Ant Larvae of the Subfamily Ponerinae:[1] Second Supplement[2]

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ABSTRACT

The authors' earlier studies on the larvae of the Ponerinae were published in 1952, 1957, and 1964. The present supplement contains descriptions of the larvae of 38 additional species in the genera *Amblyopone*, *Anochetus*, **Brachyponera*, *Cryptopone*, **Discothyrea*, **Eubothroponera*, *Euponera*, *Gnamptogenys*, **Hagensia*, **Heteroponera*, **Hypoponera*, *Leptogenys*, *Mesoponera*, **Myopias*, *Neoponera*, *Odontomachus*, *Onychomyrmex*, **Ophthalmopone*, *Platythyrea*, *Ponera*, *Prionopelta*, *Proceratium*, and *Rhytidoponera*. Genera marked with an asterisk are new to the authors' collection and are characterized here for the 1st time. Necessary revisions are made in earlier descriptions and additional references to the literature are cited. Tribes are recharacterized. The earlier classifications of body profiles, mandible shapes, and tubercles are revised. The key to genera is also revised. Since the removal of the genus *Myrmecia* from the Ponerinae, *Paraponera* is regarded as the least specialized larva in the subfamily.

The following NEW COMBINATIONS, from *Trachymesopus* to *Mesoponera*, are based on larval characters: *M. clarki* (Wheeler) (= *T. clarki* (Wheeler)); *M. gilberti* (Kempf) (= *T. gilberti* Kempf); *M. stigma* (F.) (= *T. stigma* (F.)).

Subsequent to the publication of our supplement on ponerine larvae (Wheeler and Wheeler 1964[3]) we have received from other myrmecologists so much additional material that it is now necessary to publish a 2nd supplement. The purposes of this supplement are: (1) to characterize the genera acquired since our 1st supplement; (2) to describe the newly acquired species therein; (3) to describe additional species in genera previously characterized; (4) to revise our published characterizations as required by new material; (5) to cite additional references in the literature; (6) to consider the relation of larval classification to adult classification; (7) to revise our classification of body profiles, mandible shapes, and tubercles; and (8) to revise our key to genera.

We have described in this article 8 genera (*Eubothroponera*, *Heteroponera*, *Discothyrea*, *Hagensia*, *Ophthalmopone*, *Brachyponera*, *Hypoponera*, and *Myopias*) and 38 species, which we have acquired since 1964. Including this material, we have studied 134 species in 39 genera in the subfamily Ponerinae. Descriptions, except as noted otherwise, are of mature larvae.

Tribe AMBLYOPONINI

Genus *Mystrium* Fabricius

Brown (1960) referred to our 1952 treatise (Wheeler and Wheeler 1952) and listed some of the characters we described.

Genus *Amblyopone* Erichson

Brown (1960) referred to our 1952 treatise and listed some of the characters we described. Brown and Taylor (1970) figured a larva in side view.

A. longidens Forel

Submature.—Length (through spiracles) ca. 4.7 mm. Similar to *A. australis* Erichson (1952) except in the following details. Integument of the venter of the anterior somites and the dorsa of the posterior somites with spinules in short transverse rows. Each maxillary and labial palp a low skewed knob with 3 apical sensilla and 2 subapical (1 digitiform). Hypopharynx with a few spinules in short transverse rows.

Very Young Larva.—Length (through spiracles) ca. 3.4 mm. Similar to submature larva, except as follows. More slender throughout. Spinules on venter of anterior somites only. Each galea a short cone.

Material studied.—Numerous larvae from New South Wales, courtesy of Rev. B. B. Lowery.

Genus *Prionopelta* Mayr

Brown (1960) referred to our 1952 treatise and listed some of the characters we described.

P. opaca Emery

Length (through spiracles) ca. 2.4 mm. Similar to *P. punctulata* Mayr (1952) except as follows. Body more nearly uniform in diameter and more evenly

[1] Hymenoptera: Formicidae.
[2] Received for publication Feb. 2, 1971.
[3] We shall cite each of our papers once, the first time it is referred to, with our names as authors. Subsequent to that citation, we shall use dates only, omitting our names.

curved ventrally. Body hairs sparse and relatively shorter, of 2 types: (1) 0.036–0.09 mm long, simple, without alveolus and articular membrane, shortest and most abundant on prothorax; (2) 0.045–0.18 mm long, simple, with alveolus and articular membrane, a few on each somite, longer posteriorly. Hypopharynx densely spinulose, the spinules minute and in rather long transverse subparallel rows.

Young Larva.—Length (through spiracles) ca. 1.9 mm. Similar to mature larva.

Material Studied.—10 larvae from New South Wales, courtesy of Rev. B. B. Lowery.

Genus *Apomyrma* Brown, Gotwald, & Lévieux

We have treated this genus elsewhere (Wheeler and Wheeler 1970).

Genus *Onychomyrmex* Emery

Brown (1960) referred to our description (1952), noting especially that the thoracic segments are broader than the 1st abdominal segment.

O. bedleyi Emery

(Fig. 2)

Length (through spiracles) ca. 3.9 mm. Very similar to *O. mjobergi* Forel (1952) except in the following details. Body hairs longer (0.035–0.11 mm), stout and curved to slender and flexuous. Head hairs longer (0.012–0.11 mm). Mandibles each with the apical tooth curved medially and posteriorly.

Material Studied.—14 larvae from Queensland, courtesy of Rev. B. B. Lowery.

Tribe PLATYTHYREINI

Genus *Platythyrea* Roger

Revision.—Profile platythyreiform (see Appendix A). Mandibles heavily sclerotized, subtriangular in anterior view, each apex forming a short tooth which is curved medially, with a medial blade bearing denticles on its medial border.

P. australis Forel

Length (through spiracles) ca. 4 mm. Similar to *P. inermis* Forel (1952) except as follows. Neck more slender and more sharply differentiated. Ventral tubercles present on AI–VII; transverse welts on AVI and VII (1 each). Integument densely spinulose except the dorsa of the meso- and metathorax. Body hairs 0.006–0.036 mm long, a few with alveolus and articular membrane.

Young Larva.—Length (through spiracles) ca. 2.7 mm. Similar to mature larva except as follows. Posterior portion of abdomen more swollen; no welts or tubercles. Body hairs few, on thorax and AI–IV only, 0.006–0.018 mm long.

Very Young Larva.—Length (through spiracles) ca. 1.4 mm. Similar to mature except as follows. Thorax and AI slender, remainder of abdomen slightly swollen; lateral longitudinal welts very feeble; no ventral projections. Integument sparsely spinulose, the spinules isolated or in short transverse rows. Each maxillary palp a low knob with 5 sensilla; each galea a frustum with 2 apical sensilla. Each labial palp a cluster of 5 sensilla.

Material Studied.—Numerous larvae from New South Wales, courtesy of Rev. B. B. Lowery.

P. cribrinodis (Gerstäcker)

(Fig. 1)

Length (through spiracles) ca. 20 mm. Similar to *P. inermis* (1952) except as follows. Neck longer and more slender; on midventral surface of AVI a lobe with its tip directed posteriorly, flanked on either side by a medially projecting welt. Entire integument spinulose, the spinules minute posteriorly, becoming longer anteriorly, isolated or in transverse rows. Body hairs numerous, short (0.015–0.11 mm), simple, the longest flexuous, with alveolus and articular membrane, the shorter more numerous, slightly curved or straight; a tuft of short hairs on venter of AVII posterior to lobe; very few on AX. Head hairs few, short (0.009–0.027 mm), simple, and slightly curved. Each half of anterior surface of labrum with 3 hairs and ca. 20 sensilla. Mandibles each with denticles and 2 subapical teeth on the distal half. Maxillae with the entire surface spinulose, the spinules isolated, long, and sharppointed; each palp with 4 apical and 1 basal sensilla. Each labial palp a tapered peg with 2 apical, 2 subapical, and 1 subbasal sensilla.

Immature Larva.—Length (through spiracles) ca. 9.8 mm. Similar to mature, except as follows. Abdomen not so swollen. Mandibles with teeth very sharp pointed.

Material Studied.—18 larvae from Rhodesia, courtesy of Dr. W. L. Brown.

P. incerta Emery

(Fig. 2)

Length (through spiracles) ca. 6.8 mm. Similar to *P. inermis* (1952) except as follows. Thorax more tapered. With a midventral transverse welt on each somite AIII–VII, becoming larger posteriorly; paired ventrolateral welts on each somite AVI–IX; AVI and VII each with the venter swollen and projecting posteriorly. Entire integument densely spinulose, the spinules mostly in transverse rows of various lengths. Body hairs moderately abundant, of 2 types: (1) simple, 0.009–0.05 mm long, slightly curved, without alveolus and articular membrane; (2) 0.025–0.13 mm long, with alveolus and articular membrane, a few on each somite, highly varied from slightly curved to kinked, with tip simple or short-multifid or rarely 2-hooked. Labrum with spinules on the posterior surface, mostly in short arcuate rows, very few isolated. Mandibles with the basal half of the anterior surface spinulose, the spinules minute and in short arcuate rows medially, becoming isolated laterally; all directed laterally.

Material Studied.—1 larva from Brazil, courtesy of K. Lenko.

Genus *Probolomyrmex* Mayr

Taylor (1965) described and illustrated the larva

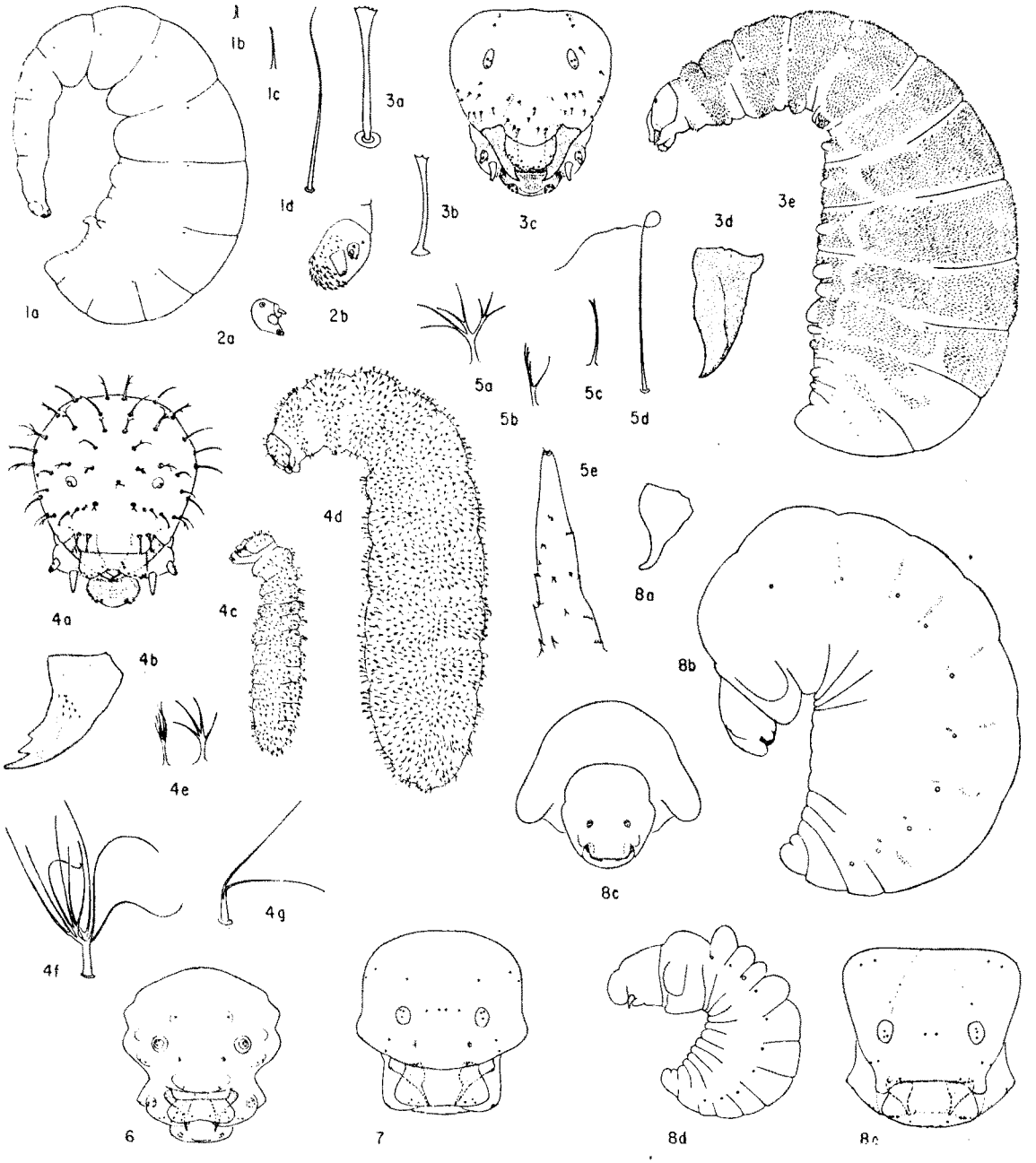

FIG. 1a–d.—*P. cribrinodis*. a, Larva in side view, ×5; b–d, body hairs, ×243. FIG. 2a, b.—*P. incerta*. a, Left maxillary palp in anterior view, ×235; b, left labial palp in anterior view, ×470. FIG. 3a–e.—*E. tasmaniensis*. a, b, body hairs, ×383; c, head in anterior view, ×50; d, left mandible in anterior view (shaded to show thickness), ×133; e, larva in side view, ×22. FIG. 4a–g.—*H. imbellis*. a, Head in anterior view, ×80; b, left mandible in anterior view (shaded to show thickness), ×185; c, very young larva in side view, ×19; d, mature larva in side view, ×19; e, 2 views of branched hairs, ×185; f, g, branched hairs, ×185. FIG. 5a–e.—*H. inca*. a–d, Body hairs, ×185; e, left galea in anterior view, ×553. FIG. 6.—*Proceratium* sp. Head in anterior view, ×44. FIG. 7.—*Discothyrea* sp. Head in anterior view, ×89. FIG. 8a–e.—*D. antarctica*. a, Left mandible in anterior view, ×185; b, mature larva in side view, ×39; c, anterior end of mature larva to show lateral bosses, ×44; d, very young larva in side view, ×39; e, head in anterior view, ×263.

of *P. angusticeps* M. R. Smith. In 1967 (Taylor 1967) he referred briefly to that description. We have not seen any larvae of this genus.

