

W.L. Brown, Jr.
COLLECTION

1903.]

NATURAL SCIENCES OF PHILADELPHIA.

215

A REVISION OF THE NORTH AMERICAN ANTS OF THE GENUS
LEPTOTHORAX Mayr.¹

BY WILLIAM MORTON WHEELER.

The diminutive species of the cosmopolitan genus *Leptothorax* are among the most interesting though least conspicuous of our ants. No other group of Formicidæ appears to present such diversity of habits, while at the same time adhering so closely to certain rather definite generic peculiarities. The species all form small colonies, often of not more than twenty-five to fifty individuals, and occupy small cavities in the soil, or between stones, or in the tissues of plants. These cavities are either of their own excavation, or found ready to their use in the form of accidental openings or the burrows and galleries of larvæ, other ants, etc. Favorite nesting-places are the abandoned woody galls of the Cynipidæ, like the galls of *Holcaspis cinerosus* on the live-oaks of central Texas, the galls of Diptera, like *Trypeta solidaginis* on the golden-rod, etc. Even hollow nuts on the ground under the trees are sometimes tenanted by species of *Leptothorax*. Brief notes on the nesting habits, so far as these are known, are appended to the descriptions of the different species enumerated below.

The small size and obscure location of the *Leptothorax* nests, which form a remarkable contrast with the teeming, conspicuous formicaries of other ants like *Formica rufa*, *F. exsectoides*, *Pogonomyrmex barbatus* and *Ischnomyrmex Cockerelli*, will readily account for our rather limited knowledge of the North American species. Then, too, none of our *Leptothorax* are really common, except in certain circumscribed localities, so that the discovery of the species is more often a matter of accident than of deliberate search, even when one is out looking for ants and nothing else. Single workers are found running about on the ground or on the trunks and branches of trees in search of sweet exudations, small insects or the remains of large insects that have been rejected by spiders, birds, etc. The nests are most readily found by following up such single workers, often a tedious and time-consuming task, as these insects will sometimes run about for an hour or

¹ Contributions from the Zoological Laboratory of the University of Texas, No. 48.

more in search of food before returning to the nest and revealing its hidden entrance, a tiny hole like a pin-prick in the soil or bark.

None of the species are known to attend aphides, and the nests very rarely or never contain guests or synœketes of any description. The *Leptothorax* themselves, however, sometimes live as guests in the nests of larger ants. Thus *L. Emersoni* is always found as a guest in the nests of *Myrmica brevinodis*, and *L. acervorum* of Europe and its American variety *convivialis* also exhibit a decided tendency toward xenobiosis. The typical *L. curvispinosus* appears to act as the slave of *Tomognathus americanus*, an extremely rare ant, which is probably similar in habits to its European congener, *T. sublaevis*. Most of the species of *Leptothorax* are very timid, and many of them readily "feign death" when roughly handled. Nevertheless they are often extremely hostile and vindictive toward other ants, especially toward ants of their own species from strange nests.

For our first insight into the habits of *Leptothorax* we are indebted to Forel, who recorded his observations in the charming *Fourmis de la Suisse* (pp. 339-341). The more important of these observations are given in the following translation:

"April 17, 1868, I found in the bark of a pine-tree a very small colony of *L. tubero-affinis*, consisting of a fertile female, about a dozen workers and some eggs. I lost four of the workers during the capture and broke two of the legs of the female. I subsequently placed this little family in a pasteboard box with a glass cover. It prospered; the female got on well with her four remaining legs; some of the eggs hatched and the larvæ were fed. The workers would eat nothing but the honey which I gave them; they were very timid and settled down with the female in the box. They gave little heed to the female, which lived almost like them. I have noticed that it is only the workers of the genera *Plagiolepis* and *Lasius* and of certain species of *Formica* that assiduously court their fertile females. *Leptothorax* goes to the opposite extreme: the females live almost like the workers, being merely somewhat less inclined to work. Huber was wrong, therefore, in generalizing the rôle of the fertile females of *Lasius*, etc. By May 24 the female of my captive formicary had again laid some eggs, and the larvæ had grown very large. The workers ate larvæ of *Lasius* that were given to them. June 4 one of the larvæ became a worker pupa, but there remained only two large larvæ and the eggs. June 10 there were two pupæ and eight or nine small larvæ had hatched from the eggs. Of the latter two were yellow and retained this color, the others were whitish. By June 13 they had grown. I then gave my *L.*

tubero-affinis a worker pupa of *L. Nylanderi*, and they took care of it. These ants never attempted to escape when I opened the box. They impressed me by the delicacy of the sense of touch in their antennæ, as they felt of little particles with remarkable precision and distinguished their qualities (one of the eggs of their queen, a grain of dust, a particle of honey, etc.). June 21 I gave them some pupæ of *Tetramorum cæspitum* which they killed and ate. On June 25 the pupa of *L. Nylanderi* had hatched, and the resulting worker lived on good terms with the *tubero-affinis*, working with them. June 28 I lost several workers through carelessness; there remained only the queen with five worker *tubero-affinis* and the worker *Nylanderi*; the small larvæ had grown considerably and began to pupate. June 29 one of the older pupæ hatched and the other soon followed, so that two worker *tubero-affinis* were added to the colony. The same day I gave my ants worker pupæ of *T. cæspitum*. They cared for two or three of the younger ones and killed the others which were about to hatch, or rather allowed them to die through neglect. July 15 three more small larvæ made their appearance. July 16 one of the two pupæ of *T. cæspitum*, which they had continued to foster, hatched and lived thenceforth with these ants of a different genus, on the best of terms. July 18 the second pupa of *T. cæspitum* followed suit, but this worker was somewhat malformed and died in a week. The first *Tetramorium*, on the contrary, prospered apace; it was larger than any of the *Leptothorax* workers and was conspicuous on account of its activity. It ran about continually in all parts of the box, but kept returning from time to time to the *Leptothorax*. By July 29 a fresh batch of little *tubero-affinis* larvæ had grown up, and the pupæ of the second generation began to hatch. August 16 I placed the seven surviving *tubero-affinis* workers and their queen in alcohol, as the colony had suffered considerably during my trip from Zurich to Vaux. It had lived in captivity four months. . . .

"June 25, 1868, having found a formicary of *L. acervorum* in the bark of a pine, with a winged female and some female pupæ, I captured and preserved it in a box till August 16. Several females hatched in the box. The females of this species are not larger than the workers. I often saw these little females carrying the larvæ and pupæ about like the workers. Strange to say, nearly all of them lost their wings within two or three days from the time of hatching. I even saw one of them obviously endeavoring to rid herself of her wings by twisting them about. As they were born in a box containing no males, they could not have been fecundated. Hence I cannot conceive why they removed their wings. Can it be that the formicaries of *Leptothorax*

are kept up in this way, because the workers cannot retain the fertile females in the nests by force, on account of the small size of the nests and their position on vertical walls, or because the males may not often be present simultaneously with the winged females? Would not these deälated females be fecundated later by males appearing in the same formicary? The fact remains that one often finds in *Leptothorax* nests deälated females with small abdomens and apparently not fecundated, together with others obviously fertile. I refrain from deciding the question."

The questions asked by Forel so long ago still remain unanswered, although it is clear that the colonies are not as a rule renewed and maintained by a retention of the virgin females in the parental nest. My own observations show that the little colonies of these ants are founded by single fertile females, in the very same manner as the huge formicaries of *Formica*, *Camponotus*, etc. On several occasions I have found deälated females of *Leptothorax* either alone or with a very few eggs, larvæ or pupæ in isolated oak-galls (e.g., *L. obturator* q. v.). Moreover, I have never found more than one queen in a nest in any of the species that I have taken, except at the very height of the breeding season (May and early June in Texas, mid- or late summer in the Northern States). Although in such nests I have sometimes seen several deälated females, which probably arose as Forel has described, I am inclined to believe that all of these, except the mother queen, must soon leave the nest and establish colonies of their own.

The question naturally suggests itself: Why are the colonies of *Leptothorax* so small? I believe that this peculiar condition may be traced, in part at least, to the following causes, either singly or collectively: 1. The females are but little larger than the workers (in *L. Emersoni* they are not even larger than the workers) and this means relatively small fecundity. This appears to be the case also in other ants that have females of the same or nearly the same size as the workers (*Myrmecina*, *Stenamma s. str.*; *Ponerinæ*). And reciprocally, owing to this reduced fecundity, the queen cannot be abundantly fed, since she produces but few workers. 2. The workers of *Leptothorax* are probably short-lived as compared with many other ants. At least one is inclined to believe this from the rather high mortality among these insects in artificial nests. 3. In most species of *Leptothorax* each colony contains only a single fertile queen.²

² Other observations on the habits of *Leptothorax* will be found in the following works: Adlerz, "Myrmecologiska Studier," II. Svenska Myror och deras Lefnadsförhållanden, *Bihang till K. Svenska Vet. Akad. Handl.*, Bd. XI, No. 18,

The geographical distribution of the North American *Leptothorax*, though very incompletely known, is not altogether devoid of interest. So far as it is possible to generalize from existing data, it would seem that the species are rather uniformly distributed over the entire continent, not excepting at least a portion of the Arctic regions. By this I do not mean to say that the same species occur everywhere, or even that the distribution of a particular species is very wide, but that the ant-fauna of any given locality usually comprises a few species of *Leptothorax*. This indicates a wide range of adaptability to differences of soil, moisture, temperature, vegetation, etc., within the same genus. The extremes of this adaptation seem to be represented by forms like *L. curvispinosus*, which inhabits the humid shady woods of the North Atlantic States, and *L. Pergandei*, which occurs even on the sun-scorched soil of the Trans-Pecos deserts.

We have few species in common with Europe, probably only *L. acervorum* and *L. muscorum*, both presenting distinct American varieties or subspecies analogous to and occurring over the same territory as the American forms of *Formica fusca*, *rufa* and *sanguinea* and *Myrmica rubra*. All of these forms occur far to the north and to considerable altitudes, both in Europe and America, and undoubtedly constitute important elements of an ancient palæarctic ant-fauna.³ At low altitudes and within our territory the forms of *L. acervorum* and *muscorum* seem to be confined to the northernmost tier of States.

The twenty species of *Leptothorax* recognized in the present paper as occurring in America north of Mexico are about equally distributed between the two divisions of the genus, which are characterized respectively by the workers and females having 11- (the males 12-) jointed antennæ, and the workers and females having 12- (the males 13-) jointed antennæ. It is an interesting fact that the species with 11-jointed antennæ in the workers are mainly confined to the Northern and Eastern States, those with 12-jointed antennæ to the Western and Southwestern territory. Exceptions are *L. curvispinosus* and *acervorum*, which present varieties even in New Mexico (though at considerable altitudes!) and *L. tricarinatus*, which was described from South

1886, and III. Tomognathus sublaevis Mayr, *ibid.*, Bd. XXI, No. 4, 1896; Wheeler, "The Compound and Mixed Nests of American Ants," *Am. Natural.*, Vol. XXXV, Nos. 414, 415, 417 and 418, 1901, and "Ethological Observations on an American Ant (*Leptothorax Emersoni* Wheeler)," *Arch. f. Psych. u. Neurol.*, Bd. II, Heft 1 u. 2, 1903 pp. 1-31.

³ *L. acervorum* var. *convivialis* (q. v.) has been taken on the summit of Las Vegas Range, N. M., at an altitude of 11,000 feet, by Prof. T. D. A. Cockerell in xenobiosis with another boreal ant, *Myrmica brevinodis*. *L. acervorum* var. *Kincaidi* was described by Pergande from Alaska.

Dakota. All the new species described in the present paper belong to the group with 12-jointed antennæ, and it is probable that many more members of this group remain to be discovered in the West and Southwest. Both groups are represented in Mexico and Central America. To judge from Emery's table of the South American species, those with 11-jointed antennæ predominate again south of the Equator. Most of these species, however, whether having 11- or 12-jointed antennæ, have acute, projecting angles to the pronotum, and are therefore consigned to a particular subgenus, *Goniothorax*, by Emery.⁴ The small group comprising the subgenus *Dichothorax* Emery (possibly monotypic) is confined to the Southern United States. This subgenus resembles the subgenus *Temnothorax* Mayr (including only *T. recedens* Nyl.) in many respects. It is interesting to note that this form occurs only in Southern Europe.

While some of the European *Leptothorax* (like *tuborum* and *unifasciatus*) are known to be extremely variable, the North American materials at the disposal of previous writers have not been sufficient to prove the same for any of the species on this side of the Atlantic. Nor am I able to throw as much light as I could wish on the limits of variability in our species, although my material certainly shows that some of our species are decidedly unstable. Such are, e.g., *L. acervorum*, *curvispinosus*, *nitens* and possibly also *Schaumi* and *fortinodis*, especially if the two latter really represent extreme forms of the same species, as seems to be indicated by the existence of intermediate forms.

The genus *Leptothorax* was established by Mayr in 1855,⁵ on a number of species previously included by Nylander and other myrmecologists in the composite genus *Myrmica*, a genus which at one time contained practically all the known ants of the subfamily Myrmicinae. Though some of the characters of *Leptothorax* are not very definite, the genus has nevertheless stood the test of nearly half a century and will probably continue to stand. Like many ant-genera, and genera of other animals also, for that matter, it is recognized not so much by a description of its characters, as by its peculiar and almost unmistakable habitus. He who has had little experience in handling ants will be liable to confound the workers of *Leptothorax* with the workers of *Pheidole* or *vice versa*, but to the experienced eye even the gait of the

⁴ "Studi sulle Formiche della Fauna Neotropica," *Bull. Soc. Ent. Ital. Ann.*, XXVIII, 1896, pp. 26, 27.

