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## A Collection of Ants from Southcentral Ohio<sup>1</sup>

Laurence G. Wesson, Jr. and Robert G. Wesson

The following paper is a report on a collection of ants made by the authors during the summers of 1934-39 in southcentral Ohio. Almost all the work was done within 45 miles of Jackson. In it are listed 97 different forms together with such biological notes as seem significant. One variety of *Leptothorax* is described as new: *L. ambiguus* Emery var. *pinetorum*. The genus *Strumigenys* was dealt with in a previous paper,<sup>2</sup> and is listed here by species only.

The area in which the collecting was done lies almost entirely in the non-glaciated, dissected portion of the Appalachian plateau. Only in the northwest corner are there glacial drifts and broad, level areas. The surface strata vary widely. In the east they are largely shale and clay, and the hills are gentle and more heavily vegetated. In the central portion, sandstones and conglomerate predominate causing the hills to be steeper, flattened on top, better drained and less densely vegetated. In the western portion, where limestone is the dominant formation, the hills are lower, the soil shallow and rocky, and the vegetation quite variable.

The varied topography and surface strata of the region combined with various kinds and degrees of land utilization furnish a great variety of habitats. In order to present a general conception of the dominant ant fauna of this region before proceeding to a more detailed report of the particular species, we attempt a rough summary of the commoner species in the broader types of habitats. Nearly everywhere are found *Tapinoma sessile*, *Lasius americanus*, *Paratrechina parvula*, *Crematogaster lineolata*, *Solenopsis molesta*, and *Ponera pennsylvanica*, all except the *Ponera* being more abundant in drier and more open localities. In dry, upland fields are *Dolichoderus beutenmuelleri*, *Pheidole tysoni*, *Aphaenogaster treatae*, *Monomorium minimum*. *Formica schaufussi* and *Leptothorax pergandei* prefer the more barren spots while *Formica nitidiventris* nests in more thickly vegetated places. *Leptothorax ambiguus* is found in grassier areas, especially those bearing beard grass (*Andropogon*). *Formica exsectoides* and *F. rasilis* are more abundant in the vicinity of scattered shrubs or small trees. On the moister hillsides, where grazing prevents weeds and brambles from growing, *Formica nitidiventris*, *Myrmica americana*, *Aphaenogaster aquia* and *Pheidole pilifera* appear in greater abundance. The open bottom meadows are characterized chiefly by *Myrmica americana* with occa-

<sup>1</sup> We wish to express here our gratitude to Dr. M. R. Smith, U. S. Dept. of Agriculture, and Dr. W. S. Creighton, College of the City of New York for their valuable assistance with the taxonomy; and to Mr. and Mrs. E. B. Matthews of Jackson, O., who furnished the facilities which made our work possible.

<sup>2</sup> Wesson, L. G., Jr., and R. G. Wesson, Notes on *Strumigenys* from Southern Ohio with Descriptions of Six New Species. *Psyche* 46:91-112, 1939.

sional *Formica nitidiventris*. Dry hillsides covered principally with oaks have *Formica subsericea* and often the associated *F. subintegra* and *F. rubicunda*, *Brachymyrmex depilis*, *Lasius nearcticus*, *L. aphidicola*, *Prenolepis imparis*, *Camponotus americanus*, *Myrmica punctiventris*, *Leptothorax curvispinosus*, and its enslaver, *Harpagoxenus americanus*, *Myrmecina graminicola*. In clearings, along the edge of, or in broken woods, *Formica nitidiventris*, *Aphaenogaster treatae* and *Myrmica emeryana* are common in addition to the preceding forms; in woods in which the soil is very poor and rocky *Camponotus castaneus* replaces *C. americanus* in abundance; *Myrmica pinetorum* is abundant in pine woods and dry oak openings. On lower, somewhat moister but not too densely wooded slopes *Formica subsericea*, *Brachymyrmex depilis*, *Prenolepis imparis*, *Lasius aphidicola*, *Leptothorax curvispinosus*, are still present, while *Camponotus ferrugineus*, *C. subbarbatus*, *Dolichoderus plagiatus*, *Aphaenogaster aquia*, *A. rudis*, *Stenammina brevicorne* become common. In low moist woods *Lasius americanus*, *Prenolepis imparis* and *Aphaenogaster picea* are the principal ants found.

The most uniform and circumscribed habitat group we have found is that of the ants which nest in the crowns of trees, especially large white oaks. This comprises *Camponotus pennsylvanicus*, *C. nearcticus*, *Leptothorax schauumi* and *L. fortimodis*; frequently *Camponotus cnemidatus*, *Aphaenogaster mariae*, *Leptothorax wheeleri* and *L. curvispinosus* var.; *Aphaenogaster rudis* and *A. tenesseeensis* sometimes nest in the lower parts of the trunk.

#### *Ponerinae*

*Stigmatomma pallipes* (Haldeman)—Found occasionally under stones or logs, usually in rather moist or shaded situations. Six workers were once observed about a large dead centipede. Males were taken in the nest early in September.

