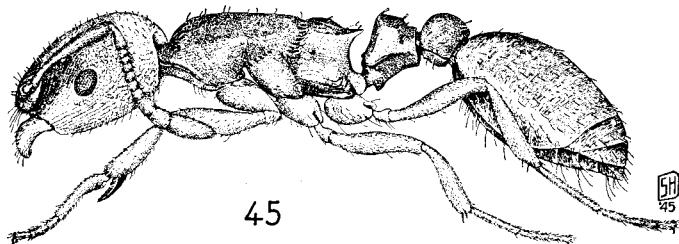
Length 2-3 mm. Head subquadrate, with deeply emarginate posterior border. Eye small, inconspicuous, placed slightly anterior to the middle of the side of the head. Antenna 12-segmented, with a distinct 3-segmented club. Anterior border of clypeus with an emarginate median lobe; portion of clypeus anterior to antennal fossa very narrow, not elevated as in *Tetramorium*. Mandibles of such shape that when closed they leave a large space between themselves and the clypeus. Maxillary palpus 4-segmented, labial palpus 3-segmented. Thorax short, stout, much broader anteriorly than posteriorly. Prothorax with well defined humeral angles. Promesonotal suture usually obsolescent. Epinotum with 2 pairs of spines, the anterior part shorter than the posterior pair. Legs rather short, with incrassated femora and tibiae; middle and hind legs without spurs. Petiole nonpedunculate. Postpetiole not very much broader than petiole, but broader and higher than long. First gastric segment occupying most of gaster. Body, exclusive of gaster, subopaque, often rather strongly sculptured, the sculpturing mostly of an irregular rugulose to rugulose-reticulate nature. Hairs simple, suberect to erect, rather abundant. Brownish to black with lighter appendages. Three forms, †*graminicola americana* Emery, †*graminicola americana brevispinosa* Emery and *graminicola texana* Wheeler. The subspecies *americana* is the most common form. Ants of this genus probably occur over the entire United States and are certainly found as far west as Arizona, California and Montana; they are apparently more common in the eastern half of the country. The small colonies occur in the ground or in rotten logs. The workers are predaceous and carnivorous. Not known to attend honeydew-excreting insects. Not rare but more uncommon than many myrmecine ants.



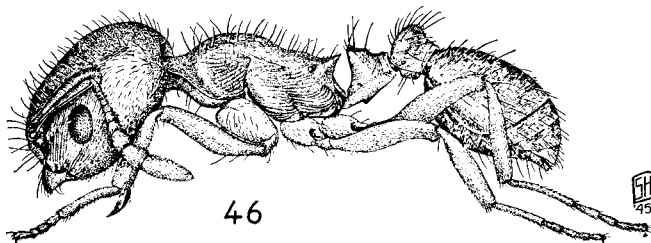
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PLATE 12

Fig. 43. *Leptothorax (Leptothorax) schaumii* Roger, worker.

Fig. 44. *Leptothorax (Dichothorax) sp.*, worker.

Fig. 45. *Leptothorax (Mychothorax) acervorum canadensis* Provancher, worker.

Fig. 46. *Harpagoxenus americanus* (Emery), worker.

MACROMISCHA Roger

Pl. 11, Fig. 41

Macromischa Roger, 1863, Berlin. Ent. Ztschr. 7:184.Genotype, *Macromischa purpurata* Roger (by designation of Wheeler, 1911).

Wheeler, 1903, Psyche 10:99-100.

*Mann, 1920, Amer. Mus. Nat. Hist. Bul. 42:409.

Wheeler, 1931, Harvard Univ. Mus. Compar. Zool. Bul. 72:27-29.

*Smith, 1939, Ent. Soc. Amer. Ann. 32:502-509, illus.

Monomorphic. Length 2-2.6 mm. Head usually distinctly longer than broad, with rounded posterior corners. Eye prominent to large, placed close to the middle of the side of the head. Clypeus with a median carina. Antenna 12-segmented, with a 3-segmented club; scape either short and robust or else rather long and slender. Thorax short, arched anteroposteriorly. Prothorax with rounded or subangular humeri. Promesonotal and mesoepinotal sutures faintly indicated or absent. Epinotal spines prominent. Femora incrassated, those of the posterior pair of legs very noticeably so; tibiae sometimes incrassated also. Petiole moderately to strongly pedunculate, the ventral surface with a weak to prominent tooth. Postpetiolar node broader than long. Base of gaster with prominent humeral angles. Body covered with moderately abundant to fairly abundant erect hairs. Habitus of *subditiva* and *polita* that of a *Leptothorax*, habitus of *floridana* more like that of a *Tetramorium*. Three forms, †*floridana* (Wheeler) of Florida, †*polita* M. R. Smith of Arizona, and †*subditiva* Wheeler of Texas and Louisiana. These ants form small colonies and nest largely, if not entirely, within cavities of plants.

LEPTOTHORAX, subgenus GONIOTHORAX Emery

Pl. 11, Fig. 42

Leptothorax, subg. *Goniothorax* Emery, 1896, Soc. Ent. Ital. Bol. 28:58.Subgenotype, *Leptothorax vicinus* Mayr (by designation of Wheeler, 1911).

Smith, 1943, Ent. Soc. Wash. Proc. 45:154.

Antenna of 11 or 12 segments, usually with a well-defined club, the last 4 or 5 segments gradually becoming wider and longer. Pronotum more or less distinctly shouldered, the anterior angles being well-defined, often sharp, sometimes toothed. Petiole and postpetiole usually adorned with numerous tubercles or spines. Body hairs obtuse or clavate. Only one form, †*wilda* M. R. Smith of southern Texas. This has an 11-segmented antenna, with a distinct 3-segmented club. Prothorax with sharp humeral angles. Each side of thorax with 3 prominent protuberances in addition to the angular humerus, and the petiole and postpetiole each with several pairs of spines or tubercles. The ant is believed to nest in crevices of plants or trees.

LEPTOTHORAX, subgenus LEPTOTHORAX Mayr

Pl. 12, Fig. 43

Leptothorax Mayr, 1855, Zool.-Bot. Gesell. Wien, Verh. 5:431.Subgenotype, *Myrmica clypeata* Mayr (by designation of Emery, 1912).

Roger, 1863, Berlin. Ent. Ztschr. 7:180.

Mayr, 1866, Sitz. Akad. Wiss. Wien 53:508.

- Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:451.
 *Emery, 1895, Zool. Jahrb., Abt. f. System. 8:317.
 *Wheeler, 1903, Phila. Acad. Nat. Sci. Proc. 55:215, illus.
 Wheeler, 1909, N. Y. Ent. Soc. Jour. 17:81, 82.
 Wheeler, 1913, Psyche 20:113.
 Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:414.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:507-511.
 Smith, 1929, Ent. Soc. Amer. Ann. 22:547-549, illus.
 Smith, 1934, Psyche 41:211-212.
 Wesson, 1940, Amer. Midl. Nat. 24:94-98.
 Smith, 1942, Ent. Soc. Wash. Proc. 44:59, illus.
 Headley, 1943, Ent. Soc. Amer. Ann. 36:743.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:286.

Length 1.5-3.3 mm. Antenna 11- or 12-segmented, with a 3-segmented club. Thoracic humeri usually rounded, occasionally subangular. Mesoepinotal impression on dorsal surface of thorax usually absent, if present, scarcely perceptible. Common. Thirty-five forms, †*andrei* Emery, †*bradleyi* Wheeler, †*curvispinosus* Mayr, †*curvispinosus ambiguus* Emery, *curvispinosus ambiguus pinetorum* Wesson and Wesson, *eldoradensis* Wheeler, †*fortinodis* Mayr, *fortinodis* var. *gilvus* Wheeler, †*fortinodis* var. *melanoticus* Wheeler, †*foveata* M. R. Smith, *furunculus* Wheeler, †*longispinosus* Roger, †*longispinosus laeviceps* Buren, *melanderi* Wheeler, *minutissimus* M. R. Smith, *neomexicanus* Wheeler, *nevadensis* Wheeler, †*nevadensis rudis* Wheeler, *nitens* Emery, †*nitens* var. *heathii* Wheeler, *nitens* var. *mariposa* Wheeler, *nitens occidentalis* Wheeler, †*obturator* Wheeler, †*rugatulus* Emery, *rugatulus annectens* Wheeler, *rugatulus brunnescens* Wheeler, *rugatulus* var. *cockerelli* Wheeler, †*rugatulus* var. *mediorufus* Wheeler, †*schaumi* Roger, *schmittii* Wheeler, †*terrigena* Wheeler, †*texanus* Wheeler, †*texanus davisi* Wheeler, †*tricarinatus* Emery, †*wheeleri* M. R. Smith. Members of this subgenus apparently occur in every state. Geographically they may be roughly divided into Eastern and Western forms, the boundary separating the two groups being approximately the 102d degree of longitude. The various forms have diverse nesting habits, their colonies occurring in the soil, wood, plant cavities, insect galls, acorns, nuts, snail shells, etc. *L. curvispinosus* and *L. longispinosus* are enslaved by *Harpagoxenus americanus* (Emery) and *L. (Mychothorax) duloticus* Wesson. The author has recently described what is believed to be a parasitic form, *L. minutissimus*, from several females collected with *curvispinosus* workers, all presumably from the same colony. The food of the workers of this subgenus appears to be honeydew and the flesh of small arthropods.

LEPTOTHORAX, subgenus DICHOTHORAX Emery

Pl. 12, Fig. 44

- Leptothorax*, subg. *Dichothorax* Emery, 1895, Zool. Jahrb., Abt. f. System. 8:323.
 Subgenotype, *Leptothorax (Dichothorax) pergandei* Emery (by designation of Wheeler, 1911).
 *Emery, 1895, Zool. Jahrb., Abt. f. System. 8:323, illus.
 *Wheeler, 1903, Acad. Nat. Sci. Phila. Proc. 55:256, illus.
 Smith, 1929, Ent. Soc. Amer. Ann. 22:549.
 *Cole, 1940, Amer. Midl. Nat. 24:58.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:286.

Length 2.5-3.25 mm. Head distinctly longer than broad, subrectangular. Eye prominent. Frontal carina short, with poorly developed lobe. Antenna 12-segmented; scape rather slender; funiculus with a 3-segmented club. Clypeus not strongly convex, usually with a weak median carina. Prothorax with rounded humeri. Promesonotal suture obsolete or absent. Mesoepinotal constriction pronounced. Epinotum with a pair of tubercles or short spines. Legs with somewhat incrassated femora. Petiole pedunculate, the node often low, with straight, rounded or excised, transverse superior border. Postpetiole distinctly broader than long. Hairs on body simple, white or grayish, suberect to erect, long, abundant. Dorsal surface of head and pronotum smooth and shining with a coriaceous appearance. Four forms, †*pergandei* Emery, †*pergandei flavus* M. R. Smith, †*pergandei floridanus* Emery, *pergandei floridanus spinosus* M. R. Smith. The most common of these is *pergandei*. The ants of this subgenus range from Maryland and Florida to at least Nebraska and Texas. Small colonies are formed in the soil, in rotting logs or stumps, or in debris. Workers are predaceous and carnivorous. The habitus of the worker somewhat resembles that of certain species of *Pheidole*. *L. (D.) manni* Wesson and *L. (D.) tennesseensis* Cole have been recently suppressed as synonyms.

LEPTOTHORAX, subgenus MYCHOTHORAX Ruzsky

Pl. 12, Fig. 45

Leptothorax, subg. *Mychothorax* Ruzsky, 1904, Fourmis, Gouv. Arkangelsk Bul. Soc. Geogr., p. 288.

Subgenotype, *Formica acervorum* Fabricius (by designation of Ruzsky, 1904). Emery, 1895, Zool. Jahrb., Abt. f. System. 8:318.

Wheeler, 1901, Amer. Nat. 35:433.

*Wheeler, 1903, Acad. Nat. Sci. Phila. Proc. 55:223-232, illus.

Wheeler, 1907, Wis. Nat. Hist. Soc. Bul. 5:70.

Forel, 1914, Deut. Ent. Ztschr., p. 617.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:415.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:511-515.

Wesson, 1937, Ent. News 48:125-129, illus.

Smith, 1939, Ent. Soc. Wash. Proc. 41:176.

*Buren, Iowa State Col. Jour. Sci. 18:286.

Length 2-3.5 mm. Antenna 11-segmented, with a 3-segmented club. Pronotum without angular humeri. Hairs on head, thorax, petiole and postpetiole suberect to erect, obtuse or clubbed (both simple and clavate in *diversipilosus*), and usually short. Mesoepinotal constriction generally distinct or pronounced. Petiole scarcely or only very slightly pedunculate. Epinotum with a pair of usually rather short, blunt spines (very long and fingerlike in *duloticus*). Gaster often with angular humeri. Clypeus sometimes with a longitudinal furrow. Eleven forms, †*acervorum canadensis* Provancher, †*acervorum canadensis calderoni* Forel, *acervorum canadensis convivalis* Wheeler, †*acervorum canadensis yankee* Emery, †*acervorum crassipilis* Wheeler, †*diversipilosus* M. R. Smith, †*duloticus* Wesson, †*emersoni* Wheeler, *emersoni glacialis* Wheeler, *hirticornis* Emery, †*muscorum* var. *sordidus* Wheeler. Mostly northern and western in distribution, probably not occurring in that section of the United States south of the 40th degree of latitude and east of the 95th degree of longitude. The ants nest in both

soil and wood. Some forms such as *emersoni* and *diversipilosus* are inquilines in the nests of other ants; the host of the former is *Myrmica brevinodis* var. *canadensis* Wheeler, that of *diversipilosus*, *Formica rufa obscuripes* Forel. *L. duloticus* even makes slaves of *Leptothorax curvispinosus* Mayr and *L. longispinosus* Roger. The subgenus *Mychothorax* also has individuals which are transitional between the worker and female (ergatogynes). The ergatogynes are usually distinguished from the worker by the extra sclerites of the thorax, their larger size, and the possession of ocelli. In addition to ergatogynes, *L. diversipilosus* also has an ergatander which can be distinguished from the worker by its vestigial mandibles, presence of ocelli, slender funiculus, and male genitalia. It is rather likely that *emersoni* Wheeler may prove synonymous with *provancheri* Emery.

SYMMYRMICA Wheeler

Symmyrmica Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:3.
 Genotype, *Symmyrmica chamberlini* Wheeler (monobasic).
 Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:5, illus.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 432, illus.
 Cole, 1942, Amer. Midl. Nat. 28:370.

Length 3-3.25 mm. Head longer than broad, with subparallel sides. Eye of moderate size, placed in middle of side of head. Small ocelli often present. Clypeus large, convex, longitudinally impressed in middle, with rounded, entire anterior border. Antennal fossa large. Frontal carinae prominent, subparallel. Maxillary palpus 5-segmented, labial palpus 3-segmented. Antenna 11-segmented; funiculus with a 3-segmented club. Thorax long, slender. Prothorax with rounded humeri. Promesontal suture faint. Mesoepinotal constriction broad, pronounced. Epinotum with a pair of short spines. Petiole not pedunculate, ventral surface with a blunt, flattened tooth. Ventral surface of postpetiole unarmed. Legs robust; femora fusiform, middle and hind tibiae without spurs. Head coarsely and densely reticulate rugose. Thorax also reticulate rugose, finely and irregularly on the pro- and mesonotum, more coarsely on the pleura and epinotum. Body and appendages covered with abundant, coarse, suberect hairs. This genus has an apterous ergatoid male with ocelli and large eyes resembling those of true males. Mandibles small, each with a single median tooth. Thorax with distinct mesonotum, paraptera, scutellum and metanotum. Antenna 12-segmented. Size approximately same as that of worker. One form, *chamberlini* Wheeler, which is an inquiline in the nest of *Myrmica mutica* Emery. Very rare. Utah. According to Wheeler this leptothoracine ant has an affinity with *Formicoxenus nitidulus* (Nylander) of Europe.

HARPAGOXENUS Forel

Pl. 12, Fig. 46

Tomognathus Mayr, 1861, Die Europäischen Formiciden, p. 56. (Preoccupied by Agassiz, in Dixon 1850.)

Harpagoxenus Forel, 1893, Soc. Ent. de Belg. Ann. 37:167.

Genotype, *Myrmica sublaevis* Nylander (monobasic).

Emery, 1895, Zool. Jahrb., Abt. f. System 8:272.

- Wheeler, 1926, *Ants*, Columbia Univ. Press, 2d ed., p. 494, illus.
 Sturtevant, 1927, *Psyche* 34:1.
 Creighton, 1927, *Psyche* 34:11.
 Creighton, 1929, *Psyche* 36:48.
 Wesson, 1939, *Amer. Ent. Soc. Trans.* 65:97.
 Smith, 1939, *Ent. Soc. Wash. Proc.* 41:165, illus.

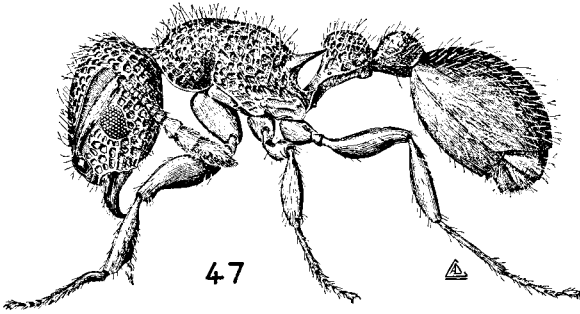
Length 2.5-4 mm. Antenna 11-segmented; scape stout, strongly flattened, lacking a great deal of reaching the posterior border of the head; last 4 segments of the funiculus enlarged but not forming a well-defined club. Frontal carina extending to about the apex of the scape and more or less forming a scrobe for the reception of the scape. Anterior border of clypeus with a very distinct median emargination. Mandible with or without teeth. Eye prominent, placed near the middle or slightly anterior to the middle of the side of the head. Mesoepinotal impression moderately distinct to distinct. Epinotum with a pair of spines. Petiole scalelike. Postpetiole much broader than long. Gaster constricted at the base. Rare. Two forms, †*americanus* (Emery) and †*canadensis* M. R. Smith. The former is a slave-making ant on *Leptothorax curvispinosus* Mayr and *L. longispinosus* Roger, and has been collected in Virginia, New Jersey, Massachusetts, New York, Pennsylvania, Illinois, Ohio, and District of Columbia. *H. canadensis* was described from Quebec, Canada, but has also been found in Minnesota. This ant is closely allied to the European *sublaevis* Nylander. It is a slave-making form on *L. acervorum canadensis* Provancher var. In this genus there are individuals intermediate in structure between the worker and the female. These can usually be distinguished from workers by the presence of ocelli and by the extra sclerites of the thorax. For detailed accounts of the biology and slave-making habits of *americanus* see Creighton and Sturtevant, 1927, and Wesson, 1939.

TRIGLYPHOTHRIX Forel

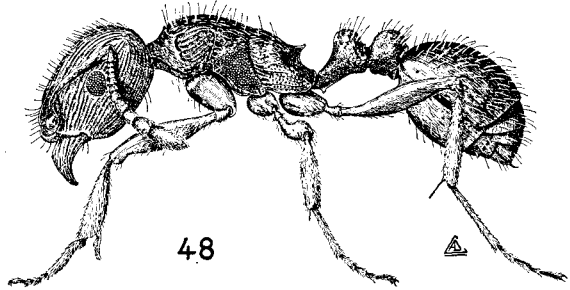
Pl. 13, Fig. 47

- Triglyphothrix* Forel, 1890, *Soc. Ent. de Belg. Ann.*, *Compt. Rend.* 34:cvi.
 Genotype, *Triglyphothrix walshi* Forel (monobasic).
 Emery, 1889, *Mus. Stor. Nat. Genova, Ann.* (2) 7:501.
 *Bingham, 1903, *Fauna British India Hymen.* 2:173.
 Wheeler, 1916, *Jour. Econ. Ent.* 9:566, illus.

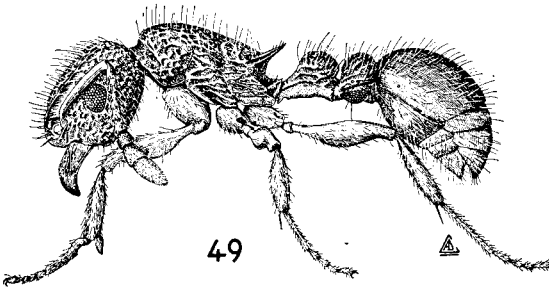
Length 2.5 mm. Posterior border of clypeus forming a distinct ridge or carina in front of each antennal insertion. Head subrectangular. Frontal carinae well-separated, greatly extended posteriorly to form scrobes for the reception of the antennal scapes. Eye prominent. Antenna 12-segmented; funiculus with a 3-segmented club. Thorax short, stout, strongly arched dorsally, without promesonotal and mesoepinotal sutures. Epinotum with a pair of long, pointed spines and a pair of metasternal spines. Petiole, in profile, pedunculate, with a somewhat subrectangular node. Head and thorax rugulose reticulate. Body covered with dense, soft, erect hairs, many of which are branched or trifid. One form, †*striatidens* (Emery), an apparently introduced Indian ant, has been found in several towns in Florida, South Carolina, Alabama, Mississippi, and Louisiana. Colonies nest in the soil. Wheeler, 1916, indicates that the ant may be expected to become established in green-



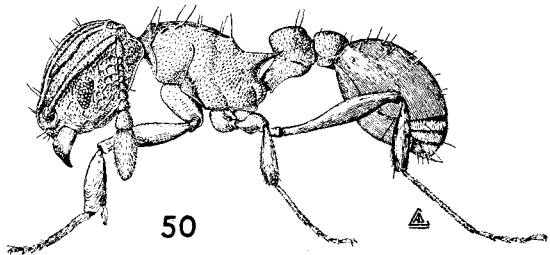
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PLATE 13

- Fig. 47. *Triglyphothrix striatidens* (Emery), worker.
 Fig. 48. *Tetramorium caespitum* (Linnaeus), worker.
 Fig. 49. *Xiphomyrmex spinosus insons* Wheeler, worker.
 Fig. 50. *Wasmannia auropunctata* (Roger), worker.

houses, especially in the more northern regions of our country. Although little is known of the biology of this species the workers no doubt attend honeydew-excreting insects.

