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SUPPLEMENTARY STUDIES ON  
ANT LARVAE: MYRMICINAE

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SUPPLEMENTARY STUDIES ON  
ANT LARVAE: MYRMICINAE

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In the long interval between the closing of the manuscript in 1973 and the publication in 1976 of our "Ant Larvae: Review and Synthesis," other myrmecologists have added 41 species to our collection. These species are in 32 genera, 11 of which had not been represented previously. This paper reports on the study of our new Myrmicinae.

TRIBE MYRMICINI

Genus *HYLOMYRMA* Forel

Profile pogonomyrmeoid. Spiracles small, those on T2 and AI larger. Body hairs sparse, short to long. Of 2 types: (1) with single shaft bearing minute denticles; (2) few, long, with flexuous shaft and fan-shaped tip, about 4 on each somite T2-AV. Antennae very small. Labrum small and trilobed. Mandibles ectatommoid, medial blade with 2 teeth and with a few denticles on anterior and posterior surfaces.

In our 1976 key, this genus would be under Profile 1. Pogonomyrmeoid, and would require a new rubric: —

14f. Four hairs each on dorsum of T2, T3, AI-AV, long and flexuous, with fan-shaped tip ..... *Hylomyrma* in Myrmicini

The index of specialization is 15.

***Hylomyrma reitteri* (Mayr)**

Fig. 1. Length (through spiracles) about 3.8 mm. Profile pogonomyrmeoid; head large; wing and leg vestiges feeble. About 10 differentiated somites. Spiracles small, those on T2 and AI larger. Integument on entire venter and on dorsal surface of posterior somites spinulose, the spinules in arcuate rows, the rows and spinules longer ventrally. Body hairs rather sparse, short to long. Of 2 types: (1) 0.038-0.288 mm long, with single shaft, which has numerous minute denticles on apical portion, on all surfaces of all somites; (2) about 0.375 mm long, with flexuous shaft and a

(581)

fan-shaped tip, about 4 on each somite T2, T3, AI-AV. Head subhexagonal, slightly broader than long. Antennae very small, with 3 sensilla, each bearing a rather long spinule. Head hairs few (about 30), 0.075-0.15 mm long, with single denticulate shaft. Labrum small (head width  $2.3 \times$  labrum width); trilobed, each lateral lobe with 4 minute hairs and/or spinulose sensilla on anterior surface near ventral border; ventral border with rather long spinules laterally and 2 contiguous sensilla medially; posterior surface with minute spinules in short arcuate rows. Mandibles ectatommoid, blade with 2 teeth and with a few denticles on anterior and posterior surfaces. Maxillae with apex spinulose and narrowly rounded, lateral surfaces bulging slightly; palp a skewed peg with 5 (2 apical with a spinule each, 2 subapical and encapsulated, 1 lateral with a spinule) sensilla; galea of same height and slightly more slender than palp, with 2 apical sensilla, each bearing a spinule. Labium with numerous short arcuate rows of rather coarse spinules and with a dorsal transverse welt; palp a short knob with 5 (2 encapsulated and 3 bearing a spinule each) sensilla; opening of sericteries a transverse slit in the bottom of a depression. Hypopharynx with a few minute spinules in a few transverse rows. (Material studied: 2 larvae from Brazil, courtesy of Dr. W. L. Brown.)

**Hylomyrma versuta** Kempf (= *H. columbica*)

Kempf (1973: 227, 230) quoted Wheeler and Wheeler 1969.

Genus MANICA Jurine

**Manica** sp.

Length (through spiracles) about 7.5 mm. Similar to *Manica mutica* (1960: 5) except as follows. Body hairs more numerous: (1) 0.025-0.25 mm long, stout, with numerous apical denticles (apex may be flattened and with lateral denticles); grading into (2) 0.175-0.25 mm long, slender with tip flexuous. Integument with spinules on dorsal surface of posterior somites as well as venter of anterior somites. Mandibles with blade extending onto apical tooth; apical tooth slightly stouter; anterior surface with spinules. Maxillary palp with 2 apical sensilla with a spinule each, 2 subapical and encapsulated and 3 or 4 lateral with a spinule each. (Material studied: 1 worker larva and 2 male semipupae from Japan, courtesy of Dr. K. Onoyama.)

TRIBE PHEIDOLINI

Genus ADLERZIA Forel

Profile myrmecoid but straighter. Body hairs sparse, with single shaft, which has minute denticles on apical half. Antennae small. Head hairs few and moderately long. Labrum short, broad and trilobed. Mandibles

pogonomyrmecoid, strongly curved; with 1 subapical tooth; anterior surface with spinules on middle half.

In our 1976 key this genus would be under Profile 5. Myrmecoid, and would run to rubric 1b; it can be distinguished from *Myopopone* by the presence of denticles on the mandibles of *Adlerzia*.

The index of specialization is 14.

### ***Adlerzia froggatti* Forel**

Fig. 6. Length (through spiracles) about 2.8 mm. Profile myrmecoid but straighter; gonopod vestiges on AVIII-AIX; with 13 feebly differentiated somites. Spiracles decreasing slightly posteriorly. Integument on venter of thorax and dorsum of posterior somites with minute spinules, isolated or in short rows. Body hairs 0.025-0.113 mm long, sparse, with single shaft, which has minute denticles on apical half. Cranium subcircular, slightly broader than long. Antennae small, with 3 sensilla, each with a spinule. Head hairs few and moderately long (0.025-0.06 mm); tip with a few minute denticles. Labrum short and broad; trilobed; each lateral lobe with 4 minute hairs and/or spinulose sensilla on anterior surface; with 2 contiguous sensilla on ventral border and minute spinules in short rows laterally; posterior surface of each lobe with 1 or 2 isolated and 2 contiguous sensilla; entire posterior surface with numerous spinules in short arcuate rows forming a reticulate pattern. Mandibles pogonomyrmecoid; strongly curved, with 1 subapical tooth; anterior surface with spinules isolated or in short rows on middle half. Maxillae lobose; palp a skewed peg with 5 (2 apical with a spinule each, 2 subapical and encapsulated and 1 lateral and bearing a prominent curved spinule) sensilla; galea a frustum with 2 apical sensilla bearing a spinule each. Labium with minute spinules in numerous arcuate rows, the rows grouped into longer curved rows dorsally and medially; palp a low irregular knob with 5 apical sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. Hypopharynx with numerous short rows of minute spinules, the rows arranged in longer subparallel rows. (Material studied: 7 larvae from New South Wales, coll. E. S. Ross and D. Q. Cavagnaro, courtesy of Dr. W. L. Brown.)