Genus *Eubothroponera* Clark

Not generically distinguishable from *Platythyrea*.

E. tasmaniensis Forel

(Fig. 3)

Length (through spiracles) ca. 4.5 mm. Thorax and AI forming a neck which is bent ventrally; remainder of abdomen voluminous; dorsal profile C-shaped, ventral serrate and nearly straight. Diameter greatest at AVI and diminishing rapidly to the posterior end, which is rounded. Terminal somite forming a small tail, which is directed ventrally at right angles to the long axis of the abdomen. Anus ventral on the anterior base of the tail. A pair of bosses on the ventral surface of each somite except AX; in addition there is an intersegmental welt between AV and VI and between AVI and VII. Leg, wing, and gonopod vestiges present. Integument sparsely spinulose, the spinules conspicuous and in short arcuate rows on TI and AVI–X and on the venter of the remaining somites, less numerous elsewhere. Body hairs numerous, short (0.013–0.06 mm), almost absent on AVII–X; rather stout with the apex expanded, flattened, and erose. Cranium subtrapezoidal (in anterior view), narrowed ventrally, with the occipital corners strongly rounded. Head hairs few, short (0.003–0.019 mm), irregularly arranged, mostly below the antennal level; shaped like body hairs. Antennae large, each bearing 3 sensilla with a spinule each. Labrum small, feebly bilobed; anterior surface of each lobe with 10 sensilla on and near ventral border; posterior surface sparsely spinulose, the spinules rather coarse and isolated or in short arcuate rows; posterior surface with ca. 16 scattered sensilla. Mandibles heavily sclerotized; stout and subtriangular in anterior view; lateral border thickened; medial portion thin and blade-like; both thick and thin portions extend into apical tooth, which is sharp pointed and only slightly curved medially; middle third of medial border with 2 or 3 denticles. Maxillae small; each apex short and sparsely covered with rather long spinules; each palp a skewed peg, with 3 apical and 2 basal sensilla; each galea digitiform with 2 apical sensilla. Labium with the anterior surface moderately spinulose, the spinules long and slender medially, lateral patches with spinules isolated or in short rows; each palp a low knob bearing 5 sensilla; opening of sericteries wide and slightly salient. Hypopharynx sparsely spinulose, the spinules minute and in short arcuate rows.

Very Young Larva.—Length (through spiracles) ca. 2.4 mm. Similar to mature larva except as follows. Thoracic spiracles half as large as abdominal. Body hairs 0.006–0.03 mm long, the shortest simple, the longer as in mature larva; restricted to thorax and AI–IV. Without bosses. Mandibles shorter with apical teeth sharper; medial blades narrower and without denticles. Opening of sericteries a transverse slit in a depression.

Material Studied.—5 larvae from New South Wales, courtesy of Rev. B. B. Lowery.

Tribe TYPHLOMYRMECINI

Genus *Typhlomyrmex* Mayr

Brown (1965) based his description of the larvae on our 1952 and 1964 descriptions.

Tribe ECTATOMMINI

Genus *Paranomopone* Mayr

What we have referred to (1952, 1964) and illustrated as *P. relicta* Wheeler is now called *Heteroponera relicta*.

Genus *Acanthoponera* Mayr

What we described and illustrated (1964) as *A.* (*Anacanthoponera*) sp. should now be called *Heteroponera* sp.

Genus *Heteroponera* Mayr

Profile paraponeriform (see Appendix A). Spiracles small. Body hairs of 2 types: (1) short, with fine branches all in 1 plane; (2) longer, simple or branched, the branches flagelliform. Antennae small. Head hairs branched, moderately long and moderately numerous. Labrum short, broad, and deeply bilobed; posterior surface spinulose, the spinules long and mostly in arcuate rows. Mandibles ectatommiform (1964).

H. imbellis Emery

(Fig. 4)

Length (through spiracles) ca. 4.5 mm. Thorax and AI strongly curved ventrally; remainder of abdomen straight and subcylindrical; posterior end round-pointed. Anus subterminal. Wing and leg vestiges present. Integument of venter of anterior somites and of dorsa of posterior somites with minute spinules in transverse rows. Body hairs short, moderately numerous, 2- to many-branched, the branches all in the same plane, of 2 types: (1) 0.054–0.09 mm long, without alveolus and articular membrane, 3- to 6-branched; (2) 0.072–0.18 mm long, with alveolus and articular membrane, 2- to many-branched, a few on each somite. Cranium subhexagonal in anterior view. Head hairs moderately numerous, 0.045–0.09 mm long, variously branched, with the branches short. Antennae each mounted on a flat disc and bearing a small rounded knob with 3 sensilla, each bearing a spinule. Labrum twice as broad as long, bilobed, each lobe with 2 or 3 minute hairs and 2 or 3 sensilla on the anterior surface near the ventral border; ventral border of each lobe with 5 or 6 projecting sensilla; posterior surface densely spinulose, the spinules long and arranged in subparallel arcuate rows, which are so close together that the spinules overlap; posterior surface with 5 or 6 sensilla near the middle of each half. Mandibles rather stout and subtriangular in anterior view, with the apex sclerotized; each apex

forming a rather long slender slightly curved tooth; with 2 subapical medial teeth on a thin medial blade, lateral border thickened; anterior surface with a few minute spinules near the middle; posterior surface with 2 transverse folds. Maxillae each with the apex narrowly round-pointed and directed medially; apex with a few short arcuate rows of rather long spinules directed laterally; each palp a frustum with 4 apical and 1 lateral sensilla; each galea digitiform with 2 apical sensilla. Labium narrow with anterior surface spinulose, the spinules long and in short arcuate rows; each palp a short peg with 4 apical and 1 lateral sensilla; opening of sericteries wide and salient. Hypopharynx spinulose.

Very Young Larva.—Length (through spiracles) ca. 1.8 mm. Similar to the mature except as follows. Subcylindrical and nearly straight; head about as long as the greatest diameter of the abdomen.

Material Studied.—13 mature larvae from Australian Commonwealth Territory and numerous young from New South Wales, courtesy of Rev. B. B. Lowery.

H. inca Brown

(Fig. 5)

Length (through spiracles) ca. 3.5 mm. Similar to *H. imbellis* except as follows. Body hairs of 2 types: (1) 0.054–0.072 mm long, with a main trunk and 2 to many branches which are all in the same plane; (2) 0.032–0.3 mm long, simple, slender, with finely attentuated flexuous tip. Head hairs long (0.13–0.18 mm), simple to many-branched, each branch with a finely attenuated flexuous tip. Posterior surface of labrum spinulose, the spinules rather long and in short arcuate rows, or spinules longer and isolated. Mandibles each with the apical tooth stouter and the medial teeth sharp pointed. Maxillae each with rather long spinules in short to long arcuate rows on the medial surface and on the entire apex; each palp a slender cone with 2 apical, 2 subapical, and 1 lateral sensilla; each galea tall and digitiform with a few minute spinules on the integument. Labial palps taller, each with 2 apical, 2 subapical, and 1 lateral sensilla.

Material Studied.—1 larva and 1 semipupa from Colombia, courtesy of Dr. W. L. Brown.

Genus *Rhytidoponera* Mayr

R. aspera Roger

Length (through spiracles) ca. 6.9 mm. Similar to *R. cristata* (Mayr) (1952) except as follows. Integument of posterior somites and venter of anterior somites with minute spinules in transverse rows. Body hairs of 3 types: (1) 0.11–0.19 mm long, bifid (rarely with more branches); (2) ca. 0.3 mm long, bifid (rarely with more branches), with the branches very fine and flexuous; (3) 0.11–0.17 mm long, simple, bifid, or with multifid tip, with the branches very short. Antennae each a slender peg with 3 apical sensilla. Labrum with each lobe bearing 2 minute hairs and ca. 10 sensilla on or near the ventral border; posterior surface with ca. 18 sensilla near the middle. Mandibles each with the medial teeth closer together and the apical tooth more curved. Labium with the anterior spinules long and in short arcuate rows.

Material Studied.—Numerous larvae from New South Wales, courtesy of Rev. B. B. Lowery.

R. chalybaea Emery

Immature Larva.—Length (through spiracles) ca. 3.9 mm. Similar to *R. cristata* (1952) except as follows. Neck less distinct. Entire integument with minute spinules which are more numerous and in short arcuate rows on the posterior somites and on the venter of the anterior somites. Head hairs rather stout, with the tip simple to multifid. Labrum with the lateral borders straight; anterior surface of each lobe with 2 minute hairs and ca. 12 sensilla on or near the ventral border; posterior surface with ca. 8 sensilla near the middle.

Very Young Larva.—Length (through spiracles) ca. 1.8 mm. Very similar to immature larva except as follows. Neck more slender and curved; abdomen short and plump. Body hairs sparse, all simple, 0.009–0.032 mm long. Head hairs rather stout, with the tip short-bifid. Antennae each a short cone, with 3 apical sensilla, each bearing a spinule. Mandibles with the teeth very acute. Maxillae each with the spinules exceedingly minute; palp a short frustum; galea a short cone. Labium shorter, with minute spinules; each palp a cluster of 5 sensilla; opening of sericteries a slit.

Material Studied.—Numerous larvae from New South Wales, courtesy of Rev. B. B. Lowery.

R. inornata Crawley

Immature Larva.—Length (through spiracles) ca. 5 mm. Similar to *R. cristata* (1952) except as follows. Body hairs shorter, type 1, 0.075–0.25 mm long; type 2, ca. 0.25 mm long; type 3, 0.05–0.125 mm long, some with spatulate erose tips. Head hairs shorter, 0.04–0.1 mm long, simple or with spatulate erose tips. Labial palp a skewed peg with 5 sensilla.

Very Young Larva.—Length (through spiracles) ca. 2.5 mm. Similar to *R. tasmaniensis* Emery (1964) in shape; otherwise similar to *R. cristata* (1952) except as follows. Thoracic spiracles half the diameter of abdominal spiracles. Body hairs of 3 types: (1) 0.006–0.125 mm long, simple or with short bifid tip, on all somites; (2) ca. 0.25 mm long, with long flexuous tip, on lateral or ventral surfaces; (3) 0.036–0.16 mm long, hooked as in *R. cerastes* Crawley (1964), on ventrolateral surfaces of some posterior somites.

Material Studied.—16 larvae from Western Australia, courtesy of Rev. B. B. Lowery.

Genus *Gnamptogenys* Roger

G. aculeaticoxae (Santschi)

What we called *Ectatomma* (*Parectatomma*) sp. (1952) has now been identified as *G. aculeaticoxae*.

G. bisulca Brown & Kempf

Length (through spiracles) ca. 3.4 mm. Similar to *G. tortuolosum* (F. Smith) (1952) except as follows. Integument of venter of anterior somites with a few short rows of minute spinules. Body hairs moderately abundant and uniformly distributed, of 2 types: (1) 0.072–0.2 mm long, with 2 to many long slender flexuous branches; (2) 0.072–0.11 mm long, stout, simple to many-branched, the branches with short-frayed tips, most numerous on thorax and AX. Head hairs longer, with bifid to multifid tip or 2-branched, with each tip bifid. Antennae very tall. The anterior surface of each lobe of the labrum with 8 minute hairs and/or sensilla. Mandibles each with longer and sharper teeth. Maxillae lobose and appearing adnate.

Very Young Larva.—Length (through spiracles) ca. 1.9 mm. Similar to mature larva except as follows. Thoracic spiracles ⅔ the diameter of the abdominal spiracles. Integument of posterior somites and of venter of anterior somites with a few short rows of minute spinules. Body hairs sparse, of 3 types: (1) 0.013–0.018 mm long, bifid, with short base and long slender coiled branches; (2) 0.018–0.09 mm long, stout, on thorax and on posterior somites; (3) 0.126μ 0.2 mm long, simple, with long coiled tip, a few near the venter.

Material Studied.—6 larvae from Colombia, courtesy of Dr. W. L. Brown.

Tribe PROCERATIINI

Genus *Proceratium* Roger

Revision.—Profile proceratiiform (see Appendix A). Body surface thickly beset with large hemispherical bosses. Head surface roughened with several low bosses. Head and body without hairs. Antennae large. Mouth parts with few or no spinules. Labrum a thick flap; considerably broader than long, narrow at base, not bilobed. Mandibles proceratiiform, small, feebly sclerotized. Labial palps represented by clusters of sensilla.

P. silaceum Roger

What we called *P. crassicorne* Emery (1952) is now *P. silaceum*.

Proceratium sp.