TETRAMORIUM Mayr

Pl. 13, Fig. 48

Tetramorium Mayr, 1855, Zool.-Bot. Gesell. Wien, Verh. 5:423.

Genotype, *Formica caespitum* Linnaeus (by designation of Girard, 1879).

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:973, 976.

*Bingham, 1903, Fauna British India Hymen. 2:176, 184.

*Emery, 1909, Deut. Ent. Ztschr. 6:695, 699, illus.

Santschi, 1909, Soc. Ent. Ital. Bol. 41:6.

Smith, 1915, Va. Truck Crop Expt. Sta. Bul. 16:1-15, illus.

Forel, 1923, Suisse Zool. Rev. 30:91.

Donisthorpe, 1927, British Ants, Geo. Routledge and Sons, London, 2d ed., p. 189, illus.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:831, 851, 853.

*Metcalf and Flint, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 770.

*Smith, 1943, Ent. Soc. Wash. Proc. 45:1-5, illus.

Length 1.75-4.25 mm. Posterior border of clypeus forming a distinct ridge or carina in front of each antennal socket. Frontal carinae well-separated, often greatly extended posteriorly to form scrobes for the reception of the antennal scapes. Eye prominent, placed very near the middle of the side of the head. Antenna 12-segmented; funiculus with a 3-segmented club. Prothorax of most species with angular humeri. Promesonotal suture usually indistinct or absent. Mesoepinotal region usually with a weak to strong impression or constriction. Epinotum with a pair of short or long spines. Metasternum usually extended posteriorly as a pair of spines or tubercles. Femora and tibiae incrassated in some species. Clypeus usually with a number of prominent longitudinal carinae. Sculpturing of head and thorax largely striate, rugulose, or rugulose reticulate. Hairs usually simple, though sometimes enlarged apically. Seven forms, *bahai* Forel, †*caespitum* (Linnaeus), †*guineense* (Fabricius), †*pacificum* Mayr var., †*rugiventris* M. R. Smith, *silvestrii* Santschi, and †*simillimum* (F. Smith). All but *bahai*, *rugiventris*, and *silvestrii* are found in greenhouses and nurseries, or in and around urban communities, especially in the southern and eastern half of the United States. The four apparently introduced forms, *caespitum*, *guineense*, *pacificum* var. and *simillimum* are of considerable economic importance. The best known of these is *caespitum* which gnaws into the roots and bases of vegetables and flowers, steals seeds from seed beds, infests houses, and attends honeydew-excreting insects. It is also the host of the well-known parasitic ant, *Anergates aratulus* (Schenck). For further information on the relation of the two see remarks under *Anergates*, p. 571. *T. bahai*, described by Forel from specimens supposedly collected at Faisons, N. C., and *T. silvestrii*, described by Santschi from Tucson, Ariz., have not been recognized since the time of their original description. It is the author's opinion that all forms authentically recorded for the United States were probably introduced.

XIPHOMYRMEX Forel

Pl. 13, Fig. 49

Tetramorium, subg. *Xiphomyrmex* Forel, 1887, Schweiz. Ent. Ges. Mitt. 7:385.Genotype, *Tetramorium* (*Xiphomyrmex*) *kelleri* Forel (by designation of Wheeler, 1911).

Pergande, 1895, Calif. Acad. Sci. Proc. 5:894.

Forel, 1901, Soc. Ent. de Belg. Ann. 45:128.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:415.

*Smith, 1938, Wash. Acad. Sci. Jour. 28:126, illus.

Length 3.2-4 mm. Habitus somewhat similar to that of *Tetramorium guineense* (Fabricius). Hairs simple, either long, or else short and somewhat coarse. Characters similar to those of *Tetramorium* except for the 11-segmented antenna. Sculpturing mostly rugulose reticulate. Habitat very warm, dry, open regions. Two forms, †*spinosus hispidus* Wheeler of the desert region around Tucson and Phoenix, Ariz., and †*spinosus insons* Wheeler from localities in Texas and Arizona. Uncommon. The ants form small colonies in the ground.

Wheeler (1915) stated that he collected in the Huachuca Mountains of Arizona a *Xiphomyrmex* closely related to *spinosus wheeleri* Forel. Forel's form was described from Mexican specimens.

WASMANNIA Forel

Pl. 13, Fig. 50

Wasmannia Forel, 1893, London Ent. Soc. Trans., p. 383.Genotype, *Tetramorium auropunctatum* Roger (by designation of Wheeler, 1911).

Roger, 1863, Berlin. Ent. Ztschr. 7:182.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:143, illus.

Smith, 1929, Jour. Econ. Ent. 22:241.

Wheeler, 1929, Psyche 36:89.

*Smith, 1939, Puerto Rico Univ. Jour. Agr. 20: 854, illus.

Spencer, 1941, Fla. Ent. 24:6.

Length approximately 1.5 mm. Antenna 11-segmented; scape not extending past the posterior border of the head; funiculus with a 3-segmented club, the last segment of which is very large and prominent and is considerably longer than the 2 preceding segments combined. Frontal carina extending almost to the posterior border of the head and forming a more or less distinct scrobe for the reception of the scape. Eye rather prominent, very coarsely faceted, the border nearest the mandible forming a rather acute point which is directed anteroventrally. Prothorax with angular humeri. Promesonotal suture obsolete or absent. Epinotal spines prominent, closely placed basally. Petiolar node, in profile, subrectangular. Hairs on body long, sparse. General color golden brown. One form, †*auropunctata* (Roger), which has apparently been introduced into a number of localities in Florida. The ants nest in both soil and wood. The colonies are usually very populous. *W. auropunctata* is of considerable economic importance because of the painful, long-lasting stings of the workers, its house-infesting habits and attendance on honeydew-excreting insects. For an account of the biology and economic importance of this ant under Florida conditions, see Spencer 1941.

CRYPTOCERUS, subgenus CRYPTO CERUS Fabricius

Pl. 14, Fig. 51

Cryptocerus Fabricius, 1804, Syst. Piez., p. 418.Subgenotype, *Cryptocerus umbraculatus* Fabricius (by designation of Emery, 1914).

Santschi, 1915, Soc. Ent. de France Bul. 13:208, illus.

Wheeler, 1916, New Engl. Zool. Club Proc. 6:32, illus.

Dimorphic. Length 3.5-6 mm. Body rather depressed. Frontal carinae distant, continuing backward above eyes on sides of head, each forming a prominent, more or less horizontal lobe under which the entire antenna can be concealed. Antenna 11-segmented, enlarged apically, but without a well-defined club. A scrobe for the reception of the antenna lying anterior to the eye and beneath the lobe of the frontal carina. Eye well-developed, convex, placed closer to the posterior corner of the head; exposed in the worker, more concealed in the soldier. Part of mandible including the masticatory margin exposed. Dorsal surface of head of soldier with a somewhat saucer-shaped structure, with the rim broken or interrupted anteriorly and very poorly formed posteriorly. Each side of thorax marginate and bearing a number of irregular spines or tubercles. Soldier with a prominent, interrupted, transverse ridge, anterior to the promesonotal suture; also with rather distinct promesonotal and mesoepinotal sutures. Legs short, femora incrassated. Petiole and postpetiole each with prominent spines on the side. Gaster oval, usually with a rather deep basal emargination where the postpetiole is attached to the gaster. Body clothed with short, closely appressed, silvery or grayish hairs. Two forms, †*rohweri* Wheeler of Arizona, and †*texanus* Santschi of Texas. The ants form small colonies in cavities within trees and plants, especially dead branches. Some colonies even nest in insect galls. Very little is known of their biology. Wheeler 1916, page 35, states that he had referred to *angustus* Mayr specimens taken at Brownsville, Tex., by Mr. Charles Schaeffer which are apparently the same form as Santschi's *texanus*.

CRYPTOCERUS, subgenus CYATHOMYRMEX Creighton

Pl. 14, Fig. 52

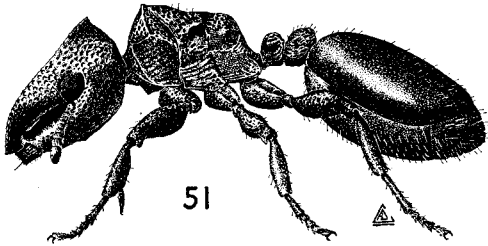
Cryptocerus, subg. *Cyathocephalus* Emery, 1915, Soc. Ent. de France Bul., p. 192.(*Cyathocephalus* preoccupied by Kessler., 1868.)*Cyathomyrmex* Creighton, 1933, Psyche 40:98.Subgenotype, *Cryptocerus pallens* Klug (by original designation).

F. Smith, 1876, Lond. Ent. Soc. Trans., p. 606, illus.

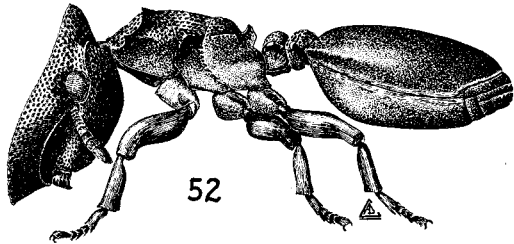
Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:102, illus.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 17, 90, 151, 426, illus.

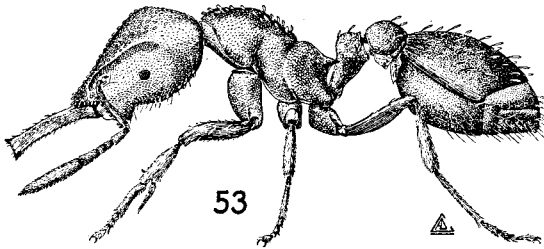
Dimorphic. Length 3-6 mm. Characters similar to those of the subgenus *Cryptocerus* except that the saucer-shaped structure on the head of the soldier is completely rimmed, and deep within (concave), the mandibles are concealed, and the gaster is noticeably elongate. The worker differs mainly in its elongate gaster. One form, †*varians* F. Smith of Florida. Nesting habits similar to those of the subgenus *Cryptocerus*.



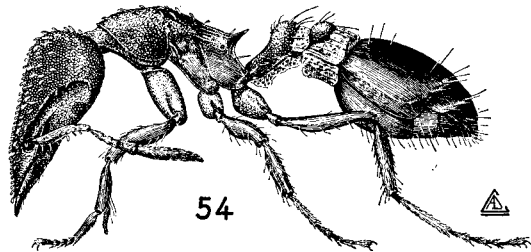
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PLATE 14

- Fig. 51. *Cryptocerus* (*Cryptocerus*) *rohveri* Wheeler, soldier.
 Fig. 52. *Cryptocerus* (*Cyathomyrmex*) *varians* F. Smith, worker.
 Fig. 53. *Strumigenys* (*Strumigenys*) *louisianae laticepala* M. R. Smith, worker.
 Fig. 54. *Strumigenys* (*Trichoscapa*) *rostrata* Emery, worker.

STRUMIGENYS, subgenus STRUMIGENYS F. Smith

Pl. 14, Fig. 53

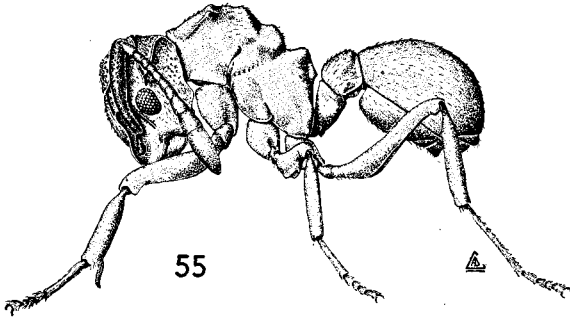
- Strumigenys* F. Smith, 1860, Jour. Ent. 1:72 (London).
 Subgenotype, *Strumigenys mandibularis* F. Smith (monobasic).
 Roger, 1863, Berlin. Ent. Ztschr. 7:211.
 *Emery, 1895, Zool. Jahrb., Abt. f. System. 8:326.
 *Smith, 1931, Ent. Soc. Amer. Ann. 24:688-691, illus.
 Creighton, 1937, Psyche 44:97, illus.

Monomorphic. Length 2.25-2.5 mm. Head subcordate, with strongly emarginate posterior border and prominent, rounded posterior corners. Anterior border of clypeus subtruncate. Mandibles placed close to each other on anterior border of head, slender, porrect, subparallel (somewhat like *Odontomachus*), longer than half of the remainder of the head; each with a preapical tooth and 2 large apical teeth. Antenna 6-segmented, with an extremely long apical segment which is longer than the remaining segments of the funiculus combined, and approximates the length of the scape. A rather well-defined scrobe above the eye for the reception of the scape. Eye unusually well-developed. Promesonotal suture obsolescent or absent. Mesopinotal constriction distinct. Epinotum with a pair of short spines and an infraspinal lamella beneath each. Petiolar and postpetiolar nodes broader than long, the latter unusually broad. Postpetiole with spongiform processes on its ventral and posterior borders. Base of first gastric segment with longitudinal striae in addition to the reticulation. Head densely, thorax less densely, covered with short, depressed, scalelike hairs; petiole, postpetiole and gaster with longer and more erect, clavate hairs. Two forms, †*louisianae* Roger and †*louisianae laticephala* M. R. Smith. Members of this subgenus have been recorded from North Carolina, Tennessee and Florida westward into Louisiana, Arkansas, Texas and Arizona. The forms appear to be mainly southern in distribution. Small colonies are found nesting in the soil and in logs and stumps. Creighton 1937 presents data to indicate that the ants of this subgenus are at least partly insectivorous.

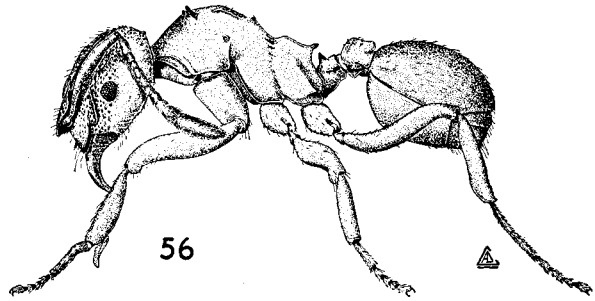
STRUMIGENYS, subgenus TRICHOSCAPA Emery

Pl. 14, Fig. 54

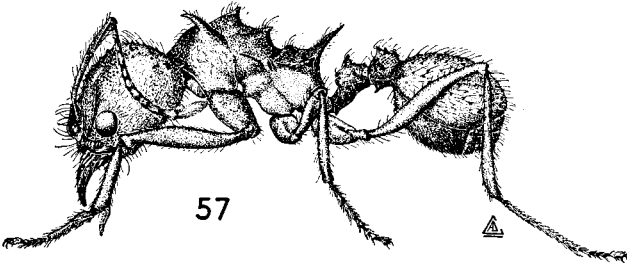
- Cephaloxys* F. Smith, 1865, Linn. Soc. Lond. Jour. Zool. 8:76. (Preoccupied by Signoret, 1847.)
 Genotype, *Cephaloxys capitata* F. Smith (monobasic).
Strumigenys, subg. *Trichoscapa* Emery, 1869, Accad. degli Aspiranti Naples, Ann. (2) 2:24.
 Subgenotype, *Strumigenys (Trichoscapa) membranifera* Emery (monobasic).
 *Emery, 1895, Zool. Jahrb., Abt. f. System. 8:325, illus.
 *Smith, 1931, Ent. Soc. Amer. Ann. 24:686, illus.
 Kennedy and Schramm, 1933, Ent. Soc. Amer. Ann. 26:95, illus.
 Wheeler, 1933, Hawaii Ent. Soc. Proc. 8:275, illus.
 Weber, 1934, Psyche 41:63, illus.
 Smith, 1935, Ent. Soc. Amer. Ann. 28:214.
 Wesson, 1936, Ent. News 47:171.
 *Wesson and Wesson, 1939, Psyche 46:91, illus.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:290.



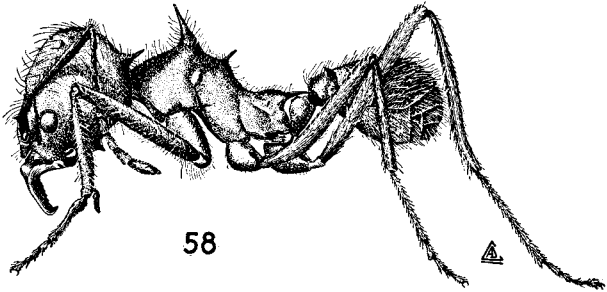
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PLATE 15

- Fig. 55. *Cyphomyrmex* (*Cyphomyrmex*) *rimosus minutus* Mayr, worker.
 Fig. 56. *Cyphomyrmex* (*Mycetosoritis*) *hartmanni* Wheeler, worker.
 Fig. 57. *Acromyrmex* (*Moellerius*) *versicolor* (Pergande), major worker.
 Fig. 58. *Atta texana* Buckley, major worker.

Monomorphic. Length 1.3-2.5 mm. Most forms smaller than in the subgenus *Strumigenys*. Head very variable in shape, narrower anteriorly than posteriorly, with emarginate posterior border and prominent rounded or angular posterior corners. Antenna 6-segmented, the last segment very long and usually as long as, or longer than, the remaining funicular segments combined; scape sometimes angular at the base. Eye varying from extremely small to rather well-developed. Clypeus of diverse shape, with subtruncate, rounded or acutely pointed anterior border. Mandible much shorter than in the subgenus *Strumigenys*, usually not as long as clypeus and generally of a subtriangular shape, but with diverse dentition. Spongiform processes on petiole and postpetiole sometimes very highly developed. Pilosity variable with regard to length, shape and abundance, most often spatulate or clavate; often the hairs on the clypeus and antennal scape are very characteristic with regard to position and shape. Base of gaster usually with longitudinal striae. Twenty-five forms, *abditata* Wesson and Wesson, †*angulata* M. R. Smith, *bimarginata* Wesson and Wesson, †*clypeata* Roger, *clypeata* var. *brevisetosa* M. R. Smith, †*clypeata* var. *laevinasis* M. R. Smith, †*clypeata* var. *pilinis* Forel, †*creightoni* M. R. Smith, †*dietrichi* M. R. Smith, †*manni* Wesson and Wesson, †*margaritae* Forel, *medialis* Wesson and Wesson, *membranifera* var. *marioni* Wheeler, †*membranifera simillima* Emery, †*missouriensis* M. R. Smith, *ohioensis* Kennedy and Schramm, †*ornata* Mayr, †*pergandei* Emery, †*pulchella* Emery, †*reflexa* Wesson and Wesson, †*rohweri* M. R. Smith, †*rostrata* Emery, †*sculpturata* M. R. Smith, *talpa* Weber, *venatrix* Wesson and Wesson. Members of this subgenus no doubt occur in all states east of the Mississippi River except perhaps Maine, Vermont, New Hampshire, Michigan and Wisconsin. West of the Mississippi their distribution is imperfectly known but the ants have been collected in Louisiana, Texas, Missouri and California. The various forms nest in the soil and also in rotten wood such as logs and stumps. The colonies are small. Wesson found that several species are predaceous on springtails. Kennedy suggested that the workers may feed on fungi.

CYPHOMYRMEX, subgenus CYPHOMYRMEX Mayr

Pl. 15, Fig. 55

- Cyphomyrmex* Mayr, 1862, Zool.-Bot. Gesell. Wien, Verh. 12:690.
 Subgenotype, *Cryptocercus rimosus* Spinola (by designation of Wheeler, 1911).
 Mayr, 1862, Zool.-Bot. Gesell. Wien, Verh. 12:691.
 Forel, 1900, Mitt. Schweiz. Ent. Gesell. 10:282.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:106, illus.
 Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. 23:719, 722, 725, 765-773, illus.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 333, illus.
 Smith, 1936, N. Y. Ent. Soc. Jour. 44:166.
 *Weber, 1940, Rev. de Ent. 11:408.

Monomorphic. Length 1.8-2.5 mm. Antenna 11-segmented. Frontal widely separated, posteriorly divergent, extending approximately to the posterior corners of the head and each forming a scrobe for the reception of the scape; each carina also forming anteriorly a very large lobe which conceals the insertion of the antenna. Eye prominent, rather strongly convex, placed approximately in the middle of the side of the head. Posterior border of head emarginate, the corners extended as weak to strong earlike lobes. Vertex

of head with 2 small, often blunt carinae lying between the earlike lobes. Carina near inner border of eye extending posteromesially. Thorax short, stout, with a number of dorsal elevations which are either blunt tubercles or more or less longitudinally directed carinae. Body covered with short, but not dense, very closely appressed, scalelike hairs. Apparently no erect hairs dorsally. Epinotum with a pair of distinct spines or with a pair of very short, vestigial tubercles. Three forms, †*rimosus* var. *comalensis* Wheeler of Texas, †*rimosus minutus* Mayr of Florida, and †*wheeleri* Forel which occurs from Texas westward into California. The members of this subgenus form small colonies in the ground. According to Wheeler 1907, page 765, *wheeleri* in Texas occurs only in arid regions. The other forms, especially *minutus*, seem to require more humid conditions. Like other Attini these ants feed on a fungus which they cultivate in their nests.

