Ant Larvae of the Subfamily Formicinae: Second Supplement^1,2

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ABSTRACT

The present supplement contains descriptions of the larvae of 16 species in the genera Acanthomyops, Myrmecorhynchus, Opisthopsis, Polyphacius, and Camponotus (Hymenoptera: Formicidae). Tribes are characterized. References to recent literature are cited. The body profiles of formicine larvae are classified into 8, and the mandible shapes into 9 generalized types. The least specialized profile is that of Melophorus; the most specialized are profiles of Myrmelachista and Camponotus. All formicine mandible shapes are specialized, but the most specialized are those of Myrmelachista, Plagiolepis, and Oecophylla. A revised key is given to the mature formicine larvae available for study, based mostly on body profile and mandible shape.

Genus Myrmecorhynchus Ern. André

M. carteri Clark

Worker Larva.—Length (through spiracles) ca. 4.5 mm. Similar to M. emeryi Ern. André, except in the following details. Body hairs of 2 types: (1) 0.036–0.12 mm long, mostly 2- or 3-branched (rarely 4- to 6-branched), the base short and the branches long, on all somites; (2) 0.036–0.054 mm long, with long shaft and 2–6 short apical branches, a few on the ventral surface of abdominal somites 1 and 2. Labrum somewhat broader than long, posterior surface with 6 small sensilla.

Queen Larva.—Length (through spiracles) ca. 9.5 mm. Similar to the worker larva, except in the following details. Head very small; body more swollen, with distinct lateral longitudinal wents. Anus ventral. Gonopod vestiges on abdominal somites VIII and IX. Entire integument with minute spinules in short transverse rows. Body hairs 0.075–0.3 mm long, with short base and long slender branches. Cranium transversely subelliptical in anterior view. Head hairs more numerous and reduced to mere spinules. Labrum with the breadth twice the length, narrowed ventrally.

Male Larva.—Length (through spiracles) ca. 6.2 mm. Similar to queen larva, except in the following details. Body less swollen and head relatively larger. Integument of venter of prothorax with a few minute spinules in short transverse rows. Body hairs of 2 types: (1) as in the queen, except shorter; (2) 0.027–0.072 mm long, with a stout base and a few short terminal denticles, numerous on prothorax, a few near the venter of meso- and metathorax. Posterior surface of labrum with 6 large and 16 small sensilla.

Material Studied.—Numerous larvae from Canberra, Australia, courtesy of the Reverend B. B. Lowery.

Genus Opisthopsis Emery

O. rufiborax Emery

Length (through spiracles) ca. 4.8 mm. Similar to O. haddoni Emery, except in the following details.
Material Studied.—Two larvae from Japan, courtesy of Mr. A. C. F. Hung.

**P. (Camposyrrna) becuba** Forel

Length (through spiracles) ca. 7.2 mm. Body hairs of 2 types: (1) 0.036–0.11 mm long, 2–to 6-branched, the branches very long and slender, numerous, generally distributed; (2) 0.054–0.14 mm long, with stout shaft which bears denticles, sparse, except numerous on abdominal somite X and on either side of the praesaeipium. Head hairs numerous, 0.05–0.1 mm long, denticulate or 2–to 4-branched. Anterior surface of labrum with ca. 13 hairs, ventral border with ca. 9 sensilla; posterior surface with 6 sensilla. Mandibles with the apical tooth stouter and more curved.

Material Studied.—Six larvae from Canberra, Australia, courtesy of the Reverend B. B. Lowery.

**P. (Myrmbopla) bippobanes** F. Smith

Length (through spiracles) ca. 5.8 mm. Stouter. Body hairs of 2 types which are about equally abundant: (1) 0.072–0.09 mm long, palmately 3–to 6-branched, the branches very long and slender; (2) 0.07–0.14 mm long, with heavy shaft and numerous denticles. Head hairs moderately numerous, 0.072–0.11 mm long, each roughened with a few minute denticles. Labrum with 15 hairs and 7 sensilla on the anterior surface; posterior surface with 6 large and 6 small sensilla. Mandibles with the apical tooth stouter.

Material Studied.—Two larvae from Japan, courtesy of Mr. A. C. F. Hung.