(Fig. 6)

Length (through spiracles) ca. 4.6 mm. Similar to *P. silaceum* (= *crassicorne*) (1952) except as follows. Bosses smaller and occupying less of the body surface, less prominent in profile, more conspicuous anteriorly. Integumentary spinules on posterior somites and on venter of anterior somites. Body hairs none. Labrum shorter and wider and with prominent lateral lobes; 18 sensilla and/or minute hairs on or near the ventral border of the anterior surface; posterior surface with ca. 10 sensilla near the middle; posterior surface spinulose, the spinules minute and in short rows dorsally; ventrally the rows and spinules longer and more numerous. Mandibles each with the base wider and the apical tooth slightly curved, the apex narrowly round-pointed, medial border nearly straight, lateral border sinuate. Each maxillary palp a low boss with 4 sensilla; each galea represented by 2 sensilla. Labium with the anterior surface spinulose, the spinules minute and isolated or in short arcuate rows; each palp represented by a cluster of 5 sensilla; an isolated sensillum between each palp and the opening of the sericteries, the latter a transverse slit. Hypopharynx with minute spinules in short arcuate rows.

Material Studied.—2 larvae from Mauritius, 30.III. 69, La Pouce Mt., 700–800 m, courtesy of Dr. W. L. Brown.

Genus *Discothyrea* Roger

Profile proceratiiform (see Appendix A). Body and head without bosses or with only 1 pair on the prothorax. Head and body without hairs. Antennae large. Mouthparts with few or no spinules. Labrum a thick flap; considerably broader than long; narrowed at the base, not bilobed. Palps and galeae represented by clusters of sensilla. Mandibles proceratiiform, small and feebly sclerotized.

D. antarctica Emery

(Fig. 8)

Length (through spiracles) ca. 2.7 mm. Short and stout. Thorax strongly curved ventrally so that the head is directed posteriorly; dorsal profile C-shaped, ventral profile of abdomen nearly straight; terminal somite directed ventrally, rounded and tail-like; a large ventrolaterally directed boss on each side of the prothorax. Anus ventral. Integument of venter of meso- and metathorax and AI–VI papillose, the papillae grading into rows of minute spinules on TI and remainder of abdomen. Spiracles large, the largest on AI. No body hairs. Head large. Cranium trapezoidal in anterior view, broadest near the occipital border which is straight. No head hairs. Antennae large discs with 3 sensilla each; situated low on the head. Labrum thick, wide (breadth twice the length), subtrapezoidal in anterior view; anterior surface with 6 sensilla near the ventral border; posterior surface with 6 sensilla near the center. Mandibles each small, the base wide and feebly sclerotized, distal portion narrow, heavily sclerotized, curved posteriorly, and sharp-pointed. Maxillae very large, tapering to a small, medially directed rounded point; each palp represented by 3 sensilla on a lateral bulge; each galea represented by 2 sensilla. Labium a thick flap, each palp represented by 4 sensilla; an isolated sensillum between each palp and the opening of the sericteries, the latter a narrow transverse slit on the ventral surface of the labium. Mouth parts apparently without spinules.

Very Young Larva.—Length (through spiracles) ca. 1.2 mm. Similar to the mature larva except as follows. Body C-shaped; no bosses on meso- and metathorax.

Material Studied.—16 larvae from New Zealand, courtesy of Dr. W. L. Brown.

Discothyrea sp.

(Fig. 7)

Length (through spiracles) ca. 2.2 mm. Similar to *D. antarctica* except as follows. Body without bosses. Head large. Cranium subtrapezoidal in anterior view, broadest below the antennae; occipital border broadly rounded. Spinules on the middle of the anterior surface of the labium. Hypopharynx with a few minute spinules.

Young Larva.—Length (through spiracles) ca. 1.8 mm. Similar to young larva of *D. antarctica* but lacking prothoracic bosses.

Material Studied.—Numerous larvae from Gerroon, sea level, New South Wales, 15-12-63, courtesy of Rev. B. B. Lowery.

Tribe PONERINI

Genus *Centromyrmex* Mayr

Kempf (1966) based his characterization of the larvae of this genus on our 1952 and 1964 treatises.

Genus *Megaponera* Mayr

M. foetens (F.)

W. M. Wheeler (1922) quoted Arnold (1914) as follows: "A worker ant, carrying a larva in its jaws, was seen just about to pass a spider standing on the edge of the camp. The spider ran up to the worker, stroked it with its front pair of legs for a second or two, and then plunged its fangs into the larva. The latter was released by the ant after a little hesitation, and within five minutes had been sucked dry by the spider."

W. M. Wheeler (1918) stated that *Megaponera* is "very restless and changes its nesting site frequently, so that it is obliged to carry its young about a great deal and for considerable distances. The larva is cylindrical, covered with a very tough, opaque, grayish, hairless skin and furnished with long, falcate mandibles."

Genus *Hagensia* Forel

Body beset with ca. 600 spinelike tubercles each of which bears short rows of minute spinules arranged spirally. Body hairs few, simple, and short. Antennae small. Head without hairs. Posterior surface of each lobe of labrum with 2 or 3 sensilla. Mandibles straight and narrowly subtriangular in anterior view.

Because we have only semipupae, we cannot fit *Hagensia* into our scheme for profiles. The mandibles are odontoponeriform and the tubercles are spine-like (1964). Emery (1911) treated *Hagensia* as a subgenus of *Megaponera*. Even without mature larvae we can be sure that the 2 genera are not closely related. The mandibles are quite different and *Megaponera* lacks tubercles and body hairs. W. M. Wheeler (1922) suggested that *Hagensia* should be a separate genus.

H. peringueyi Emery

(Fig. 9)

Semipupa.—Length (through spiracles) ca. 10.5 mm. Entire integument with prominent spinules in transverse rows of various lengths. Body beset with ca. 600 tubercles which are generally distributed. Tubercles spine-like, 0.075–0.22 mm tall, bearing short rows of minute spinules arranged spirally. Body hairs few, simple, ca. 0.018 mm long. Head large; mouth parts large. Cranium almost semicircular. Head without hairs but with numerous minute sensilla, each bearing a spinule. Antennae small, each with 3 sensilla, each of which bears a spinule. Labrum bilobed, anterior surface of each lobe with ca. 13 minute hairs and/or sensilla, ventral border of each lobe with 5 or 6 sensilla, entire posterior surface densely spinulose, dorsally the spinules rather long and in long transverse subparallel rows, the rows so close together that the spinules overlap, ventrally the rows short and arcuate; posterior surface with 2 or 3 sensilla in the middle of each lobe. Mandibles each heavily sclerotized, straight, narrowly subtriangular in anterior view, apical and subapical teeth subsequal, basal tooth smaller. Maxillae each with the apex narrowly rounded and directed ventromedially, its surface covered with coarse isolated spinules; each palp slender and subcylindrical, with 5 apical sensilla; each galea tall and digitiform, with 2 apical sensilla. Labium with the anterior surface densely spinulose, the spinules long and isolated or in short arcuate rows; each palp subcylindrical, with 5 apical sensilla; opening of sericteries wide and salient. Hypopharynx densely spinulose, the spinules long and in long transverse subparallel rows, the rows so close together that the spinules overlap.

Material Studied.—2 semipupae (extracted from cocoons) from South Africa, courtesy of Dr. W. L. Brown.

Genus *Ophthalmopone* Forel

Profile pachycondyliform (see Appendix A). Tubercles few (28); spirelike subcones without apical hairs. Head and body without hairs. Mandibles falciform.

O. berthoudi Forel

(Fig. 10)

Length (through spiracles) ca. 9 mm. Shaped somewhat like a crookneck squash; thorax and AI forming a long slender neck which is bent ventrally; remainder of abdomen swollen and subovoidal, its dorsal profile strongly convex; its ventral profile nearly straight; posterior end broadly rounded. Gonopod vestiges on venter of AVIII and IX; leg vestiges present. Anus ventral. Body with 28 spirelike conical tubercles which are arranged as follows: TI, 6; TII–AI, 4; AII and VII–X, 2 each. Entire integument densely spinulose, the spinules long and arranged in subparallel transverse rows. No body or head hairs. Cranium subhexagonal in anterior view, with all corners rounded; integument with spinules in

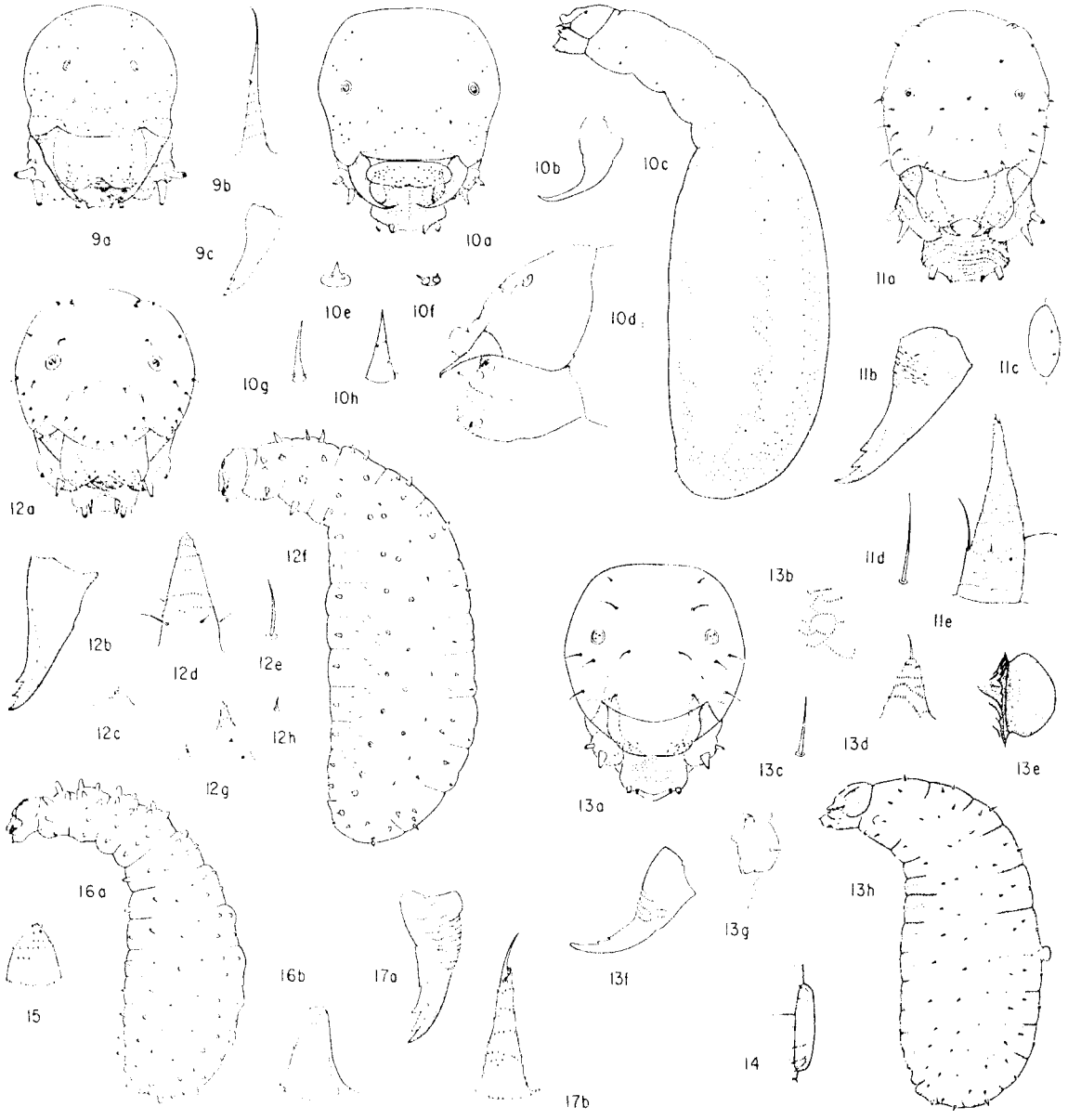

FIG. 9a–c.—*H. peringueyi*. a, Head in anterior view, ×28; b, tubercle, ×93; c, left mandible in anterior view, ×28. FIG. 10a–h.—*O. berthoudi*. a, Head in anterior view, ×36; b, left mandible in anterior view, ×57; c, larva in side view, ×10; d, head in side view, ×36; e, tubercle of TIII, ×57; f, contiguous tubercles on dorsum of AX, ×57; g, tubercle on dorsa of AI and AVII–IX, ×57; h, prothoracic tubercle, ×57. FIG. 11a–e.—*N. cavinodis*. a, Head in anterior view, ×44; b, left mandible in anterior view (shaded to show thickness), ×90; c, dorsal abdominal vestigial tubercle, ×90; d, body hair, ×178; e, thoracic tubercle, ×90. FIG. 12a–h.—*N. moesta*. a, Head in anterior view, ×44; b, left mandible in anterior view (shaded to show thickness), ×120; c, dorsal abdominal vestigial tubercle on mature larva, ×120; d, typical mature tubercle, ×120; e, body hair of mature larva, ×120; f, larva in side view, ×11; g, vestigial and typical tubercles of very young larva, ×120; h, body hair of very young larva, ×120. FIG. 13a–h.—*B. lutea*. a, Head in anterior view, ×67; b, cephalic spinules, ×333; c, body hair, ×333; d, typical tubercle, ×169; e, single middorsal tubercle, ×71; f, left mandible in anterior view, ×167; g, vestigial dorsal abodminal tubercle, ×169; h, larva in side view, ×17. FIG. 14.—B. *sennaarensis*. Single middorsal tubercle, ×35. FIG. 15.—*M. fauveli*. Typical tubercle, ×85. FIG. 16a, b.—*M. gilberti*. a, Larva in side view, ×8; b, typical tubercle, ×133. FIG. 17a, b.—*M. wroughtoni*. a, Left mandible in anterior view (shaded to show thickness), ×133; b, typical tubercle, ×185.

arcuate rows. Antennae each a flat disc bearing a low knob with 3 sensilla, each bearing a spinule. Labrum turned anteriorly so that the ventral border is directed forward; very short, breadth ca. 2½ times the length; ca. 32 sensilla on or near the ventral border; posterior surface densely spinulose, the spinules isolated posteriorly, in arcuate rows elsewhere. Mandibles each long and falcate, base dilated, distal half strongly curved medially, sharp-pointed, no medial teeth. Each maxilla with the apex paraboloidal, spinulose, the spinules minute and in short rows basally, long and isolated distally and laterally; each palp a slender cylinder with 5 apical sensilla; each galea digitiform, with 2 apical sensilla. Labium with the anterior surface densely spinulose, the spinules long and isolated or in short subtransverse rows; each palp a cylinder with 5 apical sensilla; an isolated sensillum between each palp and the opening of the sericteries, the latter wide and salient. Hypopharynx with minute spinules in scattered arcuate rows.