⁵ "Formicina Austriaca," *Verh. K. K. zool.-bot. Ver. Wien*, Bd. 5, 1855, pp. 431-433.

ants of these two genera differs very decidedly. The following are the leading diagnostic characters of the genus *Leptothorax*.

LEPTOTHORAX Mayr.

Worker.—Small, monomorphic. Head longer than broad, and broader than the thorax. Mandibles broad, 4-5-toothed. Maxillary palpi 5-jointed; labial palpi 3-jointed. Clypeus variable in shape, slightly convex or impressed in the middle, its anterior border somewhat rounded, entire or sinuately excised in the middle. Frontal carinae almost straight, diverging very little behind. Antennae 11- or 12-jointed, usually with a distinctly 3-jointed club. Frontal area present. Eyes of moderate size, near the middle of the lateral surface of the head. Ocelli occasionally present, especially in ergatoid or subergatoid individuals. Thorax slender, usually somewhat broader in front, at least above, and narrower behind. Promesonotal suture obsolete; mesoepinotal suture present or absent, the thorax at this region either without any constriction, with a faint or a very decided (subgen. *Dichothorax*) constriction. Epinotum armed with a pair of teeth, or spines of variable development. Petiole with a short peduncle in front and surmounted by a node of variable form, its lower anterior surface armed with a median tooth. Postpetiole nodiform, sometimes more campanulate, unarmed below. Gaster large, broadly elliptical, compressed dorsoventrally, its basal three-fourths formed by the first segment. Sting well developed, at least in many of the species. Legs rather stout, the femora fusiform, somewhat incrassated in the middle, the tibiae thicker toward their distal ends. Spurs of middle and hind legs simple, not pectinate. Integument very hard. In most species the hairs on the body, and in a few also those on the appendages, are short, erect, clavate and under a high magnification finely crenulate. Our species are yellow, brown, red or black, and the majority of them have the head, thorax and pedicel more or less sculptured and in great part opaque. The gaster in all our species is very smooth and shining.

Female.—Somewhat larger and more robust than the worker, or of the same size. Antennae of the same number of joints. Eyes and ocelli moderately prominent. Thorax with its sides subparallel or somewhat bulging in the middle. Mesonotum conspicuously flattened. Epinotal spines shorter and often stouter than in the worker. Basal surface of epinotum nearly horizontal. Petiole and postpetiole like the corresponding segments of the worker, the node of the former often more acute. Gaster like that of the worker, at least its basal two-

thirds formed by the first segment. Wings milky or yellowish hyaline, with very pale and indistinct veins and stigma. Radial cell sometimes open, sometimes closed. There is a single cubital cell. Transverse vein meeting cubital vein at its bifurcation; internal cubital often indistinct. Discal cell closed. The pilosity of the female is usually less pronounced than that of the worker, though of the same character; the sculpturing is rougher.

Male.—Of the same size as the worker, or but little larger, and usually darker in color. Head short and as broad or broader than the thorax. Mandibles variable, narrow, truncate and toothless, or dentate or denticulate. Clypeus somewhat convex. Antennæ 12-13-jointed; scape short, funiculus very long, slightly thickened at its distal end to form, in many cases, an indistinct 4-jointed club. Eyes and ocelli large and prominent. Mayrian furrows of mesonotum very distinct. Epinotum not prolonged backward, with two small swellings, rarely with two short teeth, in the place of the worker armature. Petiole more slender and with lower node than in the worker. Postpetiole nodiform or subcampanulate. Gaster rather slender, elongate elliptical, often slightly flattened dorsoventrally. Legs slender. Wings as in the female. Hairs on the body and appendages usually much less conspicuous than in the worker, not clavate.

I subjoin a table for the identification of the workers of the various *Leptothorax* species known to occur in America north of Mexico. As the females of only half and the males of less than half of our species are known, it is hardly worth while to construct tables for the identification of the winged sexes.⁶

⁶ The following species have been described from Mexico and Central America, and in all probability comprise but a very small portion of the species actually occurring in these countries:

1. *Leptothorax Stolli* Forel, Bull. Soc. Vaud. Sci. Nat. (2), XX, p. 352, 1894. ♂ & ♀; Dalla Torre, Cat. Hymenopt., VII, 1893, p. 127; Forel, Biol. Centr. Am., III, 1899, p. 54. ♀. Guatemala, summit of crater of the Volcan de Agua (13,000 feet!); living under stones.
2. *L. echinatinodis* Forel, Compt. Rend. Soc. Ent. Belg., XXX, 1886, p. xlviii. ♂ & ♀; Biol. Centr. Am., III, 1899, p. 55. Rio Janeiro, Brazil. Lives in hollow twigs. The typical form has not been found in North America, but only the following subspecies and possibly its variety:
Subsp. *aculeatinodis* Emery, Bull. Soc. Ent. Ital., XXVIII, 1896, p. 60. ♂. Costa Rica, Jimenez. Also Brazil.
Var. *pungentinodis* Emery, Bull. Mus. Zool. Torino, XI, 1896, p. 2. ♀. Mexico, Atoyac en Vera Cruz; Panama.
3. *L. Pittieri* Forel, Biol. Centr. Am., III, 1899, p. 56. ♂. Costa Rica.
4. *L. Tristani* Emery, Bull. Soc. Ent. Ital., XXVIII, 1896, p. 61. ♂ & ♀. Forel, Biol. Centr. Am., III, 1899, p. 56. Jimenez, Costa Rica.

Table for the identification of the workers of *Leptothorax*.

1. Antennæ 11-jointed,	2
Antennæ 12-jointed,	10
2. Thorax with faint but distinct mesoëpinotal constriction,	3
Thorax without mesoëpinotal constriction,	7
3. Postpetiole sculptured, opaque,	4
Postpetiole smooth and shining above,	6
4. Tibiæ and antennal scape without clavate hairs,	5
Tibiæ and antennal scape with short, erect, clavate hairs,	<i>L. hirticornis</i> Emery.
5. Hairs on body long and thin, not clavate,	<i>muscorum</i> Nyl. var. <i>sordidus</i> var. nov.
Hairs on body short and clavate,	<i>acervorum</i> Mayr. subsp. <i>canadensis</i> Prov., etc.
6. Tibiæ with clavate hairs,	<i>Provancheri</i> Emery.
Tibiæ without clavate hairs,	<i>Emersoni</i> Wheeler.
7. Epinotal spines very short, dentiform,	8
Epinotal spines long,	9
8. Petiole not conspicuously larger in profile than the postpetiole,	<i>Schaumi</i> Roger.
Petiole conspicuously larger in profile than the postpetiole,	<i>fortinodis</i> Mayr. (and its varieties).
9. Dark-colored, with very long, horizontal epinotal spines,	<i>longispinosus</i> Roger.
Yellow, sometimes more or less infuscated; epinotal spines shorter,	<i>curvispinosus</i> Mayr. (and its subspecies and varieties).
10. Without mesoëpinotal constriction; hairs on body clavate, not abundant,	11
With pronounced mesoëpinotal constriction, hairs abundant, not clavate (subgenus <i>Dichothorax</i> Emery),	19
11. Head very largely smooth and shining,	12
Head opaque or subopaque, or smooth only along the median line or behind,	13
12. Very dark-brown, or black, antennal scape almost reaching the posterior angle of the head,	<i>Schmittii</i> sp. nov.
Yellow, or somewhat infuscated; scape reaching to $\frac{2}{3}$ the distance between the eye and the posterior corner of the head,	<i>nitens</i> Emery (and its subspecies and variety).
13. Anterior margin of clypeus entire, rounded,	14
Anterior margin of clypeus sinuately excised,	16
14. Head and thorax very coarsely reticulate-rugose,	<i>texanus</i> sp. nov.
Head and thorax not coarsely reticulate-rugose,	15
15. Clypeus produced, with angularly projecting anterior border,	<i>tricarinatus</i> Emery.
Clypeus not produced, with broadly rounded anterior border,	<i>neomexicanus</i> sp. nov.
16. Black or dark-brown species,	17
Yellow species,	18

5. *L. petiolatus* Forel, Ann. Soc. Ent. Belg., XLV, 1901, p. 129. ♂. Wheeler, Ann. Soc. Ent. Belg., XLV, 1901, p. 201.

Cuernavaca, Mexico. "A single nest, consisting of a dealated queen and about 25 workers in a Tillandsia in parabiosis with *Cryptocerus* and *Cremastogaster*."

17. Petiole slender, seen from above three times as long as broad, node very low and rounded, *obturator* sp. nov.
 Petiole only $1\frac{1}{2}$ times as long as broad; node higher and shorter, *nevadensis* sp. nov.
18. Head opaque throughout, petiolar node round in profile; length 1.5-1.75 mm., *terrigena* sp. nov.
 Head with a smooth median line, node of petiole somewhat angular; length 2.25, *Andrei* Emery.
19. Summit of petiolar node seen from behind impressed or concave, *Pergandei* Emery.
 Summit of petiolar node seen from behind convex; rounded, *floridanus* Emery.

1. *Leptothorax hirticornis* Emery.

L. hirticornis Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 317 and 319. ♂.

Worker.—Length 2.75 mm.

Clypeus hardly impressed in the middle. Antennæ 11-jointed, joints 2-7 of the funiculus shorter than broad, club but relatively little thickened. Thorax slender, distinctly impressed at the mesoëpinal suture. Epinotal spines of average size, pointed, strongly compressed. Petiole robust, its anterior and posterior dorsal slopes forming a slightly obtuse angle; seen from above the sides of the petiole are subparallel. Postpetiole small, almost trapezoidal, a little broader than long.

Clypeus somewhat shining. Head, thorax and pedicel opaque, densely foveolate-punctate, the upper surface of the head also finely and rather regularly longitudinally rugose.

Hairs very short, strongly clavate, erect, not only covering the body but also the antennal scape and legs.

Bright testaceo-ferruginous, gaster and middle of front infuscated.

Type locality: Washington., D C. (Pergande).

Described from a single specimen in the collection of Prof. Emery.

2. *Leptothorax muscorum* Nylander, var. *sordidus* var. nov.

L. muscorum Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, p. 318. ♂.

Worker (Pl. XII, fig. 2).—Length 2-2.75 mm.

Clypeus not impressed in the middle, its anterior border nearly straight, not produced. Antennæ 11-jointed; scape reaching to mid-way between the eye and the posterior angle of the head; first funicular joint as long as joints 2-4 together, terminal joint as long as the two preceding joints of the club. Thorax broad in front, with rounded humeri, much narrower behind, with a distinct mesoëpinal constriction. Epinotal spines of moderate length, directed backward, and slightly outward, about as far apart at their bases as they are long. Petiole from above suboblong, with slightly convex sides, nearly

twice as long as broad; in profile the anterior and posterior slopes of the node are of nearly equal length, the former slightly concave, the latter distinctly convex, the apex somewhat flattened. Postpetiole hardly more than half as long as the petiole, but half again as broad, with prominent, rounded anterior angles and convex node.

Head subopaque, longitudinally reticulate rugose, mandibles and frontal area smooth, clypeus with several longitudinal rugæ, which are so delicate as to leave the surface shining. Thorax subopaque, irregularly reticulate rugose, especially on the pronotum and epinotum, the neck and pleuræ still more delicately reticulate. Petiole and postpetiole subopaque, delicately reticulate rugose. Gaster smooth and shining.

Hairs on the head and trunk whitish, rigid and obtuse, but hardly clavate, longest and most conspicuous on the abdomen. Antennæ and legs clothed with delicate, appressed, whitish hairs.

Color yellow, whole head, except the mandibles, dark-brown. There is a large brown blotch on the pronotum and one on the epinotum. Nodes of petiole and postpetiole, trochanters, swollen portions of the femora, club of antennæ and the dorsal surface of the gaster distinctly infuscated.

Type locality: Boulder, Colo.

Described from a dozen specimens received from Rev. P. J. Schmitt, O.S.B.

This variety appears to be identical with the form mentioned by Emery from Hill City, S. Dak. (Pergande). It differs from specimens of the typical European *muscorum*, sent me by Prof. Forel from the Schluderbach, Switzerland, in the following points: Hairs on the trunk distinctly shorter and at least on the head, thorax and pedicel distinctly thicker. Dorsal portions of thorax and pedicel and the thickened portions of the femora infuscated. These characters are constant in the twelve Colorado specimens.

3. *Leptothorax acervorum* Mayr, subs. *canadensis* Provancher.

L. canadensis Provancher. Addit. Faun. Canada, Hyménopt., 1887, p. 245. ♂ ♀ ♂.

L. acervorum var. *canadensis* Er. André, Rev. d'Entomol., VI, 1887, p. 295. ♂.

L. acervorum var. *canadensis* Dalla Torre, Catal. Hymenopt., VII, 1893, p. 123.

L. canadensis Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 317, 318, 319.

Worker (Pl. XII, fig. 4).—Length 2.75–3.5 mm.