## Genus APHAENOGASTER Mayr

### Subgenus ATTOMYRMA Emery

REVISION: Posterior surface of labrum with numerous heavily sclerotized ridges dorsally. Entire hypopharynx with minute spinules in short arcuate rows forming an anastomosing pattern.

**Aphaenogaster sp.**

Length (through spiracles) about 4.9 mm. Similar to *A. (Attomyrma) rudis* (1953: 56-57) except as follows: Integument of venter of thorax and AI, dorsum of AIX and all surfaces of AX spinulose, the spinules minute and in short transverse rows. Body hairs sparse. Of two types: (1) 0.088-0.15 mm long, deeply bifid (rarely trifid), on dorsum of thorax and on all surfaces of all other somites except AX; (2) 0.05-0.1 mm long, with stout base and dilated, frayed tip, on all surfaces of T1 and AX, reduced ventrally to a few on AI, AVIII and AIX. Head with frons bulging. Antennae small and high on head. Head hairs stout, 0.03-0.65 mm long and similar to type 2 body hairs. Labrum with 6 minute hairs and/or spinulose sensilla, with short spinules on and near ventral border; ventral border of each lobe with a cluster of 2 or 3 sensilla and with minute spinules medially. Mandibles with teeth longer and more slender and with several small denticles at base of subapical tooth on anterior and posterior surfaces, medio-basal portion with longer and more numerous spinules. Hypopharynx with minute spinules in short arcuate rows forming anastomosing pattern over entire surface. (Material studied: one larva from Iriomote Island, Ryukyu Islands, courtesy of Dr. K. Onoyama.)

**Subgenus DEROMYRMA Forel****Aphaenogaster (Deromyrma) swammerdami Forel**

Length (through spiracles) about 7.6 mm. Similar to *A. (D.) inermis* (1953: 63) except as follows: Integument of venter of all somites and dorsum of posterior somites with minute spinules in short transverse rows, the rows widely spaced. Type 1 body hairs 0.1-0.35 mm long, simple, with attenuated flexuous tip. Cranium with cheeks more bulging at antennal level. Antennae smaller and farther apart. Mandibles pogonomymecoid, with medial basal spinules shorter and less numerous. Labial palp a skewed knob with 4 apical and 1 lateral sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. Hypopharynx densely spinulose, the spinules minute and in numerous subparallel rows. (Material studied: 4 larvae from Madagascar, courtesy of Dr. W. L. Brown.)

**Genus PHEIDOLE Westwood****Pheidole pallidula Nylander**

Passera (1973: 305-306). Descriptions of three instars. In the third instar certain larvae receive insect fragments; they grow considerably faster and develop into soldiers without undergoing another molt.

Passera (1974) stated that three larval stages are distinguishable by hairs, mandibles and size of spiracles; illustrated on p. 75 and 77. The differentiation of soldiers begins in the third stage and is favored by a diet of insect fragments and a temperature above 24°C.

### TRIBE CARDIOCONDYLINI

#### Genus CARDIOCONDYLA Emery

#### **Cardiocondyla emeryi** Forel

Creighton and Snelling (1974: 84): life cycle — egg 12 days, larva 27 days, pupa 16 days.

### TRIBE SOLENOPSISIDINI

#### Genus LIOMYRMEX Forel

REVISION: Profile pogonomymecoid. Body hairs moderately numerous. Of 3 types: (1) very short, with tip denticulate, uniformly distributed; (2) long, denticulate on apical half, a few anteriorly; (3) long, feebly anchor-tipped, arranged in a band across dorsum of some somites. Head hairs short, with denticulate tip. Labrum semicircular. Mandibles ectatommoid, slender, subapical blade highly varied; medial denticles long, sharp and slender.

#### **Liomyrmex** sp.

Fig. 3. Length (through spiracles) about 3.7 mm. Profile pogonomymecoid. Similar to *Liomyrmex aurianus* (1955: 128) but neck more slender anteriorly. Integument of ventral surface of anterior somites with minute spinules in numerous short transverse rows. Body hairs: (1) 0.025-0.05 mm long, with single shaft, minute denticles apically, most numerous; grading into (2) 0.125-0.2 mm long, a few in a ring around the middle of each somite, more numerous anteriorly; (3) about 0.19 mm long, anchor-tipped, a few on some somites [too many hairs broken to be certain of number and locations of long hairs]. Cranium subrectangular; frons bulging. Head hairs longer (0.025-0.05 mm long) with slender shaft and frayed tip. Mandibles with apex turned posteriorly; subapical blade highly varied; medial denticles near base long and slender. Maxillary palp a skewed peg with 5 (2 apical, 2 subapical and 1 lateral) sensilla. Labial palp represented by a cluster of 5 sensilla. Hypopharynx densely spinulose, with spinules slender and in arcuate rows. (Material studied: numerous larvae from Dumaguete, Philippines, courtesy of Dr. W. L. Brown.)

Genus **MONOMORIUM** Mayr**Monomorium minimum** (Buckley)

Hutchins (1967: 12): photographs of worker and sexual larvae.

**Monomorium pharaonis** (Linnaeus)

Wüst (1973) found that in trophallaxis the liquids given by the larvae are actually food (amino acids and proteins) and that larvae are necessary for the well-being of the colony.

Genus **OXYEPOECUS** Santschi

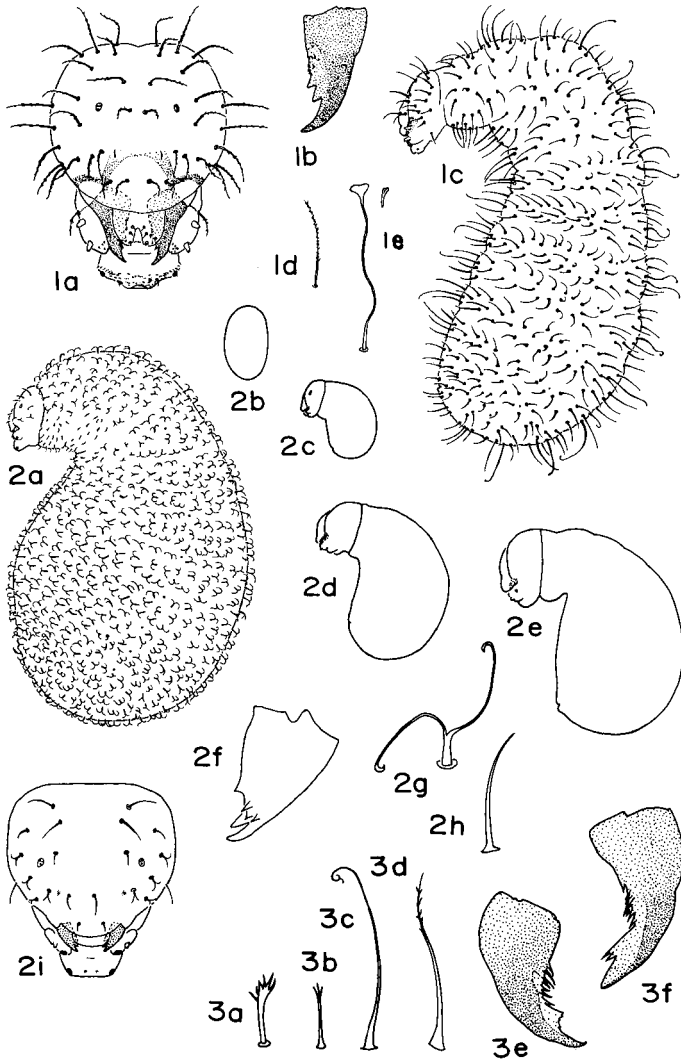
REVISION: Profile pheidoloid. Body hairs sparse, of 1 or 2 types: (1) with feebly uncinatate or short-branched tip; (2) spike-like or slightly curved, simple, with denticles near tip. Mandibles ectatommoid.