CYPHOMYRMEX, subgenus MYCETOSORITIS Wheeler

Pl. 15, Fig. 56

Atta, subg. *Mycetosoritis* Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. 23:714.

Subgenotype, *Atta (Mycetosoritis) hartmanni* Wheeler (monobasic).

Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. 23: 714-717, 761, illus.

Emery, 1913, Soc. Ent. de Belg. Ann. 57:251.

Wheeler, 1926, *Ants*, Columbia Univ. Press, 2d ed., p. 334, illus.

Monomorphic. Length 1.8-2 mm. Posterior border of head with a strong, angular emargination. Posterior corners with a well-defined angle. Antenna 11-segmented; scape robust, last funicular segment unusually large, as long as, or longer than, the 4 preceding segments. Frontal carinae widely separated, each with a very large horizontal lobe the anterolateral angle of which is very acute. A carina near the inner border of the eye extending posteromesially a slight distance beyond the eye. Inferior angle of prothorax without a spine. Pronotum with a pair of rather prominent humeral spines and a pair of small tubercles between them. A pair of converging ridges extending through the mesonotum toward the strong mesoepinotal constriction. Epinotum with a pair of short spines. Node of petiole above with a pair of spines. Postpetiole much broader than long, the posterior border emarginate. Front and vertex of head longitudinally rugulose. Hairs short, curved, more erect on head. Only one form of these fungus ants, †*hartmanni* Wheeler of Texas and western Louisiana. These ants form small colonies in the soil. The entrances to their nests are usually one or more turriform craters. For information on biology see Wheeler, 1907, pages 761-765. The ants of this subgenus have some characters in common with both *Trachymyrmex* and *Cyphomyrmex*. They are considered here as a subgenus of *Cyphomyrmex* because of their small size, unusually large frontal carinae, reduction of spines on the body, and the absence of tubercles over most of the body (gaster with very minute tubercles).

TRACHYMYRMEX Forel

Pl. 16, Fig. 59

Atta, subg. *Trachymyrmex* Forel, 1893, Soc. Ent. de Belg. Ann. 37:600.

Genotype, *Atta septentrionalis* McCook (by designation of Wheeler, 1911).

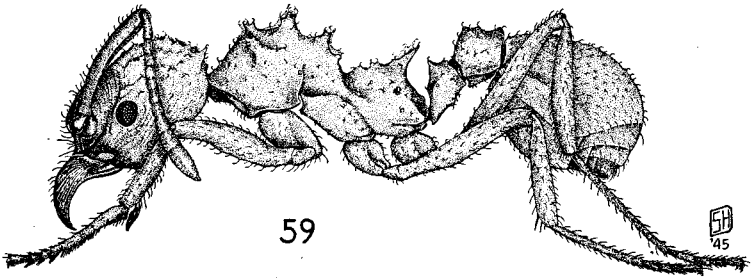
- McCook, 1880, Acad. Nat. Sci. Phila. Proc., p. 359.
 Wheeler, 1903, Psyche **10**:100, illus.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. **21**:386.
 Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. **23**:706-712, 746-759, illus.
 Wheeler, 1911, Psyche **18**:93, 98, illus.
 *Wheeler, 1911, N. Y. Ent. Soc. Jour. **19**:245-250.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 335, illus.

Monomorphic. Length 2.5-4 mm. Antenna 11-segmented, without a well-defined club. Eye convex, placed anterior to the middle of the side of the head. Frontal carinae diverging posteriorly, extending almost to the posterior border of the head; each carina with a prominent, sometimes angular, lobe covering the antennal insertion. A carina near the inner border of the eye extending either posteriorly or posteromesially. Mandibles crossing, each mandible with a long masticatory border. Anterior border of clypeus with a distinct emargination. Posterior border of head, especially the occipital lobes, with numerous tubercles. Inferior angle of prothorax with a spine. Pronotum with a pair of lateral, tubercle-covered spines, and usually a pair of short spines between them. Mesonotum with 2 pairs of prominent, tubercle-covered spines. Mesoeipinotal constriction prominent. Epinotum with the usual pair of spines and a tubercle-covered carina leading to each spine. Petiole, postpetiole and gaster with numerous tubercles, each of which bears a short, curved hair. Femora and tibiae with very small tubercles, each bearing a short, curved hair. Body often covered with a grayish substance which is occasionally of a granular nature. Spines on the promesonotum extremely variable in shape, sharp or blunt, with few or no tubercles on them. Ten forms, †*arizonensis* Wheeler, †*desertorum* Wheeler, †*septentrionalis* (McCook), †*septentrionalis obscurior* Wheeler, †*septentrionalis obscurior crystallina* Wheeler, †*septentrionalis obscurior irrorata* Wheeler, *septentrionalis obscurior seminole* Wheeler; *septentrionalis* var. *vertebrata* Wheeler, †*turrifex* Wheeler, *turrifex caroli* Wheeler. The forms east of the Mississippi River are *septentrionalis*, or variants of it, and occur more or less south of a line running from southern Illinois to southeastern New York; west of the river no forms of *Trachymyrmex* have been reported in any of the states entirely north of the 35th degree of latitude, nor have any been recorded from California. The small colonies nest in the soil. Although able to cut leaves the workers do not resort to this habit so consistently as do species of *Atta* and *Acromyrmex*. Like other *Attini* these ants feed largely, if not entirely, on the fungus which they cultivate in their nests. For information on biology see Wheeler, 1907, pages 746-759.

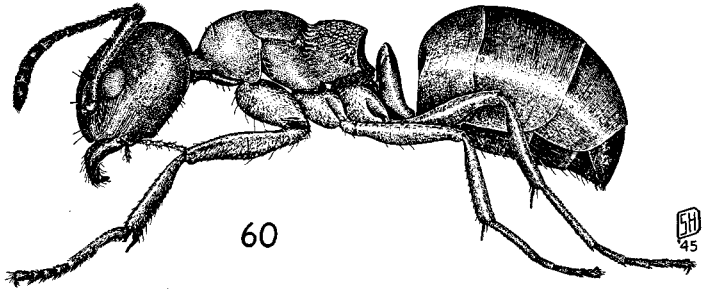
ACROMYRMEX, subgenus MOELLERIUS Forel

Pl. 15, Fig. 57

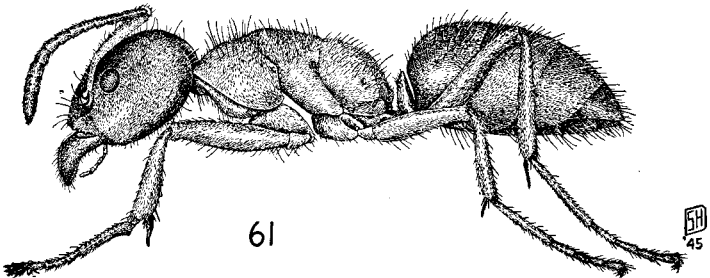
- Atta*, subg. *Moellierius* Forel, 1893, Soc. Ent. de Belg. Ann. **37**:589.
 Subgenotype, *Atta* (*Acromyrmex*) *landolti* Forel (by designation of Wheeler, 1911).
 Pergande, 1893, Calif. Acad. Sci. Proc. (2) **4**:31.
 Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. **23**:703, 743, illus.
 *Santschi, 1925, Rev. Suisse Zool. **31**:389.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 337, illus.



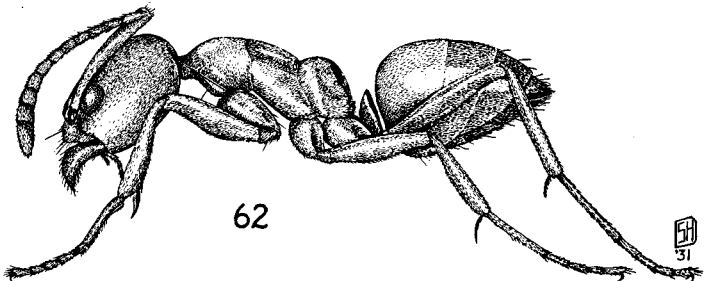
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PLATE 16

- Fig. 59. *Trachymyrmex septentrionalis obscurior seminole* Wheeler, worker.
 Fig. 60. *Dolichoderus (Hypoclinea) taschenbergi* Mayr, worker.
 Fig. 61. *Liometopum occidentale* Emery, worker.
 Fig. 62. *Iridomyrmex humilis* Mayr, worker.

Feebly polymorphic. Length 2.3-6 mm. Head subcordate. Frontal carina with a lobe covering the antennal insertion; the lobe with a pair of spines or tubercles posteriorly. A longitudinal carina near the inner border of the eye extending slightly posteromesially. Clypeus with a distinct but not very strong emargination. Antenna 11-segmented, without a well-defined club. Eye rather strongly convex; placed anterior to the middle of the side of the head. Mandible with the external margin not distinctly sinuate. Postocular spine absent or poorly developed. Occipital lobe with a number of spines or tubercles, one of which is much larger than the others. Thorax dorsally with at least 4 pairs of spines; 1 pair on pronotum, pairs on mesonotum, and the usual pair on epinotum; inferior angle of prothorax with a spine. Postpetiole and dorsal surface of gaster with many well-developed tubercles or spines. Two forms, †*versicolor* (Pergande) of Arizona and its subspecies *chisosensis* Wheeler of Texas. The former, at least, is an arid-area ant which extends from Mexico into Arizona. Like *Atta texana* Buckley it is a soil-nesting and plant-defoliating form. According to Wheeler the colonies are not as large as are those of *texana* and the characteristic earthen craters are ordinarily not so numerous. For an account of the biology see Wheeler, 1907, pages 743-746.

ATTA Fabricius

Pl. 15, Fig. 58

Atta Fabricius, 1804, Syst. Piez., p. 421.

Genotype, *Formica cephalotes* Linnaeus (by designation of Wheeler, 1911).

Buckley, 1860, Acad. Nat. Sci. Phila. Proc. 12:233.

Buckley, 1867, Ent. Soc. Phila. Proc. 6:347.

Wheeler, 1907, Amer. Mus. Nat. Hist. Bul. 23:700, 729, illus.

*Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 337.

Walter, 1938, U. S. Dept. Agr. Circ. 494: 1, illus.

Smith, 1939, Southern For. Expt. Station, Occ. Paper 84: 1, illus.

*Goncalves, 1942, Soc. Brazil de Agron. Bol. 5:335, illus.

Polymorphic. Length 1.5-12 mm. Head subcordate. Antenna 11-segmented, without a well-defined club. Eye rather strongly convex, placed anterior to the middle of the side of the head. Anterior border of clypeus with a distinct emargination and a tooth on each side of the emargination. Mandible large, flattened, with long masticatory border bearing numerous teeth. Frontal carina with a lobe covering the antennal insertion, and a spine posterior to the lobe. A longitudinal carina median to the eye ending below in a small spine or tubercle. A short spine on each occipital lobe and a long spine on each posterior corner of the head. Thorax with 3 pairs of prominent dorsal spines and a small spine on each inferior angle of the prothorax. Legs unusually long. Gaster without tubercles. Spines of larger workers more pronounced and in addition there is usually an impressed area dorsally on each side of the base of the gaster. One form, †*texana* Buckley of Texas and western Louisiana, which forms large and conspicuous nests in the soil. These nests contain innumerable individuals. The Texas leaf-cutting ant is an important economic species because of the damage it inflicts on domesticated plants, its house-infesting habits, and the injury caused to roads by the mining of the soil. For a biological account see Wheeler 1907, pages 729-743.

Subfamily Dolichoderinae Forel

Dolichoderidae Forel, 1878, Ztschr. Wiss. Zool. 30:54.

Dolichoderinae Dalla Torre, 1893, Catal. Hymen. 7:156.

Cloacal orifice ventral, slit-shaped. Pedicel composed of a single segment, the petiole. No constriction between the first and second gastric segments. Sting rudimentary or absent. Anal glands present which produce a secretion with a characteristic, disagreeable odor. Clypeus extended back between the frontal carinae. Antennal fossa touching the posterior border of the clypeus. Antenna 12-segmented; funiculus without a club. Body usually weakly sculptured. Eye well-developed, situated well toward the median line of the head. Masticatory border of mandible often with many small teeth or denticulae. Body hairs sparse on workers in many of the genera. Pubescence sometimes very dense and imparting to certain sections of the body a characteristic grayish or ashy tinge. Pupae naked. Monomorphic. This, one of our smaller subfamilies, contains 27 forms. Although representatives occur in every state more forms are found in the South than elsewhere. Colonies usually contain from a few hundred to a few thousand individuals. Nests, though commonly constructed in the soil, may also be made in rotten wood, crevices in trees and plants or other places. Honeydew and the flesh of small arthropods comprise the food of most of the members of this group. Many of the forms infest houses, the Argentine ant, *Iridomyrmex humilis* Mayr., being one of the best known of these.

The genus *Bothriomyrmex* Emery is not known to occur in the United States. The species *dimmocki* described by Wheeler from specimens collected from Mount Tom near Springfield, Mass. (1915, Amer. Mus. Nat. Hist. Bul. 34:417), has been shown by Emery (1925, Soc. Vaud. Sci. Nat. Bul. 56:19) to be a true *Tapinoma*. As Emery points out, Wheeler's specimens have 6 segments in the maxillary palpus, and a vestigial petiolar scale which clearly proves them to be a form of *Tapinoma*. *Bothriomyrmex* has 4 segments in the maxillary palpus and a distinct petiolar scale. Although the author has not seen workers of *dimmocki* it seems quite likely that they may be only a pale, depauperate form of the common *sessile* (Say), which is a highly adaptable species ranging from the sands of the seashore to an altitude of 10,000 feet.

1. Epinotal declivity strongly concave. Integument stiff, brittle. At least the epinotum usually more or less coarsely sculptured. (Mesoepinotal constriction pronounced. Color often striking.) Pl. 16, fig. 60 *Dolichoderus*, subgenus *Hypoclinea* Mayr., p. 593
- Epinotum declivity not as described. Integument thin, flexible. Epinotum as well as remainder of body finely sculptured 2
2. (1) Epinotum with a prominent conical or tubercular elevation. Maxillary palpus unusually long, the third segment approximately as long as the combined lengths of the fourth, fifth and sixth segments. Ventral surface of head usually with a weakly developed psammophore. Pl. 17, fig. 64 *Dorymyrmex*, subgenus *Conomyrma* Forel, p. 597
- Not as described above 3
3. (2) Petiolar node vestigial. (Base of gaster extended above the petiole.) Pl. 17, fig. 65 *Tapinoma*, Förster, p. 598

- Petiolar node not vestigial, although sometimes small, low, and difficult to see 4
4. (3) Ocelli usually present in at least the large workers. Gaster clothed with a very dense, grayish pubescence which often conceals the surface and imparts a characteristic grayish or ashy tinge. Anterolateral angles of the clypeus somewhat protuberant. Petiolar scale with a rather pointed and often thin, superior border. Thorax, in profile, without a conspicuous impression before the epinotum, the dorsal surface therefore forming somewhat of an uninterrupted arch. Known only from Texas, New Mexico, Arizona, Colorado, California and Oregon. Pl. 16, fig. 61 *Liometopum* Mayr, p. 594
- Ocelli absent. Other characters not as described 5
5. (4) Scale of the petiole small, low, inclined. Scapes and tibiae with erect hairs. Proventriculus with a convex, 4-lobed calyx. Entirely native. Texas; also recorded from some of the southwestern states. Pl. 17, fig. 63 *Forelius* Emery, p. 595
- Scale of the petiole well-developed although usually inclined. Scapes and tibiae without erect hairs. Proventriculus not as described. Introduced and native forms. The native forms largely confined to the southern states. Pl. 16, fig. 62 *Iridomyrmex* Mayr, p. 594

DOLICHODERUS, subgenus HYPOCLINEA Mayr

Pl. 16, Fig. 60

Hypoclinea Mayr, 1855, Zool.-Bot. Gesell. Wien, Verh. 5:377.

Subgenotype, *Formica quadripunctata* Linnæus (by designation of Wheeler, 1911).

Mayr, 1866, Sitz. Akad. Wiss. Wien 53:498.

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:953-961.

Forel, 1884, Soc. Vaud. des Sci. Nat. Bul. 20:349.

*Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:434.

Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:304.

*Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:305, illus.

Wheeler, 1916, Ind. Acad. Sci. Proc. 26:460.

Cole, 1940, Amer. Midl. Nat. 24:60.

Wesson and Wesson, 1940, Amer. Midl. Nat. 24:99.

Length 2.75-4.5 mm. Integument stiff, somewhat brittle and often rather strongly sculptured, especially on the head and thorax. No ocelli. Antenna 12-segmented. Antennal fossa touching the posterior border of the clypeus. Eye situated well toward the median line of the head. Promesonotal suture distinct. Mesoepinotal constriction strongly pronounced. Declivous surface of epinotum strongly concave. Petiole scalelike, inclined, often thick antero-posteriorly and with blunt superior border. Base of gaster not extended above petiole. Cloacal orifice inferior. Hairs and pubescence sparse in some species. Color of body very striking in some forms. Nine forms, †*mariae* Forel, †*mariae* var. *blatchleyi* Wheeler, †*mariae davisi* Wheeler, †*plagiatus* Mayr, †*plagiatus pustulatus* Mayr, †*plagiatus pustulatus* Wheeler, †*plagiatus* var. *inornatus* Wheeler, †*taschenbergi* Mayr, †*taschenbergi* var. *aterrimus* Wheeler. Members of this subgenus are known to occur from Canada to the Gulf of Mexico and from the Atlantic Ocean to approximately as far west as the 104th degree of longitude. Colonies vary from small to moderately large according to forms. Nests are commonly constructed in the soil at the base of plants, but may also be found in hollow stems, in curled leaves, or in carton attached to stalks of plants. Although the ants are very fond of honeydew they also feed on the flesh of small arthropods.

Wheeler, 1905, characterizes the odor of the fluid emitted by their anal or repugnatory glands as "a peculiar smoky or pungent odor, fainter in *mariae* and stronger and of a somewhat different character in *gagates* (*aterrimus*)."

LIOMETOPUM Mayr

Pl. 16, Fig. 61

- Liometopum* Mayr, 1861, Die Europäischen Formiciden, p. 38.
 Genotype, *Formica microcephala* Panzer (monobasic).
 Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:961.
 Emery, 1895, Zool. Jahrb., Abt. f. System. 8:330.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:321-333, illus.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:521.
 *Eckert and Mallis, 1937, Univ. Calif. Agr. Expt. Sta. Circ. 342: 17, illus.
 Mallis, 1941, So. Calif. Acad. Sci. Bul. 40:75.
 Cole, 1942, Amer. Midl. Nat. 28:371.

Length 2.5-6 mm. Integument soft, flexible. Head, including mandibles of largest workers, subcordate. Antenna 12-segmented, fossa touching posterior border of clypeus. Ocelli not always easily seen. Eye placed well toward the median line of the head. Anterolateral angles of the clypeus somewhat protuberant. Frontal carinae short, rather well separated. Maxillary palpus with 6 segments, labial palpus with 4 segments. Mandibles with well-developed teeth or denticulae, which are often numerous. Thorax without a conspicuous impression before the epinotum, in profile the dorsal surface of the thorax forming an almost uninterrupted arch. Petiole with a suberect or erect scale, the superior border of which is rather pointed and often thin. Cloacal orifice inferior. Erect hairs on body more numerous in some forms than others. Gaster clothed with a very dense pubescence which imparts a characteristic grayish or ashy tinge. Three forms, †*apiculatum* Mayr, †*apiculatum luctuosum* Wheeler, †*occidentale* Emery. One or more of these have been found in Texas, New Mexico, Arizona, Colorado, California, Wyoming and Oregon. *L. occidentale* appears to be the most common form in California. *L. apiculatum luctuosum* is usually found at high altitudes where it is associated with conifers, especially pines. *L. occidentale* is more adaptable, ranging from the lowlands to elevations as high as 6,000 feet. The ants of this genus nest in the soil and also in crevices or beneath the bark of trees. The colonies of *occidentale* are sometimes rather large. Workers of this ant often invade houses. Workers of *Liometopum* are both predaceous and honeydew-loving. They are commonly seen traveling in well-defined trails. They are very pugnacious, inflicting wounds with their mandibles and squirting into the wounds a fluid from their anal glands.

IRIDOMYRMEX Mayr

Pl. 16, Fig. 62

- Iridomyrmex* Mayr, 1862, Zool.-Bot. Gesell. Wien, Verh. 12:702.
 Genotype, *Formica detecta* F. Smith (by designation of Bingham, 1903).
 Roger, 1863, Berlin. Ent. Ztschr. 7:165.
 Mayr, 1868, Soc. dei Nat. di Modena Ann. 3:164.
 Emery, 1890, Soc. Ent. Ital. Bol. 22:56.
 André, 1893, Rev. de Ent., p. 148.
 Newell, 1908, Jour. Econ. Ent. 1:28.
 Woodworth, 1910, Univ. Calif. Agr. Expt. Sta. Bul. 207: 65, 66, 72, illus.

Newell and Barber, 1913, U. S. Dept. Agr. Bur. Ent. Bul. 122, illus.

*Smith, 1929, Jour. Econ. Ent. 22:241.

Cole, 1936, Ent. News 47:121.

Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 769.

*Cole, 1940, Amer. Midl. Nat. 24:64.

