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THE ANT LARVAE OF THE MYRMICINE TRIBE LEPTOTHORACINI[1]

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This is a large tribe of 150 species, two-thirds of which are in *Leptothorax*, the sixth largest genus of ants. *Macromischa* tallies about 25 species, but none of the other genera can muster as many as a dozen. In fact, seven consist of only a single species and six of these seven have been recorded only once.

Wheeler[2] included 13 genera in this tribe: *Macromischa, Macromischoides, Leptothorax, Harpagoxenus, Myrmoxenus, Formicoxenus, Epimyrma, Symmyrmica, Rogeria, Theryella, Lachnomyrmex, Apsychomyrmex* and *Adelomyrmex*. Two have been added since: *Chalepoxenus* Menozzi 1923 and *Myrmetaerus* Soudek 1925.

The Leptothoracini are very interesting to myrmecologists. Six of the genera are parasitic on other ant genera: *Chalepoxenus, Harpagoxenus, Myrmoxenus, Formicoxenus, Epimyrma* and *Symmyrmica*. *Leptothorax* is nearly cosmopolitan, but absent from the Australian Faunal Realm. Its members develop small colonies, usually in galleries under bark but also in plant cavities and in the soil. It is perhaps best known as the host of the parasitic ants of the genera *Chalepoxenus, Harpagoxenus, Myrmoxenus* and *Epimyrma*. However one of its species (*emersoni* Wheeler) is parasitic on *Myrmica brevinodis* Wheeler. The three Ethiopian species of *Macromischoides* and one Neotropical species of *Macromischa* construct nests of plant debris and carton on or between the leaves of trees. The economic importance of the tribe is practically nil.

Wheeler[3] once wrote that the tribe Lepthothoracini was "very unsatisfactorily defined." He was referring, of course, to adult taxonomy, but on the basis of larvae studied we concur, for they are a heterogeneous lot. Now if we could only eliminate *Macromischoides, Rogeria* and *Apsychomyrmex*, we could define the Leptothoracini in our collection (*Macromischa, Leplothorax* and *Harpagoxenus*) as follows:—

Body stout and mostly straight, with only the anterior end of the thorax slightly bent ventrally. Segmentation indistinct. Mesothoracic spiracle considerably larger than the others, which are small. Body hairs (other than anchor-tipped) short and rather sparse. The shortest hairs are usually simple; medium hairs have the tip denticulate or branched; the longest are anchor-tipped and restricted to rows of four, one row across the dorsum of each abdominal somite I-V or I-VI. Antennae small or minute. Head hairs few to numerous and minute to short. Of three types—(1) simple, (2) with the tip denticulate, (3) with the tip bifid; a larva has one or two types. Posterior surface of labrum with few or no spinules. Mandibles subtriangular in anterior view; the apex forming a short tooth, which is slightly curved medially; a moderately wide blade projects medially from the anterior surface and bears one or two large or small teeth. Maxillae, labium and hypopharynx without spinules. Labial palps each represented by a cluster four or five sensilla.

But are we justified in thus restricting the tribe? Possibly. Emery[4] may have had some such idea when he wrote concerning the adults: "J'ai rattaché, comme 'genera incertae sedis,' à la tribu des Leptothoracini *Rogeria* et un certain nombre de petits genres (*Lachnomyrmex, Apsychomyrmex* et *Adelomyrmex*) qui ont la massue des antennes de deux articles." "Je classe les quatre genres suivants [*Rogeria, Apsychomyrmex, Adelomyrmex, Lachnomyrmex*] dans la tribu Leptothoracini, non sans de forts doutes, attendu que les ♂ et meme les ailes des ♀ me sont inconnus. Les genres *Rogeria, Apsychomyrmex* et *Adelomyrmex* me semblent constituer un groupe naturel et se rattacher, par *Rogeria*, à *Leptothorax* et à *Macromischa*."

Furthermore, the larva of *Macromischoides* differs from the larvae of the Leptothoracini (as restricted above) in the shape of body and mandibles, in having rugae on the latter, in having moderately long head hairs and in the spinulose mouth parts. What Wheeler called *Macromischoides* Emery had previously put in *Tetramorium*. Certainly our larvae of *Macromischoides* show a greater similarity to the larvae of *Tetramorium* (but also to *Pheidole* and *Ischnomyrmex*) than to the typical leptothoracines.

Genus **Macromischa** Roger

Body stout throughout, but with the posterior half stouter; nearly straight, but with the thorax slightly inclined ventrally so that the head is anteroventral; posterior end broadly rounded. Body hairs sparse. Of three types: (1) short and spike-like, on the ventral surface of the ab-

[1]The illustration of this article was aided by an AAAS grant from the North Dakota Academy of Science.

[2]Bull. Amer. Mus. Nat. Hist. 45: 664 and 677. 1922.

[3]*Loc. cit.* p. 659.

[4]Genera Insectorum, Fasc. 174, pp. 244 and 266. 1922.

domen; (2) short, with denticulate tip, the most common type; (3) anchor-tipped, on the dorsal surface of the abdomen. Antennae minute and widely separated. Head hairs few (about 30) and short. Posterior surface of labrum apparently without spinules. Mandibles subtriangular in anterior view, the body tapering to an acute apical tooth; a rather wide blade projecting medially from the anterior surface and bearing two round-pointed medial teeth. Maxillae small and appearing adnate to the head; palp represented by a cluster of four sensilla, galea by a cluster of two.

Macromischa wheeleri Mann

Pl. I, Figs. 1–6

Body stout throughout but with posterior half stouter; diameter greatest at the fifth abdominal somite; nearly straight but with the thorax slightly inclined ventrally so that the head is anteroventral; ventral profile of abdomen nearly straight; posterior end broadly rounded. Anus posteroventral. Leg, wing and gonopod vestiges present. Somites indistinct. First spiracle considerably larger than the others, which are small. Integument flimsy; dorsal surface of posterior somites with a few minute spinules which are isolated or in short transverse rows. Body hairs sparse. Of three types: (1) on the ventral surface of the abdomen, very few, short (about 0.018 mm), spike-like; (2) on the thorax and on the dorsal and lateral surfaces of abdominal somites I-VIII and all surfaces of IX, short (0.018–0.18 mm), with denticulate tip, a few without alveolus and articular membrane; (3) anchor-tipped, long (about 0.32 mm), four in a row across the dorsum of each abdominal somite I-V. Cranium subhexagonal in anterior view, a fourth broader than long. Antennae widely separated and minute, each with two or three minute sensilla, each of which bears a spinule. Head hairs few, short (0.036–0.054 mm), straight or slightly curved, with the tip denticulate. Labrum short and broad (breadth 2.8X length), subtrapezoidal, but with ventral border feebly concave; anterior surface with seven short hairs; ventral border with two isolated sensilla and two clusters of three sensilla each; posterior surface with seven or eight isolated sensilla. Mandibles moderately sclerotized; subtriangular in anterior view, the body tapering to an acute apical tooth; a rather wide blade projecting medially from the anterior surface and bearing two round-pointed medial teeth. Maxillae small, appearing adnate; palp represented by a cluster of four sensilla; galea represented by two contiguous sensilla. Labium with an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit; palp represented by a cluster of five sensilla. (Material studied: numerous larvae from Cuba.)

Macromischa bermudezi Wheeler

Pl. I, Fig. 7

Similar to *wheeleri* except in the following characters: Anterior surface of labrum with 12 short hairs; posterior surface of each half with three isolated and a cluster of two or three sensilla. Mandibles less curved; blade shorter; medial teeth confluent at their bases. (Material studied: 17 larvae from Cuba.)

Genus **Macromischoides** Wheeler

Rather stout; thorax curved ventrally to about 90°; abdomen straight and subellipsoidal. Body hairs sparse. Of two types: (1) short, with the tip bifid or denticulate, generally distributed; (2) anchor-tipped, on the dorsal surface of the abdomen. Head large. Antennae small. Head hairs few (about 20) and moderately long. Posterior surface of labrum densely spinulose. Mandibles narrowly subtriangular in anterior view; somewhat thin and sinuate in side view; with two medial teeth—one anterior, the other posterior; middle half of anterior surface with a few longitudinal rugae. Maxillae with the apex free, paraboloidal and furnished with a few isolated spinules; palp a skewed peg; galea a tall frustum. Anterior surface of labium spinulose. Hypopharynx densely spinulose.