**P. (M.) simplex** Mayr

Length (through spiracles) ca. 5.7 mm. Integument largely spinulose, the spinules minute and in short transverse rows. Body hairs of 3 types: (1) 0.11–0.23 mm long, with stout shaft bearing a few denticles; (2) ca. 0.22 mm long, palmately 4–to 9-branched, fewer on the posterior abdominal somites; (3) ca. 0.25 mm long, stout, uncinate, a few in a transverse row across the dorsum of abdominal somites VII and VIII. Head hairs moderately numerous, 0.072–0.14 mm long, denticulate. Labrum more narrowed ventrally; posterior surface with 4 sensilla. Mandibles with the apical tooth slightly stouter.

Young Larva.—Length (through spiracles) ca. 2.7 mm. Body hairs of 3 types: (1) 0.072–0.18 mm long, simple to 4-branched, generally distributed; (2) ca. 0.4 mm long, slender and whip-like, a few on the dorsal and lateral surfaces of the thorax and abdominal somites I–VI; (3) 0.09–0.2 mm long, stout and uncinate, a few in a transverse band across the dorsum of abdominal somites VI–VIII. Head hairs and labrum as in mature larva. Mandibles with the apical tooth stouter, more acute and curved. Labium deeply bilobed.

Material Studied.—Two larvae from Japan, courtesy of Mr. A. C. F. Hung.

**P. (M.) wheeleri** Mann

Length (through spiracles) ca. 9 mm. Entire in-
 tegument with minute spinules in short transverse rows. Body hairs of 2 types: (1) 0.054–0.11 mm long, palmately 6-branched, on all somites; (2) 0.07–0.3 mm long, furnished with minute denticles, on the dorsal surface of the thorax and abdominal somites I–VI and IX and on all surfaces of abdominal somite X. Labrum with the anterior surface bearing 12 hairs and 6 sensilla; ventral border with 10 sensilla. Mandibles with the apical tooth stouter.

Material Studied. — Three damaged integuments from the Solomon Islands.

Genus Camponotus Mayr

In all the following descriptions for Camponotus we have compared the larvae with the larvae of C. noveboracensis (Fitch) (Wheeler and Wheeler 1953: 183) unless otherwise indicated; only differences are given here.

C. (Colobopsis) etiolatus Wheeler

Length (through spiracles) ca. 4 mm. Similar to C. mississippiensis M. R. Smith, except in the following details. Cranium shorter and wider. Head hairs more numerous. Antenna a small low elevation. Labrum nearly twice as broad as long, not so narrow ventrally; with 10 sensilla on the ventral border; posterior surface with 10 sensilla. Maxillary palp a tall cone with the apical fourth narrowed abruptly and sharp pointed.

Very Young Larva.—Length (through spiracles) ca. 1.5 mm. Similar to the mature larva but with the mouth parts more rounded.

Material Studied.—Numerous larvae from Texas, G. C. and J. Wheeler no. 233.

C. (C.) gasseri Forel

(Fig. 2)

Fig. 2 is drawn from a preserved larva which has retained the pellet in the praesaeipum. See also Wheeler and Wheeler (1953) p. 180, 183, 188, and 189.

C. (Myrmaphaenus) yogi Wheeler

Length (through spiracles) ca. 8.2 mm. Body hairs somewhat less numerous and shorter: (1) 0.054–0.072 mm long; (2) 0.09–0.18 mm long. Head hairs simple or bifid, shorter, 0.036–0.126 mm long. Labrum without the small median lobe. Lateral border of the mandible straight.

Material Studied. — Six larvae from California, courtesy of Mr. R. R. Snelling.

C. (Myrmophyusa) anthrax Wheeler

Length (through spiracles) ca. 5.2 mm. Body hairs of 2 types: (1) 0.036–0.18 mm long, mostly 2- or 3-branched; (2) 0.11–0.25 mm long, with heavy shaft, the apex with a single hook or bifid or multifid. Head hairs simple, bifid, or trifid, 0.054–0.14 mm long.