Length 1.5-2.6 mm. Integument thin, flexible, finely sculptured. Antenna 12-segmented; fossa touching posterior border of clypeus. No ocelli. Eye placed well toward the median line of the head. Mandibular dentition variable, ranging from denticulae to teeth. Maxillary palpus 6-segmented, neither unusually long nor with an extremely long third segment. Mesoeipinotal region with a distinct to conspicuous impression or constriction. Petiolar scale distinct, inclined, not terminating above in a long acute angle or point as in *Limetopum*. Cloacal orifice inferior. Body almost devoid of hairs or only sparsely pilose. Pubescence fine, closely appressed, and rather dense in some forms. The members of this genus are most apt to be confused with those of *Forelius* since the forms of neither group have as distinct structural characters as those of *Dolichoderus* (*Hypoclinea*), *Dorymyrmex* (*Conomyrma*), *Liometopum* or *Tapinoma*. Five forms, †*humilis* Mayr, †*iniquus* var. *nigellus* Emery, †*pruinusosus* (Roger), †*pruinusosus* var. *analis* (André), †*pruinusosus* var. *testaceus* Cole. *I. humilis*, the introduced Argentine ant, is almost entirely restricted to the Southern States and California. *I. iniquus* var. *nigellus*, another introduced form, is established in a number of greenhouses, especially in the northeastern section of the country. The native *pruinusosus* and its variety *analis* are confined largely to the Southern States. The Argentine ant is one of the worst house-infesting forms of all these. *I. pruinusosus* var. *analis* also infests houses. Nests of the ants of this genus may be found in rotten wood, in freely exposed soil, or in the soil beneath objects such as stones and logs. The Argentine ant is noted for the many associated queens found in a colony. The various forms of *Iridomyrmex* are well-known for their honeydew-seeking habits as well as for being carnivorous. The workers of *pruinusosus* and *analis* are capable of emitting a disagreeable, rotten-coconut or "tapinoma" odor. The crushed worker of the Argentine ant has a somewhat musty or greasy odor. For a full account of the Argentine ant the reader is referred to Newell and Barber, 1913.

FORELIUS Emery

Pl. 17, Fig. 63

Forelius Emery, 1888, Ztschr. f. Wiss. Zool. 46:389.

Genotype, *Iridomyrmex maccooki* Forel (monobasic).

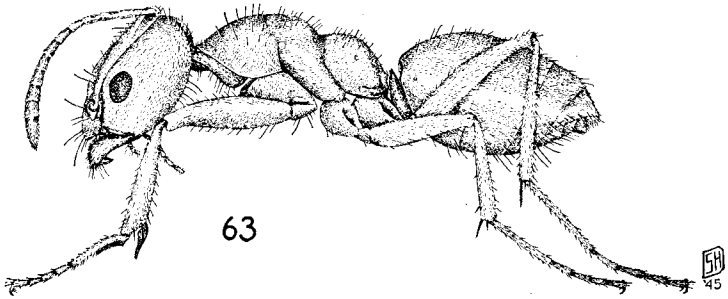
Buckley, 1866, Ent. Soc. Phila. Proc. 6:168.

Forel, 1878, Soc. Vaud. des Sci. Nat. Bul. 15:382.

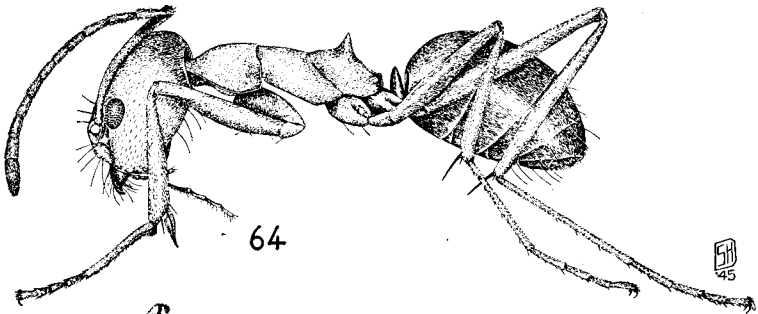
Forel, 1886, Soc. Ent. de Belg. Bul. (C. R.) 30:XXXIX.

Emery, 1888, Ztschr. f. Wiss. Zool. 46:389.

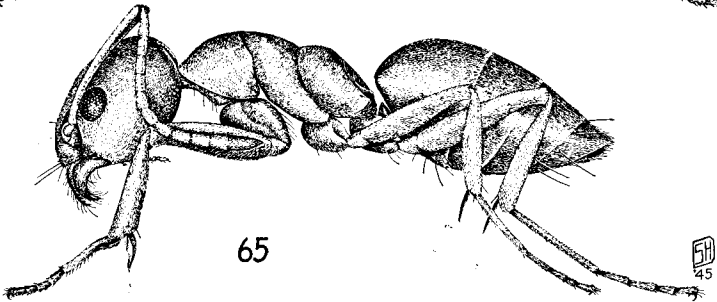
Integument thin, flexible, finely sculptured. Petiole small, low, inclined. Antenna 12-segmented; fossa touching posterior border of clypeus. Maxillary palpus 6-segmented, labial palpus 4-segmented. Ocelli absent. Eye placed well toward the median line of the head. Thorax impressed at the mesoeipinotal region. Proventriculus with a convex, 4-lobed calyx. Gaster produced anteriorly over the petiole. Cloacal orifice inferior.



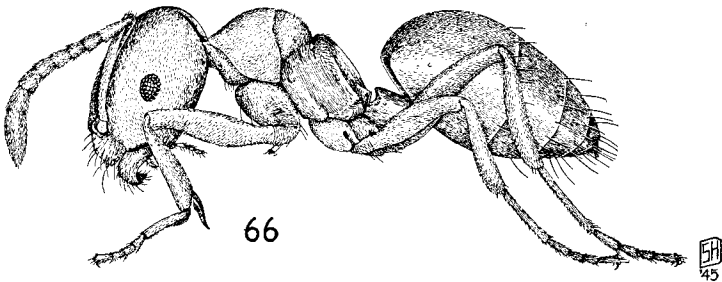
63



64



65



66

PLATE 17

Fig. 63. *Forelius maccooki* (Forel), worker.

Fig. 64. *Dorymyrmex* (*Conomyrma*) *pyramicus flavopectus* M. R. Smith, worker.

Fig. 65. *Tapinoma sessile* (Say), worker.

Fig. 66. *Brachymyrmex* (*Brachymyrmex*) sp., worker.

Forel, 1886, characterizes the single form, †*maccooki* (Forel), as follows:

"Length 2-3 mm. Head rectangular, feebly emarginate behind, with the sides almost subparallel. Mesoepinotal impression feeble, indistinct. Pronotum and mesonotum together forming an arch. Epinotum feebly arched, not elevated. Petiolar scale narrow, small. Body shining, very finely reticulated, feebly pubescent, with rather short, sparse, erect hairs. Tibiae and scapes bearing erect hairs. Yellowish red, extremity of funiculus and teeth of mandibles brownish."

As previously mentioned, the worker of *Forelius* is almost indistinguishable externally from that of an *Iridomyrmex*, which perhaps explains why Forel first described *maccooki* as a member of that genus. Emery, 1888, erected the genus *Forelius* and established *maccooki* as the genotype. The genus was based principally on an internal character, the form of the proventriculus, which is noticeably different from that of an *Iridomyrmex*.

Although originally described from Texas, *maccooki* has also been reported from several southwestern and western states. Its nests in the soil are freely exposed or placed under such objects as stones. The earth is often thrown from the nest in the form of a small crater. The workers may forage singly or in a file. Their food is probably honeydew supplemented by the flesh of small arthropods. Workers have anal or repugnatorial glands capable of emitting a fluid with "tapinoma" odor. Buckley's *Formica foetida* is thought to be the same as *Forelius maccooki*.

DORYMYRMEX, subgenus CONOMYRMA Forel

Pl. 17, Fig. 64

Dorymyrmex, subg. *Conomyrma* Forel, 1913, Rev. Zool. Afric. 2:350.

Subgenotype, *Prenolepis pyramica* Roger (by designation of Santschi, 1922).

Roger, 1863, Berlin. Ent. Ztschr. 7:160.

McCook, 1879, in Comstock's Report on Cotton Insects, p. 186.

Pergande, 1895, Calif. Acad. Sci. Proc. (2) 5:871.

Wheeler, 1906, Amer. Mus. Nat. Hist. Bul. 22:342.

Cole, 1936, Ent. News 47:120.

*Cole, 1940, Amer. Midl. Nat. 24:61.

Smith, 1944, Fla. Ent. 27:15.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:291.

Monomorphic. Length approximately 2-3 mm. Integument thin, flexible. Eye placed well toward the median line of the head. Ocelli absent. Antenna 12-segmented; fossa touching posterior border of clypeus. Ventral surface of head usually with a psammophore which is often weakly developed or vestigial. Clypeus not carinate. Mandible with a strongly curved external border, apex with a long tooth and several smaller teeth. Maxillary palpus long, 6-segmented; the 3d segment very long, approximately as long as the succeeding segments combined. Epinotum with a prominent conical or tuberculate elevation. Thorax usually without any erect hairs. Petiole well-developed, scale-like. Gaster with a basal impression. Cloacal orifice inferior. Six forms, †*pyramicus* (Roger), †*pyramicus* var. *bicolor* Wheeler, †*pyramicus flavopectus* M. R. Smith, †*pyramicus* var. *flavus* McCook, †*pyramicus* var. *niger* Pergande,

†*pyramicus* var. *smithi* Cole. The ants of this subgenus are distributed mainly over the region south of the 42d degree of latitude and are especially common in the Southern States. Nests are constructed in the soil in more or less exposed places. The nest can usually be recognized by the crater-like mass of soil surrounding each nest entrance. The colonies are small. Although the workers are fond of honeydew they are also predaceous. They are very active and often aggressive. The workers possess anal or repugnatorial glands which emit a fluid with the characteristic, disagreeable "tapinoma" odor.

TAPINOMA Förster

Pl. 17, Fig. 65

Tapinoma Förster, 1850, Hymenopterologische Studien 1:43.

Genotype, (*Tapinoma collina* Förster) = *Formica erratica* Latreille (monobasic).

Fabricius, 1793, Ent. Syst. 2:353.

Say, 1835, Boston Jour. Nat. Hist. 1:287.

*Bingham, 1903, Fauna British India, Hymen. 2:304.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:109.

*Smith, 1928, Ent. Soc. Amer. Ann. 21:307, illus.

Essig, 1926, Insects of Western North America, Macmillan Co., p. 863, illus.

Wheeler, 1932, N. Y. Ent. Soc. Jour. 40:13.

*Eckert and Mallis, 1937, Univ. Calif. Agr. Expt. Sta. Circ. 342: 17, illus.

Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., p. 770.

Wesson and Wesson, 1940, Amer. Midl. Nat. 24:100.

Length 1.25-3.2 mm. Integument thin, flexible, feebly sculptured. Antenna 12-segmented; fossa touching posterior border of clypeus. Anterior border of clypeus with a weak to a very distinct emargination. Eye placed well toward the median line of the head. No ocelli. Mandible with numerous small teeth or denticulae. Maxillary palpus 6-segmented, labial palpus 4-segmented. Mesoeipinotal constriction distinct. The flattened declivous surface of the epinotum distinctly longer than the base. Petiolar node vestigial, inclined; when viewed from above, more or less hidden by the base of the gaster. Base of first gastric segment with a conspicuous impression. Cloacal orifice inferior. Erect or suberect hairs sparse on body. Pubescence short, closely appressed, often rather dense on body but not obscuring the surface in some lights. Three forms, †*litorale* Wheeler and the introduced †*melanocephalum* (Fabricius) of Florida, and †*sessile* (Say) which apparently occurs in every state of the Union. *T. sessile* is one of our most common and highly adaptable forms, nesting at elevations ranging from sea level to over 10,000 feet, and occurring on sandy coasts, bogs, prairies, hills or mountains. Their nests may be found in the soil, beneath debris, under bark of logs and stumps, in cavities of plants, in insect galls, or even in bird nests. Although *sessile* is well-known for its honeydew-seeking habits, the workers derive a great deal of food from the flesh of small arthropods and the juices of decaying fruits and vegetables. Workers are capable of emitting from their anal glands a fluid with the disagreeable "tapinoma" or rotten-coconutlike odor. For a detailed biological account of *sessile* see Smith, 1928. Both *sessile* and *melanocephalum* are common house-infesting forms.

Subfamily Formicinae Lepeletier

Formicites Lepeletier, 1836, Hist. Nat. Ins. Hymen. 1:197.

Formicinae Wheeler, 1920, Psyche 27:51.

Cloacal orifice terminal, circular, surrounded by a fringe of hairs. No sting. Pedicel consisting of a single segment, the petiole. No constriction between the first and second gastric segments. Eye well-developed, seldom rudimentary. Ocelli present or absent. Antenna 12-segmented except in the genus *Brachymyrmex* in which it is 9-segmented; funiculus without a club. Antennal fossa touching or not touching the posterior border of the clypeus. Frontal area usually distinct. Sutures usually present on the dorsum of the thorax. Petiole generally scalelike; erect or anteriorly inclined. Body usually weakly sculptured. Character and abundance of pilosity and pubescence highly variable. Monomorphic, dimorphic, or polymorphic. Pupae generally enclosed in cocoons, but sometimes naked. Nests usually constructed in the soil, logs, stumps, crevices in trees and plants, insect galls, or even in houses. Colonies extremely variable with respect to number of individuals, some containing only a few hundred, others many thousands. Food somewhat diverse, including honeydew, sap, juices of fruits and flesh of arthropods. Some Formicinae even foster mealybugs and plant lice. This subfamily, which contains 272 forms, is our second largest subfamily of ants. Although representatives occur in every state, more forms are found in the northern section of the United States than elsewhere. Many of these infest houses. The black carpenter ant, *Camponotus herculeanus pennsylvanicus* (Degeer), not only infests houses but sometimes injures woodwork by constructing its nests therein. This ant is also known to injure telephone poles or even certain species of live trees.

1. Antenna with 9 segments. (Small species, 1.5-2 mm. in length. Epinotum with a very short base and an unusually long declivity. Petiolar node inclined, usually concealed from above by the base of the gaster.) Pl. 17, fig. 66
Brachymyrmex, subgenus *Brachymyrmex* Mayr, p. 601
- Antenna with more than 9 segments 2
2. (1) Mandible narrow, falcate, with pointed apex, internal border minutely serrated. Pl. 22, fig. 85a. (Scape somewhat abruptly enlarged toward the apex. Clypeus short, the anterior border truncate or broadly but not deeply excised. Maxillary palpus 4-segmented, labial palpus 2-segmented. Petiole erect, usually thick anteroposteriorly. Habitus somewhat like that of a *Formica*.) Pl. 22, fig. 85
Polyergus Latreille, p. 625
- Mandible not as described above 3
3. (2) Antenna inserted at or very close to the posterior border of the clypeus 4
- Antenna inserted a considerable distance from the posterior border of the clypeus. (Clypeal border and antennal fossa never touching each other. Polymorphism usually pronounced. Large species, 3-15 mm. in length.) *Camponotus* Mayr
- a. Head, from above, subcylindrical or with the sides slightly divergent anteriorly. The anterior surface truncate, more or less circular and with marginate border. Pl. 19, fig. 71 *Camponotus*, subgenus *Colobopsis* Mayr, p. 606
- Not as described above. (The head may be truncate or not, but if truncate, it is not of the shape described for *Colobopsis*.) b
- b. (a) Head truncate c
- Head not truncate d

- c. (b) Truncate area with an elongate, irregular, deep, pitlike impression beneath each eye and exterior to the clypeus and frontal carina. Arizona. (Only one form, *ulcerosus* Wheeler.) Pl. 19, fig. 73*Camponotus*, subgenus *Manniella* Wheeler, p. 607
- Truncate area without pitlike impression as described above. Texas and California. Pl. 19, fig. 72*Camponotus*, subgenus *Myrmaphaenus* Emery, p. 607
- d. (b) Rather small, stout forms, with short legs. Anterior border of clypeus without a distinct but narrow notch or impression in the middle. Thorax arcuate in profile, flattened and submarginate anteriorly. Head and thorax subopaque or opaque, densely punctate. Hairs on body, and especially the gaster, abundant, white, suberect or erect. (Florida, Texas and Arizona.) Pl. 19, fig. 74*Camponotus*, subgenus *Myrmobrachys* Forel, p. 609
- Unlike alternative in one or more characters e
- e. (d) Legs and most of body with abundant, long, yellowish, suberect to erect hairs, the hairs on the legs not arranged as a row of short, graduated bristles on the flexor surface of each middle and hind tibia. Head, thorax, petiole and legs yellowish or reddish, gaster black. Head subopaque, remainder of body shining. Scape stout, flattened basally but not lobed. Clypeus carinate. (Texas, Florida, Georgia, South Carolina, North Carolina.) Pl. 18, fig. 69*Camponotus*, subgenus *Myrmothrix* Forel, p. 605
- Not agreeing with the above f
- f. (e) Anterior border of clypeus with a very distinct, narrow, median (notchlike) emargination or impression. Clypeus either without a carina or else with a very feeble one. Scape not lobed at the base. Each middle and hind tibia usually without a row of short, graduated bristles on the flexor surface. Hairs on legs not unusually long or abundant. Cheeks and clypeus of some species with elongated, piligerous foveolae. (One of the largest and most common subgenera, with one or more forms present in every state.) Pl. 18, fig. 70*Camponotus*, subgenus *Myrmentoma* Forel, p. 605
- Differing in one or more characters g
- g. (f) Clypeus with a pronounced lobe and a rather distinct carina. Scape not lobed, weakly or not at all flattened basally. Each middle and hind tibia without a row of short, graduated bristles on their flexor surface. Each middle and hind tibia in some forms with a longitudinal sulcus. (Florida, Texas, Arizona.) Pl. 18, fig. 68*Camponotus*, subgenus *Tanaemyrmex* Ashmead, p. 603
- Not entirely as described above. (The largest and most common subgenus with one or more forms present in every state. The subgenus includes some of our largest ants.) Pl. 18, fig. 67*Campanotus*, subgenus *Campanotus* Mayr, p. 602
4. (3) Most or all of eye at the rear of the middle of the side of the head 5
- Most or all of eye anterior to the middle of the side of the head*Paratrechina* Motschoulsky, p. 609
- a. Antenna and legs unusually long, the scape extending more than one-half its length beyond the posterior border of the head. Body slender. Long, coarse, suberect or erect hairs normally absent on the scape. Integument with a peculiar metallic sheen or luster. Introduced. One form, *longicornis* (Latreille). Pl. 20, fig. 75*Paratrechina*, subgenus *Paratrechina* Motschoulsky, p. 609
- Unlike alternative in one or more characters. Tibiae and scapes, especially the former, usually with coarse, suberect to erect hairs. Mostly native forms. Pl. 20, fig. 76*Paratrechina*, subgenus *Nylanderia* Emery, p. 611
5. (4) Psammophore present. Maxillary palpus unusually long with the 4th segment approximately as long as, or longer than the combined lengths of the 5th and 6th segments. (Habitus somewhat similar to that of *Formica*.) Texas, Oklahoma, New Mexico, Colorado, Utah, Arizona, Idaho, California and Kansas. Especially typical of the arid regions. Pl. 21, fig. 81*Myrmecocystus* Wesmael, p. 616

- Unlike alternative in one or more characters. Not typical of the arid regions, with one or more forms present in every state. 6
6. (5) Thorax small, slender, with a remarkably strong constriction in the mesonotum. Antennal scape extending almost one-half its length beyond the posterior corner of the head. Gaster, from above, with the base meeting each side in a distinct angle. Pl. 20, fig. 77 *Prenolepis* Mayr, p. 612
- Differing in one or more characters 7
7. (6) Frontal area not clearly defined. Ocelli usually indistinct or absent. Monomorphic. Small forms, usually ranging in length from 2-4 mm. Pl. 21, fig. 79 *Lasius* Fabricius.
- a. Maxillary palpus short, 3-segmented. (Ants capable of emitting a pleasant lemon-verbena odor.) Pl. 20, fig. 78 *Lasius*, subgenus *Acanthomyops* Mayr, p. 615
- Maxillary palpus 6-segmented b
- b. (a) Terminal segments of the maxillary palpus more or less equal in length. Not light-avoiding; active ants above the surface of the soil. Pl. 21, fig. 79 *Lasius*, subgenus *Lasius* Fabricius, p. 613
- Terminal segments of the maxillary palpus more or less decreasing in length toward the apex. Many forms subterranean in habit and apparently light-avoiding. Pl. 21, fig. 80 *Lasius*, subgenus *Chthonolasius* Ruzsky, p. 613
- Frontal area clearly defined. Ocelli distinct. Polymorphic. Larger forms; ranging from 2.5-9 mm. in length, the major workers usually 4.5-9 mm. Pl. 22, fig. 84 *Formica* Linnaeus
- a. First funicular segment approximately as long as the combined lengths of the 2d and 3d funicular segments. Small forms (2.5-5 mm.), rather smooth and shining. Erect hairs present on gula and usually on the petiole. Pl. 22, fig. 83 *Formica*, subgenus *Proformica* Ruzsky, p. 617
- Differing in one or more characters b
- b. (a) Scape slender, weakly curved at the base, approximately one and one-fourth to one and one-third times the length of the head. Thorax slender. Pl. 22, fig. 82 *Formica*, subgenus *Neoformica* Wheeler, p. 619
- Scape not as described above. Thorax usually stout. Pl. 22, fig. 84 *Formica*, subgenus *Formica* Linnaeus, p. 620

BRACHYMYRMEX, subgenus BRACHYMYRMEX Mayr

Pl. 17, Fig. 66

Brachymyrmex Mayr, 1868, Soc. dei Nat. di Modena Ann. 3:163.

Subgenotype, *Brachymyrmex patagonicus* Mayr (monobasic).

Forel, 1893, Lond. Ent. Soc. Trans., p. 345.

Emery, 1893, Zool. Jahrb., Abt. f. System. 7:635.

Wheeler, 1903, Psyche 10:102-103, illus.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:389.

*Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:590.

*Santschi, 1923, Ann. Mus. Nac. Hist. Nat. Buenos Aires 31:663, 664, 666, illus.

Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:865, 866.

Cole, 1940, Amer. Midl. Nat. 24:65.

Monomorphic. Length 1.5-2 mm. Integument soft, flexible. Posterior border of head often emarginate. Antenna 9-segmented, funiculus without a distinct club, antennal fossa touching the posterior border of the clypeus. Maxillary palpus 6-segmented, labial palpus 4-segmented. Eye well-developed. Clypeus convex. Frontal carinae short, not spaced far apart. Frontal area distinct. Thorax short, stout, with an aspect somewhat like that of a *Lasius*.

Mesonotum short, much broader than long. Mesoepinotal impression distinct. Epinotum with an unusually short base and a very long, sloping declivity. Petiolar node inclined, usually concealed by the base of the gaster. Gaster with a basal impression. Pubescence fine or coarse, closely appressed or slightly raised. Hairs rather sparse, often absent on the thorax. Three forms, †*heeri* var. *obscurior* Forel of Florida, the common †*depilis* Emery of at least the eastern half of the United States, and †*nanellus* Wheeler of Texas. There are, no doubt, a number of undescribed forms. The ants form small colonies in the soil or in rotting wood. The workers which are mostly of subterranean habits derive much of their food from honeydew obtained from plant lice and mealybugs on the roots of plants. This subgenus contains some of our smallest ants. All are native except perhaps *heeri* var. *obscurior* which may have been introduced into Florida.

CAMPONOTUS, subgenus CAMPONOTUS Mayr

Pl. 18, fig. 67

Camponotus Mayr, 1861, Die Europäischen Formiciden, p. 35.

Subgenotype, *Formica ligniperda* Latreille (by designation of Bingham, 1903).

Degeer, 1773, Mem. Hist. Insect. 3:603, illus.

Fabricius, 1798, Ent. System. Suppl., p. 279.

Latreille, 1802, Hist. Nat. de Fourmis, p. 118, illus.

Fitch, 1855, N. Y. State Agr. Soc. Trans. 14:766.

F. Smith, 1858, Catalogue of Hymenopterous Insects in the Collection of the British Museum, pt. 6, p. 55.

Mayr, 1862, Zool.-Bot. Gesell. Wien, Verh. 12: Abt. 2, 661.

Roger, 1863, Berlin. Ent. Ztschr. 7:140.

Buckley, 1866, Ent. Soc. Phila. Proc. 6:167.

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:940.

Forel, 1879, Soc. Vaud. des Sci. Nat. Bul. 16:69.

*Emery, 1893, Zool. Jahrb., Abt. f. System. 7:671-675, illus.

Forel, 1902, Lond. Ent. Soc. Trans., p. 699.

Wheeler, 1906, Psyche 13:41.

Pricer, 1908, Biol. Bul. 14:177, illus.

*Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:301-310, 317-320, 321-325, 327-341, 354.

Forel, 1914, Deut. Ent. Ztschr., pp. 619, 620.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:420.

*Wheeler, 1916, Conn. State Geol. and Nat. Surv. Bul. 22:600.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:556-557, 558-562.

Wheeler, 1932, N. Y. Ent. Soc. Jour. 40:15.

Santschi, 1936, Rev. de Ent. 6:204.

*Cole, 1940, Amer. Midl. Nat. 24:84.

*Cole, 1942, Amer. Midl. Nat. 28:387.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:293.

Large to very large forms (5-15 mm.). Head of worker major robust. Clypeus either without a carina or else with a weakly developed carina, no anterior lobe, or else anterior lobe weakly projecting, rounded, or more or less rectangular, very seldom with an emargination. Mandibles 4-6 toothed. Thoracic dorsum convex, usually continuous in profile. Dorsum of prothorax rounded, sometimes depressed. Middle and hind tibiae in many forms each with a row of graduated bristles on their flexor surface. Antennal scape often flattened at the base or even lobed. In *acutirostris*, *ocreatus* and their forms the middle of the anterior border of the clypeus has a prominent

angular point. One of the largest subgenera of *Camponotus*, with 29 forms, †*acutirostris* Wheeler, *acutirostris* var. *clarigaster* Wheeler, †*castaneus* (Latreille), †*castaneus americanus* Mayr, *castaneus rufinasis* Santschi, †*herculeanus ligniperdus noveboracensis* (Fitch), *herculeanus ligniperdus rubens* Wheeler, †*herculeanus* var. *modoc* Wheeler, †*herculeanus pennsylvanicus* (Degeer), †*herculeanus pennsylvanicus ferrugineus* (Fabricius), *herculeanus pennsylvanicus mohican* Wheeler, †*herculeanus* var. *whymperi* Forel, †*laevigatus* (F. Smith), †*ocreatus* Emery, †*ocreatus primipilaris* Wheeler, †*sansabeanus* (Buckley), †*sansabeanus bulimosus* Wheeler, †*sansabeanus dumetorum* Wheeler, †*sansabeanus maccooki* Forel, †*sansabeanus vicinus* Mayr, *sansabeanus vicinus infernalis* Wheeler, †*sansabeanus vicinus luteangulus* Wheeler, *sansabeanus vicinus maritimus* Wheeler, †*sansabeanus vicinus nitidiventris* Emery, *sansabeanus vicinus plorabilis* Wheeler, †*sansabeanus vicinus semitestaceus* Emery, *sansabeanus* var. *torrefactus* Wheeler, †*socius* Roger, *socius* var. *osceola* Wheeler. One or more of these are present in every state. Most of the forms belong to *sansabeanus* or *herculeanus*, there being 14 variants of the former and 7 of the latter. Representatives of *herculeanus* occur in every state and those of *sansabeanus* from approximately the 93d degree of longitude westward. One of the best known forms of *herculeanus* is the black carpenter ant, *herculeanus pennsylvanicus*, which infests homes, injures telephone poles and some types of timber, and even occasionally mines out wood in buildings. Some members of the subgenus nest entirely in wood whereas others prefer the soil. Colonies are usually moderately large to large. The food is mainly the flesh of small arthropods, the sap of plants and fruits, and honeydew. For a detailed account of the biology of the black carpenter ant, see Pricer, 1908.

CAMPONOTUS, subgenus TANAEMYRMEX Ashmead

Pl. 18, Fig. 68

Tanaemyrmex Ashmead, 1905, *Canad. Ent.* **37**:384.

Subgenotype, *Formica longipes* Gerstäker (by original designation).

*Emery, 1893, *Zool. Jahrb., Abt. f. System.* **7**:670.

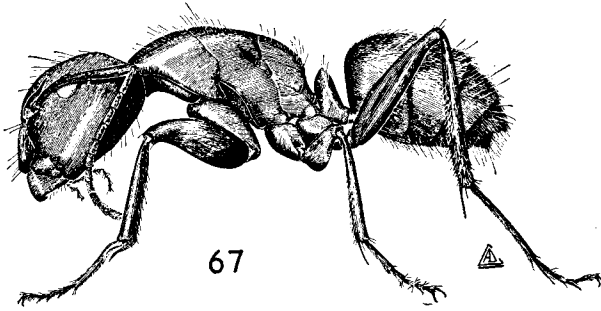
Emery, 1895, *Zool. Jahrb., Abt. f. System.* **8**:336.

Buckley, 1866, *Ent. Soc. Phila. Proc.* **6**:164.

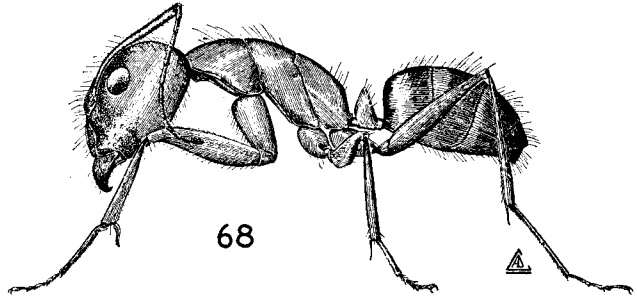
*Wheeler, 1910, *N. Y. Acad. Sci. Ann.* **20**:310-317.

Wheeler, 1932, *N. Y. Ent. Soc. Jour.* **40**:13.

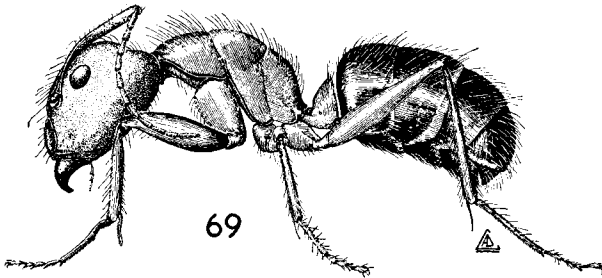
Length 6-14 mm. Base of antennal scape feebly or not at all flattened. Cheeks and clypeus with elongate punctures or foveolae. Middle and hind tibiae each without long, suberect hairs, also without a row of graduated bristles on the flexor surface. Clypeus with a pronounced lobe and a rather distinct carina. Head wider behind than anteriorly. Antenna inserted in front of the midlength of the frontal carina. Middle and hind tibia in some forms, each with a longitudinal sulcus. Five forms, †*fumidus* var. *festinatus* (Buckley), *fumidus* var. *spurcus* Wheeler, *incensus* Wheeler, †*tortuganus* Emery, and †*vafer* Wheeler. *C. (T.) incensus* and *tortuganus* have been collected in Florida, *fumidus* varieties *festinatus* and *spurcus* are known from Texas and Arizona, and *vafer* occurs in Arizona. Variants of *fumidus* may also be expected to occur in California. So far as known the ants nest in the soil beneath logs, stones or other objects.



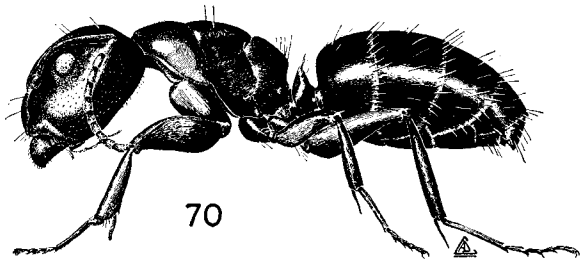
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PLATE 18

Fig. 67. *Camponotus* (*Camponotus*) *herculeanus pennsylvanicus* (Degeer), major worker.

Fig. 68. *Camponotus* (*Tanaemyrmex*) *fumidus* Roger var., major worker.

Fig. 69. *Camponotus* (*Myrmothrix*) *abdominalis floridanus* (Buckley), major worker.

Fig. 70. *Camponotus* (*Myrmentoma*) *caryae nearcticus* Emery, major worker.

CAMPONOTUS, subgenus MYRMOTHRIX Forel

Pl. 18, Fig. 69

- Camponotus*, subg. *Myrmothrix* Forel, 1912, Soc. Ent. de Belg. Mem. 20:91.
 Subgenotype, *Formica abdominalis* Fabricius (by designation of Wheeler, 1913).
 Buckley, 1866, Ent. Soc. Phila. Proc. 6:161.
 Mayr, 1866, Zool.-Bot. Gesell. Wien, Verh. 36:423.
 *Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:325-326.

Length 5.5-10 mm. Body and legs clothed with long, abundant, suberect to erect, yellowish hairs; those on the tibiae not arranged as a row of graduated, short bristles. Antennal scape stout, flattened, not lobed at the base, and bearing short, suberect to erect hairs. Clypeus carinate, anterior border extended as a broad truncate lobe which bears a slight median emargination. Head, thorax, petiole and legs yellowish or reddish, gaster black. Head infuscated dorsally in *transvectus*. Head subopaque, remainder of body shining. Cheeks often with peligerous foveolae. This subgenus contains only two forms, †*abdominalis floridanus* (Buckley), and †*abdominalis transvectus* Wheeler. The former has been recorded from Florida, Georgia and South Carolina, the latter from southern Texas. *C. floridanus* seems to be very common in Florida where it nests in rather large colonies in logs, stumps and dead branches of trees. The workers are very aggressive. They are known to infest houses and beehives. The feeding habits of the ants of this subgenus are no doubt similar to those of the other groups of *Camponotus*.

CAMPONOTUS, subgenus MYRMENTOMA Forel

Pl. 18, Fig. 70

- Camponotus*, subg. *Myrmentoma* Forel, 1912, Soc. Ent. de Belg. Mem. 20:92.
 Subgenotype, *Formica lateralis* Olivier (by designation of Wheeler, 1913).
 Fitch, 1855, N. Y. State Agr. Soc. Trans. 14:855.
 Buckley, 1866, Ent. Soc. Phila. Proc. 6:166.
 *Emery, 1893, Zool. Jahrb., Abt. f. System. 7:675, illus.
 Pergande, 1894, Calif. Acad. Sci. Proc. (2) 4:161.
 Wheeler, 1903, Psyche 10:108, illus.
 Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:271.
 Wheeler, 1909, N. Y. Ent. Soc. Jour. 17:88.
 *Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:342-346.
 *Wheeler, 1910, N. Y. Ent. Soc. Jour. 18:216.
 Wheeler, 1911, N. Y. Ent. Soc. Jour. 19:96.
 Wheeler, 1917, Psyche 24:26.
 Smith, 1923, Ent. News 34:306.
 Smith, 1940, Ent. Soc. Wash. Proc. 42:137, illus.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:293.

Length 3.5-12 mm., the major workers of most forms averaging approximately 6-8 mm. Clypeus without a carina or else with a very feeble one; anterior border with a narrow but distinct, median notchlike emargination or impression. Mandible with 5 or 6 teeth. Thorax short, robust, not or very weakly marginate; in profile, with a continuous arch, which is occasionally interrupted by an impression in the mesoepinotal region. Middle and hind tibiae usually without bristles on their flexor surfaces. Cheeks and clypeus in some species with elongate, piligerous foveolae. Most of body usually shining. One of the largest subgenera with one or more forms, no doubt,

occurring in every state. Nineteen forms, †*anthrax* Wheeler, †*caryae* (Fitch), †*caryae* var. *decepiens* Emery, †*caryae discolor* (Buckley), †*caryae discolor clarithorax* Emery, †*caryae* var. *essigi* M. R. Smith, †*caryae* var. *minutus* Emery, †*caryae nearcticus* Emery, *caryae* var. *pardus* Wheeler, †*caryae rasilis* Wheeler, †*caryae rasilis pavidus* Wheeler, †*caryae subbarbatus* Emery, †*caryae subbarbatus paucipilis* Emery, †*caryae* var. *tanquaryi* Wheeler, †*hyatti* Emery, *hyatti* var. *bakeri* Wheeler, †*sayi* Emery, †*schaefferi* Wheeler, †*texanus* Wheeler. The subgenus is badly in need of revision and the names used here will probably be considerably altered when the group is thoroughly reworked. The names are substantially those given by Wheeler in *Psyche*, 1917. The present author indicated in 1940 (see citation above) that *caryae* and *nearcticus* are not synonymous. The confusion between these two forms has led to a number of erroneous records in literature. The ants of the subgenus *Myrmentoma* form small colonies of only a few hundred individuals in crevices in trees and plants, insect galls, dead wood or even in the wooden structure of houses. Workers are exceedingly fond of honeydew. Certain species such as *rasilis* and *nearcticus*, infest houses where they show an especial fondness for sweets.

CAMPONOTUS, subgenus COLOBOPSIS Mayr

Pl. 19, Fig. 71

Colobopsis Mayr, 1861, Die Europäischen Formiciden, p. 38.

Subgenotype, *Formica truncata* Spinola (by designation of Bingham, 1903).

Roger, 1863, Berlin. Ent. Ztschr. 7:160.

Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:139, illus.

*Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:352-353.

Smith, 1923, *Psyche* 30:82.

Smith, 1930, Ent. Soc. Amer. Ann. 23:567.

Wheeler, 1934, Harvard Univ. Mus. Compar. Zool. Bul. 77:214.

Emery, 1920, Soc. Ent. Ital. Bol. 52:34.

Length 3-6 mm. Head subcylindrical, with the sides subparallel or slightly divergent anteriorly, and the anterior portion truncate. Truncated area almost circular in outline, often sharply margined, especially on the sides; the truncated area includes the mandibles, much or nearly all of the clypeus, and the anterior medial portion of the cheeks; the truncate area often concave. Frontal carinae far apart, short, straight or weakly sigmoid. Antennal insertion placed at approximately the midlength or to the rear of the midlength of the frontal carina. Eye situated well to the rear of the side of the head. Anterior half of head coarsely reticulate rugose, subopaque. Petiole low, usually thick anteroposteriorly. Hairs on the anterior part of head usually short, erect, often obtuse or apically enlarged. Eight forms, *cerberulus* Emery, †*etiolatus* Wheeler, †*impressus* Roger, †*mississippiensis* M. R. Smith, †*obliquus* M. R. Smith, †*pylartes* Wheeler, †*pylartes fraxinicola* M. R. Smith, *pylartes* var. *hunteri* Wheeler. The ants of this subgenus are apparently confined to the southern half of the United States but may range slightly farther north in the region of the Mississippi Valley. Specimens have been received from as far north as Urbana, Ill. *C. impressus* appears to be one of the most abundant forms in Florida, while *mississippiensis* and *pylartes*, or its variants, occur commonly in the Gulf Coast region.

The ants nest in trees and shrubs, especially in the branches and twigs, in insect galls, or even in hollow nuts. Colonies are small. Workers are commonly observed foraging on trees and plants in search of honeydew which much comprise a large portion of their food.

CAMPONOTUS, subgenus MYRMAPHAENUS Emery

Pl. 19, Fig. 72

Camponotus, subg. *Myrmaphaenus* Emery, 1920, Rev. de Zool. et de Bot. Africaines 8:237.

Subgenotype, *Camponotus leydigi* Forel (by original designation).

*Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:349-351.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:420.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:562.

Length 4-8 mm. Head longer than broad with slightly convex or subparallel sides and emarginate posterior border; convex above, obliquely truncate anteriorly. Truncate area neither subcircular nor marginate as in *Colobopsis*. Clypeus flattened. Antennal scape slender, not or only slightly flattened at base. At least clypeus and cheeks opaque, punctate foveolate or punctate rugose. Two species, *bruesi* Wheeler of Texas and *yogi* Wheeler of California. The former was collected from the trunk of an acacia, and the latter from the twig of a manzanita. So far as the author is aware, both species are known only from the type specimens. Wheeler states that *yogi* closely approaches the species of *Colobopsis* but differs in lacking the circular or distinctly marginate, truncate area, in the soldier.

CAMPONOTUS, subgenus MANNIELLA Wheeler

Pl. 19, Fig. 73

Camponotus, subg. *Manniella* Wheeler, 1921, Psyche 28:19.

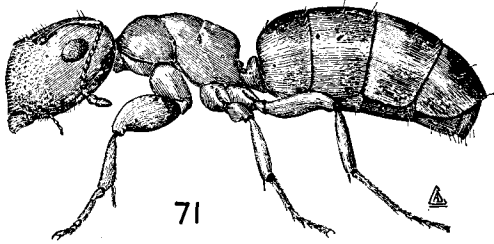
Subgenotype, *Camponotus sphaericus* Roger (by original designation).

*Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:351.

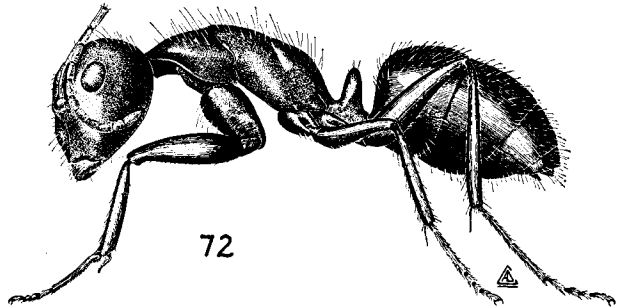
Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:562.

Emery, 1925, in Wytzman, Genera Insectorum, fasc. 183:160, illus.

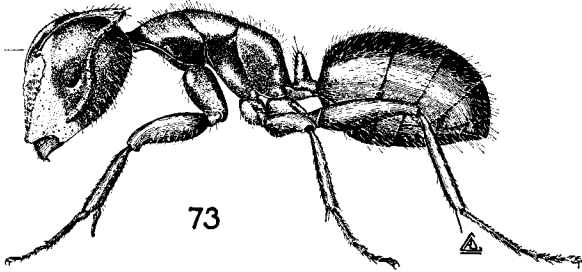
Major worker (soldier) 6.5 mm. Habitus somewhat similar to that of a *Colobopsis*. Head subrectangular, a little longer than broad, as broad in front as behind, with a nearly straight posterior border and feebly concave, subparallel sides. Posterior corners somewhat angular, anterior corners extended as rounded lobes beyond anterior border of clypeus and closed mandibles. In profile, the head is high and convex behind, flattened beneath, and obliquely truncate in front. Truncate surface with an elongate, irregular, rather deep impression on each side below the eye and exterior to the clypeus and frontal carina. Clypeus trapezoidal, flat, ecarinate. Frontal carinae far apart, lyrate in front, parallel behind and forming boundaries of rather deep scrobes for the reception of the base of each antennal scape. Head opaque, occiput and posterior angles shining; truncate anterior portion including mandibles, clypeus, the portions of the cheeks within the ridges and the anterior portion of the front, uneven and irregularly rugulose, remainder of head covered with dense uniform punctures, and scattered and rather deep foveolae. Foveolae slightly elongate on cheeks outside the ridges. Hairs glistening white, erect, abundant; longest on the gaster, petiole and thorax, shorter on



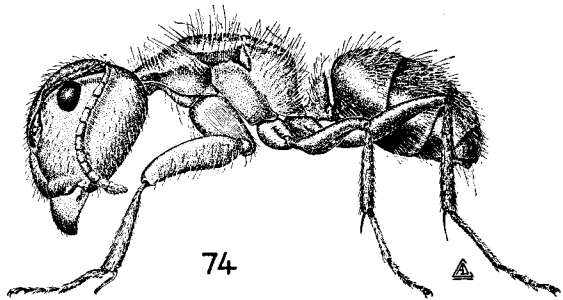
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PLATE 19

- Fig. 71. *Camponotus (Colobopsis) etiolatus* Wheeler, soldier.
 Fig. 72. *Camponotus (Myrmaphaenus) bruesi* Wheeler, worker.
 Fig. 73. *Camponotus (Manniella) ulcerosus* Wheeler, major worker.
 Fig. 74. *Camponotus (Myrmobrachys) planatus* Roger, major worker.

the head, blunt on cheeks and sides of head. Antennae with short, delicate, erect hairs on the anterior surfaces and tips of the scapes. One species, †*ulcerosus* Wheeler, of Arizona. According to Wheeler several colonies were found in the Huachuca Mountains (at an altitude of 5,000-6,000 ft.) nesting in the ground beneath stones. Nothing more is known about the biology.