Macromischoides aculeatus (Mayr)

Pl. I, Figs. 8–15

Mature Larva:—Length about 2.6 mm. Rather stout; thorax curved venturally to about 90°; abdomen straight and subellipsoidal. Anus posteroventral, with a posterior lip. Leg and wing vestiges present. With nine or ten distinct somites. Mesothoracic spiracle considerably larger

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EXPLANATION OF PLATE I

Macromischa wheeleri Mann, Figs. 1–6.—1, head in anterior view, X111; 2, left mandible in anterior view, X299; 3–5, three types of body hairs, X169; 6, larva in side view, X29.

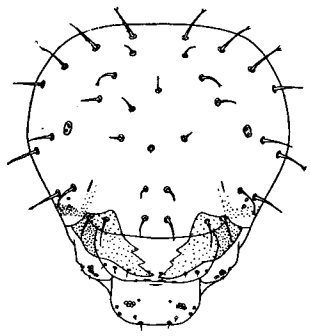
Macromischa bermudezi Wheeler, Fig. 7, left mandible in anterior view, X270.

Macromischoides aculeatus (Mayr), Figs. 8–15.—8, mature larva in side view, X44; 9–11, three body hairs, X270; 12, young larva in side view, X44; 13, head in anterior view, X126; 14, left mandible in anterior view, X270; 15, left mandible in medial view, X270.

Apsychomyrmex myops Wheeler, Figs. 16–21.—16, head in anterior view, reconstructed (only the bases of the hairs are shown), X214; 17, left mandible in anterior view, X270; 18, profile of semipupa (?), reconstructed, X18; 19–21, three body hairs, X270.

Rogeria stigmatica sublevinodis Emery, Figs. 22–23.—22, head in anterior view (only the bases of the hairs are shown), X126; 23, left mandible in anterior view, X298.

Harpagoxenus americanus Emery, Figs. 24–29.—24, head in anterior view, X111; 25, left mandible in anterior view, X324; 26–28, three body hairs, X270; 29, immature larva in side view, X35.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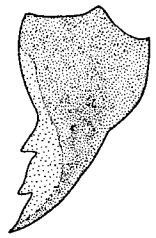
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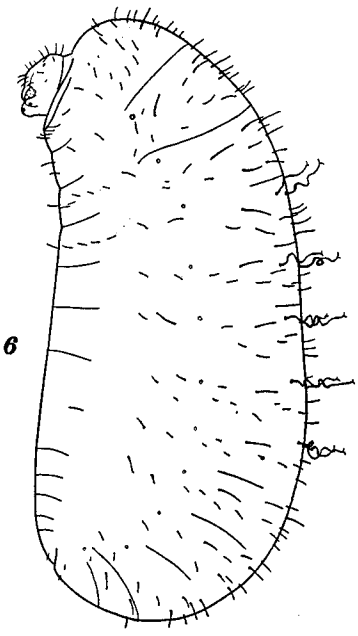
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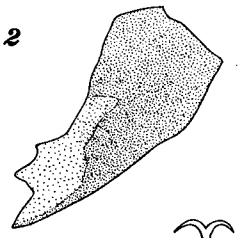
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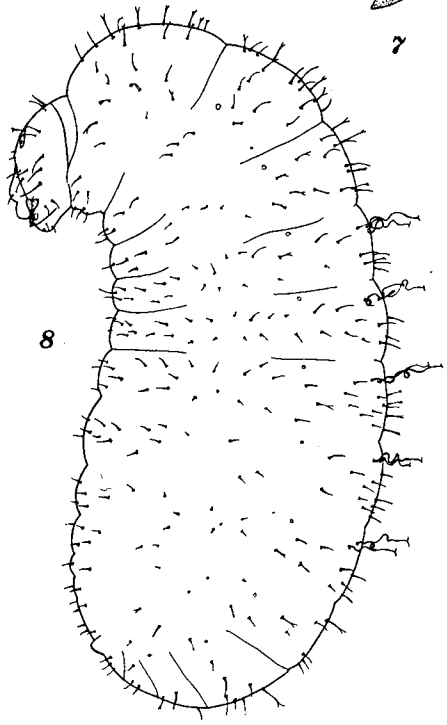
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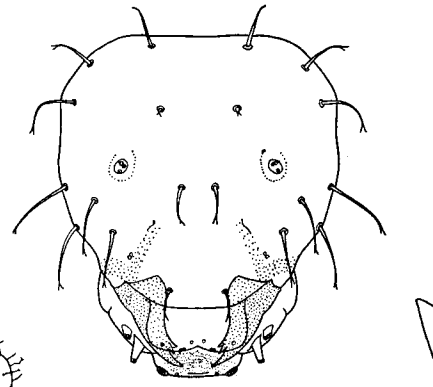
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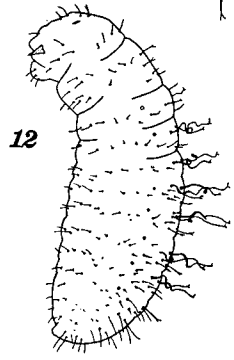
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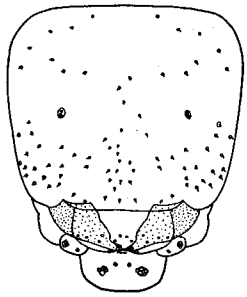
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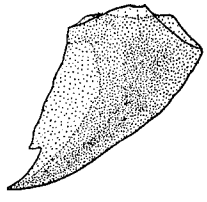
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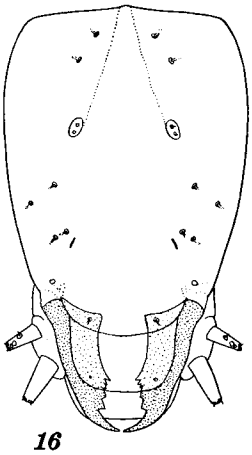
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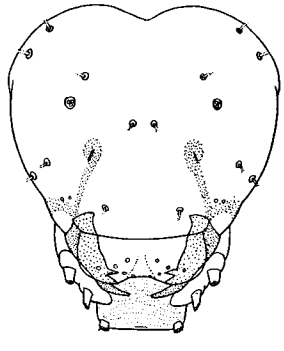
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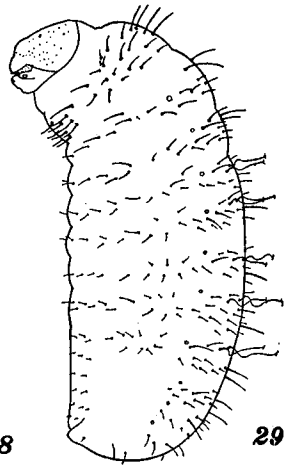
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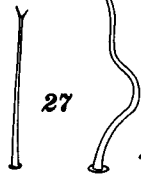
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than the others, which are small. Integument of the ventral surface of anterior somites and dorsal surface of posterior somites with a few minute spinules in short transverse rows. Body hairs sparse and uniformly distributed. Of two types: (1) short (0.018–0.108 mm), with the tip bifid or denticulate; (2) long (about 0.3 mm), anchor-tipped, with tortuous shaft, four in a row across the dorsum of each abdominal somite I-V. Head large; cranium subhexagonal with the dorsal corners rounded; breadth equal to length. Antennae small, each with three sensilla, each of which bears a spinule. Head hairs few, moderately long (0.036–0.072 mm), with the tip denticulate. Labrum feebly bilobed due to a shallow median impression of the ventral border; subrectangular (breadth twice the length); anterior surface of each half with four minute hairs and/or sensilla; ventral border of each lobe with one isolated and a cluster of three sensilla; posterior surface spinulose, the spinules in numerous subtransverse short to moderately long rows; posterior surface of each lobe with one or two isolated and a cluster of three or four sensilla. Mandibles heavily sclerotized, narrowly subtriangular in anterior view, somewhat thin and sinuate in side view; apex forming a slender acute tooth; with two subapical medial teeth—one anterior, the other posterior; middle half of anterior surface with a few longitudinal rugae. Maxillae with the apex paraboloidal and bearing a few isolated spinules; palp a skewed peg with five sensilla (three bearing a spinule each); galea a tall frustum bearing two apical sensilla. Labium with the anterior surface spinulose, the spinules minute and in rows which tend to form a reticulate pattern; palp represented by a cluster of five sensilla (three bearing a spinule each); an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. Hypopharynx densely spinulose, the spinules arranged in numerous short transverse rows.