**Oxyepoecus punctifrons** (Borgmeier)

Fig. 7. IMMATURE (?). Length (through spiracles) about 2.6 mm. Profile pheidoloid, with short neck formed by T1 and T2; abdomen sub-cylindrical. Anus posteroventral. Integument on all surfaces of AX, venter of anterior somites and dorsum of posterior somites with minute spinules in short transverse rows. Body hairs sparse. Of 2 types: (1) 0.075-0.1 mm long, on dorsal and lateral surfaces, with feeble uncinatate or short-branched tip; (2) 0.013-0.05 mm long, on ventral surface, spike-like or slightly curved, simple or with denticles near tip. Cranium moderately large; suboctagonal, slightly longer than broad. Each antenna a slight elevation with 3 sensilla, each bearing a minute spinule. Head hairs few [only hair bases present]. Labrum small, bilobed; anterior surface of each lobe with 7 minute hairs and/or spinulose sensilla on and near ventral border; entire posterior surface sparsely spinulose, the spinules few and isolated; with 4 sensilla. Mandibles ectatommoid; teeth all moderately large: 1 apical, 1 subapical and anterior, the third medial. Maxillae with apex paraboloidal and bearing minute spinules in short arcuate rows; palp a skewed peg with 5 (3 apical and 2 subapical) sensilla; galea digitiform with 2 apical sensilla, each with a tall spinule. Labium with sparse minute spinules in short arcuate rows; bearing a dorsal transverse welt with a few minute spinules; palp a low knob with 5 (4 apical and 1 subapical) sensilla;

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FIGS. 1-3: Fig. 1. *Hylomyrma reitteri*. a, Head in anterior view,  $\times 81$ ; b, left mandible in anterior view,  $\times 145$ ; c, larva in side view,  $\times 26$ ; d and e, two types of body hairs,  $\times 71$ . Fig. 2. *Paedalgus* sp. a, Larva in side view,  $\times 5$ ; b, egg,  $\times 5$ ; c, first instar larva,  $\times 5$ ; d, second instar larva,  $\times 5$ ; e, third instar larva,  $\times 5$ ; f, left mandible in anterior view,  $\times 572$ ; g



and h, two types of body hairs,  $\times 672$ ; i, head in anterior view,  $\times 141$ .  
 Fig. 3. *Liomyrmex* sp. a-d, Three types of body hairs,  $\times 267$ ; e, right mandible in anterior view,  $\times 267$ ; f, left mandible in anterior view (from same larva as e),  $\times 267$ .



an isolated sensillum between each palp and the opening of the sericteries; the latter a transverse welt in a depression. (Material studied: TYPE SERIES: 10 larvae from Rio Negro, Paraná, Brazil, Borgmeier #424, courtesy of Dr. W. L. Brown.)

### Genus SOLENOPSIS Westwood

#### **Solenopsis invicta** Buren

Length (through spiracles) about 3 mm. Similar to *Solenopsis geminata* (1955: 132) except as follows. Integument with minute spinules on dorsal surface of posterior somites as well as ventral surface of anterior somites. Body hairs: (1) 0.063-0.113 mm long, with short denticulate tip; (2) 0.063-0.088 mm long, branches long and stout, with tips recurved and blunt in surface view. Integument of head with minute spinules. Each antenna with 2 or 3 sensilla. Labrum smaller; anterior surface with 2 hairs about 0.013 mm long on each half; ventral border with about 6 sensilla on each half. Maxillae with a sclerotized band between cardo and stipes. Labium with small lateral sclerotized bands. (Material studied: numerous larvae from Pelham, Shelby County, Alabama, coll. D. P. Wojcik and W. A. Banks, courtesy of Dr. D. P. Wojcik.)

O'Neal & Markin (1973); "Queen and adult workers are very maternal in care and grooming of eggs, larvae and pupae. The only food source for first and early second instar larvae are eggs and liquid regurgitated food provided to late stadium, second, third and fourth instar larvae by a new founding queen. Brood is maintained in separate piles by either the queen or by the workers according to the age of the larvae. Molting larvae, excluding the first instar larvae, are assisted by the nurse workers. Time varies for each instar ecdysis. Workers assist in the removal of the meconium, which is never consumed." (p. 295.) Cast-off larval integuments, infrabuccal pellets of workers and insect fragments constitute a large percentage of the food of older larvae (p. 298). Trophallaxis is discussed on pages 298 to 300. "Workers solicit saliva [sic] from larvae by carressing [sic] the head and mouth parts of the larvae with the antennae. . . . Fire ant workers also will solicit a [sic] milky liquid anal excreta from the larva. . . . The excreta is [sic] one of the favorite foods of the workers. . . . All instar larvae also produce a [sic] clear watery liquid excreta which never is solicited by the workers. . . . It is deposited on the substrate." (P. 299.)

O'Neal & Markin (1975) described the four instars of minim, minor, major and sexual larvae. Crude and inaccurate sketches of the four instars of the minim purport to show how to distinguish them.