Young Larva.—Length (through spiracles) ca. 1.9 mm. Praesaeipum present. Entire integument spinulose. Body hairs moderately numerous, short to long, of 3 types: (1) 0.04–0.18 mm long, uncinate, in a row around the middle of each somite; (2) 0.036–0.09 mm long, slender and flexible, a few on the thorax, numerous on the abdomen; (3) 0.036–0.09 mm long, bifid or trifid, on all surfaces of thorax. Head hairs numerous, 0.036–0.072 mm long, simple or unicinate. No chiloscleres; labrum with the breadth twice the length. Mandibles subtriangular, slightly broader than long, lateral outline convex; apical tooth acute and moderately long. Maxillary palp a short peg with 4 apical and 1 lateral sensilla; galea slightly longer and more slender than palp, with 2 apical sensilla. Labium with a few short rows of minute spinules; palp a cluster of 5 sensilla. Opening of oenocytes a transverse slit.

Material Studied.—A dozen larvae from California, courtesy of Mr. R. R. Snelling.

C. (Myrmophyusa) capitó Mayr

Length (through spiracles) ca. 9.3 mm. Body hairs of 1 type: 0.036–0.12 mm long, simple, bifid, or trifid, the longest with alveolus and articular membrane. Head hairs more numerous, 0.075–0.15 mm long, mostly simple, a few bifid. Labrum with the breadth more than twice the length; no midventral lobe; anterior surface with 8 hairs; posterior surface with 6 large and 6 small sensilla. Mandibles much narrower apically; with straighter and longer apical tooth. Maxillae with the apex shorter and stouter.

Material Studied.—Sixteen larvae from Canberra, Australia, courtesy of the Reverend B. B. Lowery.

C. (M.) nigroaeneus F. Smith

Length (through spiracles) ca. 5.8 mm. Body hairs of 2 types: (1) 0.036–0.072 mm long, 2- or 3-branched; (2) shorter (ca. 0.12 mm long), on each
somite (including thorax), a few on the dorsal and lateral surfaces, uncinate (except a few simple on thorax). Head hairs very numerous, shorter (0.045–0.14 mm long), mostly bifid, a few simple or 3-branched, with long branches. Labrum without a midventral lobe; anterior surface with 5 hairs and 16 sensilla on or near the ventral border; posterior surface with 6 large sensilla. Mandibles with the apical tooth longer and straighter; subapical medial border more erose.

Material Studied.—Numerous larvae from Canberra, Australia, courtesy of the Reverend B. B. Lowery.

_C. (Tanaemyrmex) festinatus_ (Buckley)

Length (through spiracles) ca. 6.3 mm. Body hairs of 3 types: (1) 0.036–0.072 mm long, 2- or 3-branched, on all somites, the most numerous type; (2) ca. 0.14 mm long, uncinate, stout, on thorax and abdominal somites I–VIII; (3) 0.036–0.11 mm long, tip simple or with many short denticles, the only type on abdominal somite X, some on abdominal somite IX. Head hairs shorter, 0.054–0.09 mm long, mostly with a few minute denticles, a few deep bifid with very slender branches. Labrum lacking midventral lobe, with 5 sensilla on or near each ventrolateral border and 4 elevated sensilla on the ventral border; posterior surface with 17 sensilla.

_Very Young Larva._—Length (through spiracles) ca. 2.7 mm. Praesaeipium present. Body hairs of 2 types: (1) 0.054–0.11 mm long, uncinate, the most conspicuous type, a few on each somite; (2) 0.036–0.11 mm long, simple or bifid, with long slender tips, on all somites. Head hairs mostly uncinate, ca. 0.075 mm long; a few bifid or simple, 0.036–0.072 mm long.

Material Studied.—A dozen larvae from Texas, G. C. and J. Wheeler no. 214.

_C. (T.) ocreatus_ Emery

Length (through spiracles) ca. 11 mm. Uncinate body hairs much shorter (ca. 0.075 mm long). Cranium subpentagonal, widest just above the mandibular level. Head hairs shorter, 0.075–0.15 mm long, twice as numerous. Labrum with the breadth twice the length; 6 projecting sensilla on the ventral border; posterior surface with 6 large and 12 small sensilla.

_Very Young Larva._—Length (through spiracles) ca. 2.6 mm. Body hairs of 2 types: (1) 0.036–0.11 mm long, simple or palmately 2- to 4-branched; (2) 0.072–0.16 mm long, with alveolus and articular membrane, with heavy shaft and recurved tip which becomes curled toward the posterior end of the body. Head hairs 0.054–0.16 mm long, simple to 6-branched.

Material Studied.—A dozen larvae from Arizona, courtesy of Mr. R. R. Snelling.