CAMPONOTUS, subgenus MYRMOBRACHYS Forel

Pl. 19, Fig. 74

Camponotus, subg. *Myrmobrachys* Forel, 1912, Soc. Ent. de Belg. Mem. 20:91.

Genotype, *Formica senex* F. Smith (by designation of Wheeler, 1913).

Roger, 1863, Berlin. Ent. Ztschr. 7:148.

*Wheeler, 1910, N. Y. Acad. Sci. Ann. 20:346-349.

Rather small (3.5-7 mm.), stout species. Posterior border of head straight or weakly emarginate. Thorax short, arcuate in profile, weakly to moderately marginate anteriorly (in *planatus*, also flattened anteriorly). Legs short, middle and hind tibiae each without a row of graduated, short bristles on the flexor surface. Head and thorax opaque or subopaque, densely punctate. Hairs on body, especially the thorax and gaster, abundant, white, suberect to erect. Two forms, *mina zuni* Wheeler of Arizona and †*planatus* Roger of Florida and Texas. Both form small colonies. *C. planatus* nests in the hollow branches of trees, under bark and in logs. Although the workers attend plant lice, they also probably feed on the flesh of small arthropods.

PARATRECHINA, subgenus PARATRECHINA Motschoulsky

Pl. 20, Fig. 75

Paratrechina Motschoulsky, 1863, Bul. Soc. Nat. Moscou 36(3):13.

Subgenotype, (*Paratrechina currens* Motschoulsky) = *Formica longicornis* Latreille (by designation of Wheeler, 1911).

Latreille, 1802, Hist. Nat. Fourmis, p. 113.

*Bingham, 1903, Fauna British India Hymen. 2:326.

*Emery, 1910, Deut. Ent. Ztschr., p. 129, illus.

*Arnold, 1922, So. Afr. Mus. Ann. 14:605, illus.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 10, 154, 156, 221.

Marlatt, 1928, U. S. Dept. Agr. Farmers Bul. 740, p. 6.

*Phillips, 1934, Hawaii Univ. Expt. Sta. Pineapple Prod. Coop. Assn. Ltd. Bul. 15:18.

*Smith, 1936, Puerto Rico Univ. Jour. Agr. 20:869.

Length 2.2-3 mm. Slender. Integument thin, flexible, with a peculiar metallic sheen or lustre in some lights. Antenna 12-segmented; fossa close to but usually separated from the posterior border of the clypeus, scape unusually long, exceeding by more than one-half its length the posterior border of the head. Eye very prominent, convex, situated nearer the anterior than the posterior border of the head. Ocelli sometimes present but unusually small. Clypeus subcarinate. Frontal area indistinct or absent. Maxillary palpus long, 6-segmented. Mandible slender, usually with 5 teeth. Thorax lacking the prominent, subcylindrical mesonotal constriction which is present in *Prenolepis imparis* (Say). Legs remarkably long. Petiolar scale more or less inclined. Base of gaster with an impression; from above, base of gaster concave, distinctly angulate at each side. Body with long, coarse, pale yellowish, suberect

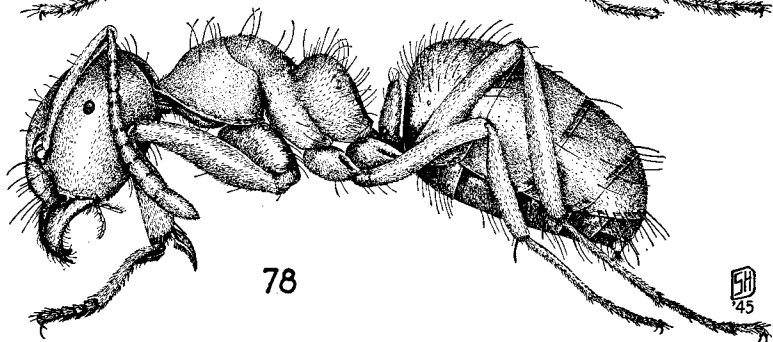
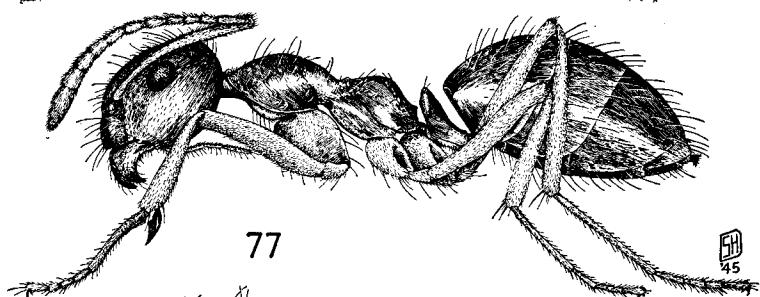
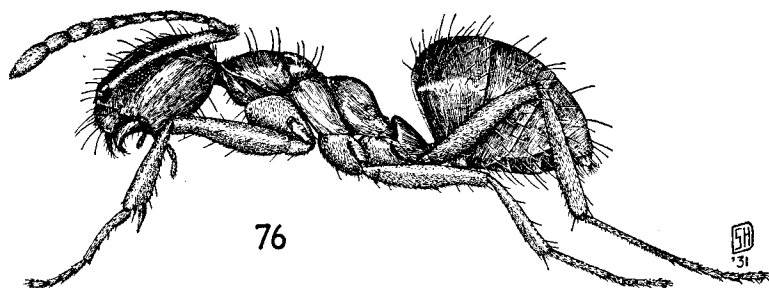
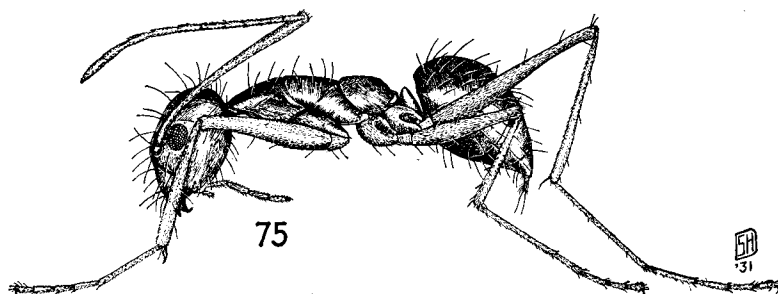


PLATE 20

- Fig. 75. *Paratrechina (Paratrechina) longicornis* (Latreille), worker.
 Fig. 76. *Paratrechina (Nylanderia) parvula* (Mayr), worker.
 Fig. 77. *Prenolepis imparis* (Say), worker.
 Fig. 78. *Lasius (Acanthomyops) interjectus* Mayr, worker.

to erect hairs. Hairs shorter and sparser, also more appressed on the legs, usually none present on the scape. A single, introduced species, †*longicornis* (Latreille), the "crazy ant," which is so called because of its habit of darting here and there in a senseless, uncontrolled manner. Its original home is thought to be India. The ant is now established in many towns and cities, especially of the states bordering the Gulf of Mexico and the Atlantic Ocean. It is commonly intercepted by plant quarantine inspectors. In the extreme South the ants may nest outdoors in the soil but in the colder regions they nest in hotels, apartment houses, greenhouses, and other buildings. The workers feed largely on the juices of fruits and vegetables, honeydew, and the flesh of small arthropods.

PARATRECHINA, subgenus NYLANDERIA Emery

Pl. 20, Fig. 76

Prenolepis, subg. *Nylanderia* Emery, 1906, Soc. Ent. de Belg. Ann. **50**:134.

Paratrechina, subg. *Nylanderia* Emery, 1926, in Wytsman, Genera Insectorum, fasc. 183, p. 217.

Subgenotype, *Prenolepis vividula* Nylander (by original designation).

Nylander, 1846, Acta Soc. Fennic. **2**:900, illus.

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. **20**:948.

Forel, 1884, Soc. Vaud. des Sci. Nat. Bul. **20**:348.

Forel, 1893, Lond. Ent. Soc. Trans., p. 338.

Emery, 1893, Zool. Jahrb., Abt. f. System. **7**:636.

Wheeler, 1903, Psyche **10**:104, illus.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. **21**:390.

Forel, 1922, Rev. Suisse de Zool. **30**:98.

Cole, 1940, Amer. Midl. Nat. **24**:66.

Wesson, 1940, Amer. Midl. Nat. **24**:100.

*Buren, 1944, Iowa State Col. Jour. Sci. **18**:295.

Length 2-3.4 mm. Body and appendages not extremely long and slender as in the subgenus *Paratrechina*. Antenna 12-segmented, scape considerably surpassing the posterior border of the head, funiculus without a club, antennal fossa inserted very close to posterior border of clypeus but usually separated from it. Eye well-developed. Ocelli usually indistinct or absent. Maxillary palpus 6-segmented, labial palpus 4-segmented. Mandible with distinct teeth. Thorax short, sometimes rather stout. Mesonotum small, more or less distinctly separated from the adjacent regions of the thorax by sutures or impressions. Mesoepinotal region clearly impressed dorsally but without a strong subcylindrical constriction as occurs in *Prenolepis*. A pair of small but distinct spiracles in this region. Base of epinotum much shorter than the declivity. Base of gaster with an impression, often more or less concealing the petiolar scale. Body more or less shining, although often bearing closely appressed, rather dense pubescence. Body with coarse, suberect to erect hairs, these usually present on the scapes and legs but especially the tibiae. Color variable, usually ranging from testaceous through light brown to almost black. Ten forms, *arenivaga* Wheeler, *arenivaga* var. *faisonensis* Forel, †*bourbonica* (Forel) var., †*bruesi* (Wheeler), †*fulva pubens* (Forel), †*parrula* (Mayr), *parvula* var. *grandula* Forel, †*vividula* (Nylander), †*vividula guatemalensis* (Forel), *vividula melanderi* (Wheeler). Members of the genus occur commonly over the eastern half of the United States but are apparently rare,

sporadically distributed or absent in the western half of the country. One of the commonest species is *parvula*. Several forms, such as *fulva pubens* and *bourbonica* var., have been introduced, the former occurring in greenhouses. The ants of this subgenus form small colonies in the soil or in rotting wood. They nest in such diverse places as sea beaches, meadows and open woods. Workers attend honeydew-excreting insects and are also known to invade houses in search of sweets. Although easily recognized generically the ants are difficult to determine specifically. Color and pilosity are variable. As Wheeler has remarked the genital appendages of the male seem to offer the best characters for the separation of the species.

PRENOLEPIS Mayr

Pl. 20, Fig. 77

Prenolepis Mayr, 1861, Die Europäischen Formiciden, p. 52.

Genotype, *Tapinoma nitens* Mayr (by designation of Bingham, 1903).

Emery, 1893, Zool. Jahrb., Abt. f. System. 7:635.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:390.

Wheeler, 1930, Ent. Soc. Amer. Ann. 23:1, illus.

Eckert and Mallis, 1937, Univ. Calif. Agr. Expt. Sta. Circ. 342: 27, illus.

*Cole, 1940, Amer. Midl. Nat. 24:66, 67.

Dennis, 1941, Ent. Soc. Amer. Ann. 34:82.

Talbot, 1943, Ecology 24:31-44.

Length 2.2-4 mm. Antenna 12-segmented; scape very long, surpassing the posterior corner of the head by almost one-half its own length; fossa extremely close to or touching the posterior border of the clypeus. No ocelli. Eye prominent, convex, placed closer to the posterior than the anterior border of the head. Frontal area usually more or less indistinct. Maxillary palpus 6-segmented, unusually long. Mandible with oblique masticatory border bearing 5 or 6 teeth. Thorax small, slender, divided into two parts by a remarkably strong constriction of the mesonotum. A pair of prominent spiracles situated in the constriction. Petiolar node strongly inclined, antero-posteriorly compressed, with a transverse, straight or weakly emarginate, superior border. Basal segment of gaster with a strong impression. Gaster, from above, with the basal border meeting each side in a very distinct angle. Tibia without erect hairs. Body smooth and shining, appendages less so because of the pubescence covering them. Seven forms, †*imparis* (Say), †*imparis* var. *arizonica* Wheeler, †*imparis* var. *californica* Wheeler, †*imparis* var. *coloradensis* Wheeler, †*imparis* var. *minuta* Emery, †*imparis* var. *pumila* Wheeler, †*imparis* var. *testacea* Emery. One or more of these are thought to occur in every state. *P. imparis* is commonly found nesting in moist, clay soil, especially that of woodlands. The single entrance to the nest is usually surrounded by coarse, characteristic earthen pellets. For detailed accounts of the nesting habits see Dennis 1941 and Talbot 1943. Workers live largely on the sap of decaying fruits and honeydew. Repletes are not uncommon in the nests. These ants apparently can withstand more cold than any other species in the United States. Workers have been seen above ground when the surface of the ground was frozen and the air temperature below freezing. *P. imparis* is one of the first ants, if not the first, to take its nuptial flights in the spring, usually in March or April. Although workers

sometimes invade houses in search of food, especially sweets, the ants are apparently never as troublesome and persistent pests as the little black ant, *Monomorium minimum* (Buckley), the thief ant, *Solenopsis molesta* (Say), and certain others.

LASIVS, subgenus LASIVS Fabricius

Pl. 21, Fig. 79

Lasius Fabricius, 1804, Syst. Piez., p. 415.

Subgenotype, *Formica nigra* Linnaeus (by designation of Bingham, 1903).

*Emery, 1893, Zool. Jahrb., Abt. f. System. 7:637-639.

Pergande, 1900, Wash. Acad. Sci. Proc. 2:519.

Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:393.

Forbes, 1908, Univ. Ill. Agr. Expt. Sta. Bul. 131:1, illus.

Tanquary, 1913, Ill. State Lab. Nat. Hist. Bul. 9:417-443.

*Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:590-593.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:524-526.

Eckert and Mallis, 1937, Univ. Calif. Agr. Expt. Sta. Circ. 342: 30.

Dennis, 1938, Ent. Soc. Amer. Ann. 31:295.

Metcalf and Flint, 1939, Destructive and Useful Insects, McGraw-Hill Book Co., 2d ed., pp. 371, 770.

*Cole, 1940, Amer. Midl. Nat. 24:67.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:296.

Length 2-4 mm. Antenna 12-segmented, without a club; antennal fossa placed very close to or touching the posterior border of the clypeus. Eye well-developed, situated approximately on the posterior half of the side of the head. Maxillary palpus long, 6-segmented, the terminal segments subequal. Ocelli usually present but small and indistinct. Petiolar scale vertical or not strongly inclined, the superior border entire or emarginate. Body varying in color from light brown to blackish. Antennal scapes and tibiae with or without erect hairs. Erect hairs on body ranging from a few to rather abundant. Pubescence closely appressed, usually rather dense but not concealing the surface, especially in some lights. Ants capable of emitting a strong formic acid odor. Three forms, †*niger alienus americanus* Emery, †*niger* var. *neoniger* Emery, and †*niger* var. *sitkaënsis* Pergande. One or more of these have been found in every state. The ants of this subgenus nest in rotten wood, in the soil, or in the soil beneath objects. Although the workers feed to a large extent on the flesh of small arthropods they are also exceedingly fond of honeydew; *americanus*, at least, has proven itself an economic pest through its habit of fostering and spreading plant lice on the roots of corn, cotton, strawberry, and other plants. This species also commonly invades houses. For a detailed account of the habits of *americanus* see Forbes, 1908. The ants of this subgenus vary so greatly in size, color and pilosity that specimens often cannot be placed specifically with complete certainty.

LASIVS, subgenus CHTHONOLASIVS Ruzsky

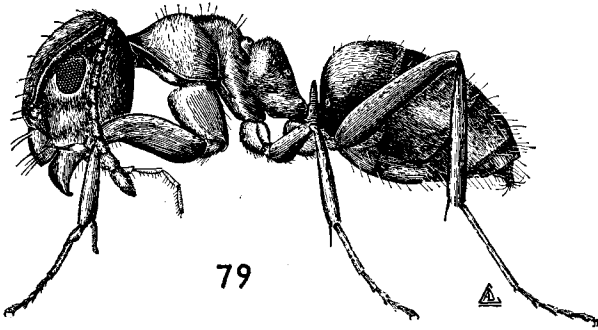
Pl. 21, Fig. 80

Lasius, subg. *Chthonolasius* Ruzsky, 1912, Kasau Zap. Vet. Inst. 29:630.

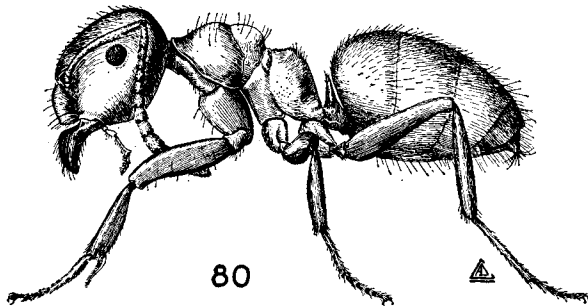
Subgenotype, *Formica flava* Fabricius (by original designation).

Walsh, 1862, Ent. Soc. Phila. Proc. 1:310.

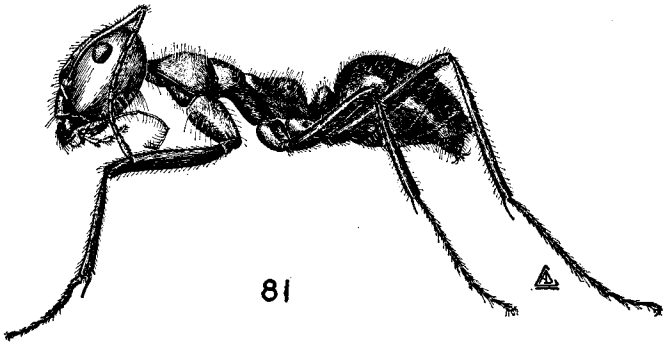
*Emery, 1893, Zool. Jahrb., Abt. f. System. 7:639-642, illus.



79



80



81

PLATE 21

- Fig. 79. *Lasius* (*Lasius*) *niger alienus americanus* Emery, worker.
 Fig. 80. *Lasius* (*Chthonolasius*) *umbratus mixtus aphidicola* (Walsh), worker.
 Fig. 81. *Myrmecocystus* sp., worker.

- Wheeler, 1906, *Psyche* 13:38.
 *Wheeler, 1910, *Psyche* 17:235.
 Wheeler, 1917, *Amer. Acad. Arts and Sci. Proc.* 52:526-530.
 Wheeler, 1917, *Psyche* 24:169.
 Smith, 1934, *Ent. Soc. Amer. Ann.* 27:384.
 *Buren, 1944, *Iowa State Col. Jour. Sci.* 18:296.

Length 1.5-5.5 mm. Maxillary palpus rather long, 6-segmented, the segments more or less decreasing in length toward the apex of palpus. Eye extremely small to moderately small, often hairy. Antennal fossa very close to or touching the posterior border of the clypeus. Apex of scape usually attaining or surpassing the posterior border of the head. Scapes and legs with or without prominent suberect to erect hairs. Petiole erect, rather strongly compressed anteroposterioly, and usually with emarginate superior border. Ocelli indistinct or absent. Base of gaster not concealing the petiole, without an impression or with a very weak one. Hairs in some forms faintly barbed. Pubescence rather dense, closely appressed but not concealing the surface of the body in some lights. Color ranging from sordid white through yellowish brown to deep brown. Twelve forms, †*brevicornis* Emery, †*brevicornis microps* Wheeler, †*flavus claripennis* Wheeler, †*flavus nearcticus* Wheeler, *humilis* Wheeler, *pilosus* M. R. Smith, †*umbratus epinotalis* Buren, †*umbratus minutus* Emery, †*umbratus mixtus aphidicola* (Walsh), †*umbratus speculiventris* Emery, †*umbratus subumbratus* Viereck, *umbratus vestitus* Wheeler. One or more of these occur in every state. One of the most common is *umbratus mixtus aphidicola*. *L. vestitus* and *L. umbratus subumbratus* seem to be boreal in distribution. The ants of this subgenus nest in rotten logs and stumps, in the soil, or in the soil beneath stones and logs. *L. umbratus minutus* commonly nests in bogs where it constructs mounds several feet broad and 1 to 2 feet high. The workers of *Chthonolasius* live largely on honeydew obtained from subterranean plant lice and mealybugs. It appears that some of the *umbratus* forms (*subumbratus*, at least) are temporary parasites in the colonies of other forms of *Lasius*, such as *niger alienus americanus* and *niger* var. *sitkaensis*. The fertilized female of *subumbratus* secures adoption in the colonies of these ants by some means or other. The host ants finally disappear and are replaced by the pure colony of the invading female. For a more detailed account see Wheeler, 1917, in *Psyche*.