### **Solenopsis richteri** Forel

Length (through spiracles) about 3.3 mm. Very similar to *Solenopsis geminata* (1955: 132) except as follows. Integument with spinules on dorsal surface of posterior somites as well as venter of anterior somites. Body hairs: (1) slightly curved with denticulate tip; (2) 0.075-0.15 mm long. Integument of cranium with very fine rugae. Each antenna with 3 (rarely 2) sensilla. Head hairs: (1) with denticulate tip; (2) 0.035-0.063 mm long, bifid, with recurved tips. Labrum small; each half with 2 or 3 hairs about 0.013 mm long and with 3 sensilla on ventral border. Maxillae with palp and galea approximately equal. (Material studied: numerous larvae from Carbon Hill, Walker County, Alabama, coll. D. P. Wojcik and W. A. Banks, courtesy of Dr. D. P. Wojcik.)

### Genus VOLLENHOVIA Mayr

REVISION. Profile pheidoloid, with AII to AIV or AV protuberant ventrally. Head hairs very few. Antennae small. Mandibles ectatommoid, with a few denticles. Dorsum of hypopharynx with 2 sets of curved longitudinal ridges; with minute spinules in transverse rows ventrally. Four anchor-tipped hairs in a row across the dorsum of each T3 and AI to AV or AVI.

In our 1976 key this genus would be in Profile 2. Pheidoloid, and would run to 9a.

### **Vollenhovia** sp.

Fig. 8. Length (through spiracles) about 3.5 mm. Profile pheidoloid. Very similar to *Vollenhovia* sp. (1955: 120) except as follows. Ventral protuberance on AII more pronounced. Anus ventral. Body hairs sparse. Of 2 types: (1) 0.038-0.188 mm long, on all surfaces of all somites, with long straight shaft and very short-bifid tip; (2) about 0.25 mm long, with flexuous shaft and anchor-tip, 4 in a row across the dorsum of each T3 and AI-AVI. Antennae with rather long spinules on sensilla. Head hairs 0.013-0.148 mm long. Labium with 5 minute hairs and/or sensilla on each half; ventral border with minute spinules in short arcuate rows. Mandibles with denticles on basal tooth and on anterior, medial and posterior surfaces near base of subapical tooth. Maxillae small, appearing adnate (no distinct apex); palp a short peg with 5 (2 encapsulated and 3 with a spinule each) apical sensilla. Labium small; with sclerotized band on each

lateral surface. (Material studied: numerous larvae from India; Kerala State (W. Ghats) Peria, 900 m, Reserve Cannanore District, 4-5 April 1969, coll. A. B. Soans and W. L. Brown, courtesy of Dr. W. L. Brown.)

### **Vollenhovia** sp.

Length (through spiracles) about 2.8 mm. Similar to *Vollenhovia* sp. above, except as follows. Slight projections on venter of AII-AV. Anus posteroventral. Anterior end more swollen; posterior end narrower. Segmentation less distinct. Spiracles small, diminishing posteriorly. Integument of all surfaces of AX also spinulose. Body hairs: (1) 0.013-0.1 mm long; (2) about 0.21 mm, on T3 and AI-AV only, 4 per somite. Cranium broader dorsally, with cheeks straighter. Labrum smaller, feebly bilobed; anterior surface of each lobe with a minute (about 0.003 mm long) hair; ventral border with 3 sensilla on each half; posterior surface with 2 or 3 contiguous and 2 isolated sensilla. Mandibles with very few spinules, on medial surface only. (Material studied: 7 larvae from Ishigki Island, Ryukyu Islands, courtesy of Dr. K. Onoyama.)

## TRIBE PHEIDOLOGETINI

### Genus PAEDALGUS Forel

**REVISION:** Profile paedalgoid (i.e., abdomen subspherical; thorax forming a very stout neck, which is arched ventrally; anus ventral and quite far forward). Body hairs sparse and short, moderately numerous. Of 2 types: (1) deeply bifid, with branches curling away from each other; (2) few, simple or with tip bifid. Head hairs few and short, simple or deeply bifid. Labrum small and short, subrectangular or crescentic. Mandibles pheidoloid.

In our 1976 key this genus requires a new profile (13) and would be at the end; it contains only the one genus.

The index of specialization of the genus should be increased from 23 to 25.

### **Paedalgus** sp.

Fig. 2. Length (through spiracles) about 2.3 mm. Profile paedalgoid. Anus with a posterior lip. Spiracles minute, T2 largest. Integument on venter of anterior somites with spinules in short transverse rows, most numerous and largest on T1. Body hairs sparse, short. Of two types: (1) 0.006-0.018 mm long, simple, most numerous on T1; (2) about 0.038 mm long, deeply bifid, on all somites. Cranium subhexagonal; slightly broader than long. Antennae at mid-length of head capsule; small, with 3 (rarely 2) sensilla each. Head hairs few, 0.013-0.025 mm long, mostly bifid, a few simple. Labrum small; feebly bilobed, nearly 4 times as broad as long;

anterior surface with 2 sensilla; ventral border with 8 sensilla; posterior surface with 8 sensilla. Mandibles small and stout, apparently pheidoloid. Maxillae appearing adnate; each palp a small knob with 4 sensilla; galea a smaller knob with 2 sensilla. Labium with a few minute spinules; palp represented by a cluster of 4 sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit.

*Very Young Larva:* Length (through spiracles) about 0.37 mm. Short and stout. Head larger than diameter of thorax. Body hairs sparse, 0.006-0.025 mm long, simple.

*Young Larva:* Length (through spiracles) about 0.68 mm. Body short and stout; head same diameter as prothorax. Body hairs sparse, short. Of 2 types: (1) about 0.013 mm long, simple; (2) about 0.025 mm long, deeply bifid.

Material studied: numerous larvae from Ivory Coast, courtesy of Dr. W. L. Brown.

### TRIBE MYRMECININI

The specialization index is reduced to 20.

#### Genus ACANTHOMYRMEX Emery

Profile pogonomyrmecoid. Body hairs sparse; medium to long. Of 3 types: (1) stout, with a few minute to long denticles; (2) simple, slender, flexuous, on ventral and ventrolateral surfaces; (3) long, anchor-tipped, with flexuous shaft, 4 in a row on dorsum of each AI-AVI. Cranium subovoidal, slightly longer than broad. Antennae minute. Head hairs few; with stout base and with fine denticles on apical half. Mandibles ectatomoid, with blade extending onto apical tooth; all teeth stout. Maxillae small; palp and galea digitiform and subequal in size.

In our 1976 key this genus would be under Profile 1. Pogonomyrmecoid, and would run to the rubric 10a. It can be distinguished from *Tetramorium* by its subovoidal cranium, which is longer than broad; in *Tetramorium* the cranium is subhexagonal and broader than long.

The specialization index is 18.

#### *Acanthomyrmex* sp.

Fig. 10. Length (through spiracles) about 3.6 mm. Profile pogonomyrmecoid; head moderately large; anus ventral, with small posterior lip. About 7 differentiated somites. Wing and leg vestiges present. Mesothoracic spiracle slightly larger than remainder. Integument of venter of anterior somites with spinules in short transverse rows; spinules smaller and rows fewer posteriorly. Body hairs sparse, medium to long.