Recent Literature on Formicine Larvae

**Gigantios destructor** (F.)

Kempf and Lenko (1968: 212–3) used our descriptions of this genus and species (Wheeler and Wheeler 1953: 170–1, 180, 211) to support their conclusion that _Gigantios_ is closer to the Formicina than to the Camponotini, but in a separate tribe.

_Camponotus herculeanus_ (L.)

_C. noveboracensis_ (Fitch)

Sanders (1964, Fig. 1, p. 896) gave lengths of larvae from nests in various months.

_C. pennsylvanicus_ (DeGreer)

(Black carpenter ant)

Newman (1967: 102) provided a photograph of larvae.

_Lasius flavus_ (F.)

Newman (1967) provided photographs of sexual larvae (p. 21) and young larvae (p. 44).

_Myrmecocystus_ spp.

Snelling (1968: 17) stated that the fluids stored in the repletes are “largely stored for the use by the adult members of the colony, little or none being fed to the larvae. Larval food consists mainly, if not entirely, of dead insects brought to them by the foraging ants.” In observation nests, if only honey-water is supplied, the larvae are rarely fed by the workers and eventually die. “On the other hand, if dead insects are supplied to the colony, these are placed with the larvae which feed directly on the fragments.”

_Formica rufa_ L.

Newman (1967: 7) published data on the life cycle: egg 13 days, larva 8 days, pupa 15 days.

_Formica_ sp.

Costello (1968: 80) published an excellent photograph of larva.

**TRIBES OF FORMICINAE**

The names, inclusions, and arrangement of the tribes of Formicinae in Emery’s “Genera Insectorum” (1925) are quite different from those proposed by W. M. Wheeler (1922) and the 2 schemes are irreconcilable. We have therefore dared to be eclectic, selecting features of both schemes and modifying them under the influence of larvae. Following is our plan; after the name of each tribe we have listed the genera that we have studied; in parentheses we have added the number of species studied in each genus.

Myrmycteratini.—None.

Santschiellini.—None.

Melophorini.—Melophorus (2), Diadontolepis (1), Notoncus (3), Prolasius (1).

Formicinae.—_Lasius_ (6), Acathomyops (4), _Myrmecocystus_ (6), _Formica_ (11), Polyergus (2).

Gesomyrmecini.—_Gesomyrmex_ (2).

Gigantopini.—_Gigantios_ (1).

Oecophyllini.—_Oecophylla_ (2).

Myrmecorychini.—_Myrmecorychus_ (2).

Plagioplepidini.—_Acropyga_ (2), _Plagioplepis_ (2).

Brachymyrmecini.—_Brachymyrmex_ (1), _Prenolepis_ (1), _Stigmatocerus_ (3).
Myrmelachistini. — Myrmelachista (2), Paratrechina (3).
Camponotini.—Opisthopsis (3), Calomyrmex (2), Dendromyrmex (1), Echinopla (1), Polygrachis (15), Camponotus (51).

Characterization of the Tribes

Tribe MeLOPHORINI Forel

Profile melophoriform or formiciform (i.e., with the thorax and 1st abdominal somite forming a distinct neck, which is curved ventrally; remainder of body straight, subellipsoidal, and rather slender). Praesaeopium lacking. No uncinate body hairs. Head small. Head hairs few and moderately long. Labrum bilobed; chiloscleres lacking. Mandibles notonciform, brachymyrmeciform, or polyrachiiform. Anterior surface of labium with a median protuberance near the base.

Tribe FormICINI Forel

Profile formiciform. Praesaeopium lacking. Body hairs short, sparse to moderately numerous; no uncinate hairs. Chiloscleres lacking. Mandibles formiciform, robust, medial border denticulate near base of apical tooth. Maxillae with the apex conoidal or paraboloidal and directed medially.

Tribe GESOMYRMECINI Forel


Tribe GigantIOPINI Ashmead

Profile formiciform. Praesaeopium lacking. Body hairs abundant, rather short and of 3 types: (1) simple, slender, and whip-like; (2) 2- to 4-branched; (3) moderately stout and denticulate; no uncinate hairs. Head hairs long, whip-like, and denticulate. Chiloscleres lacking. Mandibles camponotiform.