Minute ocelli occasionally present. Clypeus with a distinct longitudinal impression in the middle, its anterior border rather convex and

rounded. Antennæ 11-jointed; scape reaching midway between the eye and the posterior angle of the head; first funicular joint not longer than joints 2-3 together; terminal joint distinctly longer than the two preceding joints of the club. Thorax long, subcylindrical, somewhat narrowed behind, dorsally flattened, its anterior angles rounded; promesonotal and mesoëpinotal sutures both distinct, a slight but distinct constriction at the latter. Epinotal spines rather short and blunt, compressed, in many specimens tooth-like and hardly longer than broad at the base, directed backward in a line with the dorsal surface of the epinotum, in no case longer than their distance apart at the base. Petiole from above oblong, not more than $1\frac{1}{2}$ times as long as broad, the node in profile with evenly concave anterior and somewhat depressed but convex posterior slope. Postpetiole trapezoidal, distinctly broader than long, its anterior angles prominent, anterior border distinctly broader than the posterior, dorsal surface hemispherical in profile.

Mandibles shining, coarsely punctate. Median impressed surface of clypeus smooth and shining, lateral surfaces longitudinally rugose. Head opaque, longitudinally reticulate rugose, the rugæ being most distinctly longitudinal on the front, vertex and cheeks. Thorax opaque, covered with reticulate rugæ which have a decidedly longitudinal trend on the dorsal and lateral surfaces of the pronotum and on the dorsal surface of the epinotum and the mesopleuræ. On the mesonotum the reticulation resolves itself into an area of even, close-set foveolæ. Pedicel opaque, the petiole sculptured like the mesonotum, the postpetiole somewhat smoother and almost punctate. Gaster smooth and shining.

Hairs whitish; those on the head, thorax and pedicel short, rigid and subclavate, on the gaster longer and thinner; on the antennæ and legs delicate, appressed.

Color dark-brown, almost black; small joints of the funiculus, the metatarsi, bases of femora, trochanters, ventral surface of pedicel, and in many specimens also the sutural regions of the thorax, yellow or pale-brown. In some specimens (immature?) nearly the whole thorax and the whole of the tibiæ are yellow.

Female (deâlated).—Length 3.75-4 mm.

Apart from the distinctively sexual characters, the female differs from the worker in the following characters: The reticulate rugosity of the head is more decidedly longitudinal, the rugæ running back regularly to the occiput without deviation at the ocellar region. Mesonotum, scutellum and pleuræ traversed by distinct longitudinal rugæ,

the first somewhat shining in the middle near its anterior border and in the regions of the parapsidal furrows. On the epinotum, about the bases of the spines, the rugæ become very coarse and reticulate. Epinotal spines short and blunt, resembling those of the worker in shape and direction. Petiolar node pointed, with rather flat anterior and posterior slopes, coarsely reticulate rugose. Sculpture of postpetiole less pronounced than that of the petiole, but coarser than the petiole of the worker. Pilosity short, like that of the worker, but the hairs on the head, thorax and pedicel are less clavate. Head, thorax, abdomen, femora and antennal club, black, remaining portions of the legs and the funicle, brown.

Type locality: "Canada."

Additional localities: Elk county, Pa. (Bradley); Olympia, Wash. (Kincaid).

This form should, I believe, be regarded as belonging to the same species as the European *acervorum*, as suggested by André. As Emery claimed, however, it deserves to rank as a subspecies, and not as a variety. The workers differ from the European specimens of *acervorum* in my collection (from Switzerland (Forel) and Scotland (Duglich)) in the shorter epinotal spines, the much deeper coloration of the thorax, pedicel and legs, the shorter and more clavate hairs on the trunk and the minute, appressed, instead of suberect hairs on the antennal scapes and legs. My specimens of the North American form average nearly as large as the European.

This subspecies is certainly rare in the Eastern States, but seems to be very common in Washington, to judge from the number of different nests sent me from that state by Prof. Kincaid. This is probably significant in connection with the palearctic distribution of *acervorum*.

The habits of the American subspecies are unknown. They probably resemble those of the European form, which lives in small colonies under bark, in moss, etc.

3a. Var. *yankee* Emery.

L. canadensis Prov. var. *yankee*, Zool. Jahrb., VIII, '94, p. 319. ♂ ♀.

The worker (fig. 5) differs from the worker of *canadensis* *typ.* in lighter coloration and in having somewhat longer epinotal spines. Head dark-brown, gaster somewhat paler; mouth, thorax, pedicel and legs reddish; antennal club, thoracic dorsum and femora usually infuscated. Sculpture finer and less rugose than in *canadensis*. In the female the thorax is dark-brown, the sculpture more pronounced.

Type localities: South Dakota, Utah, Colorado.

Several workers sent me by Rev. P. J. Schmitt, O.S.B., from Boulder, Colo., agree very well with Emery's description.

3b. Var. *convivialis* var. nov.

Length of worker 2-2.5 mm.; of female 3 mm. Differs from the typical *canadensis* and the preceding variety, in its small size and very deep coloration. Head, thorax, abdomen, femora and tibiae black, neck, ventral portions of pedicel, funiculus, trochanters, knees and tarsi red or yellow. Epinotal spines short and blunt. Sculpturing of body as rough as that of the typical *canadensis*. Color of the female deeper than that of the worker, the shining region of the mesonotum is more extensive than in the female of *canadensis*, and there is a large shining area devoid of sculpture in the middle of the scutellum.

Type locality: Milwaukee, Wis.

Additional localities: Colebrook, Conn.; top of Las Vegas Range (11,000 feet), N. M. (T. D. A. Cockerell); Beulah, N. M. (F. W. P. Cockerell).

This variety seems to have a pronounced tendency to symbiosis with other species of Myrmicidae. The Milwaukee specimens were found living in the bark of a stump in xenobiosis with *Cremastogaster lineolata* Say. Those from the top of the Las Vegas Range were taken by Prof. Cockerell in a nest of *Myrmica brevinodis*. The Connecticut specimens appeared to be living in plesiobiosis with *Formica rufa* subsp. *difficilis* Emery.

3c. Var. *Kincaidi* Pergande.

L. Yankee Emery var. *Kincaidi* Pergande, Proceed. Wash. Acad. Sci., Vol. II, December 20, 1900, pp. 520, 521. ♂ ♀.

"Female.—Length about 4 mm.

"Head and thorax black, the abdomen dark-brown, with the posterior edge of the segments brownish-yellow; antennae, mandibles and legs yellowish-red, the neck and paler parts of the nodes of a darker red; the flagellum grows gradually darker toward the end, with the last joint black; femora dark-brown, their base and apex yellowish-red; teeth of mandibles black. Head finely striated, the striae most distinct in front of the eyes and between the frontal carinae; the posterior half of the head is finely and rather densely rugose or reticulate, the clypeus is almost smooth and the mandibles striato-punctate; pronotum and mesonotum quite coarsely rugose, the metanotum, scutellum and upper surface of nodes finely, though rather indistinctly, striated; declivity of the metathorax transversely striated. Abdomen smooth. Erect hairs short, truncate and pale-yellowish, those of the nodes and abdomen longest; there are also a few much finer, erect hairs on the femora.

"The female resembles somewhat that of *L. yankee*, which, however, is somewhat smaller, the last antennal joint and metanotal spines shorter, the hairs of the abdomen much finer and the erect hairs of the femora wanting.

"*Worker*.—Length about 3 mm.

"Head and teeth of mandibles black, the abdomen dark-brown; antennæ, mandibles, thorax, legs and nodes reddish-yellow; coloration of the last three or four joints of the antennæ and the femora as in the female, the upper surface of the thorax and nodes more or less decidedly reddish-brown. Striation of the head more distinct than in the female, and the space between the striæ more or less distinctly reticulated, particularly so toward the sides. Pronotum and mesonotum and the nodes finely rugose; sculpturing of the metanotum slightly coarser. Abdomen smooth; all the hairs similar to those of the female.

"The worker is very similar in appearance to those of *L. yankee*, though somewhat larger, more robust, the sculpturing coarser and the hairs stouter."

Type locality: Metlakatla, Alaska (June). Cat. No. 5,278 U. S. National Museum.

Described from one female and twelve workers.

4. *Leptothorax Provancheri* Emery.

Myrmica tuberculatum Provancher, Natur. Canad., V, 12, 1881, p. 3592. Faune Entom. Canad., Hyménopt., 1883, p. 602. ♂.

Leptothorax Provancheri Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 317 and 320. ♂.

Worker.—Length 2.75 mm.

Body robust. Antennæ 11-jointed. Thorax stout, impressed at the mesoepinotal suture. Epinotal spines short, tooth-like, resembling those of *L. canadensis* var. *yankee*. Petiole with subparallel sides, node angulate above. Postpetiole about half again as broad as the petiole, transversely elliptical.

Opaque, rugose-punctate; sculpturing like that of *acervorum*, the rugæ on the head less numerous, forming wide meshes. Postpetiole very smooth and shining, with a few piligerous punctures, but otherwise impunctate. Gaster smooth and shining, with short longitudinal striæ at its extreme base.

Hairs rather long, clavate, both on the body and on the tibiæ.

Testaceous, crown of head infuscated.

Type locality: "Canada" (Provancher).

Redescribed by Emery from a single specimen, Provancher's original description being inadequate for the identification of the species.

5. *Leptothorax Emersoni* Wheeler.

L. Emersoni Wheeler, Am. Natural., XXXV, 1901, pp. 433-436. ♂ ♂ ♀.

Worker (Pl. XII, fig. 6).—Length 2.5-3.3 mm.

Head rather convex above, excluding the mandibles not much longer than broad, sides rounded, posterior margin very faintly excised in the middle. Eyes rather large, convex, in the middle of the lateral surface of the head. Ocelli often present. Clypeus large, convex, broadly rounded in front. Mandibles 6-toothed. Antennæ 11-jointed, scape reaching nearly to the posterior angle of the head; first funicular joint but little longer than the second and third joints together; terminal joint not quite as long as joints 7-9 of the funiculus. Thorax rather long, rounded in front, narrowed behind, with distinct promesonotal and mesoepinotal sutures, the thorax distinctly constricted at the latter. Epinotal spines short, blunt, compressed, hardly longer than broad at their bases, directed somewhat upward and backward, their distance apart at the base greater than their length. Petiole from above oblong, $1\frac{1}{2}$ times as long as broad, sides slightly convex just in front of the middle; in profile the node is pointed, with distinctly concave anterior and posterior slopes. In some specimens, however, the posterior slope is straight or even somewhat convex. Ventral portion compressed, produced forward as a blunt projection. Postpetiole campanulate, with evenly convex dorsal surface; seen from above it is nearly twice as broad as the petiole, its anterior portion evenly rounded, not angulate. Gaster rather large, of the usual shape, without distinct anterior angles.

Head opaque. Mandibles coarsely punctate. Clypeus smooth in the middle, with a few longitudinal rugæ on either side. Head traversed by coarse longitudinal and occasionally anastomosing rugæ; interrugal spaces coarsely and more or less confluent foveolate-punctate. Around the eyes the rugæ become more reticulate, though they still have a distinctly longitudinal trend on the cheeks and lower surface of the head. Thorax opaque, its dorsal surface resembling the head in sculpture, except that the rugæ are more reticulate and without longitudinal trend. On the pleuræ the rugæ become indistinct and are replaced by even and closely aggregated foveolæ. Petiole opaque, sculptured like the pleuræ. Postpetiole smooth and shining above, delicately reticulate under a high magnification, especially on the sides. Gaster very glabrous and shining.

Whole body, including the legs and antennæ, abundantly beset with rather long, suberect, whitish hairs, which on the trunk are obtuse but by no means clavate. Hairs on the gaster longest and most regularly arranged.

Yellow or reddish-yellow, dorsal surface of head, terminal half of funiculus and the gaster, with the exception of the anterior, lateral and posterior borders of the segments, both on the dorsal and ventral surfaces, black or dark-brown.

Female.—Length 2.5–3.5 mm.

Like the worker. Thoracic dorsum dark-brown, rather shining; mesonotum and scutellum traversed by distinct, rather widely separated, longitudinal rugæ; pronotum and epinotum coarsely reticulate rugose, the rugæ of the latter being continued up onto the dorsal and lateral surfaces of the stout, blunt spines. Pleuræ subopaque, coarsely reticulate rugose, the meshes being occupied by aggregated shallow foveolæ. Node of petiole somewhat more acute than that of the worker. Wings grayish hyaline, veins and stigma dirty yellowish.

Male.—Length 2.5–3 mm.

Mandibles very small, not distinctly dentate and far from meeting each other with their blades. Antennæ 12-jointed; scape hardly as long as the three first joints of the funiculus together, first funicular joint very short, the others cylindrical, of uniform thickness but increasing gradually in length toward the tip. Parapsidal and other thoracic sutures very distinct. Epinotum with two very short rugose projections in the place of the spines. Petiolar node low, rounded, its anterior slope slightly concave, its posterior slope shorter and convex. Postpetiole hemispherical. Gaster somewhat less flattened and narrower than in the worker.

Mandibles striated. Clypeus even in the middle with a few delicate longitudinal rugæ. Head above longitudinally reticulate rugose; rugæ radiating backward and laterally from the posterior ocelli as centers. Thorax rather smooth, indistinctly punctate. Pedicel and gaster glabrous.

Hairs almost completely absent on the head and thorax, short and inconspicuous on the legs, long on the pedicel and gaster, but nowhere truncated at their tips.

Brownish-yellow like the worker. Head, thoracic dorsum, pedicel and gaster, and the middle portions of the femora and tibiæ somewhat darker. Wings as in the female.

Type locality: Colebrook, Litchfield county, Conn. Males and females appearing in August.