Material Studied.—5 larvae from Rhodesia, courtesy of Dr. W. L. Brown.

Genus *Neoponera* Emery

Revision.—Profile paraponeriform (see Appendix A). Anus ventral, with a posterior lip. Body beset with numerous (ca. 140) tubercles which are stout spirelike subcones, each with a few short hairs on the side and with the integument roughened with minute spinules in transverse rows. Body hairs few and minute. Head with a prominent boss near each dorsolateral corner. Antennae each with a basal disc. Labrum strongly bilobed, each lobe with an anteroventral boss. Mandibles narrow and somewhat elongate. Each maxillary galea scarcely longer than palp.

In 50 years of the study of ant larvae this opportunity is our first to examine a mature larva of *Neoponera;* hence the revised generic description and the complete description of mature *N. moesta* (Mayr).

N. moesta (Mayr)

(Fig. 12)

Length (through spiracles) ca. 7.3 mm. Shaped somewhat like a crookneck squash. Thorax forming a stout neck which is bent ventrally; abdomen straight and rather stout, its ventral surface nearly flat and with a straight profile, its dorsal surface strongly rounded and with a curved profile; posterior end rounded. Anus ventral, with a conspicuous posterior lip. Body beset with 144 tubercles, 10 on each thoracic somite, 12 each on A1–IX, 6 on AX. The tubercles are stout spirelike subcones, with a few hairs on the side; integument roughened with minute spinules in transverse rows. Spiracles mounted on small bosses. Integument of venter spinulose, the spinules minute and arranged in short rows. Body hairs few, simple, minute (0.025–0.075 mm). Cranium transversely subelliptical with a small boss (bearing a few small hairs) on each dorsolateral corner. Mouth parts large. Head hairs few, simple, nearly straight, very short (0.027–0.045 mm). Antennae each a disc bearing a small knob with 3 sensilla, each with a spinule. Labrum short, strongly bilobed; anterior surface of each lobe with a low ventral boss which bears ca. 10 sensilla; ventral border of each lobe with 2 sensilla and a few medial spinules; posterior surface densely spinulose, the spinules moderately long and in rather long subparallel transverse rows, the rows shorter and farther apart ventrally; posterior surface with 3 or 4 sensilla on each lobe. Mandibles each narrowly subtriangular in anterior view; heavily sclerotized; distal ⅔ with a narrow medial blade which extends into the apical tooth and bears 2 rather large subapical teeth; apical tooth short, round-pointed, and slightly curved medially. Maxillae each with the apex subparabolic and densely spinulose, the spinules rather long and in short arcuate rows; each palp a slender cylinder bearing 5 apical sensilla; each galea digitiform with 2 apical sensilla. Labium with anterior surface sparsely spinulose, the spinules rather long and isolated or in short rows; each palp a slender cylinder with 5 apical sensilla; opening of sericteries wide and salient. Hypopharynx densely spinulose, the spinules long and in subparallel rows, the rows so close together that the spinules overlap.

Very Young Larva.—Length (through spiracles) ca. 3 mm. Very similar to the mature larva except as follows. A1X with 8 tubercles; none on AX. Antennae without discs. Each maxillary palp a frustum. Each labial palp a low boss; opening of sericteries a depressed slit. Hypopharynx with minute spinules.

Material Studied.—18 larvae from Brazil, courtesy of K. Lenko.

N. cavinodis Mann

(Fig. 11)

Length (through spiracles) ca. 8.7 mm. Similar to *N. moesta* except as follows. Body beset with 142 tubercles; A1X with 10 tubercles. Integument densely spinulose, the spinules minute and in short transverse rows. Tubercles taller and with more spinules. Cranium suboctagonal in anterior view. Antennae smaller. Each mandible with minute spinules in short transverse rows on anterior, medial, and posterior surfaces of the base.

Material Studied.—2 larvae from Brazil, courtesy of Dr. W. L. Brown.

Genus *Ectomomyrmex* Mayr

Taylor (1967) stated: "The larvae lack dorsal abdominal 'doorknob' tubercles."

Genus *Mesoponera* Emery

Profile pachycondyliform (see Appendix A). Body beset with numerous (84–186) tubercles, which are spire-like or short stout subcones; integument of tubercles with minute spinules in short transverse rows; apex of tubercle with 1–3 sensilla; some dorsal tubercles may be reduced to low rounded bosses. Body hairless or with a few minute hairs. Head hairs few and short. Labrum bilobed. Mandibles ectatommiform (see Appendix B), a few spinules on the basal half. Spiracles on small papillae.

M. australis Forel

(Fig. 28)

Length (through spiracles) ca. 6.1 mm. Similar to *M. constricta* Mayr (1952) except as follows. Tubercles 104, distributed thus: TI, 10; TII, 8; TIII–AII, 10; AIII–VI, 4 and 2 low elevations each; AVII, VIII, 10; AIX, 8; AX 4; height ca. 0.15 mm. Head and mouth parts as in *Cryptopone gilva* (Roger) (= *Trachymesopus gilva*) (1952).

Young Larva.—Length (through spiracles) ca. 3.2 mm. Similar to mature larva except as follows. Tubercles 120, distributed thus: TI, 10; TII, 8; TIII–AII, 10; AIII–VI, 8 and 2 doorknobs each; AVII, VIII, 10; AIX, 8; AX, 4.

Just-Hatched Larva.—Length ca. 1.4 mm. Tubercles 116, distributed thus: TI, 10; TII, 8; TIII–AII, 10; AIII–VI, 8 and 2 doorknobs each; AVII, VIII, 10; AIX, 6; AX, 2.

Material Studied.—11 larvae and several semipupae from New South Wales, courtesy of Rev. B. B. Lowery.

M. caffraria (F. Smith)

Length (through spiracles) ca. 5.7 mm. Similar to *M. constricta* (1952) except as follows. Tubercles 84, distributed thus: TI, 10; TII–AII, 8; AIII, 6; AIV–VII, 6 and a midventral boss each; AVIII, 6; AIX, 4; AX, 2. Head hairs twice as numerous and shorter (ca. 0.03 mm). Labium with the anterior surface densely spinulose, the spinules slender and in long transverse rows basally, the spinules longer and the rows shorter distally. Mandibles and maxillae as in *C. gilva* (1952).

Submature Larva.—Length (through spiracles) ca. 4.9 mm. Similar to mature larva except as follows. Neck not so sharply differentiated. Tubercles 96, distributed thus: TI, 10; TII–AII, 8; AIII–VII, 6 and 2 vestiges each; AVIII, IX, 6; AX, 2. Head hairs 0.015–0.03 mm long. Maxillae and labium with much shorter spinules; palps shorter; opening of sericteries wide but not salient.

Very Young Larva.—Length (through spiracles) ca. 2.6 mm. Similar to mature larva except as follows. Tubercles 98, distributed thus: TI, 10; TII–AVIII, 8; AIX, 6; AX, 2. Head hairs 0.015–0.02 mm long. Labrum not bilobed. Mandibles falcate. Maxillary and labial spinules minute. Each maxillary palp a frustum; each labial palp a cluster of 4 sensilla. Opening of sericteries a narrow slit.

Material Studied.—14 larvae from South Africa and 2 from Ghana, courtesy of Dr. W. L. Brown.

M. fauveli (Emery)

(Fig. 15)

Length (through spiracles) ca. 9.3 mm. Very similar to *M. constricta* (1952) except in the following details. Tubercles 144, distributed thus: TI–III, 10; AI–VIII, 12; AIX, 10; AX, 8. Integument of body with numerous spinules which are minute and isolated or in short rows, the rows concentric immediately around the base of each tubercle. Body hairs few, simple, minute (0.008–0.016 mm), on all surfaces of prothorax, confined to venter elsewhere. Mandibles with narrower teeth and only a few isolated spinules on the anterior surface. Each maxillary and labial palp with 5 apical sensilla (1 peg-like).

Material Studied.—2 larvae from Peru, courtesy of Dr. W. L. Brown.

M. gilberti (Kempf)

NEW COMBINATION

(Fig. 16)

Length (through spiracles) ca. 4.8 mm. Similar to *M. constricta* (1952) except as follows. Tubercles 164, distributed thus: TI–III, 12; AI–VIII, 14; AIX, 10; AX, 6. Tubercles stout subcones, each bearing a few minute spinules and sensilla on or near the apex. Integument of venter with spinules in short transverse rows, elsewhere spinules isolated and smaller. Head hairs shorter (0.008–0.015 mm). Each mandible with the narrow medial blade longer.

Material Studied.—Numerous larvae from Brazil, courtesy of K. Lenko.

M. melanaria (Emery)

Length (through spiracles) ca. 5.6 mm. Similar to *M. constricta* (1952) except as follows. Tubercles 116, distributed thus: TI, 10; TII, 8; TIII–AII, 10; AIII–VI, 8 and 2 vestiges each; AVII, VIII, 10; AIX, 6; AX, 2. Integument spinulose, the spinules minute and in short rows, the rows transverse on the venter but forming a reticulum elsewhere, the reticulation more prominent posteriorly. Body without hairs, but with a few minute sensilla. Head with a pair of dorsolateral bosses which are directed anterolaterally. Head hairs shorter (0.017–0.025 mm). Mandibles and maxillae similar to *C. gilva* (1952) in shape and spinules.

Material Studied.—5 larvae from India, courtesy of Dr. W. L. Brown.

M. wroughtoni (Forel)

NEW COMBINATION

(Fig. 17)

Length (through spiracles) ca. 5 mm. Similar to *M. constricta* (1952) except as follows. Thorax and AI not so sharply marked off from remainder of abdomen. Anus with a small posterior lip. Tubercles 68, distributed thus: TI, 10; TII–AIV, 8; AV, VI, 6; AVII, VIII, 8; AIX, 6; AX, 0. Tubercles spire-like subcones, each encircled with rows of minute spinules, surmounted by a rather long stout spine, and sometimes bearing sensilla near the apex; height ca. 0.126 mm including spine. Integument moderately spinulose, the spinules minute and in short arcuate rows. Body without hairs. Cranium with rugae but lacking spinules. Head hairs minute (ca. 0.012 mm). Each maxillary palp with 5 sensilla. Anterior surface of labium moderately spinulose, the spinules in short rows basally, becoming isolated distally; each palp a frustum with 5 apical sensilla.

Young Larva.—Length (through spiracles) ca. 3 mm. Very similar to mature larva except as follows. Thoracic spiracles small, the largest on AI, diminishing gradually toward the posterior end. Maxillary palps and galeae shorter. Each labial palp a low knob bearing 5 apical sensilla. Opening of sericteries a transverse slit in a depression.

Material Studied.—3 larvae from South Africa, courtesy of Dr. W. L. Brown.

Genus *Euponera* Forel

Profile pachycondyliform (see Appendix A). Body beset with numerous (96) tubercles, which are spine-like, each with 2 basal hairs; some of the dorsal tubercles may be reduced to low rounded knobs. Body and head hairs long. Mandibles ectatommiform; a few spinules on the basal half.

E. brunoi Forel

(Fig. 18)

Length (through spiracles) ca. 3.4 mm. Similar to *M. constricta* (1952) except as follows. Tubercles 96, distributed thus: TI, 10; TII–AVIII, 8; AIX, 6; AX, 0. Tubercles spine-like, very slender, base bearing 2 long fine hairs. Integument spinulose, the spinules minute and in transverse rows ventrally, reticulate elsewhere. Body hairs very few, moderate to long (0.03–0.13 mm); longer and stouter ventrally, 4–6 each on AII–X; several short hairs on prothorax; 1 or 2 on each dorsolateral surface of each somite. Head hairs longer (0.036–0.11 mm). Labrum with a median anteroventral spinulose furrow.

Material Studied.—2 larvae and 2 semipupae from Ivory Coast and 2 larvae from Ghana, courtesy of Dr. W. L. Brown.

Genus *Brachyponera* Emery

Profile hypoponeriform (see Appendix A). Tubercles numerous (117–123), stout subcones, each with tranverse rows of minute spinules and a short apical hair; also a single middorsal discoid or doorknob between AIII and IV. Entire integument spinulose. Body hairs very few, simple, very short to moderately long, mostly confined to the ventral surface. Head large. Head hairs few. Mandibles brachyponeriform (i.e., without a medial blade, falcate, base narrow, medial teeth small). Maxillae small. Labium narrow.

Taylor (1967) stated that *Brachyponera* "has 3 pairs [of doorknob-shaped tubercles] in young larvae, on abdominal segments II–IV. In older larvae (probably in the last 2 instars) these metamorphose into 2 flat transverse raised welts, which also serve for attachment of larvae to the walls of the nest."