Young Larva:—Length about 1.1 mm. Diameter greatest at the middle, decreasing slightly toward the anterior end, more rapidly toward the posterior end, which is round-pointed; prothorax inclined ventrally, rest of body straight. Anus ventral. Integument of dorsum with short rows of minute spinules. Body hairs of three types: (1) few, simple, minute (0.001–0.027 mm); (2) with denticulate tip, 0.027–0.072 mm long, the most abundant type; (3) anchor-tipped, about 0.22 mm long, four in a row across the dorsum of each abdominal somite I-V, sometimes one on the metathorax also. Otherwise similar to the mature larva.

Material studied: numerous larvae from the Belgian Congo; labelled var. *wasmanni*.

Genus **Leptothorax**[5] Mayr

Adlerz, 1886: Overwintering larvae appear very hairy (p. 52). Larvae hatched at the beginning of July were still not fully grown at the beginning of November (p. 53). Internal anatomy (p. 58). Occasionally one-hooked hairs occur alongside anchor-tipped hairs (p. 258).

Bischoff, 1927: Die Larven von *Leptothorax* sind "so weit auf die Kropffütterung durch ihre Pflegerinnen eingestellt, dass ihre Mandibeln so gut wie funktionlos und unbeweglich geworden sind" (p. 81)."... während andere Arten wie auch manche *Lepthothorax* .... ihren Larven den Inhalt der Infrabuccaltasche, bestehend aus den verschiedensten, auch bei gegenseitiger Reinigung aufgeleckten Stoffen, vorlegen" (p. 384).

Donisthorpe, 1915: "Whitish yellow, slightly pyriform, but the posterior segments not much wider than the anterior ones, clothed with longer and shorter hairs which are more abundant on the younger larvae. The first to the sixth abdominal segments furnished with a pair of long anchor-tipped hairs, on the dorsal surface" (p. 146 = 1927, p. 162).

Forel, 1874, p. 388: "Les larves sont très courtes, épaisses aux deux bouts, raides et indistinctement annelées ... Les larves sont ... extrêmement raides, presque incapables de remuer même leur tête." In the 1920 edition (pp. 265–266) the first sentence reads, "Les larves sont très courtes, épaisses aux deux bouts, entièrement raides ... et indistinctement annelées."

Forel, 1921: "Mais l'extrême le plus complet se voit chez les *Leptothorax*. ... Ici la larve courte et épaisse ... est entièrement immobile et raide, incapable de rien manger, ni même de sucer seule; sa tête blanche et indistincte ne montre aucune mobilité perceptible des mandibules" (p. 24). ["But the most extreme condition is seen in *Leptothorax*. ... Here the short, thick larva ... is entirely stiff and motionless, incapable of eating or even sucking on its own account. Its white indistinct head shows no perceptible mobility in the mandibles" (Forel, 1928, Vol. I. p. 24).]

Forel, 1922, p. 136: "Les larves ... de quelques *Leptothorax* sont nourries avec le contenu du sac buccal de leurs ♀, avec ou sans addition de proies fraîches dépecées." ["The larvae ... of some *Leptothorax*, are fed with the contents of the buccal sac of their ♀, with or without the addition of freshly-quartered prey" (Forel, 1928, Vol. I, p. 516).]

Gantes, 1949, p. 85: growth data.

Holgersen (1942, p. 93) has stated that the ant *Harpagoxenus sublaevis* Nyl. feeds upon the larvae of *Leptothorax*.

Wheeler and Bailey, 1920, p. 255: "The larval

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[5]In this genus we have followed the subgeneric nomenclature of M. R. Smith (PSYCHE 57: 29–30, 1950). One may convert back to the nomenclature of Emery (GENERA INSECTORUM, Fasc. 174, 1922) by changing *Leptothorax* to *Mychothorax* Ruzsky, *Myrafant* to *Leptothorax* Mayr and *Nesomyrmex* to *Goniothorax* Emery.

stomach was found to contain evidence of the precise nature of the food. . . . We have examined the larvae of . . . some eight species of *Leptothorax* of the subgenera *Leptothorax* sens. str., *Mychothorax* and *Goniothorax*. . . . The larval stomach is voluminous and closely packed with coarse chitinous fragments of small insects (Plate I, Fig. 8). . . . In some species of *Leptothorax* the whole contents consist of entire or nearly entire legs of small insects. The mandibles of the larvae [of the genus *Leptothorax*] . . . are short, broad and stout and therefore well-adapted to crushing, so that the coarse fragments may have been bitten off by the larvae from larger pieces or whole insects proffered by their worker nurses. The pieces may, however, have been cut up to a considerable extent by the workers."

Subgenus **Leptothorax** Mayr

Prothorax and mesothorax forming a short stout neck, which is curved ventrally to about 90°; rest of body straight, paunchy and elongate-subellipsoidal. Prothorax with a transverse ventral welt and a pair of ventrolateral bosses. Body hairs sparse. Of three types: (1) few, simple, very short; (2) short, with denticulate tip, the common type; (3) anchor-tipped, on the dorsal surface of the abdomen. Head feebly cordate in anterior view. Antennae small. Head hairs moderately numerous (about 65) and short. Posterior surface of labrum sparsely spinulose. Mandibles rather stout; the body slightly curved medially and tapering from base to apex, which is sharp; a moderately wide blade projects medially from the anterior surface and bears two rather stout medial teeth. Maxillae with the apex free and paraboloidal; palp a stout peg; galea a small frustum.

Leptothorax (Leptothorax) canadensis yankee Emery
Text Fig. 1, A-G

Prothorax and mesothorax forming a short stout neck which is curved ventrally to about 90°, rest of body straight, paunchy and elongate-subellipsoidal; diameter greatest at the fourth abdominal somite; posterior end narrowly rounded; prothorax with a ventral spinulose swelling and a pair of ventrolateral bosses. Anus ventral, with a small posterior lip. Leg, wing and gonopod vestiges present. Segmentation indistinct. First spiracle considerably larger than the others, which are small. Integument of dorsal surface of posterior somites and of midventral surface of anterior somites sparsely spinulose, the spinules minute and in transverse rows. Body hairs sparse. Of three types: (1) few, simple, very short (0.001–0.018 mm); (2) short (0.08–0.108 mm), with denticulate tip, the most abundant type; (3) moderately long (about 0.16 mm), anchor-tipped, basal half tortuous and distal half nearly straight, four in a row across the dorsum of each abdominal somite I-VI; the first two types lack alveolus and articular membrane. Head feebly cordate; cranium subcircular but with the occipital border impressed. Antennae small, each with three (rarely four) sensilla, each of which bears a spinule. Head hairs moderately numerous, short (0.015–0.049 mm); most hairs simple, a few of the longer hairs with bifid tip. Labrum bilobed; breadth about 1.5X length; anterior surface of each lobe with three or four minute hairs and four or five sensilla; ventral border of each lobe with one isolated and a cluster of three or four sensilla; posterior surface sparsely spinulose, the spinules minute and in a few scattered short transverse rows; each half of posterior surface with four isolated sensilla. Mandibles heavily sclerotized and rather stout; body of mandible slightly curved medially, tapering from base to apex and terminating in a rather sharp point; a moderately wide medial blade projects from the anterior surface, extends the full length of the mandible and bears two rather stout medial teeth. Maxillae with the apex paraboloidal; palp a stout short peg with five apical sensilla; galea a small frustum with two apical sensilla. Labial palp represented by a cluster of five sensilla; an isolated sensillum medial to each palp; opening of sericteries a short transverse slit in a shallow longitudinal furrow.