This species always lives in xenobiosis with a larger Myrmicine ant (*Myrmica brevinodis* Emery) in the hummocks of moss (*Polytrichum commune*), under stones, bits of wood, etc., in rather damp, grassy bogs. The *Leptothorax* occupy separate nests, which, however, com-

municate by means of narrow passages with the galleries and chambers of the *Myrmica*. They obtain their food by licking the surfaces of the *Myrmica* and by regurgitation. All sorts of transitional forms occur between the workers and queens (ergatoids and macroergates with from one to three ocelli).

6. *Leptothorax Schaumi* Roger.

L. Schaumi Roger, Berl. Ent. Zeitschr., VII, 1863, p. 180, No. 70. ♂.

L. Schaumi Mayr, Verh. Zool. bot. Ges. Wien, XXXVI, 1886, p. 451. ♂.

L. Schaumi Dalla Torre, Catalog Hymenopt., VII, 1893, p. 127.

L. Schaumi Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, p. 320.

Worker (Pl. XII, fig. 7).—Length 2.5–2.75 mm,

Mandibles 5-toothed. Clypeus convex without median impression; its anterior border rather straight. Antennæ 11-jointed; scape reaching hardly to half way between the eye and the posterior angle of the head, funiculus with a distinctly 3-jointed club; first funicular joint almost as long as joints 2–5 together; joints 2–7 distinctly broader than long; terminal joint fully as long as the two preceding joints. Thorax rather short, flattened dorsally and laterally, broader in front than behind, with distinct and rather sharp humeral angles, and with a constriction at the mesoepinotal suture. Epinotal spines very short, dentiform, not longer than broad at their bases. Petiole seen from above oblong, $1\frac{1}{2}$ times as long as broad, its sides parallel except at the peduncle which is narrower; in profile the anterior dorsal slope is concave and about the same length as the straight or somewhat convex posterior slope; ventral surface with a distinct tooth directed forward. Postpetiole scarcely half again as broad as the petiole, distinctly broader than long, oblong, with distinct though rounded anterior angles. Its dorsal surface is evenly semicircular in profile. Gaster of the usual shape, with small but distinct anterior angles.

Clypeus with sharp longitudinal rugæ, two of which, near the middle, are more prominent than the others. Mandibles with distinct longitudinal rugæ. Head, clypeus and mandibles with a silky luster, the first traversed by fine parallel rugæ separated by rows of foveolate punctures, which are clearest in certain lights on the posterior lateral surfaces and cheeks. Thorax, petiole and postpetiole opaque, covered uniformly with foveolate punctures. Gaster smooth and shining.

Hairs moderately numerous on the body, white, erect, clavate; short on the head and thorax, much longer on the gaster and of intermediate length on the pedicel. Hairs on the antennæ and legs minute, non-clavate, appressed.

Yellowish-red, the edges of the mandibles black. Gaster in some specimens dark-brown throughout, in others yellow or with much of

the base of the first segment yellow. Antennæ and legs yellow, club and sometimes also the scape of the former, infuscated.

Male.—Length 3.2 mm.

Mandibles dentate, touching each other with their blades. Antennæ 12-jointed, scape about as long as the first three joints of the funiculus together; funiculus from the second joint to the end of uniform thickness, filiform; second joint a little shorter than the third, shorter, in fact, than any of the succeeding joints. Instead of spines or teeth, the epinotum bears two indistinct elongate swellings. Radial cell of wings short and closed.

Mandibles rather smooth and shining, with scattered punctures near their inner edges. Clypeus moderately shining and very delicately longitudinally rugose. Cheeks and region between antennal insertions and eyes sharply striated longitudinally; front with delicate longitudinal rugæ; vertex finely reticulate punctate. Thorax rather smooth and shining, median and posterior portions of mesonotum finely longitudinally rugose and in part obliquely. Petiole, postpetiole and gaster smooth and shining.

Pilosity sparse, tibiæ without suberect hairs.

Blackish-brown, pedicel and gaster darker. Mandibles, antennæ except the brown scape, joints of legs, tarsi, and in part also the joints of the pedicel, yellow or reddish-yellow. Wings clear, hyaline.

Type locality: "Pennsylvania" (Schaum).

Additional localities: District of Columbia (Pergande); Beatty, Pa. (Schmitt); Westville, N. J. (Schmitt); Austin, Tex.

In the locality last mentioned I have occasionally taken the workers of *L. Schaumi* running on the bark of large willows (*Salix nigra*).

7. *Leptothorax fortinodis* Mayr.

L. fortinodis Mayr, Ver. Zool. bot. Ges. Wien, XXXVI, 1886, pp. 451, 452.

♀ ♂.

L. fortinodis Dalla Torre, Catalog. Hymenopt., VII, 1893, p. 124.

L. fortinodis Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 318, 321.

Worker (Pl. XII, fig. 8).—Length 2.5–3 mm.

Head somewhat longer than broad, sides subparallel, occipital border nearly straight. Eyes moderately large and convex. Mandibles 5-toothed. Clypeus convex, its anterior border broad and rounded. Antennæ 11-jointed; scape reaching to midway between the eye and the posterior angle of the head; funiculus terminating in a 3-jointed club; first funicular joint as long as joints 2–4 together; joints 2–5 broader than long, 6 and 7 as long as broad; terminal joint somewhat

longer than the two preceding joints of the club. Thorax moderately long, its dorsal and pleural surfaces flattened; humeral angles prominent and rather sharp; no constriction between the meso- and epinotum. Epinotal spines very short, not longer than broad at their bases, turned upward. Pedicel rather robust; petiole oblong when seen from above, almost twice as long as broad; sides of the nodal portion nearly parallel, peduncle narrower; in profile the anterior slope is distinctly concave, the posterior strongly convex, the apex of the node rounded; anterior ventral surface with a prominent tooth, directed forward and downward. Postpetiole but little broader than the petiole; nearly as long as broad, subglobose, strongly arched dorsally, its anterior about as broad as its posterior border, the anterior angles rounded, hardly distinct. Gaster of the usual configuration, with small but prominent basal angles. Legs robust.

Mandibles and clypeus longitudinally rugose, the former finely and indistinctly, the latter more coarsely and distinctly. Head opaque, except the crown and occiput which are more or less shining or lustrous, covered with foveolate punctures, in addition to which the front and crown are finely longitudinally rugose, the cheeks and sides reticulate-rugose, the lower surface more indistinctly reticulate. Thorax, petiole and postpetiole opaque, or slightly lustrous, densely and evenly foveolate-punctate. Gaster smooth and shining.

Hairs on the body yellowish-white; erect and clavate on the head, thorax and abdomen; longest on the gaster; on the antennæ and legs the hairs are minute, tapering and appressed.

Head, thorax and pedicel deep reddish-brown, gaster almost or quite black; mandibles, antennæ and legs red, club of antennæ and often also the femora infuscated.

Female (deälated).—Length 3.5–4 mm.

Like the worker in coloration, except that the anterior and lateral portion of the mesonotum, the epinotum and dorsal surfaces of the petiolar and postpetiolar nodes may be distinctly infuscated. Whole upper surface of head longitudinally rugose, the rugæ diverging to the corners of the head in the postocellar region. Mesonotum and scutellum traversed by numerous parallel longitudinal rugæ, which are finer than those on the head; pronotum finely reticulate, median portion of scutellum smooth and shining; pleuræ reticulate-punctate, rather rough, the rugæ somewhat longitudinal in direction. Epinotal spines very small and tooth-like, rather blunt; the region between and below them densely foveolate-punctate. Petiole with less convex

anterior slope to the node; postpetiole relatively shorter and broader than in the worker.

Type locality: Maryland.

Additional locality: Austin, Tex.

The specimens from Austin have the head, thorax and pedicel decidedly paler in color than a type specimen received from Dr. Mayr and three topotypes given me by Mr. Pergande; the petiole is relatively smaller and there is a clavate hair at the base of each epinotal spine as in *Schaumi*. This hair is lacking in my types of *fortinodis*, possibly because these are much rubbed.

I have found only a single colony of this form at Austin. This had taken up its abode in an abandoned gall of *Holcaspis cinerosus* Basset on the live-oak (*Quercus virginiana*). It contained 143 workers, a single deälated queen and 35 larvæ in different stages. The latter were white and not greenish like the larvæ of *L. obturator* which inhabits the same kind of galls. The entrance to the *fortinodis* nest was a small round hole with much worn edges, evidently the modified exit of some parasite on the *Holcaspis*.

7a. Var. *melanoticus* var. nov.

Worker.—Length 2–2.5 mm.

This form is decidedly smaller and much deeper in color than the typical *fortinodis*. Whole body black, petiole and postpetiole brownish behind and below; mandibles, joints of legs, tarsi and funiculus brown. Epinotal spines very short and blunt in some specimens, in others acute and longer, recalling the conditions described by Mayr for a small variety of *fortinodis* from the District of Columbia.

Female (deälated).—Length 2.9–3 mm.

Decidedly smaller than the typical form, head and thorax as well as the pedicel and gaster black; the ventral surface of the petiole and postpetiole reddish. Legs dark-brown or black; coxæ, knees, tarsi and basal portion of funiculus somewhat paler.

Type locality: Rockford, Ill.

The workers of this apparently somewhat depauperate form are sometimes seen running on the bark of large prostrate oak logs in the woods. They inhabit small flat chambers only $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter excavated in the thick corky bark. Each nest contains a single deälated queen and a comparatively small number of workers (about 25 to 40).

7b. Var. *gilvus* var. nov.

Worker.—Length 2.25 mm.

Differs from the typical *fortinodis* in the color, which is throughout

a clear yellow, and in the sculpturing of the head, which is smooth and shining except on the sides, where it is more opaque and reticulate. The vertex is traversed by a few rather widely separated rugæ.

Female (deälated).—Length 4 mm.

Differs like the worker in coloration. The whole body is yellow, except the wing insertions, which are black.

Type locality: Austin, Tex.

This variety is based on a single deälated queen which was found accompanied by seven workers and a few larvæ in a small *Holcaspis cinerosus* gall on a live-oak tree. These evidently constituted an incipient colony, remarkable because the queen and two workers were pure yellow, while the five remaining workers were dark-brown with black gasters, like the workers of the typical *fortinodis*. All the workers, however, had the peculiar smoothness of the head and were undoubtedly the offspring of the same mother. I believe this colony must present a case of hybridism, a female of the new variety *gilva* having been fertilized by a male of the typical *fortinodis*. It is difficult to explain the peculiar dichromatism of the workers in this little colony in any other way, since the yellow workers were not callows but perfectly mature, and the queen differed so decidedly in color from the majority of her offspring. Unfortunately the colony was killed by dropping the gall into alcohol before the peculiarities of the workers were noticed.

The Austin specimens of *fortinodis*, together with those representing the varieties *melanoticus* and *gilvus*, all have the petiole much smaller than in Mayr's type and suggest transitions to *Schaumi*. Particularly is this the case with var. *gilvus*, which is based on the female. The female of *Schaumi* and the males of both species being unknown, I am unable to delimit the two species accurately.

8. *Leptothorax longispinosus* Roger.

L. longispinosus Roger, Berl. Ent. Zeitschr., VII, 1863, p. 180, No. 69. ♂.

L. longispinosus Mayr, Verh. Zool. bot. Ges. Wien; XXXVI, 1886, p. 451. ♂.

L. longispinosus Dalla Torre, Catalog. Hymenopt., VII, 1893, p. 125.

L. longispinosus Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, p. 321. ♂ ♀.

Worker (Pl. XII, fig. 9).—Length 2.25–2.5 mm.

Head exclusive of the mandibles not much longer than broad, posterior angles considerably rounded. Mandibles 5-toothed. Eyes of moderate size, rather flattened. Clypeus convex, not impressed in the middle, its anterior border rounded. Antennæ 11-jointed, scape reaching the posterior angle of the head, club 3-jointed; first funicular joint as long as joints 2–4 together; joints 1–3 broader than long; joints 4–6 as long as broad; terminal joint as long as the two pre-

ceding joints together. Thorax rather short, anterior angles rounded but distinct, dorsal surface and pleuræ somewhat flattened; meso-epinotal suture distinct but without a constriction. Epinotal spines very long and stout, directed backward, rather suddenly tapering at their tips which are curved slightly inward and downward. Petiole from above suboblong, twice as long as broad, sides nearly parallel, posterior border a little broader than the anterior; in profile the anterior slope is distinctly and evenly concave, the posterior convex; the anterior ventral surface has a distinct but rather blunt tooth; summit of node blunt. Postpetiole hardly half again as broad as the petiole, as long as broad, with rounded but distinct anterior angles, convex dorsally. Gaster of the usual shape, with distinct anterior angles.

Mandibles coarsely longitudinally rugose, hardly shining. Clypeus somewhat shining, traversed even in the middle by several clean-cut longitudinal rugæ. Head shining, especially on the posterior and postero-lateral portions; anteriorly with clean-cut longitudinal rugæ, which are coarsely reticulate and further apart on the cheeks, more delicate on the crown and occiput. Thorax opaque, except the mesonotum, which is somewhat shining. Neck coarsely and evenly punctate; remaining surface of thorax covered with coarse, irregularly longitudinal rugæ which extend up on the epinotal spines; interrugal spaces with shallow foveolate punctures, forming a secondary reticulation. Petiole and postpetiole opaque, coarsely rugose and punctate. Gaster very smooth and shining.