Tribe OECOPHYLLINI Emery

Profile oecophylliform. Praesaeopium lacking. Body hairs very few, minute, simple, acute. Antennae minute. Head hairs few, very short, simple, acute. Labrum small, bilobed; only 2 hairs on the anterior surface; chiloscleres lacking. Mandibles oecophylliform, very small. Maxillae broad and apparently adnate; palp and galea very small. Labium a small frustum; palps very small.

Tribe Myrmecorhynchini Wheeler

Profile myrmecorhynchiform. Praesaeopium lacking. Body hairs sparse and short, of 2 types: (1) with the apex denticulate or with 2-6 short apical branches; (2) simple or 2- to 6-branched, with the distal portion very long, slender, and flexuous; no uncinate hairs. Head small. Antennae small. Head hairs few and short. Chiloscleres lacking. Mandibles brachymyrmeciform.

Tribe Plagiolepini Forel


Tribe Brachymyrmecini Emery


Tribe Myrmelachistini Forel

Profile myrmelachistiform or paratrechiniiform (i.e., body plump, straight or nearly so, subellipsoidal, and without a neck; head applied to the ventral or anteropreventral surface). Praesaeopium lacking. No uncinate hairs. Head hairs few and short. Labrum bilobed; chiloscleres lacking. Mandibles myrmelachistiform or paratrechiniiform.

Tribe Camponotini Forel

Profile camponotiform. Praesaeopium present, its floor spinulose. Body densely and uniformly covered with short hairs (except sparse on ventre of the thorax and abdominal somites I and II). Five types of hair-shape occur in the tribe: (1) branched (typically with 2-6 branches, but there may be as many as 12); (2) simple, short, and slightly curved; (3) simple, long, and whip-like; (4) denticulate; (5) uncinate. One type, the branched in most species, is numerically predominant; other types are sparsely represented. Branched and simple hairs are generally the shortest, whip-like and uncinate hairs the longest; denticulate hairs are usually intermediate. Branched hairs are palmate and the plane of the branching is transverse. Typically a species has 3 of these 5 types, but the number of types ranges from 1 to 4; thus no species has all types. Head hairs are numerous. Head with a conspicuous naked area in the form of an inverted V. Four types of head hairs occur in the tribe: (1) branched (typically bi-, tri-, or trifid, but there are also 4-branched hairs); (2) simple; (3) whip-like; (4) denticulate. A species usually has 2 of these types but may have 1, 3, or 4. Labrum subparabolic in anterior view; somewhat broader at the base than long; chiloscleres present; posterior surface with numerous (6-30) sensilla. Mandibles camponotiform. Maxillae swollen ventrolaterally; apex in the form of a slender cone which is directed medially; medial surface with rows of minute spines. Anterior surface of labium spinulose.

Significant Structural Characters

In our study of the larvae of the Myrmicinae (1960) we discussed the taxonomic importance of various characters and described our techniques for generalizing about certain characters. We have applied the same reasoning and techniques to the larva of the formicines.
Among the Formicidae, body shape is the larval character which is most nearly constant throughout each genus. It is also the character which most closely correlates larval taxonomy with adult taxonomy. Therefore we have chosen body shape as the basic character for classifying the larvae of the Formicidae. The next most useful character is mandible shape. There are more kinds of mandible shapes than body shapes. Mandible shape also shows intrageneric and intraspecific variation.

Other characters are less useful in separating genera and may be considered as primarily specific characters: integumentary spinules (location, pattern, abundance); hairs (shape, size, distribution, abundance); head shape; teeth of mandibles (size and shape); spinules on mandibles; other mouth parts (shape, spinules, sensilla). The species of a genus usually differ in characters which are both variable and quantitative.

**Body Shape.**—In our study of body shapes we have used only the profiles (i.e., outlines in side view), since dorsal and ventral views rarely show anything distinctive. Applying the technique just referred to, we found 8 generalized profiles for the Formicidae (Fig. 3 and Appendix A). A simultaneous comparison of these 8 generalized profiles showed that they could be arranged in 3 groups on the basis of more superficial resemblances. We have not, however, attempted generalized diagrams of the 2nd order and we have not named these larger groups.