Half-Grown Larva:—Body (except neck) slender and subcylindrical with a more or less prominent welt across the ventral surface of each thoracic somite and abdominal somites I and II. Otherwise as in the mature larva.

Material studied: numerous larvae from North Dakota.

Leptothorax (Leptothorax) canadensis Provancher

Very similar to subspecies *yankee* except that the anchor-tipped hairs are about 0.23 mm long and the mandibles are stouter and have blunter teeth. (Material studied: several damaged specimens from Massachusetts and Washington.)

Leptothorax (Leptothorax) acervorum (Fabricius)

Generally similar to *canadensis yankee* except in the following details: Type 2 body hairs with denticulate or multifid tip, type 3 about 0.2 mm long. Head hairs shorter (0.006–0.036 mm). Posterior surface of labrum with about 12 sensilla. Maxillary palp represented by a cluster of five sensilla, galea by two sensilla on a slight elevation. Labium with an isolated sensillum between each palp and the opening of the sericteries. (Material studied: nine larvae from Switzerland.)

Adlerz, 1886, p. 151: "I have at times seen how the workers while feeding the larvae playfully deal out bites with the mandibles to right and left in a mass of larvae, whereupon the bitten

larvae are wont to make known their desire for food [by repeatedly moving the head out and in or by writhing]. Possibly the workers, by means of this strange procedure, discover which larvae are in need of food." (Translation from the Swedish by Professor Edith E. Larson.)

Eidmann, 1943, p. 227: Larvae overwinter in the nest.

Gantes, 1949: "Les larves sont grandes: 4 mm. 25 pour une larve adulte. Le corps est subcylindrique, avec la tête repliée ventralement: tout le corps est arqué et plus svelte que chez les formes précédentes. Il est couvert de poils de plusieurs types: 1. *Poil épineux*, très long, 0 mm. 25, raide, de plus en plus fin vers l'extrémité; sur le dernier quart, il est couvert de petits poils. Ce genre se trouve surtout sur le thorax, mais on en trouve sur tout le corps. 2. *Poil épineux*, très court, 0 mm. 10, épineux sur la moitié de sa hauteur: répandu sur tout le corps. 3. *Poil* très court, 0 mm. 087, trapu, le tronc formant des épines qui sont elles-mêmes recouvertes de poils. 4. *Poils à doubles crochets*, très longs, 0 mm. 25: ils sont terminés par un crochet petit et raide; de plus ils ne présentent pas de ressort comme les précédents et sont en général coudés à 90° sur le premier quart de leur longueur. Ils forment six rangs de quatre poils à partir du premier segment thoracique. 5. *Poil* très long, 0 mm. 27. Il s'élève droit sur le $\frac{1}{6}^{e}$ de sa longueur, puis se coude à 90° et devient parallèle au corps. Vers la moitié de sa longueur il est interrompu par deux fortes épines du même côté, puis il devient de plus en plus fin et souple. A partir des épines, ils portent des petits poils sur un côté seulement. 6. *Poil* de même longueur, ayant la même allure, mais sans épines, ni poils, simplement l'apex plus large et épineux. 7. *Poils* courts, 0 mm. 069, dont l'extrémité s'aplatit en une sorte de spatule couverte d'épines. Je n'en ai vu qu'un exemplaire. 8. *Poil* unique et sur une seule larve (il est sans doute dû à une malformation): d'une base large partent six branches d'inégale longueur. 9 et 10. Sur tout le corps, nous avons des poils simples et rigides de 0 mm. 059 et 0 mm. 027. La tête, toujours en poire, est couverte de vingt-quatre poils. Le labre est formé de deux lobes égaux, un peu plus hauts que larges. Ventralement, près du bord antérieur on a cinq sensilles parallèles au bord; dorsalement sur chaque lobe trois petits poils et deux plus grands. Les mandibules, bien chitinisées, de 0 mm. 115, sont plus simples que dans les cas précédents: on a un simple triangle, dont le côté externe est plus épais et se termine par une dent; à l'intérieur, sur la partie plus claire, deux petites dents formant une simple saillie" (p. 82). Pl. V, Fig. VI, larva in side view; ten different hairs, Pl. VI, mandible and labrum. Growth data on p. 86.

Gösswald (1934–35, p. 125) listed this ant as a mermithid host. Presumably the nematode larvae had been parasitic in the ant larvae.

Stärcke, 1948 (1949), p. 29: "Fullgrown larva . . . Oncochaeta 146–164 Micron, on 6 Abdominal segments; Acrochaeta 73–100, only on the thorax, for the rest only Microch. of 36–55 Micron. A second larva of this species had Oncoch. of 141–150, Acroch. of 80 on the Thorax, Microch. of 13–26, Abd. 35. Most of the hair-tips of the *acervorum*-larva are shortly forked for only 2 Micron, the hairs on the head being forked for even a shorter part."

Subgenus **Myrafant** M. R. Smith

Plump, subellipsiodal and nearly straight, but with the thorax slightly inclined ventrally; head anteroventral. Body hairs sparse. Of three types: (1) few, simple, very short; (2) short, with denticulate tip, on the dorsal surface; (3) anchor-tipped, on the dorsal surface of the abdomen. Head subtrapezoidal in anterior view. Antennae minute and widely separated. Head hairs few (30–45) and minute to short. Posterior surface of labrum apparently without spinules. Mandibles subtriangular in anterior view; apex forming a small acute tooth; anterior surface of distal half produced medially into a blade; medial edge of blade highly variable, with rounded denticles or with small teeth. Maxillae small and appearing adnate to the head; palp represented by a minute cluster of four or five sensilla; galea by a minute cluster of two sensilla.