Hairs silvery-white, those on the head, thorax and abdomen very regularly arranged, clavate, erect; on the antennæ and legs minute, non-clavate and appressed.

Head and gaster black; thorax and pedicel dark-brown; antennæ and legs yellow; scape and club of the former, coxæ, femora and sometimes also the tibiæ of the latter, infuscated. Mandibles dark-brown, their distal half yellow.

Female.—Length 3.5–4 mm.

Head opaque, densely and rather finely longitudinally rugose. Eyes moderate; ocelli rather small. Thorax opaque; pronotum coarsely longitudinally rugose; mesonotum traversed by numerous very regular, parallel rugæ. Scutellum somewhat shining, covered with much more delicate rugæ than those of the mesonotum and more reticulate and less longitudinal in direction. Pleuræ, epinotum and epinotal spines covered with coarse reticulate rugæ, which have a decidedly longitudinal trend. Epinotal spines shorter, stouter and less curved than those

of the worker. Petiole and postpetiole opaque and more roughly sculptured than those of the worker. Wings milky-white, the veins and stigma very pale. Pilosity and color of body, legs and antennæ like the worker, except that the thorax is darker and often quite black, especially on the dorsal surface.

Male.—Length 2–2.5 mm.

Head, exclusive of the mandibles, about as broad as long. Eyes very prominent; ocelli reniform. Mandibles overlapping, small, acute, dentate. Antennæ 12-jointed; scape as long as joints 1–4 of the funiculus, the funiculus with a 4-jointed club; first funicular joint swollen, somewhat longer than joints 2–3 together; joints 3–7 cylindrical, about twice as long as broad, joints of club fusiform gradually increasing in length distally. Thorax with strongly marked parapsidal and Mayrian furrows. Epinotum evenly rounded, with two small prominences in the place of the large spines of the worker and queen. Petiole larger and postpetiole more slender than in the worker and both with much lower nodes, the former somewhat pedunculate, the latter subquadrate from above, with rounded angles, as long as broad and hardly half again as broad as the petiole. Gaster of the usual shape. Legs rather long and slender.

Clypeus shining, with a few clean-cut, longitudinal rugæ. Head subopaque, indistinctly rugose and punctate except the cheeks, where the rugæ are pronounced and reticulate. Thorax smooth; pleuræ, mesonotum and scutellum shining, their surfaces indistinctly and irregularly punctate at the sutures. Epinotum opaque, very finely rugose. Petiole and postpetiole opaque, finely rugose; the upper surfaces of the nodes, especially of the postpetiole, smooth and almost shining. Gaster subopaque.

Hairs on the body few and very slender, whitish; longest on the gaster; those on the legs and antennæ minute and appressed.

Black; mandibles, antennæ, legs and genitalia white. Bases of mandibles, scape, antennal club, coxæ, femora, tibiæ and last tarsal joint of each foot, distinctly infuscated. Wings milky-white with very pale veins and stigma.

Type locality: "America."

Additional localities: Virginia (Mayr); District of Columbia (Pergrande); New York (Schmelter); Colebrook, Litchfield county, Conn.

This species is evidently allied to *L. curvispinosus*, but is readily distinguished by its dark coloration, strong epinotal spines, shining head, etc. The specimens from which the above description was drawn may be considerably darker than Rogers' types. In most of

my material the thorax of the worker is black, and the head rather smooth so as to resemble the forms described by Emery from New York and by Mayr from Virginia.

L. longispinosus appears to be confined to the Eastern United States. At any rate I have not yet been able to find it in the Middle West or among my material from the Western States. At Colebrook, Conn., the workers of this species are often seen running over the leaves or bushes in rather damp, shady places. The nests, containing the winged females and males in August, were found in clefts of granite boulders and in worm-eaten hickory nuts on the ground under the trees in the woods. Some of the colonies were quite populous for *Leptothorax* colonies, others very small.

9. *Leptothorax curvispinosus* Mayr.

L. curvispinosus Mayr, Sitz. B. k. Akad. Wiss. Wien, LIII, 1866, p. 508. ♂.

Stenamma gallarum Patton, Am. Natural., 1879, p. 126. ♂ ♀.

L. curvispinosus Mayr, Verhand. zool. bot. Ges. Wien, XXXVI, 1886, pp. 451 and 453. ♀.

L. curvispinosus Dalla Torre, Catalog. Hymenopt., VII, 1893, p. 124.

L. curvispinosus Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 317 and 320.

Worker (Pl. XII, fig. 10).—Length 2–2.5 mm.

Mandibles 5-toothed. Clypeus moderately convex, with broadly rounded anterior border, without median impression. Antennæ 11-jointed, scape reaching to midway between the eye and the posterior corner of the head; funiculus terminating in a distinct 3-jointed club; first funicular joint nearly as long as the three succeeding joints together; joints 2–7 about as long as wide; terminal joint little longer than the two preceding joints of the club taken together. Thorax but little broader in front above than below and behind; humeri slightly angular; dorsum convex, without promesonotal and meso-epinotal sutures and without a constriction at the latter region. Epinotal spines long and slender, tapering rather rapidly at their tips; directed backward and slightly upward, their tips incurved and slightly converging. Petiole from above more than twice as long as broad, distinctly narrower at the anterior peduncular end than behind; node in profile rather blunt, with longer and slightly concave anterior slope and convex posterior slope; lower surface laterally compressed, with a small but distinct downwardly directed tooth near the anterior end. Postpetiole globose, about half again as broad as the petiole, almost circular when seen from above. Gaster short, elliptical, with small but distinct basal angles.

Mandibles shining, with indistinct longitudinal striæ. Clypeus longitudinally rugose, even in the middle. Head opaque, covered

with fine longitudinal rugæ separated by densely foveolate punctures. Thorax opaque, coarsely and irregularly longitudinally rugose, except just back of the neck where there are a few transverse rugæ. The rugæ on different parts of the thorax are so fine that their trend is hardly discernible except under a high magnification. Lower pleuræ foveolate-punctate. Petiole and postpetiole somewhat less roughly sculptured than the head and thorax; both densely foveolate-punctate; punctures on the petiole somewhat coarser than on the postpetiole, which therefore often appears smoother. Gaster and legs smooth and shining.

Hairs whitish, those on the head, thorax and pedicel shorter and more clavate than those on the gaster. Hairs on the legs and antennæ short, non-clavate and appressed.

Yellow; head, thorax and gaster tinged with brown; mandibles, legs, antennæ and venter pale, sometimes whitish; edges of mandibles and a large triangular spot on either side of the first gastric segment, black or dark-brown. In some specimens the femora are slightly infuscated.

Female (deälated).—Length 2.75–3.3 mm.

Longitudinal rugæ of the head more prominent than in the worker. Pronotum coarsely reticulate-rugose. Mesonotum shining, especially in front and in the parapsidal regions, longitudinally rugose, as are also the paraptera and scutellum. Epinotum with coarse, transverse rugæ, especially below the spines, which are shorter and stouter than in the worker. Pleuræ and sterna coarsely longitudinally rugose. Sculpturing of the petiole and postpetiole like that of the worker but more pronounced, so that these segments are quite opaque. Upper surface of head, scutellum, posterior portion of epinotum, wing-insertions, lower pleuræ, posterior portions of petiole and postpetiole, a broad band across the first gastric segment and all except the borders of the posterior gastric segments, dark-brown or black.

Type locality: ? District of Columbia.

Additional localities: Virginia (Mayr); Beatty, Pa. (Schmitt); Belmont, N. C. (Schmitt); Covington, Ky. (Schmitt); New York (Emery); New Jersey (Emery).

This species in its typical form appears to be confined to the Eastern United States. Patton found small colonies of it nesting in the hollow galls on the golden-rod (*Solidago*). Rev. P. J. Schmitt, O.S.B., who has frequently taken the species in Pennsylvania, sends me the following note on its habits: "In one locality at least where *curvispinosus* was abundant the colonies were in saplings of ash, the tops of

which had been eaten off by cattle and hollowed out, perhaps by some larger insect than *Leptothorax*. At all events, when I visited these colonies in autumn (I knew of their existence by watching foraging workers going in and out of the nests) every colony had been dislodged and dispossessed of its premises by a species of wasp which was busily bringing in paralyzed spiders. The *L. curvispinosus* had then retired to hollows in stumps or logs or dead branches lying on the ground." This species is also of interest because it is enslaved by *Tomognathus americanus* Emery, in the nests of which it has been found by Pergande.

9a. Subsp. *ambiguus* Emery (Pl. XII, fig. 11).

L. curvispinosus Mayr subsp. *ambiguus* Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, p. 320.

Differs from the typical *curvispinosus* in the somewhat coarser sculpturing and the decidedly shorter and nearly straight epinotal spines.

Type localities: Hill City, S. Dak. (Pergande); Cleveland, O. (Wasmann); New York (Schmelter).

A number of specimens collected at Colebrook, Conn., have the same sculpturing as the typical *curvispinosus* but decidedly shorter epinotal spines. These were found running on the surfaces of leaves in the shade of very damp woods. I failed to discover the nests.

9b. Subsp. *rugatulus* Emery (Pl. XII, fig. 12).

L. rugatulus Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, p. 321.

Owing to the existence of the next subspecies (*annectens*), I feel justified in regarding Emery's *L. rugatulus* merely as a subspecies of *curvispinosus*. The type specimens were from South Dakota (Pergande) and Colorado (Pergande). Specimens from Seattle, Wash. (Kincaid), in my collection agree very closely with Emery's description. They differ from the typical *curvispinosus* in the following characters: The rugæ of the head and thorax are decidedly coarser, and longitudinal on the latter. Epinotal spines much shorter and hardly curved. Tooth on the anterior ventral surface of the petiole distinctly larger, blunter and directed downward and forward. Postpetiole broader than long, oblong when seen from above, with rather distinct anterior angles. In profile the upper surface of the postpetiole is almost angular, its ventral surface very short. Upper surface of head and gaster, with the exception of the posterior edges of the segments of the latter, dark-brown. Femora more or less infuscated in some specimens.

9c. Var. *Cockerelli* var. nov.

Worker.—Length 2–2.5 mm.

Differs from the typical *rugatulus* in having the head, thorax and

petiole less opaque, owing to the rugæ being further apart and the smooth interrugal spaces more prominent. Epinotal spines shorter and more acute. Postpetiole somewhat longer, being intermediate in shape between that of the typical *curvispinosus* and *rugatulus*, but distinctly wider in front than behind, and with rounded but perceptible anterior angles. The coloration is also intermediate between the forms just mentioned. Upper surface of head pale-brown and more of the cheeks, sides and front of head yellow than in *rugatulus*, whereas the infuscation of the gaster is limited to the posterior dorsal half or two-thirds of the first segment, leaving the remaining segments yellow.

Female (deâlated).—Length 3–3.5 mm.

Whole body, with the exception of the legs and antennæ, yellowish-brown; head and gaster, with the exception of the base of its first segment, darker. Antennæ and legs more yellowish. Pedicel, especially the petiole, very rough, and surmounted by a more acute node than in the worker.

A fine living colony of this species, comprising more than a hundred workers and eight females, was sent me by Prof. T. D. A. Cockerell from Las Vegas Hot Springs, N. M. Fragments of bark accompanying the ants showed that the nest was found in a tree trunk.

9d. Subsp. *annectens* subsp. nov. (Pl. XII, fig. 13).

Worker.—Length 2–2.5 mm.

This form has the epinotal spines long and thin, and shaped like those of the typical *curvispinosus*. Head very coarsely longitudinally rugose, subopaque. Pronotum evenly and coarsely foveolate-punctate, meso- and epinotum opaque, coarsely reticulate rugose, the rugæ without a longitudinal trend. Petiole and postpetiole opaque, shaped like those of *rugatulus*, the former with a prominent ventral tooth, directed downward and forward. Upper surface of head and whole dorsal surface of gaster, except a large, transversely elliptical spot on the anterior portion of the first segment and the extreme posterior edge of this and the remaining segments, dark-brown or black. Remainder of body brownish-yellow.

Type locality: Boulder, Colo.

Described from four specimens collected by Rev. P. J. Schmitt, O.S.B.

This form is clearly intermediate in structure and coloration between the typical *curvispinosus* and the subspecies *rugatulus*.

10. *Leptothorax Schmittii* sp. nov.

Worker (Pl. XII, fig. 14).—Length 2–2.25 mm.

Head conspicuously narrow, with parallel sides, decidedly longer

than broad, with straight posterior border. Mandibles 5-toothed. Clypeus moderately convex, its anterior border with a small but distinct excision in the center and a distinct median carina extending nearly its full length. Antennæ 12-jointed; scape reaching the posterior corner of the head; first funicular joint as long as joints 2-4 together; second joint as long as broad; joints 3-8 nearly as long as broad; club distinctly 3-jointed, first and second joints subequal, together a little shorter than the terminal joint. Thorax rather long and narrow, widest in front where the humeral angles are sharp and prominent. In profile the pronotum rises very abruptly from the neck, so that a transverse ridge is formed which gives the thorax a square-shouldered appearance; dorsum flatly and evenly rounded, without mesoëpinal constriction. Epinotal spines well-developed, longer than broad at their bases, tapering and pointed, directed distinctly backward though slightly upward and outward; in profile the ventral outline of the spines is distinctly concave, the dorsal convex. They are about as long as their distance apart at the base. Petiole about $1\frac{1}{2}$ times as long as broad, distinctly broader behind than in front when seen from above; in profile the height of the node is fully equal to the length of the whole joint; its anterior surface is steep and somewhat concave, the top of the node abruptly truncated, the posterior slope so steep that it is even inclined forward below and forms somewhat less than a right angle with the extreme posterior dorsal surface of the petiole; ventral tooth well developed, directed downward. Postpetiole hardly twice as broad as the petiole, distinctly broader than long; its anterior wider than its posterior border, its anterior angles rather prominent. Gaster of the usual shape.