B. lutea (Mayr)

(Fig. 13)

Length (through spiracles) ca. 3.2 mm. Short and stout; thorax curved ventrally and tapering to the diameter of the head; each anterolateral surface of prothorax with a distinct but low rounded elevation; abdomen stout, straight, and subellipsoidal. Anus ventral, with a posterior lip. Tubercles 118, distributed thus: TI–AVIII, 10; AIX, 6; AX, 1 small, middorsal. Typical tubercles stout subcones, each with transverse rows of minute spinules and a short apical hair; on the dorsa of some abdominal somites the typical tubercles are replaced by minute doorknobs; in addition, between AIII and IV there is a single low middorsal subhemisperical doorknob. Integument spinulose, the spinules minute and in rows which form a reticulate pattern. Body hairs very few, very short (0.01–0.04 mm), simple, nearly straight, confined to the venter except 1 on each dorsolateral surface of the prothorax. Head large; cranium subhexagonal in anterior view, but with rounded corners. Head hairs few, simple, short (0.04–0.05 mm), slightly curved and constricted at base. Antennae mounted on discs; each bearing 3 sensilla. Labrum short and broad, breadth nearly twice the length; anterior surface with ca. 20 sensilla on or near the ventral border; posterior surface densely spinulose, the spinules in long, transverse, subparallel rows, posterior surface with 2 sensilla near the middle of each half. Mandibles each narrow and elongate, basal half slightly dilated, distal half strongly curved medially and ending in a slender round-pointed apical tooth; with 2 small to minute subapical teeth on the medial border; basal half with minute spinules in short arcuate rows. Maxillae each small and subglobular; entire surface with spinules in short rows; each palp subcylindrical with 2 apical and 3 subapical sensilla; each galea digitiform with 2 apical sensilla. Labium with all surfaces spinulose, the spinules longest and in longest rows on the middle of the anterior surface; palps subcylindrical, each with 2 apical and 3 subapical sensilla; opening of sericteries wide and salient. Hypopharynx spinulose, the spinules in short transverse subparallel rows.

Material Studied.—7 larvae and 2 semipupae from New South Wales, courtesy of Rev. B. B. Lowery.

B. sennaarensis (Mayr)

(Fig. 14)

Length (through spiracles) ca. 5 mm. Similar to *B. lutea* except as follows. Tubercles 123, distributed thus: TI–AVIII, 10; AIX, 8; AX, 4; with a single middorsal discoid between AIII and IV. Body hairs moderately long (0.037–0.1 mm). Head hairs longer (0.25–0.4 mm) and with flexuous tip. Length of labrum nearly equal to width.

Material Studied.—6 larvae from Belgian Congo, courtesy of Dr. W. L. Brown.

Genus *Simopelta* Mann

Gotwald and Brown (1966) have given a sketchy generic characterization, a drawing in side view of a young larva of *S. oculata* Gotwald & Brown, and a few details about the latter. We detect no resemblance between this larva and that of *S. pergandei* (Forel), which we described (Wheeler and Wheeler 1957).

Genus *Cryptopone* Emery

Revision. — Profile cryptoponiform (see Appendix A). Tubercles numerous (156–174), spire-like, with numerous short transverse rows of minute spinules, some with 1 or 2 sensilla on or near the apex; also on each dorsum of AIII–VII a pair of doorknobs. Body hairs few, minute to short. Head hairs few, short. Labrum small. Mandibles cryptoponiform (i.e., falcate, with narrow base and blade; 2 or 3 medial teeth). Labium narrow.

Brown (1963) transferred *Trachymesopus gilva* (Roger) to *Cryptopone*. We described the larva of this species under the older name (1952). Taylor (1967) stated that *Cryptopone* (sensu Brown 1963) has 4 or 5 pairs of doorknob-shaped tubercles on abdominal somites III–VI or III–VII.

C. rotundiceps Emery

(Fig. 19)

Length (through spiracles) ca. 4.9 mm. Shaped somewhat like a crookneck squash; thorax and A1 forming a short stout neck, which is bent ventrally; remainder of abdomen straight and slightly stouter, its ventral surface nearly flat and with a straight profile; its dorsal profile rounded; diameter greatest at AVI; posterior end rounded. Anus ventral, with a conspicuous posterior lip. Leg vestiges present. Each spiracle mounted on a low knob. Tubercles 174, distributed thus: T1–III, 12; AI, II, 14; AIII–VII, 12 and 2 doorknobs each; AVIII, IX, 14; AX, 12. A typical tubercle consists of a slightly curved spire, with numerous short transverse rows of minute spinules, some with 1 or 2 sensilla on or near the apex; height ca. 0.125 mm; doorknobs have a stout column which bears an inflated knob, height ca. 0.12 mm. Integument spinulose, the spinules larger and isolated dorsally and anteriorly, smaller, more numerous, and in short arcuate rows ventrally and posteriorly. Body hairs few, minute to short (0.008–0.075 mm), simple, slightly curved, a few on the ventral surface of each somite and on the dorsum of the prothorax. Cranium subhexagonal in anterior view. Head hairs few, short (0.025–0.075 mm), simple, straight to slightly curved. Antennae hemispherical, each mounted on a disc and bearing 3 (rarely 4) sensilla, each with a minute spinule. Labrum small, bilobed, breadth 1½ times length; anterior surface of each lobe with 7 or 8 sensilla; posterior surface of each lobe with 4 sensilla; posterior surface spinulose, the spinules in the middle numerous, minute, and in numerous subtransverse rows, each lateral quarter with larger and fewer spinules. Mandibles each subtriangular in anterior view, with a short narrow blade curved medially, with 2 or more apical and subapical teeth of varied sizes. Maxillae each with the apex paraboloidal, spinulose, the spinules longer and in longer rows distally; each palp a peg with 5 apical sensilla; each galea digitiform with 2 apical sensilla. Labium narrow; anterior surface sparsely spinulose and with a posterior transverse spinulose welt; each palp a frustum with 5 apical sensilla; opening of sericteries wide and salient. Hypopharynx densely spinulose, the spinules numerous, minute, and in subtransverse rows medially, laterally few and in shorter rows.

Young Larva.—Length (through spiracles) ca. 2.1 mm. Similar to mature larva except as follows. No distinct neck. Anus lacking posterior lip. Body hairs confined to ventral surface, 0.012–0.1 mm long. Head relatively much larger. Mandibles with teeth more acute and more curved. Each labial palp a low knob, with 4 apical sensilla. Opening of sericteries a slit on a slightly raised welt.

Material Studied. — Numerous larvae from New South Wales, courtesy of Rev. B. B. Lowery.

Genus *Ponera* Latreille

In his monograph on this genus, Taylor (1967) divided the former *Ponera* into 2 genera: *Ponera* and *Hypoponera*. This change necessitates nomenclatural revisions in our 1952 and 1964 accounts of *Ponera*. *P. coarctata pennsylvanica* Buckley becomes *P. pennsylvanica*. *P. coarctata* (Latreille) and *P. japonica* Wheeler remain unchanged. *P. opaciceps* Mayr, *nitidula* Emery, and spp. are now in *Hypoponera*. *P. trigona opacior* Forel becomes *H. opacior* (Forel).

Taylor's generic characterization (1967) of the larvae, based on ours (1952) stated: "There is apparently nothing unusual in the general body shape or cephalic structure. The body bears about 150 papilliform tubercles, each surmounted by a strong spine. Such structures are present in many larval Ponerini. The exceptional character, apparently allowing generic diagnosis of *Ponera* larvae, is the presence of *3 or 4 pairs* of peculiar mushroom or doorknob shaped *glutinous tubercles*, on the dorsa of abdominal segments III-V or III–VI. Their number and arrangement is characteristic of *Ponera*, although similar organs are present in other genera of tribe Ponerini."

To justify his separation of *Hypoponera* from *Ponera*, Taylor employed (1967) "segmentation of the oral palpi, structure of the subpetiolar process of the workers and females, the male genital characteristics, and distribution and numbers of certain specialized larval tubercles." He used the larval tubercles in 1 of the couplets of his key to the species of *Ponera*.

Taylor's specific descriptions follow. *P. coarctata:* "I have seen no larvae of *P. coarctata*, but it may be dependably asumed that they have 4 pairs of glutinous 'doorknob' tubercles." *P. pennsylvanica:* He referred to our 1952 description. *P. alpha* Taylor: "The larva has 6 pairs [sic!] of glutinous tubercles on the abdominal dorsum, as do all other known Indo-Australian *Ponera* species." (But he had already said in his generic characterization (quoted earlier) that the presence of 3 or 4 pairs was diagnostic of *Ponera*.) *P. xenagos* Wilson: "Larvae from Aiyura have 3 pairs of dorsal abdominal glutinous tubercles, as usual in Indo-Australian *Ponera*." *P. taipingensis* Group: "The larvae have 3 pairs of glutinous tubercles on the abdominal dorsum." *P.*

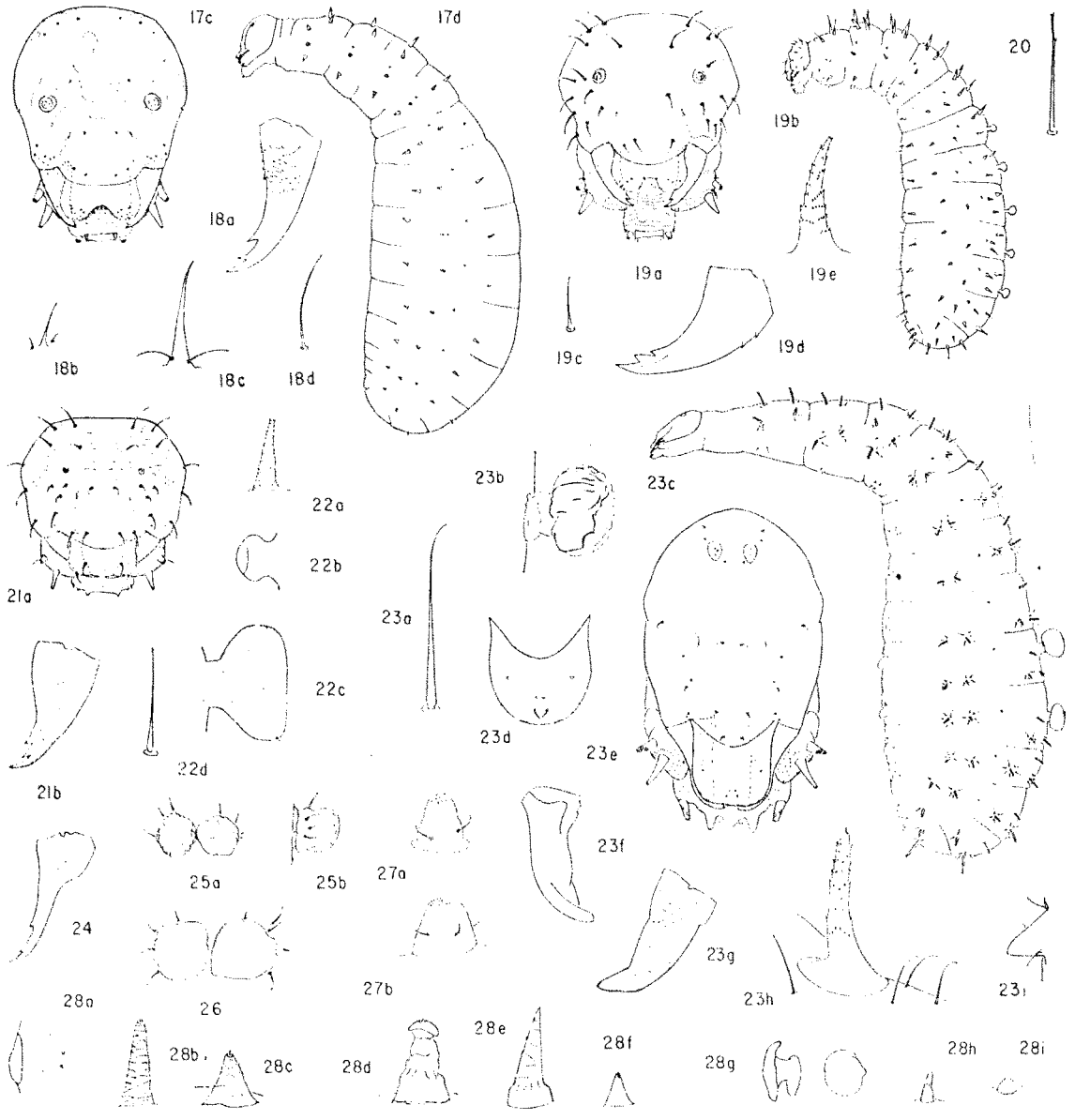

FIG. 17c, d.—*M. wroughtoni*. c, Head in anterior view, ×56; d, larva in side view, ×11. FIG. 18a–d.—*E. brunoi*. a, Left mandible in anterior view, ×167; b, vestigial tubercle, ×133; c, typical tubercle, ×133; d, body hair, ×133. FIG. 19a–e.—*C. rotundiceps*. a, Head in anterior view, ×67; b, larva in side view, ×14; c, body hair, ×133; d, left mandible in anterior view, ×133; e, typical tubercle, ×133. FIG. 20.—*P. lutea*. Body hair, ×267. FIG. 21a, b.—*H. opaciceps*. a, Head in anterior view, ×81; b, left mandible in anterior view, ×333. FIG. 22a–d.—*H. iheringi*. a, Typical tubercle, ×167; b, ventral tubercle, ×167; c, dorsal doorknob tubercle, ×167; d, body hair, ×333. FIG. 23a–i.—*Myopias* sp. a, Body hair, ×450; b, dorsal doorknob tubercle, ×143; c, larva in side view, ×27; d, labrum in anterior view, ×133; e, head in anterior view, ×101; f, left mandible in lateral view, ×135; g, left mandible in anterior view (shaded to show thickness) ×145; h, typical tubercle, ×143; i, ventral tubercle, ×143. FIG. 24.—*O. hedleyi*. Left mandible in anterior view, ×111. FIG. 25a, b.—*A. graeffei*. a, Dorsal pulleys in surface view, ×67; b, dorsal pulley in side view, ×67. FIG. 26.—*A. horridus*. Discoids on AV in surface view, ×67. FIG. 27a, b.—*L. iheringi*. a, b, Tubercles. FIG. 28a–i.—*M. australis*. a–c, Tubercles of mature (6.2 mm) larva; a, side and surface views of dorsal vestigial doorknob tubercle, ×84; b, typical tubercle, ×84; c, vestigial tubercle, ×84; d–f, tubercles on young (3.2 mm) larva; d, dorsal doorknob tubercle in side view, ×84; e, typical tubercle, ×84; f, vestigial tubercle, ×84; g–i, tubercles of very young (1.4 mm) larva; g, side and surface views of dorsal doorknob tubercles, ×84; h, typical tubercle, ×84; i, vestigial tubercle, ×84.

woodwardi Taylor: Larvae have "3 pairs of dorsal abdominal 'door knob' tubercles." *P. elegantula* Wilson: "Larvae conforming to general plan for Indo-Australian members of genus, closely resembling those of *P. alpha*, with 3 pairs of dorsal abdominal glutinous tubercles." *P. japonica:* "Teranishi (1940) figured a larva supposed to be that of *P. japonica*. He showed 3 pairs of dorsal abdominal glutinous tubercles, as in all other Oriental-Australian species." *P. incerta* (Wheeler): "Larvae with 3 pairs of glutinous abdominal tubercles." *P. tenuis* (Emery): "Larvae have 3 pairs of dorsal abdominal doorknob tubercles."