Leptothorax (Myrafant) ambiguus Emery
Text Fig. 1, H-N

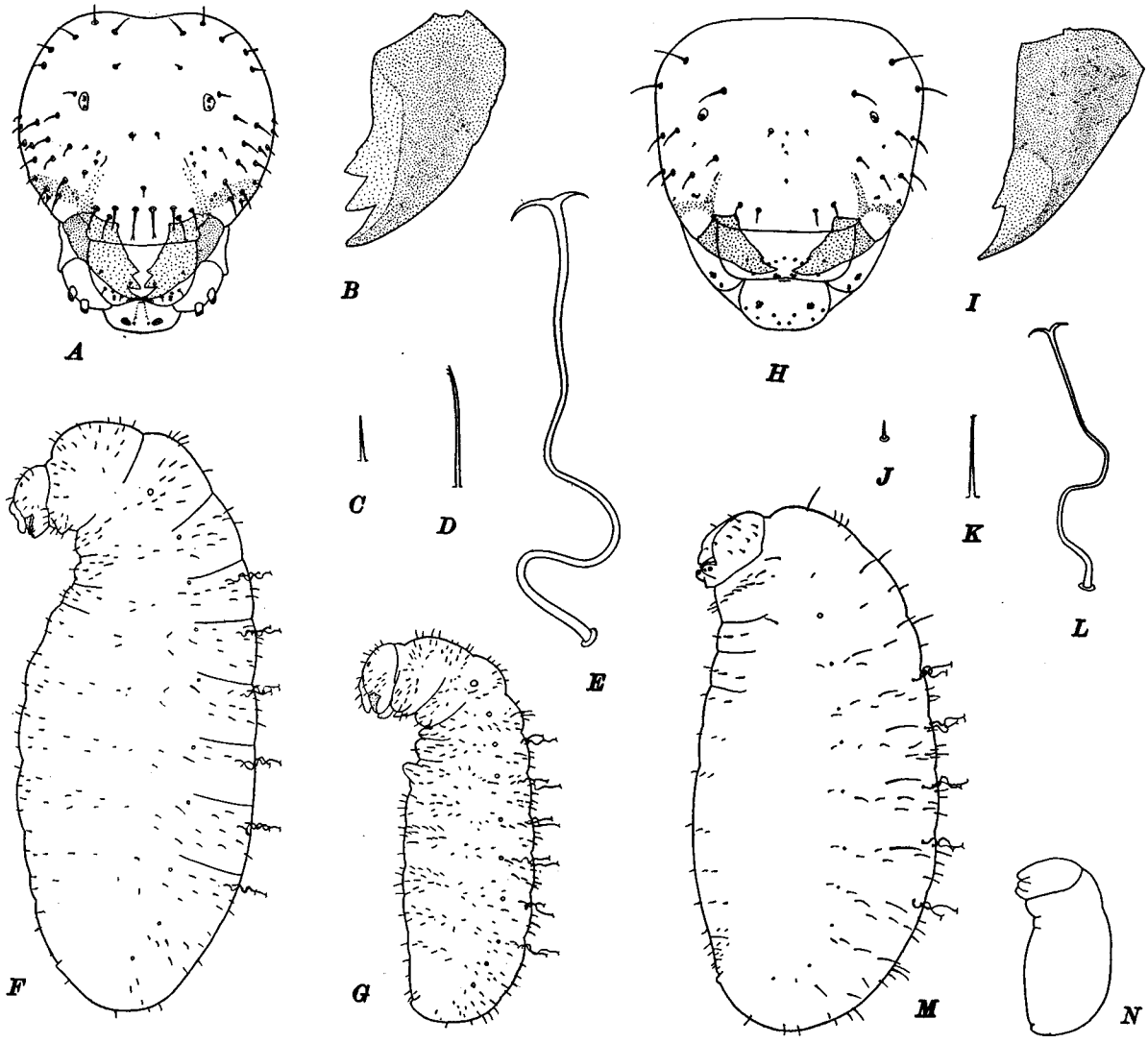
Mature Larva:—Length about 1.6 mm. Plump; subellipsoidal; nearly straight, but with the prothorax slightly inclined ventrally; diameter greatest at the third abdominal somite; head anteroventral. Anus ventral. Segmentation indistinct. Leg vestiges present. First spiracle considerably larger than the others, which are small. Integument of ventral surface of anterior somites sparsely spinulose, the spinules minute and in short transverse rows. Body hairs sparse; ventrolateral surfaces naked. Hairs of three types: (1) simple, very short (0.006–0.027 mm), a few on the ventral surface; (2) short (0.018–0.09 mm), with denticulate tip, a few on the dorsal surface, mostly without alveolus and articular membrane; (3) moderately long (about 0.18 mm), anchor-tipped, with tortuous shaft, four in a row across the dorsum of each abdominal somite I-V. Cranium subtrapezoidal in anterior view, narrowed ventrally, a third broader than long. Antennae widely separated and minute, each with three sensilla, each of which bears a spinule. Head hairs few, minute to short (0.001–0.045 mm), simple or with the tip denticulate. Labrum short and broad (breadth 2.7X length); subrectangular, with the ventral corners rounded and the ventral border feebly concave; anterior surface with ten minute hairs; ventral border with two

isolated sensilla and two clusters of three sensilla each; posterior surface with about ten sensilla (rarely three in a cluster), but apparently without spinules. Mandibles moderately sclerotized and subtriangular in anterior view; apex forming a small acute apical tooth; the anterior surface of the distal half produced medially into a blade, the medial edge of which is highly variable, with rounded denticles or with small teeth. Maxillae small, appearing adnate; palp represented by a cluster of four sensilla; galea represented by two contiguous sensilla. Labial palp represented by a cluster of four sensilla; opening of sericteries a short transverse slit.

Just Hatched Larva:—Length about 0.6 mm. Head on the anterior end. Without hairs, but with the dorsal surface of the abdomen densely beset with coarse, isolated spinules.

Young Larva:—Length about 1.1 mm. Like mature larva.

Material studied: numerous larvae from North Dakota; workers identified by Dr. M. R. Smith.



Leptothorax (*Leptothorax*) *canadensis yankee* Emery, Figs. A–G.—A, head in anterior view, X111; B, left mandible in anterior view, X270; C–E, three types of body hairs, X343; F, mature larva in side view, X29; G, immature larva in side view, X29.

Leptothorax (*Myrafant*) *ambiguus* Emery, Figs. H–N.— H, head in anterior view, X153; I, left mandible in anterior view, X405; J–L, three types of body hairs, X270; M, mature larva in side view, X47; N, very young larva in side view, X47.

Leptothorax (Myrafant) congruus F. Smith

Young Larva:—Similar to young of *ambiguus* except in the following characters: Simple body hairs shorter. Integument apparently without spinules. Blade of mandible with a rather large acute tooth. (Material studied: seven larvae from Japan, courtesy of Cho Teranishi.)

Leptothorax (Myrafant) exilis Emery

Menozzi, 1936: "*Larva matura dell'operaia.*—Colore biancastro, col capo leggermente melleo, le mandibole di colore crema, ocracee nel terzo distale; setole biancastre. Il capo visto di faccia appare più alto che largo. Il cranio è un poco più largo che lungo, coi lati nettamente più arrotondati del margine posteriore e fornito di setole semplici distribuite come appare dalla figura citata. Le placche antennali sono piuttosto piccole e fornite ciascuna di tre sensilli. Il clipeo, non distinto posteriormente dal resto del cranio, ha il margine anteriore troncato. Il labbro superiore è subrettangolare, del doppio più largo che lungo, coi lati diritti, gli angoli anteriori arrotondati, col margine libero leggermente crenulato e provvisto di 6 setole; nella faccia ventrale di esso, nel terzo distale, vi sono alcune serie di formazioni tegumentali poste trasversalmente, scostate l'una dall'altra e i cui elementi appaiono come delle squame a forma semilunare, lungo il margine anteriore vi è inoltre una diecina di sensilli. Le mandibole sono piuttosto gracili, lunghe un poco meno del doppio della loro larghezza prossimale, col margine esterno leggermente concavo nel mezzo e con quello orale fornito di tre denti, di cui l'apicale bene sviluppato e aguzzo, mentre gli altri due sono poco pronunziati ed ottusi. Mascelle con cardine e stipite ben distinti l'uno dall'altro; quest'ultimo appare della solita forma, però molto più stretto e più corto del cardine, senza setole o peluzzi e provvisto apicalmente di una placca (processo distale mascellare) con tre sensilli alla quale segue, posteriormente, l'altra placca del palpo mascellare che ha quattro sensilli. Labbro inferiore pressapoco così lungo che largo, col margine anteriore arrotondato; le placche corrispondenti ai palpi labiali sono alquanto più grandi di quelle dei palpi mascellari, provviste di cinque sensilli ciascuna e contornate anteriormente da tre setolette, per lo più, rivolte all'indietro. Il corpo è fornito di setolette subtroncate all'apice o bifide, distribuite con una certa regolarità come appare dalla figura; le aptochete sono in numero di 3–4 e poste, tanto nella larva adulta che giovane, solamente al dorso del segmento metatoracico e dei primi quattro uriti. Sistema tracheale eguale a quello della larva del *L. rottenbergi* var. *galatica* Sants. Lunghezza della larva adulta mm. 2,5" (pp. 288–289). Fig. XII on p. 288: 1, mature worker larva in side view; 2, head in anterior view; 3, mandible: 4, anchor-tipped hair. Menozzi assigned this ant to "var. *darii* For."

Leptothorax (Myrafant) longispinosus Roger

Apparently similar to *ambiguus*. (Material studied: two damaged integuments from New York.)

Leptothorax (Myrafant) obturator Wheeler

Similar to *ambiguus* except in the following details: Body hairs somewhat shorter. Integument of dorsal surface with a few minute isolated spinules. Head hairs all simple. Anterior surface of labrum with six minute hairs. Blade of mandible with two prominent sharp-pointed medial teeth. Maxillary palp represented by a cluster of five sensilla. Labial palp represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries. (Material studied: nine integuments from Texas.)