Mandibles not distinctly striated; shining, with a few coarse punctures. Clypeus shining, longitudinally rugose on the sides. Head very smooth and shining, covered with rather coarse but sparse piligerous punctures; sides of frontal area, cheeks and subocular region subopaque and delicately longitudinally rugose. Pro- and mesonotum very smooth and shining, with a few piligerous punctures passing over onto the pleuræ into delicate longitudinal rugæ, which become much coarser and distinctly reticulate on the sides and whole upper surface of the epinotum. Petiole and postpetiole opaque, reticulate and punctate-rugose. Gaster very smooth, shining.

Hairs white, only moderately abundant; clavate and erect on the thorax and crown of head, somewhat longer and more reclinate on the pedicel and gaster; the hairs on the sides of the head, antennæ and legs non-clavate, appressed; those on the clypeus thin and projecting.

Very dark-brown, almost black. Mandibles, neck, funiculus and legs yellow; scape and club of antennæ and the middle of the femora and tibiæ infuscated; edges of mandibles black.

Type locality: Cañon City, Colo.

Described from four specimens collected by Rev. P. J. Schmitt, O.S.B., to whom I take pleasure in dedicating this very striking species. It is quite unlike any of the other described North American forms in the shape of the thorax and petiole and the smoothness of the head, pro- and mesonotum.

11. *Leptothorax nitens* Emery.

L. nitens Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 318, 322, 323.

Worker (Pl. XII, fig. 15).—Length 2–2.25 mm.

Mandibles 5-toothed; basal teeth very small. Clypeus moderately convex, impressed in the middle and with sinuately excised anterior border. Antennæ 12-jointed; scape reaching to $\frac{3}{4}$ the distance between the eye and the posterior angle of the head; funiculus terminating in a distinctly 3-jointed club, the two basal joints of which are subequal in length, together decidedly shorter than the terminal joint; first funicular joint as long as the three succeeding joints together, joints 2–7 of the funiculus slightly broader than long, the 8th about as long as broad. Thorax slender, somewhat broader in front than behind; compressed laterally, pronotum rather prominent and square in front, humeri rounded; in profile the dorsal surface is somewhat flattened and without mesoëpinotal constriction. Epinotal spines very small, tooth-like, hardly as long as broad at their bases, directed upward, about as far apart as they are broad at their bases. Petiole about $1\frac{1}{2}$ times as long as broad, gradually widened behind when seen from above; in profile the node is very high, its anterior slope steep and concave, its summit very short and rounded, the posterior slope abrupt, the ventral tooth is distinct and pointed forward and downward. Petiole nodiform, a little broader than long, half again as broad as the petiole, its anterior angles much rounded. Gaster of the usual shape.

Mandibles smooth and shining, indistinctly striated and punctate. Clypeus smooth and shining, with a few longitudinal rugæ on its antero-lateral surfaces. Head very smooth and shining, minutely and sparsely punctate; sides of front, antennal foveæ and cheeks longitudinal rugulose. Thorax, petiole and postpetiole opaque, finely and regularly foveolate-reticulate. In some specimens more or less of the pro- and mesonotum is shining. Pleuræ faintly striated longitudinally. Gaster very smooth and shining.

Hairs moderately abundant, yellow; clavate on crown of head, thorax

and abdomen; erect and shorter on head and thorax; longer and slightly reclinate on the pedicel and gaster; hairs on sides of head, legs and antennæ minute, non-clavate, appressed.

Yellow, in some specimens crown of head, antennal club and dorsum of gaster slightly infuscated.

Type locality: American Fork Cañon, Utah (Pergande).

Additional localities: Pacific Grove, Cal. (Dr. H. Heath); Cañon City, Colo. (Rev. P. J. Schmitt, O.S.B.).

Emery described the species from a single specimen in which the thorax was shining. Examination of a number of California and Colorado specimens from the same nests shows this to be a common but by no means constant character; in a great many individuals the thorax is uniformly opaque throughout.

One of the colonies sent me by Dr. Heath was found in the ground, hibernating in a Termite burrow.

11a. Var. *Heathii* var. nov.

Worker.—Differs from the preceding in the coloration, which is constant in a whole colony sent me by Dr. Harold Heath from Pacific Grove, Cal. The body is brown, often rather dark, the legs and antennæ brownish-white without the distinct yellow cast of the typical form.

Found nesting in the ground under a stone.

11b. Subsp. *occidentalis* subsp. nov.

Worker.—This form combines the color characters of the type and the preceding variety. The ground color is yellow, the upper surface of the head, thorax and pedicel brown; the first gastric segment with a broad, brown dorsal band across its posterior half or two-thirds. Thorax and pedicel decidedly opaque. Antennal scape nearly reaching the posterior angle of the head, epinotal spines decidedly more robust than in the typical *nitens* and the var. *Heathii*.

Type locality: Friday Harbor, Wash.

Described from six specimens received from Prof. Trevor Kincaid.

12. *Leptothorax texanus* sp. nov.

Worker (Pl. XII, fig. 16).—Length 2.25–2.75 mm.

Head longer than broad. Eyes rather large. Mandibles 5-toothed. Clypeus moderately convex, its anterior border somewhat rounded. Antennæ 12-jointed; scape reaching nearly to the posterior angle of the head; funiculus terminating in a very distinct 3-jointed club, the last joint of which is somewhat longer than the two preceding joints; first funicular joint nearly as long as joints 2–5;

second funicular joint about as long as broad, the remaining joints broader than long. Thorax rather short, its humeral angles rounded, dorsum evenly and slightly rounded, without mesoëpinal constriction. Epinotal spines moderate, distinctly shorter than the declivous surface of the epinotum, scarcely as long as their distance apart at the base, rapidly tapering, acute, directed upward, outward and backward. their tips slightly deflected. Petiole from above fully $1\frac{1}{2}$ times as long as broad; its sides somewhat convex, so that its outline is sub-elliptical; in profile the anterior slope is abrupt and distinctly concave, the summit of the node flattened, and the posterior slope suddenly declivous; ventral tooth small, acute, directed downward. Postpetiole very large, fully twice as broad as the petiole; broader than long, its anterior and posterior angles rounded, so that it appears transversely elliptical from above; in profile it is very convex, especially in front. Gaster elliptical, depressed, without distinct anterior angles.

Mandibles coarsely striated. Clypeus traversed by several clean-cut longitudinal rugæ, subsiding on the posterior portion which is smooth and shining. Head subopaque, coarsely reticulate-rugose; the rugæ distinctly longitudinal only on the front and vertex; interrugal spaces secondarily reticulate. Neck evenly reticulate; thoracic dorsum very coarsely and irregularly reticulate-rugose; the spaces between the rugæ smooth and shining, because the secondary reticulation is indistinct or lacking. Pleuræ somewhat more delicately and evenly rugose. Petiole and postpetiole coarsely reticulate-rugose, interrugal spaces filled with shallow foveolæ or secondary reticulation. Gaster smooth and shining.

Hairs white, rather numerous and prominent; on the trunk clavate; shorter and more erect on the head and thorax, longer and slightly reclinate on the pedicel and gaster; on the legs and antennæ distinct, non-clavate, more or less appressed.

Black or very dark-brown, especially on the head, thorax and petiole. Mandibles, excepting the teeth, funiculus, tips of epinotal spines, tarsi and articulations of legs, excepting the last tarsal joint, yellow; antennal scape brown.

Female.—Length 3.75–4 mm.

Head more decidedly and extensively longitudinally rugose than in the worker. Neck delicately, pronotum more coarsely reticulate-rugose; mesonotum and paraptera traversed by numerous longitudinal rugæ which are more or less interrupted and have a tendency to anastomose. Scutellum with such rugæ only in front and on the sides,

posteriorly it is nearly smooth and shining. Pleuræ and epinotum with rather coarse, distinctly longitudinal rugæ. Epinotal spines small, acute, straight. Petiole with pointed node and more abruptly declivous posterior slope than in the worker, its dorsal surface scarcely flattened. Postpetiole very convex in front above. Sculpturing of petiole and postpetiole as in the worker. Color of head, thorax and pedicel reddish-brown, darker on the dorsal surface. Gaster black. Pilosity of body and legs and color of the latter much as in the worker. Wings whitish-hyaline; veins and stigma yellow.

Male.—Length 2–2.5 mm.

Head exclusive of the mandibles broader than long, cheeks short, posterior angles convex and rounded. Mandibles overlapping each other. Antennæ 13-jointed; scape as long as the first four joints of the funiculus, club very distinct, 4-jointed, the first, second and third subequal, fully $1\frac{1}{2}$ times as long as broad, apical joint as long as the second and third together; first funicular joint somewhat swollen, fully $1\frac{1}{2}$ times as long as broad; joints 2–8 longer than broad. Epinotum with two very small, indistinct protuberances in the place of the spines. Petiole slender, in profile concave below; anterior dorsal slope nearly straight, gradual, posterior slope shorter, abruptly declivous, rather concave. Postpetiole campanulate, about as long as broad; $1\frac{1}{2}$ times as broad as the petiole. Legs long and slender.

Mandibles striated. Clypeus coarsely and irregularly reticulate-rugose, shining. Head subopaque, evenly and rather delicately reticulate-rugose. Neck finely reticulate; mesonotum shining, with a faint reproduction of the irregular rugosity of the worker; remainder of thorax and the pedicel delicately reticulate-punctate. Gaster smooth and shining.

Hairs white, non-clavate, long and moderately abundant on the mandibles, pedicel and gaster; sparser elsewhere.

Black; mandibles and genitalia yellow; antennal funiculus grayish-brown; wings like those of female; legs like those of the worker in color.

Type locality: Milano, Millan County, Tex.

All three sexual phases of this species were taken May 23, 1902, in nests consisting of a few small galleries, 3–4 inches long, excavated in the sand in rather damp spots under post-oaks and cedars.

13. *Leptothorax tricarinatus* Emery.

L. tricarinatus Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 318, 321, 322. ♂.

Worker (Pl. XII, fig. 17).—Length 2.25 mm.

Clypeus produced in front in the middle, obtusely angulate, above

with three slender longitudinal carinae. Antennae 12-jointed, first funicular joint longer than the three succeeding joints together; remaining joints shorter than broad; two basal joints of club subequal. Thorax not impressed at the mesoepinotal suture. Epinotal spines short, rather acute, obliquely erect. Petiole thickened behind, node subconical, obtuse. Postpetiole much larger than the petiole, subglobose.

Mandibles striated. Clypeus shining. Head, thorax and petiole subopaque, punctate and finely rugose, pronotum more shining in the middle.

Hairs on the body clavate, on the legs and antennal scape non-clavate and sparse.

Fuscous black; mandibles, articulations of legs and the tarsi reddish. Type locality: Hill City, S. Dak. (Pergande).

Described from a single specimen in the collection of Prof. C. Emery.

14. *Leptothorax neomexicanus* sp. nov.

Worker (Pl. XII, fig. 18).—Length 2.25–2.5 mm.

Head longer than broad. Mandibles 5-toothed. Clypeus moderately convex, broadly rounded in front, not impressed. Antennae slender, 12-jointed; scape extending to a distance equal to its own breadth beyond the posterior angle of the head; funiculus terminating in a 3-jointed club, the two basal joints of which are subequal and together shorter than the terminal joint; first funicular joint as long as the three succeeding joints together; joints 2–8 of the funiculus as long as broad. Thorax not much broader in front and above than behind and below; humeral angles rounded; dorsal surface flattened, without mesoepinotal suture or constriction. Epinotal spines short, robust, blunt, not longer than broad at their bases and nearly twice as far apart at their bases as long. They are directed obliquely upward, outward and backward. Petiole hardly $1\frac{1}{2}$ times as long as broad; distinctly wider behind than in front, sides somewhat convex; in profile the node is nearly as high as the length of the petiole, its anterior slope steep, slightly concave; the summit somewhat truncated, passing abruptly into the angular posterior declivity; ventral surface in front with a prominent tooth, directed downward and forward. Postpetiole nearly twice as broad as the petiole; nearly as long as broad, subglobular, its anterior dorsal surface in profile abruptly convex, the posterior dorsal surface more flattened. Gaster of the usual shape with slight basal angles.

Mandibles coarsely striated and punctate. Clypeus longitudinally rugose, especially on the sides, behind without rugae, smooth and

shining, somewhat foveolate-punctate. Head subopaque except along a broad median strip, extending from the frontal area to the occiput, and on the posterior angles. These regions are smooth and shining. Cheeks and sides of head rather delicately and longitudinally reticulate-rugose. On the front and vertex there are also a few rather large indentations at widely separated intervals. Thorax nearly opaque, in front delicately and evenly reticulate-rugose; on the epinotum and pleuræ the rugæ are coarser and have a distinctly longitudinal trend. Petiole and postpetiole nearly opaque, finely reticulate-rugose. Gaster very smooth and shining.