Of 3 types: (1) 0.05-0.25 mm long, stout, with a few minute to large denticles, on every somite, stoutest around anus; (2) 0.13-0.175 mm long, simple, slender, flexuous, on ventral and ventrolateral surfaces; (3) about 0.325 mm long, anchor-tipped, with flexuous shaft, 4 in a row across the dorsum of each AI-AVI. Cranium subovoidal, slightly longer than broad. Antennae minute, with 3 small sensilla, each bearing a spinule. Head hairs few, with stout base and with fine denticles on apical half. Labrum feebly bilobed; each half of anterior surface with 5 minute hairs and/or spinulose sensilla and with numerous spinules (isolated or in short rows); ventral border with numerous spinules and 2 projecting sensilla; entire posterior surface with rather large isolated spinules, some in short rows on each ventrolateral area, 6 sensilla on each half. Mandibles ectatommoid, with blade extending onto apical tooth; all teeth stout. Maxillae small, appearing adnate, apex blunt, integument around galea with a few rather large isolated spinules; palp and galea equal in height and diameter; palp digitiform with 5 (2 apical, 2 subapical and 1 lateral) sensilla, each bearing a spinule; galea digitiform, with 2 apical sensilla with a spinule each. Labium with medial portion projecting ventrally; densely spinulose, with spinules minute and in short transverse rows; palp a short skewed knob with 5 (2 apical and with a spinule each, 2 subapical and encapsulated, 1 lateral and with a spinule) sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. Hypopharynx with a few minute spinules in transverse rows. (Material studied: 1 larva from Borneo, 17-46 km W Batulitjin, 28-VI-2-VII-1972, W. L. Brown, B-117, courtesy of Dr. W. L. Brown.)

### Genus LORDOMYRMA Emery

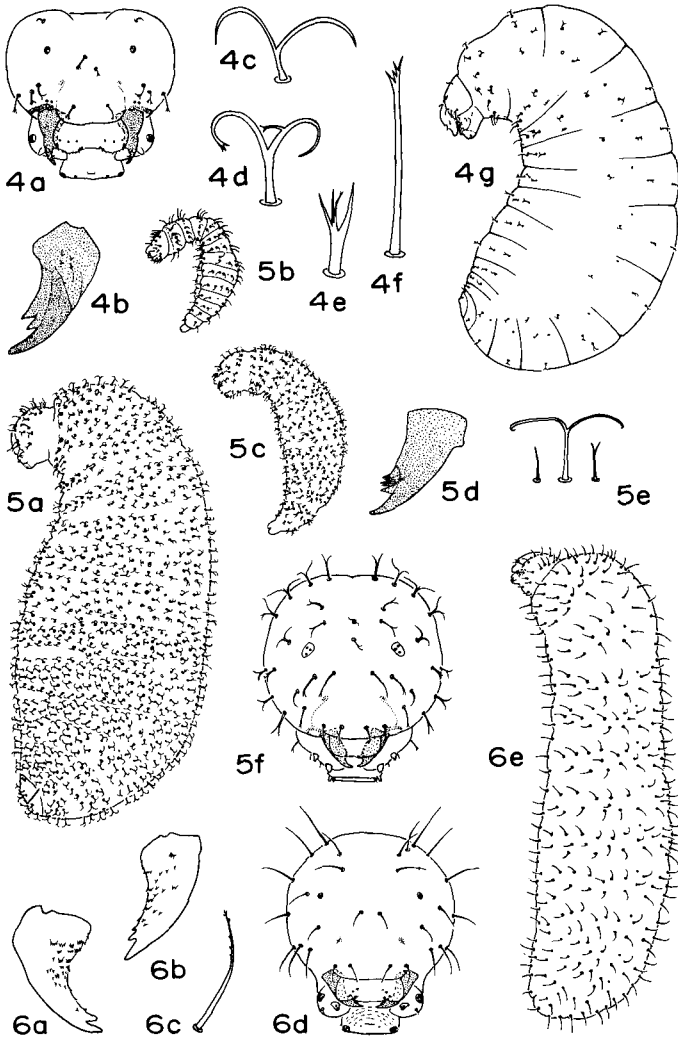
Profile pogonomymecoid, stout. Body hairs very few; short. Shape of hairs varied: unbranched with tip frayed, or bifid with long recurved branches, the branches simple, branched or frayed at the tip. Cranium transversely subelliptical, lateral areas swollen. Antennae small. Head hairs very few, short, stout, with frayed tip. Mandibles ectatommoid.

In our 1976 key this genus would be under Profile 1. Pogonomymecoid, and would run to a new rubric "14 g. Body hairs of two types: (1) bifid to multifid, with short, straight-branched tip and (2) deeply bifid, branches curled."

The index of specialization is 16.

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FIGS. 4-6: Fig. 4. *Lordomyrma* sp. a, Head in anterior view,  $\times 109$ ; b, left mandible in anterior view,  $\times 267$ ; c-f, sample of body hair shapes,  $\times 529$ ; g, larva in side view,  $\times 33$ . Fig. 5. *Ochetomyrmex* sp. a, Larva in side view,  $\times 35$ ; b, very young larva in side view,  $\times 35$ ; c, young larva



in side view,  $\times 35$ ; d, left mandible in anterior view,  $\times 339$ ; e, three types of body hairs,  $\times 185$ ; f, head in anterior view,  $\times 121$ . Fig. 6. *Adlerzia froggatti*. a and b, right and left mandibles in anterior view (from same larva),  $\times 290$ ; c, body hair,  $\times 529$ ; d, head in anterior view,  $\times 111$ ; e, larva in side view,  $\times 28$ .