Revised Generic Characterization.—Profile poneriform (see Appendix A). Tubercles 156–158, spirelike, subconical, each encircled by a few rows of minute spinules and surmounted by a rather long stout spine; 3 or 4 pairs of doorknobs on the dorsa of AIV–VI or AIII–VI. Body hairs few, confined to the ventral surface. Head hairs few. Antennae large. Labrum bilobed. Mandibles ectatommiform (see Appendix B).

P. leae Forel

(Fig. 20)

Length (through spiracles) ca. 2.5 mm. Similar to *P. pennsylvanica* (1952) except as follows. Tubercles 158, distributed thus: TI, 10; TII, III, 12; AI–III, 14; AIV–VI, 12; AVII, VIII, 14; AIX, 12; AX, 6; 1 pair of doorknobs each on AIV–VI. Body hairs shorter (0.01–0.05 mm), simple or with the tip frayed. Head large; cranium subhexagonal in anterior view. Head hairs short-bifid or short-trifid.

Young Larva.—Length (through spiracles) ca. 1.9 mm. Similar to mature larva except as follows. Head relatively much larger. Neck more distinct. Mandibles with the teeth shorter and sharper.

Material Studied.—16 larvae from New South Wales, courtesy of Rev. B. B. Lowery.

P. pennsylvanica Buckley

Revision.—Integument spinulose; dorsally and laterally the spinules are large, coarse, and isolated; ventrally minute and in short transverse rows. Head hairs few.

Genus *Hypoponera* Santschi

Profile hypoponeriform (see Appendix A). Tubercles 130–230, spire-like, subconical, each encircled by a few rows of minute spinules and surmounted by a rather long stout spine. One pair of doorknobs each on the dorsa of AIV and V. Body hairs few, simple, mostly confined to the ventral surface. Head hairs few. Antennae large. Labrum bilobed. Mandibles ectatommiform (see Appendix B).

Brown and Taylor (1970) figured a larva in side view. Taylor (1967) stated that the larvae are "similar to those of *Ponera*, but with *2 pairs of* doorknob-shaped *glutinous tubercles* on abdominal segments IV and V. These are present in all known instars of all castes. Some species also have flap-like outgrowths on the lateroventral aspects of the 1st thoracic segment (G. C. & J. Wheeler 1952), and others have tiny doorknob-shaped tubercles on the ventral aspects of the abdomen. . . .

"Discussion. Immature stages are known for about 30 *Hypoponera* species, from New Guinea, Australia, Polynesia, North and Central America, Brazil, and the Ivory Coast. The larval characters are thus fairly well based.

"Presence of similar glutinous dorsal tubercles in both *Ponera* and *Hypoponera* larvae might be supposed to indicate relationship between them. However, convergent evolution of similar tubercles is demonstrable in several ponerine genera. The following details are abstracted from my notes on larval characters and ponerine evolution. They contain some new information on genera, the larvae of which are undescribed. Detailed discussion will be presented elsewhere; in the meantime the papers of G. C. & J. Wheeler (1952) are essential references. I have conducted experiments in New Guinea and Panama with all genera named here. The specialized dorsal tubercles serve for attachment of the larvae to the nest walls, or even to the ceiling in moist or flooded conditions. . . .

"In conclusion, mushroom or doorknob-shaped glutinous tubercles should not lightly be used as phylogenetic markers indicating relationship between ponerine genera; since such structures have apparently been evolved on at least six occasions in the subfamily. The fact that *Ponera* and *Hypoponera* have similar tubercles, arranged similarly, does not indicate relationship between them. There can be little doubt that this resemblance is convergent; of course it is not perfect, since all known *Hypoponera* have 2 pairs of these organs, while *Ponera* has a primary complement of 3 pairs, with 4 pairs present as a probably secondary character in one superspecies."

H. opaciceps (Mayr)

(Fig. 21)

Revision (1964).—Length (through spiracles) ca. 2.3 mm. Short and stout; thorax curved ventrally and tapering to the diameter of the head; abdomen stout, straight, and subellipsoidal. Anus ventral, with a posterior lip. Tubercles numerous (134), distributed thus: TI–AI, 10; AII, III, 12; AIV, V, 10; AVI, VII, 12; AVIII, 10; AIX, 6; AX, 4. Each tubercle a slender spirelike subcone encircled by a few rows of minute spinules and surmounted by a long spine (or stout hair); height of tubercles (including spine) 0.06–0.1 mm. In addition there is a pair of doorknobs on the dorsum of AIV and a similar pair on the dorsum of AV; each doorknob tubercle consists of a stout column and an inflated knob; the column is encircled by numerous rows of minute spinules and bears 2 hairs ca. 0.03 mm long; height of knob plus column ca. 0.12 mm. Integument spinulose, the spinules on the ventral surface shorter; dorsal and lateral surfaces densely spinulose, the spinules isolated, long (0.01–0.03 mm) and hair-like. Body

hairs few, moderately long (0.05–0.1 mm), simple, slightly curved, restricted to the ventral surface. Head large; cranium subhexagonal (in anterior view), with the occipital margin slightly concave. Head hairs few, simple, slightly curved, ca. 0.06 mm long. Antennae large, each with 3 sensilla, each of which bears a spinule. Labrum short, broad, and bilobed; anterior surface of each lobe bearing 2 hairs (0.05 mm long) and 4 sensilla (near the ventral border); anterior surface spinulose, the spinules minute and in short arcuate rows; posterior surface densely spinulose, the spinules long and in long subtransverse parallel rows medially, in short arcuate rows near the borders; posterior surface with 2 sensilla near the base of each lobe. Mandibles narrowly subtriangular (in anterior view), each with a distinct medial blade arising from the anterior surface and bearing 2 medial teeth; apical half slightly curved medially; basal half sparsely spinulose, the spinules minute and in short transverse arcuate rows. Maxillae each large and bulging; apex paraboloidal and densely spinulose, the spinules minute and in short arcuate rows; remainder of surface with spinules sparse and irregular; each palp a frustum, with 4 apical and 1 subapical sensilla; each galea digitiform with 2 apical sensilla. Labium prominent, with the spinules arranged in short transverse rows medially, isolated laterally; each palp a short frustrum, bearing 4 apical and 1 subapical sensilla; opening of sericteries wide and salient. Hypopharynx densely spinulose, the spinules minute and in long subtransverse rows.

H. iheringi (Forel)

(Fig. 22)

Length (through spiracles) ca. 5.2 mm. Similar to *H. opacipes* except as follows. Tubercles numerous (230), distributed thus: TI, 12; TII, III, 16; AI, 18; AII, III, 20; AIV, V, 18; AVI–X, 20. Ventral vestigial tubercles on AII–VI small knobs without spinules; AIV and V each with a pair of dorsal doorknobs, each of which has a short base and a thick knob; only the top is without spinules. Integumentary spinules in short arcuate rows, the rows concentric around the base of the tubercles. A few body hairs on each somite, short (0.01–0.05 mm), simple, straight or slightly curved. Head not large; cranium suboctagonal in anterior view; integument spinulose, the spinules minute and in short arcuate rows. Head hairs 0.03–0.075 mm long. Anterior surface of labrum lacks hairs; 8 sensillae near the ventral border of each lobe. Posterior surface with 5 or 6 sensilla near base of each lobe.

Material Studied.—13 larvae from Brazil, courtesy of K. Lenko.

Genus *Myopias* Roger

Profile pachycondyliform (see Appendix A). Tubercles numerous (134); of 3 types: (1) spirelike subcone, with an apical hair (the most numerous); (2) stout subcone with 2 or 3 basal hairs, on the ventral surface; (3) a single middorsal doorknob on each AV and VI. Body hairs very few, simple, short, 1–8 around the base of each spirelike tubercle. Head with the mouth parts pointed forward; cranium a third longer than broad; antennae high on the head and close together. Head hairs very few, minute. Labrum subparabolic (in anterior view). Mandibles large and rather narrow, each with a medial blade without teeth; apical tooth blunt and curved medially and posteriorly.

Taylor (1967) stated that there are single, nonpaired tubercles on the dorsa of abdominal somites V and VI.

Myopias sp.

(Fig. 23)

Length (through spiracles) ca. 4.6 mm. Shaped somewhat like a crookneck squash; thorax forming a distinct long slender neck the diameter of which is notably less than that of the abdomen and which is strongly bent ventrally; size of AI transitional to that of remainder of abdomen which is slightly swollen, subovoidal, but with the ventral profile nearly straight. Anus ventral. Gonopod vestiges present on AIX; leg vestiges present. Spiracles minute and on slight elevations. Tubercles numerous (132), distributed thus: TI–III, 8; AI–VIII, 10; AIX, 8; AX, 4. In addition, on each ventrolateral surface of AI–VIII is a stout subcone with 2 or 3 basal hairs; on the dorsa of each AV and VI is a middorsal doorknob. Most tubercles are spire-like, with isolated lateral spinules and a single apical spinule, ca. 0.18 mm tall (including spinule). Integument spinulose, the spinules in short, transversely arcuate rows. Body hairs very few, short (0.012–0.1 mm), 1–8 near the base of each tubercle except the anterodorsal pair on TII–AIX and the doorknob tubercles. Head long and narrow with the mouth parts pointed forward; cranium a third longer than broad, subelliptical. Antennae situated high on the head and close together; each bearing 3 sensilla. Head hairs very few, minute (0.01–0.027 mm), simple, with the tip extremely fine and curved. Labrum broadly subparabolic in anterior view; anterior surface with ca. 16 sensilla and/or minute hairs on and near the ventral border; posterior surface densely spinulose, the spinules long and in numerous subparallel transverse rows, the rows so close together that the spinules overlap; posterior surface of each half with a cluster of 3 contiguous sensilla ventrally and 3 or 4 minute sensilla dorsally. Mandibles each large and rather narrow; lateral portion thick and terminating in a blunt tooth, which is curved medially and posteriorly; medial portion a thin blade, without teeth; basal third with a few minute spinules in short arcuate rows on the anterior surface. Maxillae each small; apex narrowly rounded, with a few isolated spinules on the distal half; each palp a tall skewed peg with 3 apical and 3 subapical sensilla; each galea very long, digitiform, with 2 apical sensilla. Labium with the anterior surface densely spinulose, the spinules in arcuate rows of varied lengths, the rows so close together that the spinules overlap; each palp a tall skewed peg, with 3 apical and 3 subapical sensilla; opening of sericteries

wide and salient. Hypopharynx densely spinulose, the spinules long and in long subparallel transverse rows, the rows so close together that the spinules overlap.

Young Larva.—Length (through spiracles) ca. 2.3 mm. Similar to mature larva except in the following details. Neck shorter; abdomen more swollen dorsally; anus lacking lip; body hairs shorter (0.012–0.037 mm); spinules on mouthparts shorter and not overlapping; mandibles each with apical tooth sharp-pointed; opening of serecteries not salient.

Material Studied.—5 larvae and 5 semipupae from "lower Busu R., Huon Pen, New Guinea, E. O. Wilson #1048," courtesy of Dr. W. L. Brown.

Genus *Leptogenys* Roger

L. (Lobopelta) iheringi Forel

(Fig. 27)

Length (through spiracles) ca. 6 mm. Similar to *L. (Lobopelta) elongata* (Buckley) (1952) except as follows. Tubercles 136. No body hairs. Maxillary and labial palps each a skewed peg, with 2 apical and 2 subapical sensilla.

Material Studied.—5 damaged larvae from Brazil, courtesy of K. Lenko.