Hairs rather sparse, silvery-white; those on the body subclavate, shorter and more erect on the head and thorax, longer and more reclinate on the pedicel and gaster. Hairs on the legs and antennæ short, non-clavate, appressed.

Black. In some specimens the pedicel and thorax are dark-brown. Scape and funiculus of antennæ brown. Mandibles yellow, with black teeth. Legs yellow, middle portion of the femora and tibiæ and terminal tarsal joint on each foot, black.

Type locality: Manzanares, N. M.

Described from five specimens taken by Miss Mary Cooper. The species is obviously closely related to *L. tricarinatus* Emery, and may prove to be merely a subspecies of this form. To judge from Emery's description, the head of *tricarinatus* is more opaque, the mesonotum shining, the first funicular joint larger than the three succeeding joints, the remaining joints of the funiculus shorter than broad. Apparently, also, the postpetiole is considerably larger than in *neomexicanus*.

15. *Leptothorax obturator* sp. nov.

Worker (Pl. XII, fig. 19).—Length 2.25–2.75 mm.

Mandibles 5-toothed. Clypeus rather flat, its anterior margin broadly truncated in the middle. Antennæ 12-jointed; scape reaching posterior angle of head; first funicular joint as long as the three succeeding joints; joints 3–8 broader than long, joints 9–11 forming a club, the ninth distinctly narrower and shorter than the tenth, the terminal joint longer and considerably thicker than the two preceding joints. Thorax slender, somewhat broader in front than behind; rounded at the humeri, in profile convex in front and slightly concave behind on the dorsal surface, without mesoëpinotal constriction. Epinotal spines small, rather acute, not longer than broad at their bases, nor further apart than long, directed upward. In front and

on the side of each epinotal spine there is a distinct longitudinal swelling or ridge on the epinotum. Petiole very slender, three times as long as broad, sides of the node parallel, the peduncle somewhat narrower when seen from above; in profile the lower surface is evenly concave, the anterior tooth minute; the dorsal surface with a low regularly rounded, knoll-like node. Postpetiole small, about $1\frac{1}{2}$ times as broad as the petiole, as broad as long, square when seen from above, with prominent anterior angles; in profile the lower surface is flattened, the upper convex, especially in front. Gaster with distinct anterior angles. Sting well developed.

Mandibles opaque, striated and with a few coarse punctures. Clypeus subopaque, its whole surface longitudinally rugose. Head subopaque in front and on the sides, shining behind, on the former regions densely and rather finely reticulate-rugose; the rugæ with a distinct longitudinal trend except on an opaque patch above each eye, where the rugæ are evenly reticulate. The shining portion of the head is traversed by clean-cut longitudinal rugæ much farther apart than on the front and crown and interspersed with a few coarse punctures; posterior angles of head delicately reticulate. Thorax subopaque; pronotal region more shining, foveolate-reticulate on the whole dorsal surface; pleuræ more coarsely reticulate-rugose, with pronounced longitudinal trend in a few of the rugæ, especially in the upper meso- and lower metapleuræ. Petiole and postpetiole subopaque, rather evenly foveolate-reticulate. Gaster smooth and shining.

Hairs moderately abundant, snow-white; clavate on the crown of the head, thorax, pedicel and gaster; a little longer on the pedicel and gaster and somewhat more reclinate. Hairs on the legs and antennæ sparse, non-clavate, appressed and inconspicuous.

Black or very dark-brown. Mandibles, joints 3-9 of the antennæ, neck, ventral surface of petiole and postpetiole reddish-yellow. Legs reddish-yellow, except the middle of the coxæ, femora, tibiæ and last tarsal joint; which are black.

Female.—Length 3.5-3.75 mm.

Clypeus and head more coarsely longitudinally rugose and more opaque than in the worker. Thorax subopaque; neck delicately reticulate-rugose; pronotum transversely and irregularly rugose; mesonotum, paraptera and scutellum traversed by dense, parallel, clean-cut, longitudinal rugæ. Epinotum delicately and somewhat concentrically reticulate-rugose; armed with two inconspicuous swellings in the place of the spines; pleuræ longitudinally rugose. Petiole and postpetiole like those of the worker, the node of the former relatively lower; post-

petiole hardly $1\frac{1}{2}$ times as broad as the petiole. The white hairs on the body are non-clavate, though those on the pedicel and gaster are somewhat thickened. Head, thorax and pedicel yellowish-red or dark-red, their upper surfaces more or less infuscated. Gaster black. Antennal scape black with basal half yellow; first joint of funiculus and club black, remaining joints yellow. Legs colored like those of the worker. Wings milky-white, veins yellow; stigma brown, conspicuous.

Male.—Length 1.5–2 mm.

Head as long as broad, exclusive of the mandibles; cheeks very short. Mandibles meeting with their tips. Clypeus convex, truncated in front. Antennæ slender; 13-jointed; scape nearly as long as the first five joints of the flagellum; first flagellar joint thickened, nearly as long as the three following joints together; joints 2–8 of the flagellum cylindrical, as long as broad; the four terminal joints forming a club, of which the three basal joints are subequal in length but increase somewhat in thickness distally; terminal joint much larger, distinctly longer than the two preceding joints. Epinotum with two very inconspicuous thickenings in the place of the spines. Petiole and post-petiole similar in shape to the corresponding segments of the worker, node of former very low.

Clypeus shining, with a few reticulate rugæ forming rather large meshes. Head, thorax and pedicel opaque, finely and evenly reticulate-rugose. Mesonotum sparsely foveolate-punctate and traversed by a narrow, smooth, longitudinal stripe. Pleuræ shining in part. Gaster smooth and shining.

Hairs white, sparse, non-clavate, most abundant on the thoracic dorsum, pedicel and gaster.

Black; pleuræ and pedicel more piceous. Mandibles, legs and antennæ white; the mandibles with brown edges, the antennæ with scape, second joint and club blackened; legs with the coxæ, middle of the femora and tibiæ and the last tarsal joint blackened.

Type locality: Austin, Tex.

Described from many specimens collected at different times from the abandoned *Holcaspis cinerosus* galls on the live-oaks (*Q. virginiana*). The young fertilized queen, on entering the gall to establish her colony, gnaws minute fragments from the ligneous wall, mixes these with some secretion (saliva?) and completely plugs up the round opening through which the *Holcaspis* escaped and she herself has entered. Later when the first batch of tiny workers appear, they perforate the center of the plug with a small opening like a pin-prick, and just large enough for egress and ingress. This opening is too small for

the queen to pass, so that she remains imprisoned. With the growth of the colony the chamber formerly made and inhabited by the *Holcaspis* larva is enlarged by the workers. The queen with the larvæ prefers to inhabit the small central capsule in which the *Holcaspis* passed its pupal life. The larvæ are of a peculiar greenish tint. The males and virgin females make their appearance in the colony during the last week of May. At no time are the colonies of *L. obturator* very large. They rarely comprise more than 36 or 40 workers. Members of different colonies, even from galls on the same branch, are extremely hostile to one another. Along the creek-bottoms near Austin, *L. obturator* is also occasionally found nesting in the twigs of the wafer-ash (*Ptelea trifoliata*) which have been hollowed out by tiny carpenter-bees (*Ceratina nanula* Ckll. and *C. arizonensis* Ckll.). The relatively large entrance made by the bees at the end of the twig is plugged up by the ants with agglutinated vegetable particles and then perforated with a minute opening in the center.

16. *Leptothorax nevadensis* sp. nov.

Worker (Pl. XII, fig. 20).—Length 2.5–3 mm.

Mandibles 5-toothed. Clypeus depressed in the middle, its anterior margin sinuately excised. Antennæ 12-jointed, scape reaching to posterior corner of the head, first funicular joint as long as joints 2–4 together, joints 2–6 slightly broader than long, joints 7 and 8 as long as broad; two basal joints of club subequal, together shorter than the terminal joint. Thorax above in front of about the same width as below and behind; humeri much rounded, dorsum flattened in profile, without mesoëpinotal constriction. Epinotal spines robust, pointed, decidedly longer than broad at their bases, and nearer together at their bases than long, directed upward, outward and backward. Petiole $1\frac{1}{2}$ times as long as broad, sides of node rounded, broader than the peduncle; seen from above the node is transverse, in profile it is narrow antero-posteriorly, its anterior slope gently ascending, concave, its posterior slope more abrupt, also concave, summit rounded; ventral surface of petiole with a prominent, compressed, downwardly directed tooth. Postpetiole in profile with a prominent, sometimes slightly angular node; the segment seen from above is transversely elliptical, about half again as broad as long, its anterior angles rounded. Gaster and legs of the usual conformation.

Mandibles striate and punctate. Clypeus subopaque, its surface, especially at the sides, traversed by rather coarse longitudinal rugæ. Head with a satiny luster, sparsely punctate and with delicate longitudinal rugæ, which become decidedly reticulate in the antennal

foveæ. Thorax subopaque, its dorsal surface irregularly reticulate-rugose and foveolate, pleuræ, petiole and postpetiole regularly foveolate-punctate; posterior epinotal declivity rather coarsely longitudinally rugose. Gaster smooth and shining.

Hairs yellow, not very abundant; clavate on thorax, pedicel and crown of head; short and erect on head and thorax, longer and somewhat reclinate on the pedicel and gaster. Hairs on antennæ, legs and sides of head less conspicuous and appressed, except on the antennæ, where they are suberect.

Rather dark reddish-brown, ventral portions of head, thorax and pedicel and the incisures of the gastric segments, yellowish. Legs and antennæ yellowish, middle of femora and the antennal club dark-brown. Immature specimens have the thorax and pedicel more extensively yellow.

Female (deälated).—Length 4.5 mm.

Mandibles densely striated and somewhat punctate. Clypeus with coarse longitudinal rugæ, one of which forms a distinct carina in the middle of the sclerite. Frontal area opaque. Head with coarse and very regular longitudinal rugæ, but little diverging behind and but slightly reticulate. On the upper surface of the head there are also a number of shallow but distinct foveolæ in the interrugal furrows. Pronotum and pleuræ coarsely longitudinally rugose; mesonotum shining, sparsely foveolate and rather indistinctly longitudinally rugose, especially in front. Scutellum and paraptera like the mesonotum, the former with indications of rugæ only at its anterior border. Whole epinotum subopaque, coarsely rugose, even over the entire surface of the robust, pointed spines, which are as long as they are broad at their bases. Declivous surface of epinotum regularly transversely rugose. Petiole and postpetiole opaque, reticulate and punctate-rugose, more coarsely on the sides than on the summits of the nodes; petiolar node in profile more acute than in the worker. Gaster very glabrous. Head, thorax and pedicel rich reddish-brown; gaster decidedly darker. Legs and antennæ yellow. In the latter all the joints of the funiculus are distinctly longer than broad, and the club, which is not infuscated, is indistinct. Wing-insertions black. Hairs on the body sparse, yellow, not clavate like those of the worker, but more or less tapering.

Male.—Length 2.5–3 mm.

Mandibles dentate, overlapping with their blades. Clypeus convex, truncated in the middle in front. Antennæ 13-jointed; scape slender, as long as joints 1–5 of the funiculus. First funicular joint fully twice

as long as broad, much stouter than the succeeding joints, except those of the 4-jointed club; joints 3-7 longer than broad; three basal joints of club subequal, each not more than half as long as the terminal joint. Cheeks short. Thorax with very deep Mayrian and other sutures. Epinotum without indications of spines. Petiole and postpetiole longer and with lower nodes than in the worker. Gaster of the usual shape.

Mandibles and clypeus somewhat shining, the latter with a few prominent and irregular longitudinal rugæ. Head decidedly opaque, uniformly and densely punctate. Thorax shining, mesonotum, scutellum and pleuræ with faint, parallel, longitudinal striæ. Pronotum and epinotum more reticulate-rugose. Petiole and postpetiole smooth and shining on the summits of the nodes, elsewhere subopaque, finely reticulate-rugose. Gaster smooth and shining.

Hairs covering the body sparse, whitish, non-clavate, longest and most conspicuous on the gaster, very small and appressed on the legs and antennæ.

Black, thorax and pedicel more piceous, especially on their lateral and ventral surfaces. The following parts are yellowish, or yellow suffused with piceous: mandibles, except their teeth, which are black, antennæ, legs and genitalia. Wings whitish-hyaline, veins and stigma colorless.

Type locality: King's Cañon, Ormsby county, Nev.

Described from eight workers, one female and eight males, found by Mr. C. F. Baker during August, 1902, nesting in the ground under a stone.

This species appears to be similar to *L. tricarinatus* Emery, but differs in the shape of the clypeus, which is impressed and sinuately excised and not produced, and in the shape of the epinotal spines, petiole, etc.

17. *Leptothorax terrigena* sp. nov.

Worker (Pl. XII, fig. 21).—Length 1.5-1.75 mm.

Head rather narrow, with parallel sides. Mandibles 5-toothed. Clypeus moderately convex, without median impression and with broadly rounded, non-sinuate anterior border. Antennæ 12-jointed, scape extending to $\frac{2}{3}$ the distance between the eye and the posterior corner of the head; first funicular joint as long as the three succeeding joints together; joints 2-8 of funiculus decidedly broader than long, subequal; three terminal joints forming a distinct club, of which the two basal joints are subequal in length but not in thickness, and together shorter than the terminal joint. Thorax slender, somewhat broader in front than behind, with rounded humeral angles and moderately

elevated anterior pronotal border. Pleuræ compressed; dorsum flattened and without mesoëpinotal constrictions. Epinotal spines small, conical, distinctly longer and further apart than broad at their bases. Petiole short, hardly $1\frac{1}{2}$ times as long as broad, sides of node convex when seen from above and much broader than the peduncle; in profile the node is high and very thick with an evenly rounded summit, very steep and concave anterior, and very abrupt posterior declivity; ventral tooth rather large, blunt. Postpetiole twice as broad as the petiole, distinctly broader than long, transversely elliptical from above, with rounded anterior angles. Gaster of the usual shape.