**Lordomyrma sp.**

Fig. 4. Length (through spiracles) about 2.9 mm. Profile pogonomyrmeceid, plump; anus ventral, with posterior lip. Wing and leg vestiges present. Eight differentiated somites. Spiracles small, decreasing slightly posteriorly. Integument on venter of anterior somites with minute spinules in short transverse rows, smaller and less numerous posteriorly. Body hairs few (2-24 per somite, except none of AX), short. Shape of hairs varied, ranging from: (1) 0.025-0.075 mm long, with long bifid recurved branches, branches simple or branched, on dorsal and lateral surfaces; to (2) 0.03-0.057 mm long, with bifid or multifid short straight-branched tip, on ventral surface. Cranium transversely subelliptical but with bulging dorsolateral areas. Antennae small, each with 3 sensilla, each bearing a spinule. Head hairs few, short (0.013-0.025 mm long), stout, with frayed tip. Labrum feebly bilobed, lateral surfaces bulging; each half of anterior surface with 4 small sensilla; each half of ventral surface spinulose and with 2 contiguous sensilla medially; posterior surface with numerous heavily sclerotized longitudinal ridges dorsally, spinulose ventrally, the spinules large and isolated laterally, medially minute and in short transverse rows; with 3 contiguous sensilla near middle of each half. Mandibles ectatommoid, with blade bearing an anterior subapical tooth and a medial basal tooth. Maxillae with apex narrowly paraboloidal and bearing rather short rows of rather long spinules; palp a short knob with 5 apical sensilla; galea a short cylinder with 2 apical sensilla. Labium subtrapezoidal, narrowed dorsally; palp a short peg with 5 apical sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a transverse slit. Hypopharynx with minute spinules in arcuate rows, the rows frequently forming a reticulate pattern.

IMMATURE LARVA: Length (through spiracles) about 1.6 mm. Similar to mature larva except as follows: Neck more distinct; venter of abdomen flatter; head relatively much larger. Integument feebly spinulose. Body hairs shorter: (1) 0.008-0.063 mm long; (2) about 0.05 mm long. Head hairs shorter (0.008-0.025 mm long). Mandibles with sharper teeth.

Material studied: 3 larvae from the Celebes, courtesy of Dr. W. L. Brown.

**Genus MYRMECINA Curtis****Myrmecina americana Emery**

Fig. 12 is a photograph of living larvae taken by the senior author in 1920. It was intended for publication with our paper on the tribe Myrmecini (1954), but it got lost and was not found for half a century. It shows well the elongate head which characterizes *Myrmecina* and *Pristomyrmex*.

## TRIBE LEPTOTHORACINI

## Genus LEPTOTHORAX Mayr

**Leptothorax diversipilosus** M. R. Smith

Alpert and Akre (1973: 756): a crude photograph of a young larva and a semipupa.

## TRIBE OCHETOMYRMECINI

## Genus OCHETOMYRMEX Mayr

Profile pheidoloid but with the ends more slender. Body hairs moderately numerous, short. Of 3 types: (1) shaft stout, apex deeply bifid with branches curling in opposite directions; (2) short-bifid; (3) few, simple. Cranium subcircular. Head hairs few; short; simple or deeply bifid or with tip branched. Mandibles ochetomyrmecoid [i.e., with a large (about 1/3 total length) sharp-pointed apical tooth, with an anterior and a posterior subapical teeth, between which are numerous long, needle-like teeth].

In our 1976 key this genus would be under Profile 2. Pheidoloid, and would require a new rubric "1h. Mandibles ochetomyrmecoid."

The index of specialization is 18.

**Ochetomyrmex subpolitus** W. M. Wheeler

Fig. 5. Length (through spiracles) about 2.3 mm. Profile pheidoloid, but with anterior end more slender. Leg and gonopod vestiges present. Integument of AX with spinules in short transverse rows; venter of thorax and AI with rather coarse spinules in transverse rows, the rows fewer and spinules smaller laterally and posteriorly. Body hairs moderately abundant, short. Of 3 types: (1) 0.025-0.09 mm long, with stout shaft and deeply bifid (rarely trifid) apex, branches curling in opposite directions, on all somites except AX; (2) 0.009-0.028 mm long, with stiff short-bifid tip, on all surfaces of AX and on venter of T1-T3 and AI-AII, fewer posteriorly; (3) 0.012-0.024 mm long, simple, few, on venter of T1 and AX. Cranium subcircular but with occipital border feebly notched; slightly longer than wide. Each antenna a flat disc with 3 sensilla, each with a rather long spinule. Head hairs few, 0.025-0.038 mm long, simple or deeply bifid or with tip branched. Labrum subtrapezoidal, narrowed ventrally, with a slight midventral indentation; each lobe with 3 sensilla and a minute hair; lateral borders slightly rounded and with a few spinules; ventral surface spinulose, with 1 or 2 sensilla on each half; entire posterior surface with short rows of spinules, the rows arranged in longer rows concentric with edge of labrum. Mandibles ochetomyrmecoid. Maxillae appearing adnate; palp a



skewed peg with 5 (2 apical, 2 subapical and 1 lateral) sensilla; galea a stout cone with 2 apical sensilla. Labium short and wide, with numerous small spinules in short arcuate rows, the rows frequently forming a reticulate pattern; palp a skewed peg with 5 (2 apical and 3 lateral) sensilla; opening of sericteries wide and slightly salient. Hypopharynx spinulose, the spinules minute and in transverse subparallel rows.

**YOUNG LARVA:** Length (through spiracles) about 1.1 mm. Body crescentic, widest at AIV, decreasing rapidly to AX and less rapidly anteriorly; diameter of head greater than that of T1; T2 sharply narrowed; AX a small knob directed ventrally. Anus terminal. Diameter of spiracles decreasing slightly posteriorly. All surfaces of AX, venter of anterior somites and dorsum of posterior somites with rather large spinules, which are in short rows ventrally, isolated elsewhere. Body hairs: (1) about 0.019 mm long; (2) and (3) about 0.012 mm long. Head hairs 0.01-0.034 mm long. Antennae represented by a cluster of 3 sensilla, with a short stout spinule each. Labrum with about 7 sensilla on anterior surface on and near ventral border; ventral border thick and spinulose, the spinules minute and in transverse rows. Maxillary palp with 3 apical and 2 lateral sensilla. Opening of sericteries a transverse slit. Otherwise similar to mature larva.

**VERY YOUNG LARVA:** Length (through spiracles) about 0.73 mm. Dorsal profile C-shaped, venter of abdomen flat, lateral longitudinal welts well developed; head, thorax and posterior end turned ventrally; head and T1 of about same diameter, T2 and T3 narrowed; narrowest at AI, widest at AIV and AV, narrowing rapidly to posterior end. Spiracles all minute. Entire integument with large isolated spinules. Body hairs few, all simple, 0.012-0.05 mm long, longest with fine flexuous tip. Each antenna represented by a cluster of 3 sensilla, each bearing a tooth-shaped spinule. Labrum with 2 sensilla on anterior surface; ventral surface with about 7 sensilla; posterior surface with minute spinules. Mandibles with teeth small and sharp-pointed; a few minute spinules on medial surface. Maxillae with galea short, digitiform, with 2 apical sensilla. Labium minutely spinulose; palp a peg with 3 apical sensilla. Otherwise similar to young larva.