LASIUS, subgenus ACANTHOMYOPS Mayr

Pl. 20, Fig. 78

- Acanthomyops* Mayr, 1862, *Zool. Bot. Gesell. Wien, Verh.* 12:699.
 Subgenotype, *Formica clavigera* Roger (by designation of Wheeler, 1911).
 Walsh, 1862, *Ent. Soc. Phila. Proc.* 1:311.
 Mayr, 1870, *Zool.-Bot. Gesell. Wien, Verh.* 20:950.
 *Emery, 1893, *Zool. Jahrb., Abt. f. System.* 7:637, 638, 642.
 Forel, 1901, *Soc. Ent. de Belg. Ann.* 45:367.
 Wheeler, 1909, *N. Y. Ent. Soc. Jour.* 17:83.
 *Wheeler, 1916, *Conn. State Geol. and Nat. Hist. Surv. Bul.* 22:591, 592, 594.
 Wheeler, 1917, *Amer. Acad. Arts and Sci. Proc.* 52:530-533.
 Smith, 1934, *Psyche* 41:213.
 *Cole, 1940, *Amer. Midl. Nat.* 24:68, 70, 72.
 Buren, 1941, *Iowa State Col. Jour. Sci.* 15:231, illus.

Buren, 1942, Iowa State Col. Jour. Sci. 16:405.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:296.

Length 2.5-5 mm. Body somewhat robust. Antenna 12-segmented, fossa extremely close to or touching posterior border of clypeus, funiculus slightly to strongly enlarged from base to apex. Ocelli absent or indistinct. Eye very small to small. Maxillary palpus short, 3-segmented, labial palpus 4-segmented. Mesoeipinotal region with a prominent constriction in which there is a pair of distinct dorsal spiracles. Petiole erect in profile, usually rather thin, occasionally thick, with emarginate or rounded superior border. Base of gaster not concealing petiole, and usually without a distinct impression. Body rather shining, usually varying in color from pale yellowish to dark yellowish red. Suberect to erect hairs generally rather abundant on body but absent on scapes. Hairs in most species finely barbed (in *plumopilosus* Buren distinctly plumose toward the apex). Thirteen forms, †*claviger* (Roger), †*claviger subglaber* Emery, †*clavigeroides* Buren, †*interjectus* Mayr, †*interjectus arizonicus* Wheeler, *interjectus californicus* Wheeler, *interjectus coloradensis* Wheeler, †*latipes* (Walsh), †*murphyi* Forel, *occidentalis* Wheeler, †*parvulus* M. R. Smith, †*plumopilosus* Buren, †*pubescens* Buren. One or more of these occur in every state. The two best known are *interjectus* and *claviger*. The latter form is peculiar in possessing dimorphic females. The ants of this subgenus can be distinguished from other North American ants by the pleasant, lemon-verbena odor they exude. The species nest in rotting wood and in the soil, often under stones or other objects. They are subterranean in habit, depending for food largely, if not entirely, on honeydew obtained from underground plant lice and mealybugs, which they foster. Occasionally such species as *claviger* and *interjectus* nest around or beneath the basement walls and floors of houses and become especially objectionable by giving off numerous winged females and males which enter the basements through breaks in the mortar. Housekeepers often mistake these for termites.

MYRMECOCYSTUS Wesmael

Pl. 21, Fig. 81

Myrmecocystus Wesmael, 1838, Brussels, Acad. Roy. des Sci. de Belg. Bul. 5:766.

Subgenotype, *Myrmecocystus mexicanus* Wesmael (monobasic).

Wesmael, 1838, Brussels, Acad. Roy. des Sci. de Belg. Bul. 5:766.

McCook, 1881, Acad. Nat. Sci. Phila. Proc. [33]: 17, illus.

Forel, 1886, Soc. Ent. de Belg. Ann. 30:202.

Emery, 1893, Zool. Jahrb., Abt. f. System. 7:666.

Forel, 1901, Soc. Ent. de Belg. Ann. 45:135.

Wheeler, 1908, Amer. Mus. Nat. Hist. Bul. 24:345, illus.

Wheeler, 1909, N. Y. Ent. Soc. Jour. 17:98-99.

*Wheeler, 1912, Psyche 19:172, illus.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 366-371, illus.

Parks, 1929, Brooklyn Ent. Soc. Jour. 24:32.

Cole, 1936, Ent. News 47:118.

Cole, 1938, Amer. Midl. Nat. 19:678.

*Cole, 1942, Amer. Midl. Nat. 28:385.

Length 2,2-9 mm. (replete of *mexicanus* 10-13 mm.). Polymorphism weakly to strongly developed. General habitus of a *Formica*. Antenna 12-

segmented; antennal fossa placed close to or touching posterior border of clypeus, funiculus slender, without a club. Eye convex, placed posterior to the middle of the side of the head. Ocelli varying from absent or indistinct to distinct. Maxillary palpus unusually long, 6-segmented, the 4th segment at least as long as, or longer than, the 2 succeeding segments combined. Psammophore present. Apical tooth of mandible long, acute. Frontal carinae subparallel. Mesoepinotal region somewhat constricted, saddle-shaped. Petiolar scale erect, usually thick anteroposteriorly, and with blunt superior border. Body, especially the gaster, clothed with dense, appressed pubescence, usually also with numerous erect hairs which are present even on the scapes and legs. Twenty-two forms, *hammettensis* Cole, *lugubris* Wheeler, †*melliger* Forel, *melliger depilis* Forel, *melliger lomoaënsis* Wheeler, *melliger mendax* Wheeler, *melliger mendax comatus* Wheeler, † *melliger mimicus* Wheeler, *melliger mimicus californicus* Cole, *melliger mimicus jesuita* Wheeler, †*melliger orbiceps* Wheeler, †*melliger semirufus* Emery, *melliger semirufus romainei* Cole, †*melliger semirufus kennedyi* Cole, † *melliger semirufus testaceus* Emery, †*mexicanus* Wesmael, †*mexicanus* var. *hortideorum* McCook, †*mexicanus idahoensis* Cole, †*mexicanus mojave* Wheeler, †*mexicanus navajo* Wheeler, *yuma* Wheeler, *yuma* var. *flaviceps* Wheeler. One or more of these have been found in Texas, Oklahoma, New Mexico, Colorado, Arizona, Utah, Idaho, California and Kansas. According to Wheeler, 1908, p. 346, our forms occur in the warm, arid plains and deserts; *melliger* being more abundant at altitudes of 300-1,500 meters and *mexicanus* finding its best environment at altitudes of 2,000-3,000 meters. The ants are called honey ants because of the honeylike substance stored in the gaster of the repletes. The workers of some forms, at least, forage at night. Although they are carnivorous their food consists to a large extent of the sweet excretions derived from plants and the honeydew obtained from insects. They nest in the soil in colonies of only a few hundred individuals or less. Although the worker bears a striking resemblance to that of a *Formica* it can be distinguished by the shape of the eyes, length and form of the maxillary palpus, presence of a psammophore, shape of thorax and petiole, and other characters.

FORMICA, subgenus PROFORMICA Ruzsky

Pl. 22, Fig. 83

Formica, subg. *Proformica* Ruzsky, 1903, Soc. Ent. Ross. Horae 36:303.

Subgenotype, *Formica nasuta* Nylander (by designation of Wheeler, 1911).

*Emery, 1893, Zool. Jahrb., Abt. f. System. 7:661, 664.

*Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. 53:536-542.

*Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:599.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:554.

Cole, 1942, Amer. Midl. Nat. 28:384.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:299, 308.

Small for a *Formica* (2.5-5.5 mm.). Rather smooth and shining. Head narrowed anteriorly, with rounded posterior border and rounded posterior corners. Antenna 12-segmented, scape flattened, the first funicular segment approximately as long as the two succeeding segments combined. Frontal carinae short, subparallel. Clypeus sharply carinate, the anterior border somewhat extended in the middle. Epinotum often with the base and de-

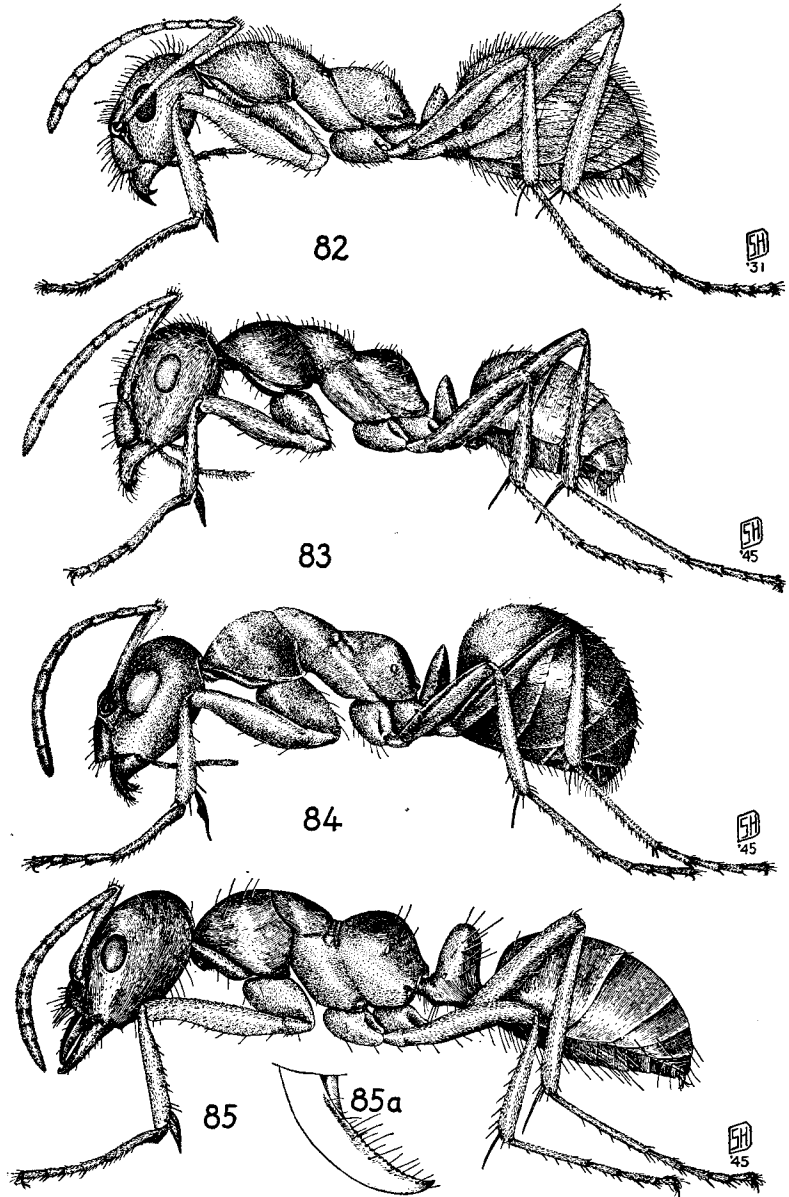


PLATE 22

- Fig. 82. *Formica (Neoformica) pallidefulva schaufussi* Mayr, worker.
 Fig. 83. *Formica (Proformica) neogagates* Emery, worker.
 Fig. 84. *Formica (Formica) fusca* var. *subsericea* Say, worker.
 Fig. 85. *Polyergus lucidus* Mayr, worker; fig. 85 a, right mandible.

clivity not clearly defined. Petiole convex anteriorly, more flattened posteriorly, with transversely rounded, usually entire, superior border. Pubescence often sparse. Erect hairs present on gula, head, thorax, petiole and gaster. Antennal scape with or without erect hairs. Head and sections of the thorax often with a delicate sculpturing which does not obscure the shining appearance of these parts. General color ranging from reddish or brownish to almost black, the gaster often darker than the rest of the body. One or more forms have been recorded from almost every state except those entirely south of the 35th degree of latitude from South Carolina to New Mexico. Six forms, *limata* Wheeler, †*neogagates* Emery, †*neogagates lasioides* Emery, † *neogagates lasioides vetula* Wheeler, *neogagates* var. *morbida* Wheeler, †*neogagates* var. *vinculans* Wheeler. The most common is *neogagates* and several of its variants. The ants of this subgenus form small colonies in the soil, usually beneath stones or other objects. Wheeler, 1913, p. 538, states that *neogagates* nests from sea level to altitudes of at least 6,000 to 8,000 feet. The food of the workers of *Proformica* is undoubtedly the flesh of small arthropods supplemented by honeydew. The ants are enslaved by various forms in the Sanguinea group. Workers are sometimes infected with the parasitic fungus, *Laboulbenia formicarum* Thaxter. This subgenus contains some of our smallest *Formica*.

FORMICA, subgenus NEOFORMICA Wheeler

Pl. 22, Fig. 82

Formica, subg. *Neoformica* Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. 53:548.

Subgenotype, *Formica pallidefulva* Latreille (by designation of Wheeler, 1913). Latreille, 1802, Hist. Nat. Fourmis, p. 174.

Mayr, 1866, Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 53:493, illus.

*Emery, 1893, Zool. Jahrb., Abt. f. System. 7:654, illus.

*Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:369.

Wheeler, 1906, Amer. Mus. Nat. Hist. Bul. 22:343.

*Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. 53:548-560.

*Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:598.

Cole, 1938, Amer. Midl. Nat. 20:369.

Smith, 1939, Ent. Soc. Amer. Ann. 32:583.

Wesson and Wesson, 1940, Amer. Midl. Nat. 24:102.

*Cole, 1942, Amer. Midl. Nat. 24:385.

Cole, 1943, Amer. Midl. Nat. 29:184.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:299, 309.

Length 4-7 mm. Head, excluding mandibles, noticeably longer than broad (usually one and two-tenths to one and three-tenths times as long as broad), narrowed anteriorly, with rounded posterior border and rounded posterior corners. Antennal scape slender, weakly curved at the base, approximately one and one-fourth to one and one-third times the length of the head; first funicular segment distinctly shorter than the two succeeding segments combined. Frontal carinae subparallel in the *pallidefulva* forms. Clypeus rather sharply carinate, with the anterior border extended in the middle. Maxillary palpus 6-segmented. Thorax slender, the promesonotum not very strongly convex and the mesoepinotal impression usually not very deep. Epinotum low, base and declivity not clearly delimited in the *pallidefulva* forms. Petiole erect, with rather strongly convex anterior surface and more

weakly convex or flattened posterior surface, the superior border transversely rounded, often more or less blunt. Pubescence in the *pallidefulva* forms variable but never dense on the head and thorax; pilosity ranging from sparse to rather abundant, with erect hairs always absent from the antennal scapes and present or absent on the gula. Body in the *pallidefulva* forms (excepting *archboldi*) more or less shining, especially the head and thorax; rather sub-opaque in the *moki* forms. General color ranging from pale yellowish through reddish brown to almost black, the gaster often darker than the head and thorax. Twelve forms, †*moki* Wheeler, *moki grundmanni* Cole, †*moki xerophila* M. R. Smith, †*pallidefulva* Latreille, †*pallidefulva archboldi* M. R. Smith, †*pallidefulva delicata* Cole, †*pallidefulva nitidiventris* Emery, †*pallidefulva nitidiventris fuscata* Emery, †*pallidefulva schaufussi* Mayr, *pallidefulva schaufussi dolosa* Wheeler, †*pallidefulva schaufussi incerta* Emery, †*pallidefulva* var. *succinea* Wheeler. The *pallidefulva* forms have been recorded from New Mexico to Wyoming and eastward to the Atlantic Ocean. Members of the Moki group are known only from Arizona, Utah, and Washington, but may occur in some of the other Western States. The ants of this subgenus form small to moderately large colonies in the ground, either freely exposed or beneath stones and other objects. Their food is mainly the flesh of arthropods and honeydew. The *pallidefulva* forms are enslaved by various *Polygerus* and members of the *Formica sanguinea* group. *F. pallidefulva* in the broad sense is easily recognized but its many variants are often extremely difficult to determine because of variations in size, color, and pilosity. The parasitic fungus, *Laboulbenia formicarum* Thaxter often infects workers of the *pallidefulva* forms.

FORMICA, subgenus FORMICA Linnaeus

Pl. 22, Fig. 84

Formica Linnaeus, 1758, System. Naturae Ed. 10, 1:579.

Subgenotype, *Formica rufa* Linnaeus (by designation of Curtis, 1839).

This is the largest subgenus of *Formica*. It contains 107 of the 122 forms and is so large and unwieldy that for the sake of convenience it has been divided into 5 groups, called the Exsecta, Rufa, Microgyna, Fusca and Sanguinea groups. The characters employed for delimiting these groups, although the best known, are not always entirely satisfactory, because the ants composing an individual group are rather variable with respect to many of the characters. A novice attempting identification may therefore be easily led astray. Members of the Sanguinea group can usually be readily recognized by the emargination of the anterior border of the clypeus and those of the Exsecta group by the emarginate posterior border of the head. Members of the remaining groups are often placed with much more difficulty.

1. Posterior border of head with a pronounced emargination. Superior border of mandible often bearing small denticulae. Petiole with sharp superior border. Gaster usually darker than the head and thorax, and often shiningExsecta group, p. 624
One or more characters unlike alternative 2
2. (1) Anterior border of clypeus with a more or less distinct to a very pronounced median emarginationSanguinea group, p. 624
Anterior border of clypeus entire, rounded or subangularly produced in the middle.... 3

3. (2) Body robust (subopaque); color usually light to dark red with brown or black gaster 4
 Body more slender. Color diverse, often brown or black. Pubescence varying from moderate to abundant Fusca group, p. 621
4. (3) Female larger than the largest worker, usually 6 mm. or more in length Rufa group, p. 622
 Female not larger than the largest worker (often smaller than the largest worker).
 Ants noted for parasitizing colonies of other *Formica* Microgyna group, p. 623

FUSCA GROUP

Pl. 22, Fig. 84

- Say, 1836, Boston Jour. Nat. Hist. 1:289.
 Buckley, 1866, Ent. Soc. Phila. Proc. 6:156.
 Mayr, 1886, Zool.-Bot. Gesell. Wien, Verh. 36:426.
 *Emery, 1893, Zool. Jahrb., Abt. f. System. 7:657-661, 663, 664.
 Wheeler, 1902, Amer. Nat. 36:947.
 *Emery, 1909, Deut. Ent. Ztschr., p. 193.
 Wheeler, 1912, Psyche 19:90.
 *Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. 53:494-536, illus.
 Santschi, 1913, Soc. Ent. de Belg. Ann. 57:435.
 Wheeler, 1915, Psyche 22:205.
 *Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:598.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:545-553.
 Kennedy and Dennis, 1937, Ent. Soc. Amer. Ann. 30:542.
 *Cole, 1940, Amer. Midl. Nat. 24:77-79.
 *Cole, 1942, Amer. Midl. Nat. 28:381.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:300.

Length 2.5-7.5 mm. For characters see the key. This group contains 28 forms, †*cinerea* var. *altipetens* Wheeler, †*cinera* var. *canadensis* Santschi, *cinerea* var. *lepada* Wheeler, †*cinerea* var. *neocinerea* Wheeler, *cinerea* var. *rutilans* Wheeler, †*fusca* Linnaeus, *fusca* var. *algida* Wheeler, †*fusca* var. *argentea* Wheeler, *fusca* var. *blanda* Wheeler, †*fusca* var. *gelida* Wheeler, *fusca* var. *glacialis* Wheeler, †*fusca* var. *marcida* Wheeler, †*fusca* var. *neoclara* Emery, †*fusca* var. *neorufibarbis* Emery, †*fusca* *pruinosa* Wheeler, *fusca* *pruinosa* *lutescens* Wheeler, †*fusca* var. *subaenescens* Emery, †*fusca* var. *subsericea* Say, †*hewitti* Wheeler, †*lecontei* Kennedy and Dennis, †*montana* Emery, †*pilicornis* Emery, †*rufibarbis* var. *gnava* Buckley, †*rufibarbis* var. *occidua* Wheeler, †*sibylla* Wheeler, †*subpolita* Mayr, †*subpolita* var. *camponoticeps* Wheeler, and *subpolita* var. *ficticia* Wheeler. One or more of these occur in every state of the Union with the possible exception of Florida. The majority of the forms are included under *fusca*, its one subspecies and 11 varieties, *subpolita* and its 2 varieties, and the 5 varieties of *cinerea*. As previously mentioned some of the forms of the group are enslaved by *Polyergus*, and by *Formica* of the Sanguinea group. Although a great many of the forms in the Fusca group have more or less dark brown or black bodies there are some at least which have a color approaching that of the ants in some of the other *Formica* groups. The ants of the Fusca group nest in the soil either freely or under cover of stones, logs, and other objects. The workers are carnivorous as well as feeders on honeydew. The common *subsericea* often builds unsightly mounds on lawns in some regions.