Mandibles and clypeus subopaque, the former longitudinally striated and with a few coarse punctures, the latter longitudinally rugose. Head opaque throughout, evenly and densely punctate except along the sides of the frontal region, where there are a few delicate longitudinal rugæ. Thorax, petiole and postpetiole opaque, densely punctate. Gaster smooth and shining.

Hairs white, moderately numerous, clavate on crown of head, thorax and abdomen; erect on head and thorax, more reclinate on the pedicel and gaster; minute, inconspicuous and appressed on the antennæ and legs.

Whole body, even the anterior portion of the gaster, golden-yellow, except the antennal club which is blackened.

Female (deälated).—Length 2.5 mm.

Head opaque, densely punctate; cheeks and whole preocellar region irregularly longitudinally rugulose, the postocellar region and posterior angles more reticulate. Thorax opaque, densely punctate; mesonotum and scutellum with very faint, parallel, longitudinal rugæ. Epinotal spines very short and stout, regularly conical, not as far apart as they are broad at the base. Petiole and postpetiole like those of the worker, but the latter segment fully twice as broad as long. Both segments of the pedicel densely punctate, opaque, except the dorsal surfaces of the nodes which are somewhat smooth and shining. Body brownish-yellow, legs pale-yellow. Antennal club, wing-insertions, sides and posterior border of first gastric segment, a broad transverse band on the second gastric segment and the tip of the gaster, dark-brown. Pilosity like that of the worker.

Type locality: Austin and McNeil (Travis county), Tex.

This small species lives in and on the ground. At Austin I have occasionally seen a few workers running about on the dry gravelly hill-slopes exposed to the sun. At McNeil I took a few dozen workers and a deälated queen, which were inhabiting a small spherical chamber

in the "black waxy" soil under the center of a large flat stone. Two other nests taken at Austin exhibited a tendency toward plesiobiosis. One of these was found in the vegetable débris at the very entrance of the nest of a timid fungus-growing ant (*Trachymyrmex turrijex* Wheeler), the other under a stone at the very edge of a flourishing colony of *Pheidole instabilis* Emery.

L. terrigena is undoubtedly closely allied to *L. Andrei* Emery, which I have not seen. The worker differs, however, in its decidedly smaller size, shape of petiole and postpetiole, its larger and stouter epinotal spines, the absence of a clypeal sinuosity, a shining longitudinal band on the front and vertex, and the absence of infuscation on the abdomen, although the last character is clearly present in the female.

18. *Leptothorax Andrei* Emery.

L. Andrei Emery, Morph. Jahrb. Abth. f. Syst., VIII, 1894, pp. 318, 322.

Worker (Pl. XII, fig. 22).—Length 2.25 mm.

Clypeus feebly carinate in the middle, its anterior border subsinuate. Antennæ 12-jointed; first funicular joint a little shorter than the three succeeding joints; second joint of club a little longer than the preceding joint. Thoracic dorsum without a mesoëpinotal constriction. Epinotal spines in the form of short, stout teeth. Petiole with a rather long peduncle, its node above subrotund. Postpetiole about a third broader than the petiole, a little broader than long.

Mandibles striated. Head opaque, longitudinally rugulose-punctate; cheeks and clypeus striated, the latter and a median line along the front and vertex shining. Thorax and pedicel opaque; the former densely, the latter more faintly punctate. Gaster and legs shining.

Hairs on the body sparse, short and clavate.

Testaceous, abdomen darker behind, legs pale.

Type locality: California (André).

The species was described from a single specimen in the collection of Prof. Emery.

19. *Leptothorax (Dichothorax) Pergandei* Emery.

L. (D.) Pergandei Emery, Zool. Jahrb. Abth. f. Syst., VIII, 1894, pp. 318–323, 324. ♂.

Worker (Pl. XII, figs. 23 and 23a).—Length 2.5–3.25 mm.

Mandibles rather broad, 5-toothed. Clypeus moderately convex, broadly rounded in front, with a distinct median carina. Antennæ 12-jointed, scape extending beyond the posterior angle of the head a distance fully equal to twice its breadth; first funicular joint as long as the three succeeding joints together; joints 3–8 nearly as long as broad; club 3-jointed, the two basal joints subequal, together shorter

than the terminal joint. Thorax long, rather robust, not much wider in front than behind, without abrupt declivity at the juncture of the neck and pronotum, pro- and mesonotum convex; mesoëpinotal constriction very deep and broad. Epinotal spines small, not longer than broad at the base, directed upward. Petiole from above nearly three times as long as its greatest width which is in the middle; in profile the node is low and rounded above, the anterior slope very long, at first nearly horizontal, then gradually ascending, the posterior slope shorter, somewhat flattened; summit of node distinctly impressed or concave when seen from behind; ventral surface of peduncle with a long but not very prominent tooth. Postpetiole fully half again as broad as the petiole, a little broader than long, nearly square, its anterior angles prominent, its dorsal surface in profile very convex, especially in front. Gaster rather large, of the usual shape. Sting well developed. Legs robust.

Mandibles longitudinally striated. Clypeus smooth, especially behind, its sides longitudinally rugose. Head smooth and shining above and behind, sparsely punctate and irregularly and delicately reticulate. Antennal foveæ with curved, parallel rugæ; front and cheeks with straight rugæ. Neck opaque and delicately rugose; pro- and mesonotum shining, very finely and irregularly reticulate, pleuræ, epinotum and mesoëpinotal constriction subopaque, coarsely reticulate-rugose; in the constriction and on the meso- and metapleuræ the rugæ have a distinctly longitudinal trend. Declivous surface of epinotum smooth and shining. Petiole and postpetiole shining and finely reticulate above, more opaque and reticulate-rugose on the sides. Gaster smooth and shining, finely and irregularly reticulate.

Hairs white, long and very abundant, obtuse but not clavate, erect on the trunk, suberect on the legs and antennæ.

Black or rich dark-brown, mandibles, antennæ, except the club, frontal carinæ, thorax, pedicel and legs yellowish-red or testaceous. In some specimens the dorsal surface of the thorax and nodes is blackened, while in others the whole of the thorax, nodes and legs is black except the peduncle of the petiole and the tarsi and joints of the legs, which are yellow.

Female.—Length 3.5–4 mm.

Apart from the usual sexual characters, differs from the worker in having the lower surfaces of the head, thorax, pedicel and the legs more yellowish. The smooth surfaces of the body are hardly reticulate. Mesonotum adorned with a median brown blotch on its anterior half and a large comma-shaped spot on either parapsis. Scutellum, epi-

notum and pleuræ more or less spotted with brown, and a small black spot at the insertion of the forewing. Femora and tibiæ infuscated in the middle. Antennal club infuscated. Wings milky-hyaline, with colorless veins and stigma. Concavity at summit of petiolar node very distinct; postpetiole nearly twice as broad as long. Epinotal spines distinctly shorter than broad at their bases.

Male.—Length 2-2.25 mm.

Head a little longer than broad; cheeks very short, eyes and ocelli prominent. Mandibles overlapping, 4-toothed. Clypeus convex. Antennæ 13-jointed, scape about as long as the five succeeding joints, first funicular joint about as long as the second and third together; joints 3-8 slender, cylindrical, subequal, twice as long as broad; club 4-jointed, the three basal joints subequal, together as long as the terminal joint. Thorax long, mesonotum rounded, projecting forward, so that the head is scarcely visible when the insect is viewed from above. Epinotum with a pair of slight projections in the place of the spines. Petiole long and slender, like that of the worker but with lower node. Postpetiole as long as broad, square from above, in profile with the node highest in the middle of the segment and rounded. Gaster and legs of the usual conformation.

Mandibles and clypeus subopaque, the latter coarsely rugose. Head shining, very irregularly and sparsely reticulate, in front of the ocelli with a few shallow foveolæ. Pronotum subopaque, reticulate; mesonotum very smooth and shining, finely reticulate. Scutellum and epinotum more opaque, disk of former coarsely reticulate, sides of both longitudinally rugulose. Petiole and postpetiole opaque, more shining above, delicately corrugated. Gaster very smooth and shining.

Hairs white, rather sparse and long, even on the legs and antennal scape, where they are reclinate but not appressed.

Black. Mandibles, antennæ and legs white except the following portions, which are infuscated or blackened: Edges and teeth of mandibles, terminal joint of antennæ, basal two-thirds of coxæ, middle of femora and tibiæ and last tarsal joint. Wings like those of the female.

Type locality: Washington, D. C. (Pergande).

Additional localities: Morgantown, N. C. (Forel); Austin, Tex.; San Angelo, Tom Green County, Tex.; Toronto, Brewster County, Tex.

The type specimens of this fine species were taken by Mr. Pergande in a nest of *Monomorium minutum* Mayr var. *minimum*, and it was supposed that the *Leptothorax* was a guest in the nests of the *Monomorium*, but Forel, who observed the species in North Carolina, showed that this was altogether an exceptional case. He found *L. Pergandei*

living "in independent formicaries, in the moss of woods or in the earth of meadows, like the ordinary species of *Leptothorax*" (*Ann. Soc. Ent. de Belg.*, Tome XLV, 1901, pp. 389-398). In Texas I have had ample opportunity to observe the habits of this ant, especially in the neighborhood of Austin, where it is found making its nests in very sparsely grassy spots among the mesquite and *Opuntia* thickets. The nests can be found only by carefully tracking foraging workers, as the entrance is a small hole often concealed under a dead twig or a tuft of grass roots. The colonies are hardly more populous than those of other species of *Leptothorax*. The winged forms appear during the last week in April and the first week in May. The workers run about on the soil in the hot sun as fierce hunters of small insects (Aphids, minute Heteroptera, etc). As they are extremely pugnacious even toward individuals of the same species from other nests, and as I have never found them nesting with *Monomorium minimum*, though this species is very common in the same localities, I believe, with Forel, that Pergande's observation must be quite exceptional or may even involve some misinterpretation.

20. *Leptothorax* (*Dichothorax*) *floridanus* Emery.

L. (D.) floridanus Emery, Zool. Jahrb., Abth. f. Syst., VIII, 1894, pp. 318, 324. ♂.

According to Emery, the worker of this species (Pl. XII, figs. 24 and 24a) differs from the preceding in the following characters: The body is more shining, the epinotum smooth and shining above, the mesoëpinotal constriction punctulate, subopaque, the petiolar node is narrower, and not impressed above, the postpetiole is hardly $\frac{1}{3}$ again as broad as the petiole and proportionally narrower than in *Pergandei*.

Type locality: Florida (Pergande).

Additional locality: North Carolina (Forel).

The differences between the two *Dichothorax* are so slight that Emery suspected *floridanus* to be merely a subspecies of *Pergandei*. I am myself strongly of this opinion, but as I have seen only a single specimen of *floridanus*, kindly given me by Prof. Forel, I hesitate to reduce this form to subgeneric rank. In my specimen the petiolar node is very decidedly convex when seen from behind, and the epinotal spines are longer and more curved than in any of my specimens of *Pergandei*. In other respects I can see no differences of importance. Color, pilosity and sculpture are the same in both forms.

EXPLANATION OF PLATE XII.

- Fig. 1.—*Leptothorax muscorum* Nylander. Switzerland. In this and the following figures only the profile view of thorax and pedicel (petiole and postpetiole) of the worker are represented. All the figures are from camera lucida drawings.
- Fig. 2.—*L. muscorum* var. *sordidus* var. nov.
- Fig. 3.—*L. acervorum* Mayr. Switzerland.
- Fig. 4.—*L. acervorum* subsp. *Canadensis* Provancher.
- Fig. 5.—*L. acervorum* subsp. *Canadensis* var. *Yankee* Emery
- Fig. 6.—*L. Emersoni* Wheeler.
- Fig. 7.—*L. Schaumi* Roger.
- Fig. 8.—*L. fortinodis* Mayr.
- Fig. 9.—*L. longispinosus* Roger.
- Fig. 10.—*L. curvispinosus* Mayr.
- Fig. 11.—*L. curvispinosus* subsp. *ambiguus* Emery.
- Fig. 12.—*L. curvispinosus* subsp. *rugatulus* Emery.
- Fig. 13.—*L. curvispinosus* subsp. *annectens* subsp. nov.
- Fig. 14.—*L. Schmiltii* sp. nov.
- Fig. 15.—*L. nitens* Emery.
- Fig. 16.—*L. texanus* sp. nov.
- Fig. 17.—*L. tricarinatus* Emery. (After Emery.)
- Fig. 18.—*L. neomexicanus* sp. nov.
- Fig. 19.—*L. obturator* sp. nov.
- Fig. 20.—*L. nevadensis* sp. nov.
- Fig. 21.—*L. terrigena* sp. nov.
- Fig. 22.—*L. Andrei* Emery. (After Emery.)
- Fig. 23.—*L. (Dichothorax) Pergandei* Emery. 23a node of petiole seen from behind.
- Fig. 24.—*L. (Dichothorax) floridanus* Emery. 24a node of petiole seen from behind.