Leptothorax (Myrafant) rottenbergi semiruber Ern. André

Menozzi, 1936: "*Larva adulta dell'operaia.*—Di colore biancastro, col capo leggermente melleo ferrugineo, le mandibole di colore crema e ocracee distalmente. Setole biancastre. La forma del corpo è subcilindrica coi segmenti poco distinti. Nell'ultimo urite, nella regione ventrale, è bene accennato una convessità trasversale, nel mezzo della quale s'apre lo sbocco dell'estremità posteriore dell'intestino. Il capo è molto piccolo e apparentemente non diviso dal segmento del protorace. Il cranio è nettamente trasversale, coi lati e il margine posteriore ampiamente arrotondati, la sua superficie è cosparsa di parecchie setole semplici distribuite come appare nella figura citata. Le antenne sono formate da due distinte placchette ovali, aventi il diametro longitudinale del doppio più lungo di quello trasversale e fornite ciascuna di tre sensilli. Il clipeo è troncato anteriormente e senza limite ben definito posteriormente. Il labbro superiore ha forma semilunare; dorsalmente è fornito di una mezza dozzina di peluzzi distribuiti in due serie obliquolongitudinali; ventralmente esso mostra soltanto una diecina di sensilli placoidei situati nella zona mediana del margine anteriore. Le mandibole sono del doppio più lunghe che larghe, provviste di tre denti, di cui i due primi (apicale e subapicale) sono ben sporgenti ed acuti, mentre il terzo è poco accennato. Le mascelle hanno lo stipite di forma pressapoco ovale e più lungo che largo, fornito subapicalmente di due peluzzi e di due placche delle quali l'anteriore, da riferirsi al processo distale mascellare, ha forma arrotondata e porta due sensilli, mentre la seconda, riferibile al palpo mascellare, è ovale, assai più grande e porta quattro sensilli. Labbro inferiore con la parte anteriore fortemente trasversa e col margine arrotondato; i palpi labiali sono rappresentati da

due placche rotonde, più grande di quelle dei palpi mascellari e fornite ognuna di cinque sensilli. Davanti a ciascuna di queste placche, nella larva adulta esistono tre peluzzi che mancano nelle larve giovani. Tutto il corpo è provvisto di numerose setolette troncate all'apice o bifide, distribuite, almeno apparentemente, senza alcun ordine, e tanto nella larva giovane che adulta di un gruppo di 3–4 aptochete poste al dorso del segmento metatoracico e dei primi cinque uriti. Sistema tracheale olopneustico con 10 paia di spiracoli. Lunghezza della larva adulta mm. 3, 2" (pp. 286–287). Fig. XI on p. 287: 1, mature worker larva; 2, head in anterior view; 3, mandible; 4, anchor-tipped hair. Menozzi assigned this ant to "var, *galatica* Sants."

Leptothorax (Myrafant) rugatulus brunnescens Wheeler

Very similar to *ambiguus* except in the following characters: Simple and denticulate body hairs shorter. Integument of dorsal surface of posterior abdominal somites with a few minute isolated spinules. Head hairs simple or with the tip bifid. Blade of mandible narrower and bearing a short stout medial tooth. Maxillary and labial palps each represented by a cluster of five sensilla. (Material studied: nine larvae from North Dakota.)

Leptothorax (Myrafant) tuberum (Fabricius)

Gösswald (1930, p. 17 and 1934–35, p. 125) has listed *tuberum* (and some of its varieties) as mermithid hosts. Presumably the nematode larvae had been parasitic in the ant larvae.

Leptothorax (Myrafant) tuberum interruptus (Schenck)

Donisthorpe, 1915 and 1927, Pl. II: photograph of a larva in side view.

Gösswald (1934–35, p. 125) listed this ant as a mermithid host. Presumably the nematode larvae had been parasitic in the ant larvae.

Leptothorax (Myrafant) tuberum unifasciatus (Latreille)

Similar to *ambiguus* except in the following details: Head hairs all simple. Mandibles with the blade somewhat longer and bearing one blunt medial tooth. Labial palp represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries. (Material studied: a dozen larvae from Switzerland.)

Gösswald (1934–35, p. 125) has listed this ant as a mermithid host. Presumably the nematode larva had been parasitic in the ant larva.

Subgenus **Nesomyrmex** Wheeler

Body hairs moderately numerous. Of two types: (1) very short, with finely denticulate tip; (2) anchor-tipped, on the dorsal surface of the abdomen. Head feebly cordate. Head hairs numerous (about 80) and short. Posterior surface of labrum apparently without spinules. Mandibles rather stout; the body slightly curved medially and tapering from base to apex, which is sharp; a wide blade projects medially from the anterior surface and bears two long stout sharp-pointed teeth. Maxillae with the apex free and paraboloidal; palp a stout peg; galea a small frustum.

Leptothorax (Nesomyrmex) echinatinodis Forel

Apparently similar to *canadensis yankee* except in the following characters: Body hairs moderately numerous. Of two types: (1) very short (0.018–0.036 mm), with finely denticulate tip, generally distributed; (2) about 0.18 mm long, anchor-tipped, with tortuous shaft, four in a row across the dorsum of each abdominal somite I-V. Head hairs numerous, 0.009–0.036 mm. long, simple or with the tip denticulate. Anterior surface of labrum with 6–10 simple (or with denticulate tip) very short (0.009–0.018 mm) hairs, ventral border of each lobe with two isolated and a cluster of three or four sensilla. Mandibles with a wider blade and with the teeth more sharply pointed. (Material studied: four damaged integuments from Costa Rica).

Subgenus **Temnothorax** Mayr

Leptothorax (Temnothorax) arenarius Santschi

Santschi, 1908: "Les larves présentent une particularité remarquable: au lieu d'être déposées en paquets ou en tas plus ou moins irréguliers, comme c'est généralement le cas chez les autres Fourmis, les larves de cette espèce sont suspendues avec ordre contre les parois verticales du nid. Voici comment j'ai observé cette façon de faire. Dans un nid artificiel, consistant en un simple flacon de verre, assez large, j'avais réuni: 1° un peu de sable provenant du nid naturel; 2° quelques feuilles de papier à filtrer imbibées d'eau et arrangées les unes verticales, les autres horizontales; 3° une vingtaine d'ouvrières et leur couvain. Or dès le premier jour presque toutes les larves se trouvaient être appliquées régulièrement contre les feuilles de papier verticales. Seules, quelques larves (celles qui étaient au point de subir la nymphose) demeuraient étalées sur le sol. C'est par le dos que les larves adhéraient contre la paroi de papier, comme si elles y étaient suspendues la tête en haut et la bouche en avant, côté à côté, dans un certain ordre. Chaque fois que je les déplaçais ou couchais la feuille de papier, les ouvrières les transportaient sur une autre feuille encore debout, ou, à défaut de quoi, contre une petite paroi de sable qu'elles avaient construite. En examinant ces larves de plus près, on découvre aussitôt la raison de cette curieuse disposition; elle est due à certains poils raides, conformés et distribués d'une façon spéciale; il y en a de trois sortes, que je nommerai: 1° poils longs ou à crochets; 2° poils moyens ou