Tribe ODONTOMACHINI

Genus *Odontomachus* Latreille

Revision.—Pachycondyliform (see Appendix A). Tubercles moderately numerous (90–116); majority consisting of a frustum bearing 1–14 (usually 3–5) relatively long hairs; on this base is seated a spire, which bears an apical stout spinelike hair; integument of spire with short transverse rows of spinules. On the middorsal surface of AIV there is a pair of glabrous subcircular areas which may be considerably elevated and pulley-like, or thin discs, or merely differentiated areas which are scarcely perceptible in profile; similar structures on AV; or there may be only 1 such structure on AIV and 1 on AV; glabrous areas incompletely fringed with short hairs. (*O. tyrannicus* F. Smith has typical tubercles instead of glabrous areas.)

O. cephalotes F. Smith

Young Larva.—Length (through spiracles) ca. 8 mm. Similar to *O. haematoda* (L.) (1952) except as follows. Tubercles 104, distributed thus: TI, 10; TII–AV, 8; AVI–VIII, 10; AIX, 6; AX, 2. In addition on each dorsum of AIV and V, 2 contiguous discs similar to those on *O. haematoda*. Integument distinctly spinulose, the spinules isolated or in short rows.

Material Studied.—4 larvae from South Australia, courtesy of Rev. B. B. Lowery.

O. hastatus (F.)

Length (through spiracles) ca. 8 mm. Very similar to *O. haematoda* (1952) except as follows. Tubercles 104, distributed thus: TI, 10; TII–AV, 8; AVI, VII, 10; AVIII, 8; AIX, 6; AX, 2. In addition there is on the dorsum of AIV a single slightly raised discoid glabrous area, which is fringed laterally by small hairs; a similar structure on AV. Head hairs shorter (0.035–0.075 mm). Antennae moderately large.

Material Studied.—1 larva from Brazil, courtesy of Dr. W. L. Brown.

Genus *Anochetus* Mayr

Generically indistinguishable from *Odontomachus*.

A. graeffei Mayr

(Fig. 25)

Young Larva.—Length (through spiracles) ca. 3 mm. Similar to *Anochetus* (*A.*) sp. (1952) except as follows. Tubercles 108, distributed thus: TI, 10; TII–AII, 8; AIII, 10; AIV, 8; AV–VIII, 10; AIX, 6; AX, 2. In addition there are 2 contiguous pulleys on the middorsum of AIV only. Posterior surface of labrum with spinules fine and long.

Material Studied.—4 larvae from New South Wales, courtesy of Rev. B. B. Lowery.

A. horridus Kempf

(Fig. 26)

Very Young Larva.—Length (through spiracles) ca. 4 mm. Similar to *A. emarginatus* (F.) (1952) except as follows. Tubercles 114, distributed thus: TI, II, 10; TIII–AIII, 8; AIV, V, 6; AVI–VIII, 8; AIX, 6; AX, 4. In addition, on the middorsa of each AIV and V there is a contiguous pair of low discoids.

Material Studied.—2 damaged larvae from Brazil, courtesy of Dr. W. L. Brown.

Tribal Characterizations

AMBLYOPONINI.—This tribe is a heterogeneous assemblage, which cannot be characterized by any significant characters.

Genera Studied.—Amblyopone, Apomyrma, Myopopone, Mystrium, Onychomyrmex, Prionopelta, and *Stigmatomma.*

PLATYTHYREINI.—Profile platythyreiform. Mandibles platythyreiform.

Genera Studied.—Eubothroponera and *Platythyrea.*

TYPHLOMYRMECINI.—Profile onychomyrmeciform. Body densely and uniformly covered with a mat of branched (mostly trifid) hairs. Head with a few large bifid hairs. Cranium transversely subelliptical; frons bulging. Antennae small, cylindrical; each with 3 sensilla, each of which bears a long stout spinule. Labrum large and thick. Mandibles typhlomyrmeciform; anterior surface with numerous longitudinal rows of minute spinules. Labium large, subhemispherical.

Genus Studied.—Typhlomyrmex.

ECTATOMMINI.—Profile paraponeriform or ectatommiform; body hairs branched or at least denticulate. Antennae small, projecting conspicuously, diameter not greater than length, each bearing 3 apical sensilla, each of which is surmounted by a stout spin-

ule. Mandibles (except in *Paraponera*) with numerous spinules on anterior surface arranged in longitudinal rows.

Genera Studied.—Ectatomma, Gnamptogenys, Hetcroponera, Paraponera, and *Rhytidoponera.*

PROCERATIINI.—Profile proceratiiform. Head and body without hairs. Antennae large. Mouth parts with few or no spinules. Labrum a thick flap, considerably broader than long, narrowed at the base, not bilobed. Mandibles proceratiiform, small, feebly sclerotized. Labial palps represented by clusters of sensilla.

Genera Studied.—Discothyrea, and *Proceratium.*

PONERINI.—Profile paraponeriform, pachycondyliform, cryptoponiform, poneriform, or hypoponeriform. Body furnished with tubercles (except *Megaponera*) which are not smoothly rounded bosses and are not restricted to the ventral surface. Body hairs (other than those on tubercles) few or lacking (except in some species of *Trapeziopelta*).

Genera Studied.—Belonopelta, Bothroponera, Brachyponera, Centromyrmex, Cryptopone, Diacamma, Dinoponera, Euponera, Hagensia, Hypoponera, Leptogenys, Megaponera, Mesoponera, Myopias, Neoponera, Odontoponera, Ophthalmopone, Pachycondyla, Ponera, Psalidomyrmex, Simopelta, and Trapeziopelta.

THAUMATOMYRMECINI.—Body beset with numerous spirelike tubercles. Head elongate; mouth parts large. No hairs on head or body. Antennae minute; situated high on the head. Mandibles thaumatomyrmeciform. [Profile not known.]

Genus Studied.—Thaumatomyrmex.

ODONTOMACHINI.—Profile pachycondyliform. Beset with numerous tubercles; none on midventral surface. A typical tubercle consists of a frustum bearing a circle of 4–6 relatively long slender hairs which are constricted at the point of attachment; seated on this frustum is a spire, which bears on its apex a heavy, straight, spinelike hair; integument of spire with short transverse rows of spinules. On the middorsal surface of AIV there is 1 or a pair of glabrous areas which may be almost flush or noticeably elevated; similar areas on AV; glabrous areas incompletely fringed with short hairs. Head hairs few and short. Mouth parts rather large. Mandibles ectatommiform or odontoponeriform; on a part of the anterior surface are a few minute spinules in short transverse rows.

Genera Studied.—Anochetus and *Odontomachus.*

Larval Classifications vs. Adult Classifications

Stigmatomma.—Brown (1960) synonymized *Stigmatomma* under *Amblyopone.* We have found (1952, 1964) the larvae of the 2 taxa to be generically separable on the basis of profile, pilosity, and shapes of cranium, labrum, and mandibles.

Platythyrea.—We are unable to distinguish generically the larvae of *Enbothroponera* from those of *Platythyrea.*

Typhlomyrmex.—This genus should remain in a separate tribe, which is closely related to the Ectatommini as evidenced by body hairs, antennae, and mandibular spinules. The distinctive characters are the profile, the bulging frons, and the shape of the mandibles.

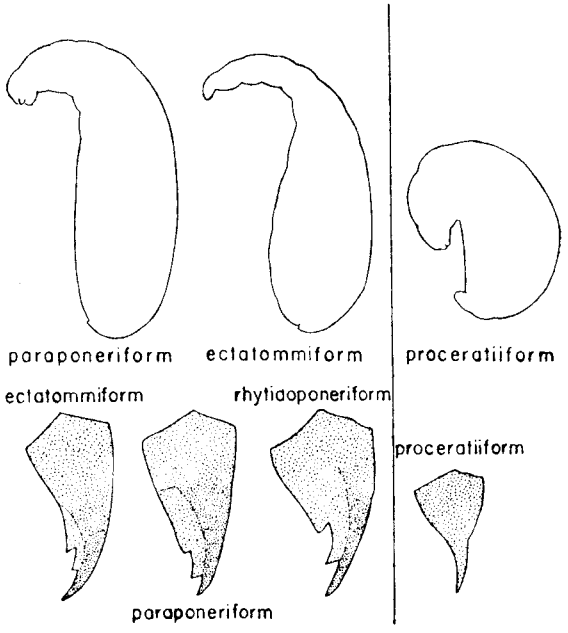

FIG. 29.—Comparisons of tribes Ectotommini (left of line) and Proceratiini (right of line); body profiles above, mandible shapes below.

PROCERATIINI.—Brown (1958) transferred *Proceratium* and *Discothyrea* to the Ectatommini and abolished the tribe Proceratiini. We strongly disapprove of this change. If the larvae are to be considered at all in ant classification, then these 2 genera must have separate tribal status. We would even be willing to grant subfamily rank, as was proposed by Clark (1951). In Table 1 and the accompanying Fig. 29 we have contrasted these 2 tribes.

Euponera.—Emery (1911) divided the genus *Euponera* into 4 subgenera: *Euponera, Mesoponera, Brachyponera,* and *Trachymesopus.* Wilson (1958) raised these 4 subgenera to generic rank. In our previous treatments (1952, 1964) of ponerine larvae, we have called attention to the discordance between adult classification and larval classification in the subgenera *Mesoponera* and *Trachymesopus.* (At those dates we had no larvae of *Brachyponera.*) We described 3 species alleged to be *Trachymesopus: gilva, clarki* (Wheeler), and *stigma* (F.). Brown (1963) transferred *gilva* to *Cryptone;* we are here transferring *clarki* and *stigma,* together with *gilberti* and *wroughtoni,* to *Mesoponera,* on the basis of larval characters. We have left only *brunoi* in *Euponera,* which is rather close to *Mesoponera* but can be differentiated by the shape of the tubercles. *Brachyponera* (of which we now have 2 species) presents no problem, for it is quite distinct from both *Euponera* and *Mesoponera* in profile, tubercles, and mandible shape.

The new combinations referred to in the preceding paragraph all result from transfers of species from

Table 1.—Comparisons of tribes Ectatommini and Proceratiini.

Character	Ectatommini	Proceratiini
Body profile	Paraponeriform or ectatommiform (Fig. 29)	Proceratiiform (Fig. 29)
Segmentation	Distinct	Indistinct
Body hairs	Numerous	None
Head hairs	Numerous	None
Antennae	Small; projecting conspicuously; diameter not greater than length; each bearing 3 apical sensilla, each of which is surmounted by a stout spinule	Large, on a low rounded convexity; each with 3 minute sensilla, each bearing a minute spinule
Labrum:		
Shape	Bilobed	Not bilobed; large, short, thick
Posterior surface	Several to many sensilla; numerous spinules	Few sensilla; no spinules
Mandible:		
Size	Moderate to large	Small
Sclerotization	Moderate to heavy	Feeble
Shape	Paraponeriform, ectatommiform, or rhytidoponeriform (Fig. 29)	Proceratiiform (Fig. 29)
Spinules	Numerous, on anterior surface, in longitudinal rows	None
Maxillae:		
Palps	Peglike, with 4 or 5 sensilla	Represented by a few scattered sensilla only
Spinules	Sparse to dense	Few or none
Labium:		
Size	Small to moderately large	Large
Spinules	Dense	Few or none
Palp	Peg, bearing 3–5 sensilla	Cluster of 3–4 sensilla
Hypopharynx	Moderately to densely spinulose	Few or no spinules

Trachymesopus to *Mesoponera: M. clarki* (for *T. clarki*); *M. gilberti* (for *T. gilberti*); *M. stigma* (for *T. stigma*); *M. wroughtoni* (for *T. wroughtoni*).

Bothroponera.—We are treating the *Bothroponera* problem elsewhere (Wheeler and Wheeler 1971). Here it will suffice to say that the species we have studied fall into 3 generically distinct groups: group I—*denticulata* Kirby, *pilicentris* F. Smith, and *sublaevis* Emery; group II—*mayri* Emery; group III—*sjostedti* Mayr. These groups may be differentiated on the basis of profile, tubercles, and mandible shape.

LEPTOGENYINI.—Brown (1963) transferred this tribe into the Ponerini on the basis of "both adult and larval" characters. We concur in this action.

ODONTOMACHINI.—In our previous treatises (1952, 1964), we had trouble with *Anochetus: A. (Stenomyrmex)* which was more like *Odontomachus* than it was like *A. (Anochetus)*; furthermore *A. (A.) mayri* partook of the characters of both subgenera. We are unable to solve this problem.

APPENDIX A. GENERALIZED BODY PROFILES[4]

The wealth of new material forces us to a complete revision of our scheme of generalized body profiles (1964). However, only new or revised illustrations of profiles are shown in Fig. 30.

Group A

Shaped somewhat like a crook neck squash; thorax forming a distinct neck the diameter of which is notably less than that of the abdomen and which is strongly bent or curved ventrally; size of 1st abdominal somite transitional to that of remainder of abdomen, which is stout or swollen.

1. Paraponeriform (Fig. 30, A1). Neck short and stout; abdomen stouter, straight, and subcylindrical. Genera: *Bothroponera* groups I and II, *Heteroponera, Neoponera,* and *Paraponera.*

2. Ectatommiform (Fig. 30, A2). Neck long and slender; head small; abdomen ovoidal; anus subterminal. Genera: *Amblyopone, Ectatomma, Gnamptogenys,* and *Rhytidoponera.*

3. Pachycondyliform (1964, Fig. 17, B3). Neck long and slender; head large; abdomen subovoidal, but with the ventral profile nearly straight; anus ventral. Genera: *Anochetus, Bothroponera* group III, *Centromyrmex, Diacamma, Dinoponera, Euponera, Leptogenys, Mesoponera, Myopias, Odontomachus, Odontoponera, Ophthalmopone, Pachycondyla, Psalidomyrmex, Stigmatomma,* and *Trapeziopelta.*

Group B

Banana-shaped (elongate, moderately slender; diameter nearly uniform; slightly curved ventrally), anus subterminal.