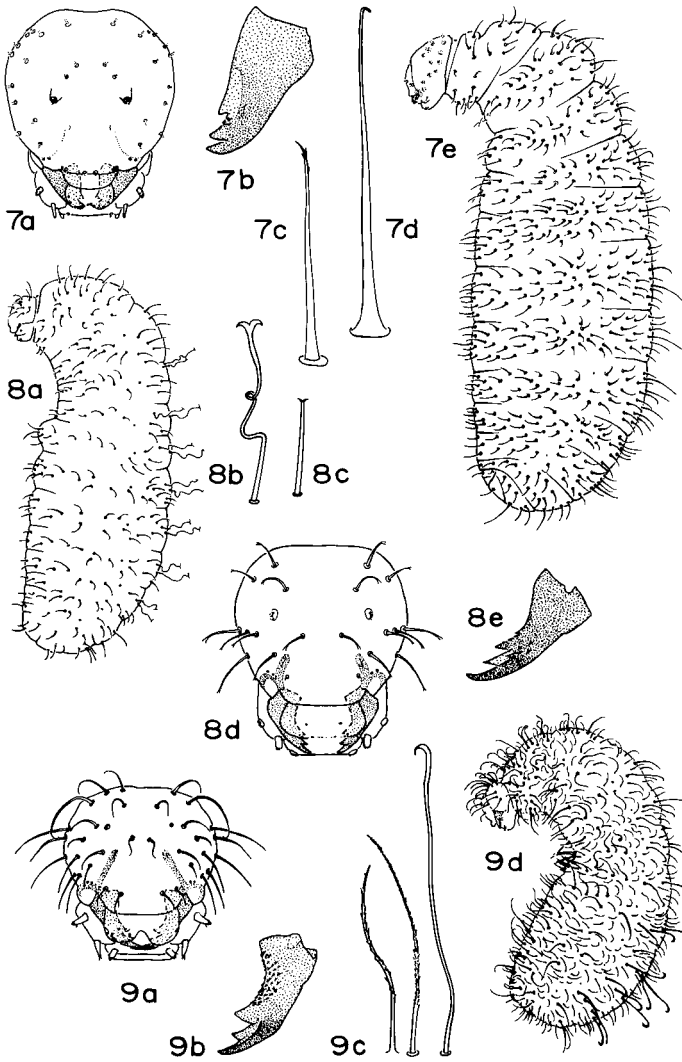
Material studied: Limoncocha, Prov. Napo, 00° 24' S 76° 36' W, 280 m, Ecuador, 15-VII-1972, Ruth Chad, #F-279; and 9-VIII-1973, #C2, Colony 595, Marian Rettenmeyer; numerous larvae, courtesy of Dr. W. W. Kempf.

### TRIBE BASICEROTINI

The index of specialization is reduced from 16 to 15.

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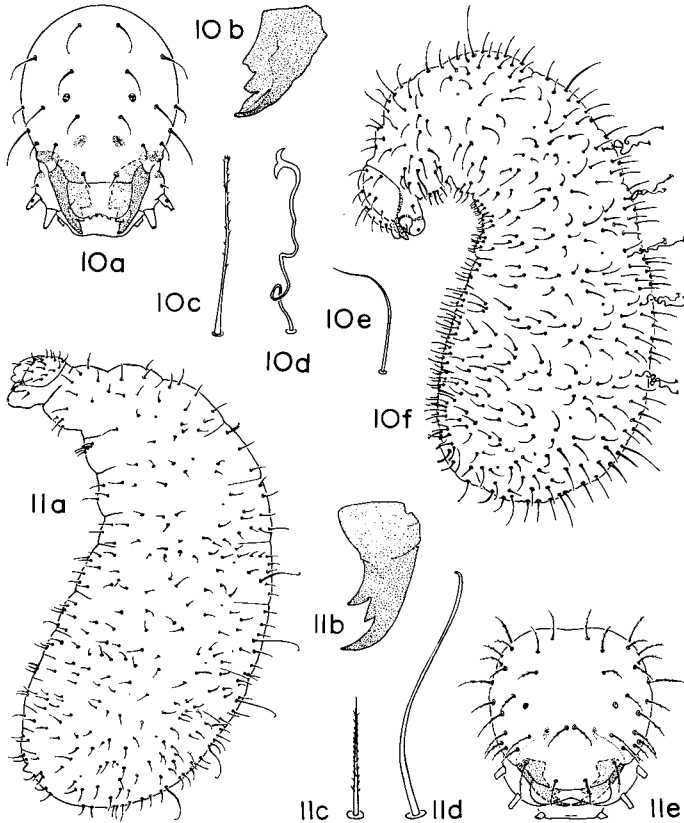
FIGS. 7-9: Fig. 7. *Oxyepoecus punctifrons*. a, Head in anterior view,  $\times 103$ ; b, left mandible in anterior view,  $\times 267$ ; c and d, two types of body hairs,  $\times 50$ ; e, larva in side view,  $\times 35$ . Fig. 8. *Vollenhovia* sp. (from India). a, Larva in side view,  $\times 21$ ; b and c two types of body hairs,



×133; d, head, in anterior view, ×95; e, left mandible in anterior view, ×185. Fig. 9. *Basiceros* sp. a, Head in anterior view, ×51; b, left mandible in anterior view, ×95; c, three body hair types, ×133; d, larva in side view, ×13.

Genus *BASICEROS* Schulz

REVISION: Profile aphaenogastroid. Body hairs moderately numerous, long. Of 3 types: (1) long, slender, with flexuous tip, apical portion denticulate; (2) long, stout, slightly curved, with numerous fine denticles, arranged in a band around the middle of each somite; (3) long, uncinete,



FIGS. 10-11: Fig. 10. *Acanthomyrmex* sp. a, Head in anterior view,  $\times 74$ ; b, left mandible in anterior view,  $\times 128$ ; c-e, three types of body hairs,  $\times 133$ ; f, larva in side view,  $\times 28$ . Fig. 11. *Octostruma inca*. a, Larva in side view,  $\times 35$ ; b, left mandible in anterior view,  $\times 290$ ; c and d, two types of body hairs,  $\times 267$ ; e, head in anterior view,  $\times 107$ .