ramifiés; 3° poils courts ou bifurqués. Long de 0,3 mill., le poil à crochet présente deux parties distinctes, de longueur à peu près égale. La partie basale, contournée en demi-cercle, forme une espèce de boucle plus ou moins ouverte en arrière (parfois aussi elle est enroulée en hélice comme un ressort à boudin) et se continue avec la portion distale, laquelle est rigide, assez rectiligne et terminée par un petit crochet arrondi et très pointu à son extrémité qui est dirigée en arrière. Au nombre constant de neuf, ils forment trois faisceaux de trois poils chacun et toujours placés sur le bord antérieur de la face dorsale d'un des trois premiers segments abdominaux. Le premier groupe sur le premier segment abdominal (4e segment en comptant les trois segments thoraciques); les deux autres groupes sur les segments suivants, soit les 2e et 3e abdominaux. Les trois poils d'un faisceau sont insérés sur une ligne droite, transverse, et distants les uns des autres de la moitié de leur longueur. L'insertion du poil central se trouve toujours exactement sur la ligne médiane de l'insecte. Les poils moyens ou ramifiés ont l'aspect de petites épingles implantées dans le tégument. La tête ou extrémité libre est représentée par de petites ramifications dichotomiques, plus ou moins régulières, qui se terminent par quatre à huit bouts. La longueur de ces soies varie entre 0,1 à 0,22 mill.; les plus courtes sont plutôt distribuées sur les deux premiers segments thoraciques où elles sont aussi plus nombreuses, puisqu'on peut en compter six à huit, tandis qu'il n'y en a qu'un à quatre sur les autres segments. Ceux qui portent les poils à crochets n'en ont tantôt pas, tantôt une seule; c'est alors la plus longue soie; celle-ci est implantée un peu en arrière des poils à crochets, tandis qu'ailleurs les insertions se trouvent plutôt vers le bord antérieur des segments. Ils ne sont distribués que sur la face dorsale de la larve. Les petits poils bifurqués se répandent au contraire à profusion sur tout le tégument. Leur extrémité est simplement bifide, très courte et leur longueur totale est de 0,06 mill. Ils représentent la pilosité ordinaire de la larve, aux dépens de laquelle les deux autres espèces de poils se sont probablement différenciées. Il est naturel de déduire que c'est grâce à ces poils à crochets que la larve peut rester suspendue aux parois du nid. La direction arrière de la pointe des crochets indique bien aussi qu'elle doit être suspendue la tête en haut. Mais en outre il est intéressant de remarquer l'utilité de la partie contournée de la base du poil, partie que j'appellerai *le ressort*, en raison de la fonction modératice des tractions exercées sur l'implantation du poil. Grâce à l'allongement possible de cet organe, la traction peut être répartie d'une façon plus uniforme sur tous les poils. Ainsi, tous les crochets pouvant être utilisés, il en résulte plus de solidité et plus de bien-être pour l'insecte. Quant aux poils ramifiés, ils me paraissent devoir isoler les téguments larvaires des parois du nid, et servir en quelque sorte de préservatifs contre l'humidité et contre certains parasites" (pp. 528–530). Fig. 10 on p. 529: *a*, larva in side view, X37; *b*, arrangement of larvae on the wall of the nest. (Referred to by Bernard, 1948, p. 179.)

Genus **Harpagoxenus** Forel

Body hairs moderately numerous. Of two types: (1) short to moderately long, stiff and stout, with short-bifid or short-trifid tip; (2) anchor-tipped, on the dorsal surface of the abdomen. Antennae minute. Head hairs numerous (about 90) and minute. Posterior surface of labrum apparently without spinules. Mandibles stout; subtriangular in anterior view; with a blade projecting medially from the anterior surface and extending nearly the entire length; apex forming a sharp tooth, which is slightly curved medially; blade bearing one short stout medial tooth. Maxillae with the cardo swollen laterally; stipes distinct, elliptical, very small and apparently adnate to the labium; palp represented by a minute cluster of five sensilla, galea by a minute cluster of two sensilla.

Harpagoxenus americanus Emery
Pl. I, Figs. 24–29

Immature Larva:—Length about 2.2 mm. Plump; diameter greatest at the middle; decreasing slightly toward either end; prothorax inclined ventrally, rest of body straight. Anus ventral, with a posterior lip. Somites indistinct. Mesothoracic spiracle considerably larger than the others, which are small. Integument of dorsal surface of posterior somites with rather numerous transverse rows of spinules. Body hairs moderately numerous. Of two types: (1) short to moderately long (0.018–0.126 mm), longest anteriorly and dorsally, stiff and stout, with short-bifid or short-trifid tip; (2) anchor-tipped, about 0.18 mm, with the basal half sinuate, four in a row across the dorsum of each abdominal somite I-V. Cranium subtrapezoidal in anterior view, slightly broader than long, somewhat narrowed ventrally. Antennae minute, each with three (rarely two) sensilla, each of which bears a spinule. Head hairs numerous, minute (0.003–0.009 mm), simple. Labrum feebly bilobed; breadth twice the length; anterior surface with 12–14 minute hairs; ventral border of each lobe with one isolated sensillum and a cluster of four sensilla; posterior surface of each lobe with three isolated and two contiguous sensilla. Mandibles moderately sclerotized; stout; subtriangular in anterior view, with a blade projecting medially from the anterior surface and extending nearly the entire length; apex forming a sharp tooth, which is slightly curved medially; blade bearing one short stout medial tooth. Maxillae with the cardo swollen laterally; stipes distinct, very small,

elliptical and apparently adnate to the labium; palp minute, represented by a cluster of five sensilla; galea minute, represented by two contiguous sensilla. Labial palp represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: numerous larvae from New York, courtesy of Dr. W. S. Creighton.)

Wesson, 1939, p. 100–101: "On the arrival of warm weather in the spring, the *americanus* brood is represented by a variable number of small larvae, that are rather uniform in size. . . . These larvae, initially of a yellowish tinge and varying from one-third to one-tenth the bulk of a *curvispinosus* worker, developed uniformly, there being usually a spread of ten to twelve days between the pupation of the first and last larvae. The duration of the developmental periods was determined in the artificial nests to be approximately as follows: Length of semi-pupal stage, six to eight days; length of pupal stage, thirteen to fourteen days for males, fourteen to seventeen days for females and workers. . . . No new larvae or eggs appeared in the nests until the overwintered larvae were pupating. . . . When the larvae are pupating, eggs begin to appear in numbers and continue to do so for several weeks; then their production rapidly tapers off. The larvae that hatch from these eggs grow quite slowly and seldom attain any size during the summer and fall. . . . Thus during the summer and fall the brood comes to consist of a number of larvae, fairly uniform in size, which pass the winter in that stage, shrinking somewhat in bulk, and appearing in the spring as the spring brood discussed above. The length of the larval period is, therefore, somewhat less than one year."

Harpagoxenus sublaevis (Nylander)

Adlerz, 1886: A few single-hooked hairs were mixed among the more numerous anchor-tipped hairs—also all possible transitional shapes (pp. 51 and 258). Internal anatomy pp. 58 and 60. "The larvae have strongly chitinized and large mouth parts. The ventral surface lacks hairs, at least in the larger larvae. The dorsal hairs are similar to those of *Formicoxenus* larvae, with the exception of the wool-hairs, which have ends of many different kinds. Some have simple ends; the majority, however, have double ends, as with other Myrmicidae. Between these extremes are found various transitional forms. Some have deeply divided ends, as with *Anergates* larvae" (p. 267–268). (Translation from the Swedish by Professor Edith E. Larson.) Pl. VII, Fig. 9: a crude drawing of the mouth parts in anterior view. The generic name *Tomognathus* was used.

Adlerz, 1896: "A short time after hatching [the larvae] swell out to noticeably larger dimensions than the eggs, which without question, depends upon the fact that the collapsed tracheal tubes fill with air. The head is relatively very large and especially clearly delimited on the newly hatched larvae. The dorsal surface already has long hairs. In *Swedish Ants* I have called attention to the hair forms which in most cases are characteristic for the species. Especially are myrmicids distinguished from camponotids by means of their wooly hairs which are divided at the ends into two branches. In this connection it should be noted that *Tomognathus* [= *Harpagoxenus*] and *Leptothorax* sometimes have a few wooly hairs without divided ends among the more numerous ones with divided ends. In contrast I must point out that the certainly meaningless difference which I have thought I found between the shorter hair of *Tomognathus* and *Leptothorax* is not constant. To be sure, I have on one *Tomognathus* larva (hatched from a *T.* laid egg) noticed wooly hairs which were particularly deeply divided at the tip to form two long points. This hair-form was not found on any *Leptothorax* larva, but since this hair-form even in *T.* larvae is unusual it cannot be reliably used for distinguishing the larvae. In addition, as the over-all body form appears to be exactly the same as in the *acervorum* group and in both species larvae have toothed and otherwise similarly formed mandibles, I see at present, no possibility of distinguishing them from one another. This situation depends upon the close relationship between these two species, which is evident in the anatomy of the fully developed ants, both externally and internally. Likewise, in addition, I believe that the great similarity which I have called attention to between such otherwise unlike ants as *Tetramorium* and *Anergates* must indicate a close relationship between these latter. . . . .