After the profiles were classified, the next question was: which profile is unspecialized? We selected melophoriform, because: (1) *Melophorus* is generally regarded as the least specialized genus of the Formicidae; (2) among the larvae of this genus no character shows extreme deviation from an average for all known ant larvae; (3) among larvae exhibiting melophoriform and formiciform profiles no character shows adaptation to any limited function or habit; (4) among larvae having these profiles the majority of characters are only moderately developed, in contrast to the extremes of the same characters in the subfamily.

The melophoriform profile resembles rather closely the tetramoriform profile, while the formiciform profile is similar to the paraonceriform (both in the Ponerinae); both of these profiles are among the less specialized ponerine profiles. Myrmecorhynchiform and brachymyrmeciform are like myrmicine profile. Paratrechinaeiform suggests allomoriferous, a rather specialized myrmicine profile. The most specialized formicine profiles are myrmelachistiform and camponotiform. We shall comment on this under "Specialization," following.

**Mandible Shape.**—The same generalizing procedures have been applied to the anterior view of the mandibles, using the apex and the anterior condyle as reference points for standardization (see Wheeler and Wheeler 1960: 102). The results of our generalizations are shown in Fig. 4 and Appendix B.

In the Formicidae the least specialized mandible shape is probably aphaenogastriiform (in the Myrmicinae). It is narrow, subtriangular, and has 3 large subequal teeth—an apical and 2 medial. By this token all formicine mandible shapes are specialized. The most specialized are myrmelachistiform, plagiolepidiform, and oecophylliform.

The myrmelachistiform mandible shape resembles rather closely that of the subfamily Dolichoderinae, while the brachymyrmeciform is similar to the messoriform in the Myrmicinae. Other formicine mandible shapes are different from any in other subfamilies.

**Heterogeneity.**—We have discussed at length the heterogeneity of the Myrmicinae, Ponerinae, and Dolichoderinae (Wheeler and Wheeler 1960, 1964, 1966). The adults of the Formicidae are less heterogeneous than those of the Myrmicinae. Can the same be said of their larvae? To attempt an answer we have devised a simple index of heterogeneity: the
Specialization.—The most specialized formicine larvae are those of the tribes Myrmelachistini and Camponotini. Many of the species in these tribes inhabit plant cavities. The larvae of both tribes have the body elongate, straight, and subcylindrical; hairs are mostly minute or short. Both of these characters are possibly adaptations to life in plant cavities, particularly tubular cavities of small bore. A larva parked parallel and close to the wall would be less of a traffic hazard than a shorter larva parked crosswise or obliquely. These same characters are to be found also in the larvae of other ants that inhabit plant cavities, notably Azteca (Dolichoderinae), Cataulacus, Crematogaster, and Cryptocerus (Myrmicinae), and the Pseudomyrmecinae. Camponotus larvae have a neck, but it is short, stout, and strongly arched ventrally and posteriorly so that the cylindricality of the profile as a whole is scarcely affected.

We regard the Camponotini as even more specialized than the Myrmelachistini, because they possess 2 characters lacking in the latter tribe: chiloscleres and praesaeapium. Each chiloscope is a hard brown spot on each lateral border of the labrum. Chiloscleres are unique for the tribe Camponotini.

The praesaeapium is a shallow depression on the ventral surface of certain anterior abdominal somites, which is partly surrounded by welts to form a sort of trough. It is reminiscent of the trophothylax of pseudomyrmicine larvae and probably serves the same purpose (i.e., a receptacle for food) in a rudimentary way. The praesaeapium attains its most elaborate form in the subgenus Colobopsis; see Fig. 2.

For a fuller discussion of chiloscleres and praesaeapium, see Wheeler and Wheeler 1953: 180.

Appendix A. Generalized Body Profiles

(Fig. 3)

Group A

(Thorax and 1st abdominal somite forming a distinct neck, which is arched ventrally; remainder of body elongate, straight, subelliptical and rather slender.)


Group B

(Short and stout; no neck.)


Group C

(Plump, straight or nearly so, subelliptical; no neck.)
1. Paratrechinaform. Plump, chunky, and subelliptical; anterior end broadly rounded; posterior end round-pointed; no neck; anterior end formed from the dorsa of prothorax and mesothorax; head ventral near the anterior end; anus posteroventral. Genus: Paratrechina.

2. Myrmelachistiform. Straight and subcyllindrical; diameter nearly uniform back to the 5th abdominal somite, then tapering rather rapidly to the posterior end which is round-pointed; anterior end broadly rounded; head applied to the anteroventral surface; anus subterminal. Genus: Myrmelachista.