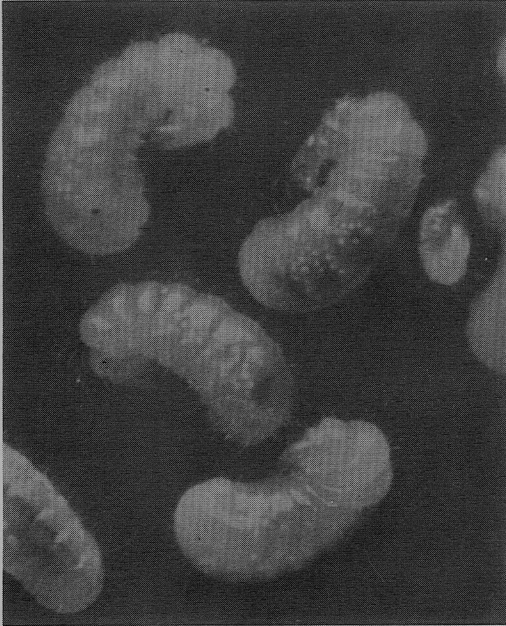


FIG. 12. Photograph of living *Myrmecina americana* larvae. Note the long head which characterizes this genus.

with or without denticles, 4 in a row across the dorsum of each AI-AVI. Antennae small. Head hairs few, short to long, stout, slightly curved, with numerous small denticles. Mandibles ectatomoid, slender, with large medial teeth, spinules on middle of anterior, medial and posterior surfaces.

### **Basiceros sp.**

Fig. 9. Length (through spiracles) about 4.9 mm. Profile aphaenogastroid; anus ventral, with a small posterior lip; leg and wing vestiges present; six feebly differentiated somites. Spiracles minute; T2 largest, remainder 1/2 its diameter. Integument of venter of thorax and AI-AIII with spinules in short transverse rows. Body hairs moderately numerous, short to long. Of 3 types: (1) 0.1-0.3 mm long, slender with flexuous tip bearing numerous fine denticles, on all somites; (2) 0.175-0.2 mm long, stout, slightly curved, with numerous fine denticles, arranged in a band around middle of each somite; (3) about 0.375 mm long, uncinat, with or without denticles on shaft, 4 in a row across dorsum of each AI-AVI.

Cranium feebly subcordate. Antennae small, each with 3 sensilla, each bearing a spinule. Head hairs few, 0.088-0.25 mm long, stout, slightly curved, with numerous small denticles. Labrum bilobed; each half with 6 minute hairs and/or spinulose sensilla on anterior surface; with 4 (2 contiguous) sensilla and numerous spinules in short rows on ventral surface; entire posterior surface spinulose; lateral 1/6 with coarse spinules, isolated or in short arcuate rows; middle 2/3 with numerous transverse subparallel rows of minute spinules; near ventral border of each lobe 1 isolated and a cluster of 4 sensilla. Mandibles ectatommoid, slender; medial teeth large; middle portion with numerous isolated spinules on anterior, medial and posterior surfaces. Maxillae with apex paraboloidal and densely spinulose, the spinules more numerous, longer and in short transverse rows apically, isolated or in groups of 2 or 3 basally; palp and galea subequal in height and diameter; palp digitiform with 5 (4 apical — 2 encapsulated and 2 with a spinule each — 1 subapical and with a distinct spinule) sensilla; galea digitiform with 2 apical sensilla, each with a spinule. Labium with anterior surface densely spinulose, the spinules minute and in short arcuate rows, the rows frequently forming a reticulate pattern; palp a peg with 5 apical (3 with a spinule each and 2 encapsulated) sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. Hypopharynx densely spinulose, the spinules rather long and in numerous transverse subparallel rows.

QUEEN LARVA: Length (through spiracles) about 5.8 mm. Very similar to worker larva.

Material studied: 12 larvae from "Limon Cocha & vic. ECUADOR Sept.-Nov. 64 H. R. Hermann," courtesy of Dr. W. L. Brown.

### Genus OCTOSTRUMA Forel

Profile pogonomyrmecoid, with the anterior portion of T1 slender. Body hairs sparse. Of 2 types: (1) short, slightly curved, with numerous minute denticles; (2) long, uncinata, 2 on dorsum of each AI-AVI. Antennae small and slightly below mid-length of cranium. Head hairs few, mostly stout, with numerous small denticles. Mandibles ectatommoid, with apical tooth very long, slender and sharp-pointed; medial teeth stout and sharp-pointed.

In our 1976 key this genus would be under Profile 1. Pogonomyrmecoid, and would require a new rubric "14h. Body with 2 long uncinata hairs on the dorsum of each AI-AVI; other hairs short and denticulate."

### **Octostruma inca** Brown and Kempf

Fig. 11. Length (through spiracles) about 2.8 mm. Profile pogonomyrmecoid, with anterior portion of T1 slender. Anus with distinct posterior

lip. Leg, wing and gonopod vestiges present. About 4 differentiated somites. Spiracles small. Integument with patches of isolated spinules on dorsal and dorsolateral surfaces of posterior somites; venter of thoracic somites with minute spinules in short rows. Body hairs sparse. Of 2 types: (1) 0.038-0.075 mm long, slightly curved, with numerous minute denticles; (2) 0.138-0.188 mm long, uncinata, 2 on dorsum of each AI-AVI. Cranium subhexagonal. Antennae slightly below middle of head length, small, each with 3 sensilla, each with a rather long spinule. Head hairs few, 0.03-0.06 mm long, mostly stout, with numerous small denticles. Labrum bilobed, each half with 6 minute hairs and/or a few spinulose sensilla on anterior surface, with minute spinules on ventral and lateral surfaces; entire posterior surface spinulose, the spinules dense, minute and in numerous subtransverse rows dorsally, ventral and lateral portions with sparse minute spinules, isolated or in short arcuate rows. Mandibles ectatommoid; apical tooth very long, slender and sharp-pointed; medial teeth stout and sharp-pointed. Maxillae with apex paraboloidal and densely spinulose, the spinules minute; palp and galea subequal; palp subcylindrical with 5 (2 apical and encapsulated, 2 apical and with a spinule each, one subapical and with a prominent spinule) sensilla; galea digitiform and with 2 apical sensilla. Labium feebly bilobed; anterior surface densely spinulose, the spinules rather long and in short transverse rows; palp a short peg with 5 apical (2 encapsulated and 3 with a spinule each) sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a wide transverse slit. Hypopharynx densely spinulose, the spinules minute and in transverse rows. (Material studied: 1 larva from Columbia, courtesy of Dr. W. L. Brown.)

## TRIBE ATTINI

### Genus ACROMYRMEX Mayr

#### ***Acromyrmex hispidus* Santschi**

Zolessi and Abenante (1973): sexual larva in side view (p. 159). "Curvada, gruesa, blanca, con el tegumento glabro; piezas bucales rudimentarias" (p. 156).

#### ***Acromyrmex lobicornis* (Emery)**

Zolessi and González (1974): drawing of a sexual larva in side view with a short anchor-tipped hair enlarged (p. 74); brief description (p. 54).

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