"The universal situation—which I have previously described—is that the ant larvae are fed exclusively with liquid food which is brought up from the stomachs of the workers. This is not quite the case with *Tomognathus* and *Leptothorax* larvae, and surely a more careful observation will give the same result for other ants which live off of animal food. The ant larvae, which are stored for food, are killed by the workers in such a way that the integument is bitten hard by the mandibles and punctured, and the juices sucked up. But the empty, and to outward appearance, dry remains are not discarded but torn into small pieces. These pieces are held in front of the mouths of the larvae, which are usually lying on their backs, at which time their mouth parts start working in a lively fashion. As soon as the ant notices this she usually loosens her grip, and the larva now continues with a gluttonous appetite to chew up its piece of skin which visibly becomes smaller and shortly vanishes entirely. During the continued chewing the ant larva handily turns the firmly held piece at its convenience. Without question it is the muscular maxillae and the short, branched palps of the

lower lip which function for holding and turning. Even the shed cuticle of the pupating larvae is conserved by the workers in the most careful manner and is rationed out as food for the remaining larvae. Even at such happy times for the community as a pupa's change to an imago extra food was provided for the larvae in that these then were allowed to feast on small pieces of skin shed by their earlier metamorphosed brothers and sisters. One can hardly believe that this chitinous skin is nutritious food. At one time I even saw a worker offer a larva an egg-shell which had recently lost its inhabitant. This was not taken by the larva, however. Certainly eggs were often destroyed by workers but they were not given directly to larvae. In contrast, I saw on a couple of occasions *Tomognathus* workers which grabbed newly hatched larvae and offered them as food to the older larvae, in the usual manner, holding them in front of their mouths. My *Tomognathus–Leptothorax* communities ate flies also. It was especially the thoracic musculature which was conserved and used as food for the larvae. Often larger or smaller pieces of the chitinous thoracic skeleton were torn away attached to the muscle, which did not seem to prove a handicap to the larvae but were likewise consumed. The most prized food seemed to be larvae of their own kind. In contrast, they would not consume larvae or pupae of *Formica* or *Lasius*. The larvae or pupae of *Leptothorax* which were stored for food were usually killed; otherwise they were adopted among the community's own larvae. This happened, for example, with a *tuberum* larva, which for a long time was raised in a *Tomognathus-Leptothorax* community, later pupated and at last metamorphosed to a small *tuberum* worker. It behaved as if it had been in its own community, fed and cleaned the larvae, and without fear consorted with its large companions, among whom it seemed to arouse a certain notice because of its different appearance" (pp. 35–38). (Translation from the Swedish by Professor Edith E. Larson.) The preceding quotation is summarized in French on page 75. The following is based on the French summary (pp. 75–76) of material on pages 35 and 38–41: The egg stage varies from 25 to 35 days, depending on the temperature. When the meconium is evacuated the semipupal stage begins; it lasts 4–14 days, depending on the temperature. The workers assist in the evacuation, but do not eat the meconium. The pupal stage lasts 10–25 days for males and 12–26 days for females, depending on the temperature.

Wheeler, 1910, p. 493, discussing Adlerz, 1896: "It seems probable, therefore, that this ant depends on its slaves for the nurture of its young. . . . The larvae of *sublaevis* are so much like those of their hosts that he could not distinguish them. They are nourished both with regurgitated liquid food and with pieces of insects, a method of larval feeding which was also observed by Viehmeyer."

Adlerz has stressed his inability to distinguish the larvae of *Harpagoxenus sublaevis* from those of its host. By contrast we have found that in our material the larvae of *H. americanus* are easily separated from those of its host, *Leptothorax longispinosus* Roger, by the number and shape of body hairs, the number and size of head hairs and by the shape of mandibles and maxillae.

Genus **Formicoxenus** Mayr
Formicoxenus nitidulus (Nylander)

Adlerz, 1886: "The hairs of both dorsal and ventral surfaces are approximately as long and branched in the same way: either with the ends shortly two-branched and the branches with or without spines, or also with simple aculeate ends (the latter hair-form is less common). Anchor-tipped hairs ["ullhär"] of the usual form numerous in young larvae, very few in older larvae" (p. 266). (Translation from the Swedish by Professor Edith E. Larson.) Internal anatomy p. 58. Pl. VII, Fig. 1, larva (without hairs) in side view; Fig. 2, three hair tips; Fig. 3, tip of anchor-tipped hair.

Genus **Epimyrma** Emery
Epimyrma gösswaldi Menozzi

Gösswald (1934–35, p. 125) has recorded this ant as a mermithid host. Presumably the nematode larva had been parasitic in the ant larva.

Genus **Rogeria** Emery

Head cordate. Antenna minute. Head hairs few (about 14). Posterior surface of labrum with numerous spinules. Mandibles long and slender; apex forming a long sharp-pointed tooth, which is strongly curved medially; with a narrow blade projecting medially from the anterior surface and bearing two long coarse subapical medial teeth. Maxillae narrow, with the apex conoidal; palp a short frustum; galea a frustum. Anterior surface of the labium with numerous spinules. Hypopharynx with numerous longitudinal ridges.

Rogeria stigmatica sublevinodis Emery
Pl. I, Figs. 22–23

Head cordate; cranium slightly broader than long. Antennae minute, each with three sensilla, each of which bears a spinule. Head hairs few. Labrum bilobed; short and broad (width 2.6X length); anterior surface of each lobe with four or five sensilla; ventral border of each lobe with two contiguous sensilla and numerous short rows of spinules; posterior surface of each lobe with one isolated and two contiguous sensilla and with numerous spinules in short rows. Mandibles heavily sclerotized, long and slender; apex forming a long sharp-pointed tooth which is strongly

curved medially; with a narrow blade projecting medially from the anterior surface and bearing two long coarse subapical medial teeth. Maxillae narrow; apex conoidal; palp a stout frustum bearing four sensilla (two large and encapsulated, two small and each bearing a spinule); galea a slightly longer frustum with two apical sensilla. Anterior surface of labium with numerous transverse rows of minute spinules; palp a short peg narrowed at the base; opening of the sericteries a short transverse slit. Each half of hypopharynx with numerous longitudinal ridges. (Material studied: four damaged heads from the Fiji Islands).

Genus **Apsychomyrmex** Wheeler

Anterior half strongly curved ventrally; posterior half nearly straight; diameter increasing rapidly to the metathorax, decreasing to abdominal somite II, increasing again to VI(?), then decreasing rapidly to the posterior end. Body hairs moderately numerous, with short base and 2–4 long fine lash-like branches. Head long, narrow and subcylindrical. Cranium subtrapezoidal in anterior view, narrowed ventrally, its breadth ¾ the length. Antennae small, each with two sensilla. Head hairs few (about 14). Posterior surface of labrum spinulose. Mandibles long and narrow; apical tooth rather stout, sharp-pointed and strongly curved medially; near the apical tooth a series of four or five small blunt medial denticles. Maxillae with the apex free and conoidal; palp a tall frustum; galea a tall frustum.

Apsychomyrmex myops Wheeler

Pl. I, Figs. 16–21

Anterior half strongly curved ventrally; posterior half nearly straight; diameter increasing rapidly to the metathorax, decreasing to abdominal somite II, increasing again to VI(?), then decreasing rapidly to the posterior end, which is round. Body hairs moderately numerous, about 0.08 mm long, with short base and 2–4 long fine lash-like branches. Head long, narrow and subcylindrical; breadth of cranium about three-fourths the length; subtrapezoidal in anterior view, narrowed ventrally. Antennae small, each with two sensilla, each of which bears a spinule. Head hairs few. Labrum subtrapezoidal but with the ventral corners rounded, narrowed ventrally; anterior surface with two sensilla; ventral border with six sensilla; posterior surface spinulose and with two clusters of three sensilla each. Mandibles rather large, long and narrow; apical tooth rather stout, sharp-pointed and strongly curved medially; near the apical tooth a series of four or five small blunt medial denticles. Maxillae with the apex conoidal; palp a tall frustum bearing five sensilla; galea a tall frustum with two apical sensilla. Labial palp with five sensilla. (Material studied: a single damaged semipupa (?) from Honduras.)

This larva resembles much more closely the larva of *Myrmecina* in the tribe Myrmecinini than it does the larvae of other Leptothoracini.

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