RUFA GROUP

- Nylander, 1856, *Sci. Nat. Zool. Ann.* **5**:62.
 Mayr, 1870, *Zool.-Bot. Gesell. Wien, Verh.* **20**:951.
 Forel, 1886, *Soc. Ent. de Belg. Bul. (C. R.)* **30**:39.
 Mayr, 1886, *Zool.-Bot. Gesell. Wien, Verh.* **36**:428.
 *Emery, 1893, *Zool. Jahrb., Abt. f. System.* **7**:649-652, 663, *illus.*
 Wheeler, 1903, *Amer. Mus. Nat. Hist. Bul.* **19**:391, 395, 460, 639-645.
 Wheeler, 1904, *Amer. Mus. Nat. Hist. Bul.* **20**:374.
 Wheeler, 1905, *Amer. Mus. Nat. Hist. Bul.* **21**:268-269.
 Wheeler, 1909, *N. Y. Ent. Soc. Jour.* **17**:85.
 Wheeler, 1912, *Psyche* **19**:90.
 *Wheeler, 1913, *Harvard Univ. Mus. Compar. Zool. Bul.* **53**:425-465, 560, *illus.*
 *Wheeler, 1916, *Conn. State Geol. and Nat. Hist. Surv. Bul.* **22**:595.
 Wheeler, 1917, *Amer. Acad. Arts and Sci. Proc.* **52**:535-542.
 *Burrill and Smith, 1919, *Ohio Jour. Sci.* **19**:286.
 Abbott, 1926, *Ent. News* **37**:210.
 Wheeler, 1926, *Ants, Columbia Univ. Press, 2d ed., p.* 444.
 Cole, 1932, *Psyche* **39**:30, *illus.*
 Weber, 1935, *Ecolog. Monograph* **5**:165, *illus.*
 Kennedy and Dennis, 1937, *Ent. Soc. Amer. Ann.* **30**:531, *illus.*
 *Creighton, 1940, *Amer. Mus. Novitates No.* 1055: 10 pp., *illus.*
 Buren, 1942, *Iowa State Col. Jour. Sci.* **16**:402.
 *Cole, 1942, *Amer. Midl. Nat.* **28**:379-381, *illus.*
 *Buren, 1944, *Iowa State Col. Jour. Sci.* **18**:300, 301-303.

Length 3-9 mm. Workers of many species robust in stature. For other characters see key. This group includes many forms with light to dark red head, thorax and petiole, and dark brown to black gaster. In some species the head, thorax and even the petiole are infuscated. Pilosity highly variable, ranging from no hairs on the thorax and petiole to abundant hairs on these regions and the remainder of the body. There are 31 forms, †*ciliata* Mayr, †*comata* Wheeler, †*criniventris* Wheeler, †*dakotensis* Emery, †*dakotensis* var. *montigena* Wheeler, †*dakotensis* var. *saturata* Wheeler, †*dakotensis* var. *specularis* Emery, †*ferocula* Wheeler, †*foreliana* Wheeler, †*fossiceps* Buren, †*foreas* Wheeler, †*foreas* var. *comptula* Wheeler, †*prociolata* Kennedy and Dennis, †*rufa clivia* Creighton, †*rufa coloradensis* Wheeler, †*rufa gymnomma* Wheeler, †*rufa haemorrhoidalis* Emery, †*rufa integra* Nylander, †*rufa integroides* Emery, †*rufa laeviceps* Creighton, †*rufa melanotica* Emery, †*rufa mucescens* Wheeler, †*rufa obscuripes* Forel, †*rufa obscuriventris* Mayr, †*rufa planipilis* Creighton, †*rufa propinqua* Wheeler, †*rufa ravida* Wheeler, †*rufa subcaveiceps* Wheeler, †*rufa subfasciata* Wheeler, †*rufa subnitens* Creighton, †*rufa tahoensis* Wheeler. One or more occur in every state with the possible exception of Florida. In the eastern half of the United States the two most common forms are *rufa integra* and *rufa obscuriventris*. One of the most widely distributed and best known is *rufa obscuripes*, the western mound thatching ant. The inquiline ant, *Leptothorax diversipilosus* M. R. Smith, has been found nesting in the colonies of *obscuripes* and *melanotica*. Many of the members of the *Rufa* group are temporary parasites on other forms of *Formica* belonging to the *Fusca* group and the subgenus *Neoformica*, but especially the former. Since the biology of many of the ants is not known there may be more temporary parasites and hosts than those listed. The ants of this group nest in rotten logs and

stumps, or in the soil. Their nests in the soil are usually below objects. In most instances the surface of the nest is covered with vegetable detritus. Colonies are often large with strongly aggressive workers. The food of the ants is similar to that of other *Formica*.

MICROGYNA GROUP

- *Emery, 1893, Zool. Jahrb., Abt. f. System. 7:651, illus.
 Wheeler, 1903, Amer. Mus. Nat. Hist. Bul. 19:645, illus.
 Wheeler, 1904, Amer. Mus. Nat. Hist. Bul. 20:347.
 Forel, 1904, Soc. Ent. de Belg. Ann. 48:152.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. 21:270-274.
 Wheeler, 1906, Psyche 13:39, illus.
 Wheeler, 1909, N. Y. Ent. Soc. Jour. 17:84.
 *Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. 53:465-481, illus.
 *Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. 22:597.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:542-544.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., pp. 414-444, illus.
 Kennedy and Dennis, 1937, Ent. Soc. Amer. Ann. 30:536-542, illus.
 Cole, 1939, Amer. Midl. Nat. 22:413, illus.
 *Cole, 1940, Amer. Midl. Nat. 24:76.
 Cole, 1940, Amer. Midl. Nat. 23:224.
 *Cole, 1942, Amer. Midl. Nat. 28:381.
 Buren, 1942, Iowa State Col. Jour. Sci. 16:399.
 *Buren, 1944, Iowa State Col. Jour. Sci. 18:300, 303.

Length 3.3-6.5 mm. Differing from the Rufa group mainly in that the female is approximately as small as, or even smaller than the worker. For other characters see the key. Twenty-five forms, †*difficilis* Emery, †*difficilis* var. *consocians* Wheeler, †*habrogyna* Cole, †*impexa* Wheeler, *indianensis* Cole, †*knighti* Buren, †*microgyna* Wheeler, †*microgyna californica* Wheeler, †*microgyna californica hybrida* Wheeler, †*microgyna rasilis* Wheeler, †*microgyna rasilis pinetorum* Wheeler, *microgyna rasilis pullula* Wheeler, †*microgyna rasilis spicata* Wheeler, *microgyna* var. *recidiva* Wheeler, *microgyna scitula* Wheeler, †*microgyna spatulata* Buren, †*morsei* Wheeler, †*nepticula* Wheeler, *nevadensis* Wheeler, †*postoculata* Kennedy and Dennis, †*querquetulana* Kennedy and Dennis, *reflexa* Buren, *whymperi* Forel, *whymperi* var. *adamsi* Wheeler, *whymperi* var. *alpina* Wheeler. The distribution of the forms in this group is imperfectly known due to the sparsity of records. One or more forms are believed, however, to occur in every state with the possible exception of Florida and some of the Gulf States. The small size of the female readily suggests that the ants are temporary parasites on other *Formica*. Wheeler has shown that the female of *difficilis* var. *consocians* secures adoption in the nests of *pallidifulva schaufussi incerta* and that the workers of *incerta* rear the progeny of *consocians* until the *incerta* workers die off and a pure colony of the parasite remains. The method or methods employed by the *consocians* female in obtaining adoption is not known. Other *Formica* believed to act as hosts are those of the Fusca group and of the subgenus *Proformica*; there may be others. Nests of the ants of the *Microgyna* group are mostly constructed in the soil beneath objects and the surface of the nest covered with vegetable detritus. Buren has recorded free nests in the soil except for the covering of vegetable detritus. In the Eastern States *difficilis*

is one of the most common forms. The food of the ants of this group is the same as that of other *Formica*. The entire group is very much in need of some very careful biological and taxonomic work.

EXSECTA GROUP

- McCook, 1877, Amer. Ent. Soc. Trans. **6**:295, illus.
 Forel, 1886, Soc. Ent. de Belg. Bul. (C. R.) **30**:38.
 *Emery, 1893, Zool. Jahrb., Abt. f. System. **7**:653.
 *Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. **53**:481-489, illus.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. **52**:544-545.
 Andrews, 1926, Psyche **33**:127.
 Andrews, 1928, Amer. Nat. **62**:63.
 Holmquist, 1938, Ecology **9**:70.
 Andrews, 1929, Ent. Soc. Amer. Ann. **22**:369.
 Park, 1929, Ent. News **40**:325-326.
 Dreyer and Park, 1932, Psyche **39**:127.
 *Cole, 1940, Amer. Midl. Nat. **24**:75, illus.
 *Buren, 1944, Iowa State Col. Jour. Sci. **18**:300, 307.

Length 3.5-7.5 mm. Antenna 12-segmented. Scape flattened. Posterior border of head distinctly emarginate, the emargination broad but not always deep. Clypeus carinate, the anterior border projecting in the middle. Frontal carinae diverging posteriorly. Superior border of mandible often with small denticulae. Petiole with a sharp superior border. Gaster generally darker than the head and thorax and often shining. Erect hairs sparse or absent on head and thorax of all forms of *exsectoides* except *opaciventris*. Six forms, †*exsectoides* Forel, †*exsectoides* var. *davisi* Wheeler, *exsectoides* var. *hesperia* Wheeler, †*exsectoides opaciventris* Emery, †*ulkei* Emery, †*ulkei* var. *hebescens* Wheeler. The distribution of these ants is not well known. One or more forms have been found in the region from Maine to Georgia and westward to Colorado and Wyoming. The best known is perhaps the Allegheny mound building ant, *exsectoides*, whose mounds often reach enormous proportions and contain many thousands of individuals. Wheeler has shown that the females of *exsectoides* establish their colonies by temporarily parasitizing small colonies of *Formica fusca* var. *subsericea*. A number of investigators have found that the workers of *exsectoides* can destroy small trees and other growth by attacking the bark and cambium layer. The workers are very aggressive. The food of the ants is the flesh of small arthropods supplemented by honeydew and the sap of plants.

SANGUINEA GROUP

- *Emery, 1893, Zool. Jahrb., Abt. f. System. **7**:646-649, illus.
 Forel, 1901, Soc. Ent. de Belg. Ann. **45**:395.
 Wheeler, 1905, Amer. Mus. Nat. Hist. Bul. **21**:1.
 *Wheeler, 1913, Harvard Univ. Mus. Compar. Zool. Bul. **53**:401-425.
 *Wheeler, 1916, Conn. State Geol. and Nat. Hist. Surv. Bul. **22**:595.
 Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. **52**:533-535.
 Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 452, illus.
 Creighton, 1935, Amer. Mus. Novitates No. 773, p. 1, illus.
 Cole, 1938, Amer. Midl. Nat. **20**:368.
 *Cole, 1940, Amer. Midl. Nat. **24**:74.

*Cole, 1942, Amer. Midl. Nat. 28:375-378.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:299, 307.

Length 3-8 mm. Anterior border of clypeus with a more or less indistinct to a very pronounced median emargination. Body rather stout in the subspecies and varieties of *sanguinea*. Head and thorax usually of a general reddish color with the gaster darker (this color also present in some of the forms in other groups, especially the Rufa and Microgyna groups). Pilosity variable, very sparse or absent on the thorax and petiole of *sanguinea aserva* and *sanguinea subnuda* but rather abundant in *perpilosa* and *obtusopilosa*. The Sanguinea group comprises 17 forms, †*bradleyi* Wheeler, *curiosa* Creighton, *emeryi* Wheeler, †*manni* Wheeler, †*obtusopilosa* Emery, *obtusopilosa* var. *alticola* Wheeler, †*oregonensis* Cole, *pergandei* Emery, †*perpilosa* Wheeler, †*sanguinea aserva* Forel, †*sanguinea puberula* Emery, †*sanguinea rubicunda* Emery, *sanguinea rubicunda sublucida* Wheeler, †*sanguinea subintegra* Emery, *sanguinea subintegra gilvescens* Wheeler, †*sanguinea subnuda* Emery, *wheeleri* Creighton. The ants of this group are widely distributed over the United States and probably occur in every state with the possible exception of Florida. Although no forms have been recorded from Georgia, Alabama, Mississippi and Louisiana there is reason to believe they may occur in the more northern section of these states. Some of the best known forms of *sanguinea* are *rubicunda*, *subintegra* and *subnuda*. The ants are called facultative slave makers because they are not entirely dependent on their slaves as are the obligatory slave makers, the forms of *Polyergus*. Some forms apparently do not have slaves at all, and others can live part of their life, at least, free of slaves. Their slaves are members of the subgenera *Proformica* and *Neoformica* and the Fusca group of *Formica* (*Formica*). The ants form moderate-sized colonies in the soil freely exposed or else beneath the cover of stones and other objects. Their food consists largely of the flesh of other small arthropods, honeydew and the brood they appropriate of other *Formica*. Although ordinarily the members of this group are not considered as living in arid regions there are at least two forms, *perpilosa* and *manni*, capable of doing this. Wheeler assigned *bradleyi* to the Sanguinea group, but this ant has some characters which are strongly suggestive of the subgenus *Proformica*.

POLYERGUS Latreille

Pl. 22, Fig. 85

Polyergus Latreille, 1804, Nouv. Dict. Hist. Nat. 14:179.

Genotype, *Formica rufescens* Latreille (monobasic).

Mayr, 1870, Zool.-Bot. Gesell. Wien, Verh. 20:952.

Emery, 1893, Zool. Jahrb., Abt. f. System. 7:666.

Wasmann, 1901, Allg. Ztschr. f. Ent. Neudamm 6:353.

Burrill, 1908, N. Y. Ent. Soc. Jour. 16:144.

Santschi, 1911, Soc. Ent. Ital. Bol. 41:7.

Wheeler, 1915, Amer. Mus. Nat. Hist. Bul. 34:419-420.

Wheeler, 1916, N. Y. Ent. Soc. Jour. 24:107.

Wheeler, 1917, Amer. Acad. Arts and Sci. Proc. 52:555.

Wheeler, 1926, Ants, Columbia Univ. Press, 2d ed., p. 471.

Jones, 1943, Amer. Midl. Nat. 29:185.

*Buren, 1944, Iowa State Col. Jour. Sci. 18:310.

Length 4-7 mm. Habitus somewhat similar to that of *Formica*. Antenna 12-segmented, scape rather abruptly enlarged toward the apex, antennal fossa either touching the posterior border of the clypeus or inserted exceedingly close to it. Ocelli distinct. Eye well-developed, convex, placed more than its greatest diameter from the base of the mandible. Frontal carinae short. Clypeus short, with a truncate or broadly but not deeply excised anterior border. Maxillary palpus 4-segmented, labial palpus 2-segmented. Mandible narrow, falcate, with pointed apex; internal border minutely serrated. Thorax stout, with a strong mesoepinotal impression in which is a pair of distinct protuberant spiracles. Petiole erect, unusually stout, generally with a somewhat transversely rounded superior border. Hairs rather sparse on body, especially the thorax. Eight forms, †*lucidus* Mayr, *lucidus montivagus* Wheeler, †*rufescens bicolor* Wasmann, †*rufescens breviceps* Emery, *rufescens breviceps fusciventris* Wheeler, *rufescens breviceps silvestrii* Santschi, *rufescens breviceps umbrata* Wheeler, *rufescens laeviceps* Wheeler. Members no doubt occur in every state with the possible exception of those states bordering the Gulf of Mexico where the ants are either rare or absent. *P. lucidus* is the most common form in the eastern section of the United States. Subspecies and varieties of *rufescens* occur in the Middle West and West, *breviceps* being perhaps the most common form. *Polyergus* workers raid the nests of *Formica* belonging to the subgenera *Neoformica* and *Formica*. Their attention in the last-mentioned subgenus is especially confined to the *Fusca* group. The *Polyergus* workers appropriate the *Formica* brood for food and those members of the brood which are not eaten develop into slave workers in the *Polyergus* nests. The slaves nurse the brood of the slave makers, repair their nests and feed the *Polyergus* adults.

Glossary

- For interpretation of symbols such as *, †, and illus. see pages 5 and 8.
- abdominal pedicel, the one or two reduced basal segments of the abdomen between the epinotum and gaster.
- anal glands, glands near the anus of worker and female dolichoderine ants which produce a sticky secretion with a disagreeable odor. The secretion is often ejected on other ants as a means of offense or defense.
- antennal funiculus, the flexible portion of the antenna distal to the scape. It may be composed of a variable number of segments.
- antennal insertion, the place where the antenna is articulated to the head.
- antennal fossa, the concavity or socket into which the base of the antenna is articulated to the head.
- anterodorsal, toward the front and back.
- anterolateral, toward the front and side.
- anteroposterior, from the front toward the rear.
- anteroventral, toward the front and lower surface (venter).
- basal surface of epinotum, the dorsal surface of the epinotum to its junction with the epinotal declivity.
- bristle, a coarse, stiff hair.
- calyx, a section of the proventriculus with such definite anatomical structures that the structures can often be used for the purpose of taxonomic classification.
- carina, a ridge.

- cheek, the region on the side of the head between the mandible and compound eye.
- cloacal orifice, the anal opening.
- crenated, scalloped with small, blunt teeth.
- conulate, cone-shaped.
- denticulae, small teeth.
- depauperate, impoverished or starved.
- ecarinate, without carina.
- edentate, toothless; without teeth.
- emarginate, notched.
- epinotal declivity, the sloping, posterior surface of the epinotum.
- epinotal tubercle, a small, elevated, triangular structure borne on each side of the epinotum near where the base and declivity meet.
- epinotum, usually designated as the area of the thorax lying posterior to the mesonotum; in reality, it represents the area resulting from a fusion of the first abdominal segment with the metathorax.
- ergataner, see ergatoid male.
- ergatogyne, an individual with structures common to both worker and female.
- ergatoid female, see ergatogyne.
- ergatoid male, an individual with structures common to both worker and male.
- extensor surface of leg, the anterior surface of the leg.
- female, the active reproducing unit of the colony, commonly designated as "queen." The female differs from the workers in many morphological structures. Also see page 522 of the introduction.
- flexor surface of leg, the posterior surface of the leg.
- front, the region of the head lying between the frontal carinae posterior to the clypeus and extending indefinitely toward the vertex and temples.
- frontal area, the small, usually triangular area between the frontal carinae directly posterior to the clypeus.
- frontal carina, the longitudinal ridge lying on the inner side of the insertion of the antenna.
- frontal groove, the impressed longitudinal line extending through the median groove of the head from the frontal area toward the median ocellus.
- frontal lobe, the platelike extension of the frontal carina above the insertion of the antenna.
- funicular club, the enlarged apical segment or segments of the funiculus, which singly or together form a more or less distinct club.
- gaster, the section of the abdomen posterior to the petiole in ants with a single-segmented petiole, and posterior to the postpetiole in ants with a two-segmented petiole.
- gula, the ventral surface of the head which is bounded in front by the labium, on the sides by the cheeks, and extends posteriorly to the occipital foramen.
- humeral angles of thorax, the anterolateral corners of the prothorax.
- humerus, relating to the shoulder.
- hypogaecic, subterranean.
- inferior angle of head, the anterolateral corner.
- inferior angle of prothorax, the angle at the lower anterolateral corner of the prothorax.
- infraspinal lamella, a platelike structure beneath the epinotal spine.
- inquiline, an individual, especially one of certain Hymenoptera, that lives habitually in the nest or abode of some other species without causing inconvenience to the host other than consuming some of its food; a guest.
- lateral spur, the spur on the tibia nearest the exterior surface of the leg.

- lyrate, lyre-shaped.
- marginate, bounded by an elevated border.
- masticatory border, chewing border.
- median spur, the tibial spur nearest to the body.
- mesoepinotal suture, the suture separating the mesonotum from the epinotum.
- metasternal angle or spine, the angle or spine at the lower posterolateral corner of the thorax.
- monomorphic, having only one form. (For more detailed explanation see page 522 of introduction.)
- nodiform, in the form of a knot or knob.
- occipital lobe, the prominent posterolateral corner of the head.
- petiole, a pedicel composed of only one segment, or the first segment of a two-segmented pedicel.
- pile, hair; applied to the longer and usually coarser, more erect hairs of the body and appendages in contrast to pubescence.
- piligerous, bearing hair.
- polymorphic, with several different forms. (For more detailed explanation see page 522 of introduction.)
- porrect, extended horizontally, stretched out.
- posteromesially, directed toward the rear and middle.
- promesonotal suture, the suture separating the pronotum from the mesonotum.
- proventriculus, the portion of the alimentary canal preceding the true stomach or ventriculus. Used in ants as a pumping organ.
- pruinose, with the effect of a frosted or bloomlike covering.
- psammophore, beard; referring to the long hairs beneath the head which are arranged in somewhat of a comblike series.
- pubescence, the short, usually fine, appressed hairs covering the body and appendages.
- pygidium, the dorsal surface of the last exposed gastric segment. The term is applied specifically to this region in the ants of the subfamily Cerapachyinae.
- queen, see female ant. (For more detailed explanation see page 522 of the introduction.)
- reniform, kidney-shaped.
- replete, an inactive worker ant into whose greatly distended gaster food (honeydew) is stored for common use in the future. The food is later distributed among the workers through a process of regurgitation.
- rugulae, small wrinkles.
- rugulose, minutely wrinkled.
- scalelike, a term applied to the petiole or postpetiole when the node is of a shape in distinct contrast to that of "nodiform." A term also applied to hairs when they have a general similarity to the scales on Lepidoptera.
- scrobe, a groove formed for the reception or concealment of all, or part of an appendage.
- sigmoid, shaped like the Roman S or the final lower case of the Greek sigma.
- soldier, a worker ant which is distinct from other workers of its species by its larger size, much developed head or other structural characters; a major worker. (Also see page 522 of introduction.)
- spatulate, spoon-shaped.
- spine, an unarticulate thornlike outgrowth of the body wall.
- sting, the spinelike organ borne near the apex of the gaster which is used as an organ of offense or defense. It is capable of being extruded or retracted. The sting is absent or vestigial in the subfamilies Dolichoderinae and Formicinae.
- subcampanulate, somewhat bell-shaped.

subcordate, approaching the shape of a heart.

subopaque, nearly opaque but with a faint luster.

sulcus, a furrow or groove.

superior border of mandible, the border lying nearest to the clypeus.

tibial spur, the spinelike appendage borne near the apex of the tibia; a tibia may have one spur, two spurs or none.

turriform, tower form.

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