1. Prionopeltiform (Fig. 30, B1). Genus: *Prionopelta.*

Group C

Thorax curved or bent ventrally but not forming a distinct neck; abdomen only moderately swollen.

1. Cryptoponiform (Fig. 30, C1). Slender; tapering from the posterior end, which is round-pointed, to the prothorax; anus ventral. Genus: *Cryptopone.*

2. Poneriform (Fig. 30, C2). Rather slender;

[4] The following genera which we have studied are not included here or in the key, because the material we have does not show adequate body profiles (the larvae are immature or the integuments are damaged or the specimens are semipupae): *Hagensia, Megaponera, Myopopone, Mystrium, Simopelta,* and *Thaumatomyrmex.*

ventral profile of abdomen nearly straight; anus ventral. Genera: *Belonopelta* and *Ponera*.

3. Hypoponeriform (Fig. 30, C3). Short and stout; ventral profile of abdomen nearly straight; anus ventral. Genera: *Brachyponera* and *Hypoponera*.

4. Apomyrmiform (Fig. 30, C4). Elongate and moderately slender; abdomen elongate-ellipsoidal; anus terminal. Genus: *Apomyrma*.

Group D

Both ends bent or curved ventrally; terminal somite rounded and tail-like.

1. Platythreiform (1964, Fig. 17, D1). Thorax forming a long slender neck; ventral profile jagged. Genera: *Eubothroponera* and *Platythyrea*.

2. Proceratiiform (Fig. 30, D2). The ends curved ventrally so far that the head and tail are directed toward each other; thorax short and very stout. Genera: *Discothyrea* and *Proceratium*.

Group E

Thorax curved or bent ventrally but not forming a distinct neck; constricted at the 1st abdominal somite; abdomen only moderately swollen.

1. Onychomyrmeciform (1964, Fig. 17, C2). Abdomen subovoidal; anus subterminal. Genera: *Onychomyrmex* and *Typhlomyrmex*.

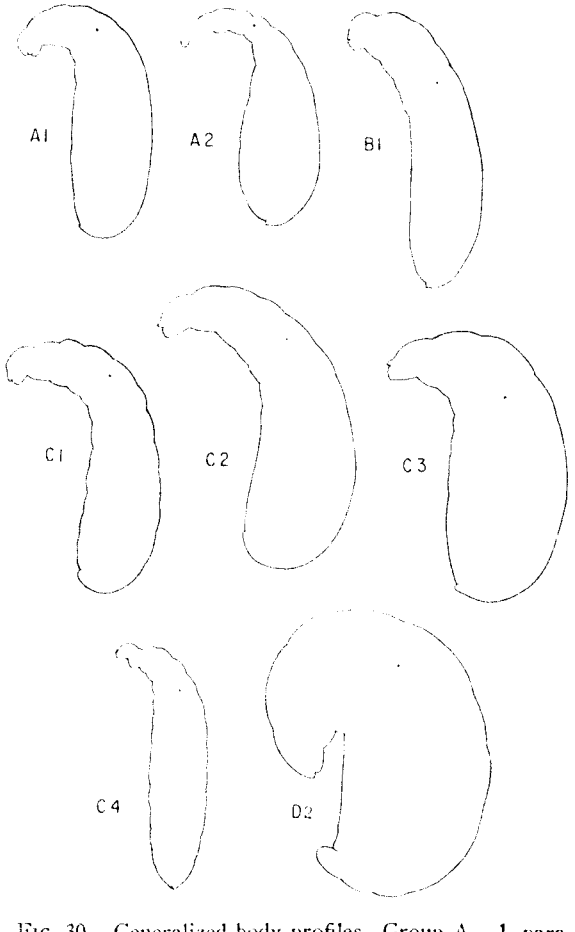

FIG. 30.—Generalized body profiles. Group A.—1, paraponeriform; 2, ectatommiform. Group B.—1, prionopeltiform. Group C.—1, cryptoponiform; 2, poneriform; 3, hypoponeriform, 4, apomyrmiform. Group D.—2, proceratiiform.

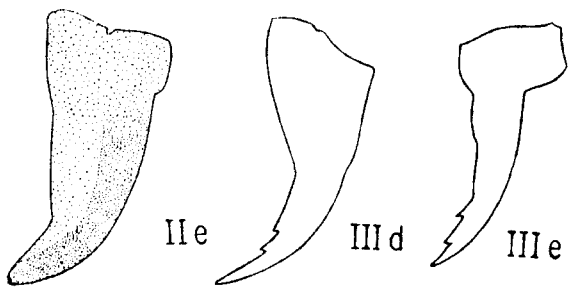

FIG. 31.—Generalized mandible shapes. Group II.—e, myopiasiform. Group III.—d, brachyponeriform; e, apomyrmiform.

APPENDIX B. CHANGES IN CLASSIFICATION OF MANDIBLE SHAPES

We classified and illustrated mandible shapes in 1964. Drawings of only newly recognized shapes are described hereinafter and shown here, in Fig. 31.

Group I

a. Genera: add *Bothroponera* group I, *Heteroponera*, and *Mesoponera*, *Euponera*, *Hypoponera*.

b. Change name from myrmeciiform to paraponeriform. Genera: delete *Myrmecia*.

c. Genera: add *Bothroponera* group II.

Group II

c. Change name from stenomyrmeciform to cryptoponiform. Genera: add *Cryptopone*.

Add new: e. Myopiasiform (Fig. 31, IIe). Rather narrow; blade without teeth; apical tooth blunt and curved medially and posteriorly. Genus: *Myopias*.

Group III

a. Genera: add *Discothyrea*.

b. Genera: add *Ophthalmopone*.

Add new: d. Brachyponeriform (Fig. 31, IIId). Falcate, with moderately stout base; apical tooth long; 2 small subapical teeth. Genus: *Brachyponera*.

Add new: e. Apomyrmiform (Fig. 31, IIIe). Distal ⅔ narrow; base abruptly widened laterally; apical and subapical teeth rather short. Genus: *Apomyrma*.

APPENDIX C. CHANGES IN NAMES OF GENERALIZED TUBERCLE SHAPES

We classified and illustrated tubercle shapes in 1964. Illustrations of only newly recognized shapes are shown here in Fig. 32.

I. Subcone (completely revised)

Subconical, varying from very slender (spire-like

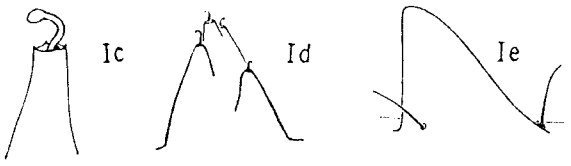

FIG. 32.—Generalized tubercle shapes. I, Subcone. c, frustum with an apical hair; d, multiple subcones; e, skewed subcone.

or digitiform) to stout; with or without a few lateral hairs; apex with or without 1–3 sensilla or hairs.

a. Slender (i.e., spire-like or digitiform) (1964, Fig. 19, Ia). Genera: *Belonopelta, Bothroponera pilicentris, Cryptopone, Hypoponera, Mesoponera australis, M. caffraria, M. melanaria, M. wroughtoni, Myopias, Neoponera, Odontoponera, Ophthalmopone, Ponera,* and *Trapeziopelta.*

b. Stout (1964, Fig. 19, Ib). Genera: *Bothroponera denticulata, B. sjostedti, B. sublaevis, Brachyponera, Leptogenys iheringi, Mesoponera constricta, M. gilberti,* and *Odontoponera.*

c. Frustum with an apical hair (which is sometimes capitate) (Fig. 32, Ic). Genus: *Bothroponera mayri.*

d. Multiple subcones, each with an apical sensillum or minute hair (Fig. 32, Id). Genus: *B. mayri.*

e. Skewed subcone, with 1 or more basal hairs (Fig. 32, Ie). Genus: *Myopias.*

II. Spine

Genera: add *Euponera.*

III–VII. (See 1964: p. 460 and Fig. 19.)

VIII. Doorknob

Genera (revised) (1964: Fig. 19, VIII): *Belonopelta, Brachyponera lutea, Cryptopone, Hypoponera, Myopias,* and *Ponera.*

IX. Discoid

Genera: add *Brachyponera sennaarensis.*

Revised Key to the Genera of Mature Worker Larvae of Ponerinae in our Collection[5]

Group A

1. Body without tubercles ..... a
2. Body beset with tubercles ..... d
   - a_1. Body paraponeriform (Fig. 30, A1) ..... b
   - a_2. Body ectatommiform (Fig. 30, A2) c
   - a_3. Body pachycondyliform (Fig. 17, B3) ..... *Stigmatomma*
   - b_1. Mandibles ectatommiform (Fig. 18, Ia) ..... *Heteroponera*
   - b_2. Mandibles paraponeriform (Fig. 18, Ib) ..... *Paraponera*
   - c_1. Mandibles ectatommiform, with uniformly short spinules; body hairs lash-like, with denticulate base ..... *Ectatomma*
   - c_2. Mandibles ectatommiform, with both long and short spinules; body hairs of more than 1 type, some branched ..... *Gnamptogenys*
   - c_3. Mandibles rhytidoponeriform (Fig. 18, Ii) ..... *Rhytidoponera*
   - c_4. Mandibles amblyoponiform (Fig. 18, IIIc) ..... *Amblyopone*
   - d_1. Profile paraponeriform (Fig. 30, A1) ..... e
   - d_2. Profile pachycondyliform (Fig. 17, B3) ..... f
   - e_1. Typical tubercle a slender subcone with hairs on its sides ..... *Neoponera*
   - e_2. Tubercles various but not as above ..... *Bothroponera* groups I, II
   - f_1. With 2 or 4 glabrous discoids (Fig. 19, IX) on the dorsum ..... *Odontomachus*
   - f_2. With 2 unpaired doorknobs (Fig. 19, VIII) on the dorsum ..... *Myopias*
   - f_3. With neither glabrous discoids nor doorknobs on the dorsum ..... g
   - g_1. Typical tubercle spinelike (Fig. 19, II) ..... h
   - g_2. Typical tubercle not spinelike ..... j
   - h_1. Tubercles extremely numerous (300+) i
   - h_2. Tubercles only moderately numerous (96); mandibles ectatommiform (Fig. 18, Ia) ..... *Euponera*
   - i_1. Mandibles centromyrmeciform (Fig. 18, Ih) ..... *Centromyrmex*
   - i_2. Mandibles psalidomyrmeciform (Fig. 18, Ie) ..... *Psalidomyrmex*
   - j_1. Mandibles dinoponeriform (Fib. 18, IVb); typical tubercle conoid (Fig. 19, III) ..... *Dinoponera*
   - j_2. Mandibles diacammiform (Fig. 18, IIb), the bases spinulose ..... *Diacamma*
   - j_3. Mandible trapeziopeltiform (Fig. 18, IVc); typical tubercle a stout subcone (Fig. 19, Ib) ..... *Trapeziopelta*
   - j_4. Mandibles megaponeriform (Fig. 18, IIIb); typical tubercle a spirelike subcone ..... *Ophthalmopone*
   - j_5. Mandibles ~~cryptoponiform~~ (Fig. 18, Ic) ... k
   - j_6. Mandibles ectatommiform (Fig. 18, Ia) .. l
   - k_1. Tubercles subconical, both spirelike (Fig. 19, Ia) and stout (Fig. 19, Ib) ... *Odontoponera*
   - k_2. Tubercles all stout subcones (Fig. 19, Ib) ..... *Bothroponera* group II
   - l_1. Tubercles stout subcones (Fig. 19, Ib) ..... *Mesoponera*
   - l_2. Tubercles conoids (Fig. 19, III) .. *Pachycondyla*

Group B

1. Profile prionopeltiform ..... *Prionopelta*

Group C

1. Body without tubercles ..... *Apomyrma*
2. Body beset with tubercles ..... a
   - a_1. With a single glabrous discoid on the dorsum (Fig. 19, IX) *Brachyponera sennaarensis*
   - a_2. With a single doorknob on the dorsum (Fig. 19, VIII) ..... *B. lutea*
   - a_3. With 2 pairs of doorknobs on the dorsum (Fig. 19, VIII) ..... *Hypoponera*
   - a_4. With 5 pairs of doorknobs on the dorsum (Fig. 19, VIII) ..... *Cryptopone*
   - a_5. With 3 or 4 pairs of doorknobs on the dorsum (Fig. 19, VIII) mandibles ectatommiform (Fig. 18, Ia) ..... b
   - b_1. Head and body hairless; cranium subcordate; no spinules on mandibles ..... *Belonopelta*
   - b_2. Body hairs few; head hairs moderately numerous; cranium suboctagonal; basal half of mandible sparsely spinulose ..... *Ponera*

Group D

1. Profile platythyreiform; mandibles platythyreiform (Fig. 18, IId) ..... *Platythyrea*
2. Profile proceratiiform; mandibles proceratiiform (Fig. 18, IIIa) ..... a

[5] To use this key it is necessary to refer to our 1964 paper; references to Fig. 30, 31, and 32 refer to figures in the present paper and to Fig. 17, 18, and 19 of the 1964 paper. Characterizations of groups are in Appendices A–C, 1964 and emended in Appendices A–C in the present paper.

a_1. Body surface thickly beset with large hemispherical bosses ..... *Proceratium*
a_2. Body surface without bosses or with only 1 pair on the prothorax ..... *Discothyrea*

Group E

1. Mandibles typhlomyrmeciform (Fig. 18, Id) .... *Typhlomyrmex*
2. Mandibles onychomyrmeciform (Fig. 18, IVa) .. .. *Onychomyrmex*

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