3. Oecophylliform. Sausage-shaped; slightly curved ventrally; terete, the diameter nearly uniform; anus posteroventral. Genus: Oecophylla.

Appendix B. Generalized Mandible Shapes

(Fig. 4)

a. Formiciform. Very broad (width at base equal to the length exclusive of apical tooth); apex forming a slender, smooth, round-pointed, slightly curved tooth, which is sharply demarcated from the wide basal portion. No medial teeth. Medial border (excluding apical tooth) moderately to strongly convex; lateral border feebly convex or sinuate. Genera: Acanthomyops, Formica, Gesomyrmez, Lasius, Myrmecocystus, Polyrhysus.


c. Polyrhachiform. Subtriangular, base broad (ca. ¾ the length); medial border slightly convex; basal half of lateral border nearly straight; apex forming a short, stout, straight, blunt tooth; no medial teeth. Genera: Diodontolepis, Polyrhachis.

d. Camponotiform. Subtriangular; base broad (ca. ¾ the length); medial border slightly convex; basal half of lateral border slightly convex, distal half slightly concave; apex forming a short stout curved blunt tooth; no medial teeth. Genera: Calomyrmez, Camponotus, Dendromyrmez, Echinopla, Gigantops, Opisthopus.

e. Notonciform. Width at base ¾ the length; distal half narrowing rapidly to a curved apical tooth, which is moderately slender and moderately sharp; no medial teeth; medial border convex; lateral border nearly straight. Genera: Acropyga, Melophorus, Notoncus.


g. Polyrhachiform. Basal half broad; distal half forming a long, slender, round-pointed tooth; a conspicuous jagged notch at the middle of the medial border. Genera: Diodontolepis.

h. Myrmelachistiform. Subtriangular; base broad (width ¾ the length); distal fourth forming a slender, straight, sharp-pointed, apical tooth. Genus: Myrmelachista.

i. Oecophylliform. Width at base ¼ the length; basal ¼ broad and subtrapizoidal; apical ¾ forming a long, straight, slender, sharp-pointed tooth. Genus: Oecophylla.

Appendix C. Revised Key to the Mature Worker Larvae of Formicineae in our Collection

Group A

Thorax and 1st abdominal somite forming a distinct neck which is strongly arched ventrally; remainder of body elongate, straight, subellipsoidal, and rather slender.

1a. Body melophoriform; mandibles notonciform

1b. Body camponotiform; chiloiolceres present

1c. Body formiciform .......................... Tribe Camponotini

2a. Mandibles polyrhachiform .......................... Tribe Diodontolepidini

2b. Mandibles camponotiform; head hairs numerous, long, denticulate, and whip-like .......................... Tribe Gigantopsini

2c. Mandibles notonciform; head hairs few, short, the tips fuzzy .......... Tribe Notoncini

2d. Mandibles plagiolepidiform .......................... Tribe Plagiopelini

2e. Mandibles brachymyrmeciform .......................... Tribe Brachymyrmeini

2f. Mandibles formiciform .......................... Tribe Formicini

Tribe Gesomyrmeini and Formicini

Group B

Short and stout; curved somewhat at the anterior end; no neck.

1a. Body brachymyrmeciform . Tribe Brachymyrmeini

1b. Body myrmecorhynchiform . Tribe Myrmezorhynchini

2a. Mandibles brachymyrmeciform .......................... Tribe Brachymyrmeini

2b. Mandibles paratrechinaform .......................... Tribe Paratrechina

2c. Mandibles plagiolepidiform .......................... Tribe Plagiopelini

2d. Mandibles brachymyrmeciform .......................... Tribe Brachymyrmeini

2e. Mandibles formiciform .......................... Tribe Formicini

Group C

Plump, straight or nearly so; subelliptical, no neck.

1a. Body paratrechinaform; mandibles paratrechinaform

1b. Body myrmelachistiform; mandibles myrmelachistiform

1c. Body oecophylliform; mandibles oecophylliform

*Acropyga and Dendromyrmez have been omitted from the key, the former because our material is immature, the latter because we have only damaged integuments.

REFERENCES CITED


Kempf, W. W., and K. Lenko. 1968. Novas obser-