*Sysphincta pergandei* Emery—We have taken 3 single workers and a colony of this species. One worker was found in clay soil on the edge of a pasture under a stone under which ran numerous galleries of *Lasius aphidicola*. A worker was taken in a clearing in dry woods on clay soil under a punky pine log. Also under the log, near where the *Sysphinctas* were found, was a colony of *Lasius aphidicola*. Digging around the spot failed to reveal additional specimens. A worker was taken under a stone on shallow clay soil among some small pines and oaks. Under the stone were some deserted galleries of *Aphaenogaster aquia*. A colony, comprising a queen, 11 workers and 8 males was found in late August in dense oak woods under and scattered among the leaves surrounding a stone which also sheltered a colony of *Camponotus castaneus*. Thinking that there might be some relationship between the *Sysphincta* colony and the *Camponotus*, we put the former, together with workers and brood of *C. castaneus*, in an artificial nest so constructed that the *Camponotus* could not enter the *Sysphincta* chamber while the latter were free to go among the *Camponotus*. The *Sysphincta* went freely around in the *Camponotus* chambers, but seemed to avoid the open places and the brood. The *Camponotus* workers paid little attention to the intruders, but when one did on

occasion snap at a *Sysphincta*, the latter merely remained quiet until the attack passed. On the other hand, the *Sysphincta* workers were continually fighting among themselves, and once the queen was observed attacking a worker. This fighting resulted in 3 deaths in a few days. Frequently, a *Sysphincta* worker would approach another, give a little tug on its mandibles, whereupon the first worker would turn about and start off closely followed by the second. Such pairs would meander considerable distances but seemed to have no real goal. Attempts to feed the *Sysphinctae* on insect food met with little success. They refused to accept living or dead insects, with the exceptions noted below, appearing to be frightened by them. They likewise refused pupae of *Formica nitidiventris*. They were, however, seen to eat the inside of the gaster of a dead *nitidiventris* worker which had been offered them, and later did the same to a dead *F. fusca* and *Camponotus castaneus*. These observations, while quite inconclusive, suggest that *Sysphincta* may live, in part at least, on dead or dying ants.

Two of the single workers differed from the other collections and from Emery's figure of the species<sup>3</sup> in having the head, excluding the mandibles, as broad as long, with the posterior border broadly and evenly rounded; the first gastric segment shining above; the second gastric segment compressed dorso-ventrally and elongate, the length 1.6 x the greatest thickness.

*Proceratium silaceum* Roger—On each of the seven occasions that we have taken this species, it has been in open woods in a stump or log that was well decayed superficially and kept moist by a protective layer of bark. A single colony, taken in mid August, comprised 40 workers, several winged males and females, 3 cocoons, 3 naked pupae and about 20 small larvae. In an artificial nest, one of the dealated females remained near the brood while the other roamed like a worker.

*Proceratium crassicornе* Emery—In contrast to the preceding species, we have occasionally (4 times) taken this ant in rather dry soil under stones or moss in open woods. One worker was taken in a rotten pine log in a clearing among grass and scattered bushes. A colony comprising 30 workers, a dealated female, about 8 males, 2 cocoons, 5 naked pupae and a few small larvae was taken in mid August from the soft, punky portion of a rotten log. In the artificial nest, workers of both this and the above species constructed neat, oval chambers from the crumbled rotten wood offered them. They ran actively about, but showed little interest in any form of food offered them. This may have been due to the lateness of the season, however.

*Ponera coarctata pennsylvanica* (Buckley)—Very common and widely distributed. In low moist woods, colonies are to be found in logs and stumps or in the humus. In drier woods and in fields, colonies are often found under stones as well.

*Ponera trigona* var. *opacior* Forel—Much less common than the above

<sup>3</sup> Emery, C., Beiträge zur Kenntniss der Nordamerikanischen Ameisenfauna. Zool. Jahrb. Abth. Syst. 7:633-682, 1893.

species, taken in fields or dry woods under stones. A few workers were found in a rotten stump in partial shade.

*Ponera oblongiceps* M. R. Smith—A few workers of this species were found under a stone in partial shade, on moist but well drained soil, in Jackson.

### *Myrmicinae*

*Myrmecina graminicola americana* Emery—*Myrmecina graminicola americana* var. *brevispinosa* Emery—Taken rather often in dry or open woods, the single workers being found on the ground under leaves or grass. Males have been taken at the end of August. Our material shows considerable variation in size, coloration and length of spines, although workers in each colony vary much less among themselves than do workers from different colonies. In general, the material varies between small brownish forms, small black forms and large black forms. The length of the spines is quite variable in all three forms. Small pale workers with short spines are referable to var. *brevispinosa*, but, in our opinion this variety is hardly separable from *americana*.

*Monomorium minimum* (Buckley)—Very abundant in sunny places and scattered woods.

*Solenopsis molesta* (Say)—Very abundant; found in rotten logs and stumps and under stones in woods and fields. Colonies of this species are often exposed while excavating the nests of other ants. One group of workers, taken on a moist wooded ridge in Jackson County, differ from the typical *molesta* in their smaller size and darker color which is brown.

*Solenopsis laeviceps* Mayr\*—A single colony, apparently referable to this species, was found under a stone on an open, grassy, bushy hillside in Gallia County.

*Solenopsis texana carolinensis* Forel—Less abundant than *molesta* but found over a similar range of habitat. Like *molesta*, it is often lestopibiotic.

*Pheidole pilifera* (Roger)—Fairly common in both dry and moist fields and meadows where the sun reaches the soil. One colony was taken in a small opening on a moist slope in the woods.

*Pheidole tysoni* Forel—Very common in dry fields and meadows and grazed hillside pastures; found occasionally in openings in the woods. Winged females were taken in the middle of July.

*Pheidole vinelandica* Forel—Found in the same type of situations as *P. pilifera*, but apparently occurs much more sporadically. However, where we have found it, it is very abundant. Nearly all our scattered records are from south of Jackson. Numerous colonies of this species were found on a low.

\* Identification verified by Dr. W. S. Creighton. Specimens of this species collected at Baton Rouge, La. in 1928 are in the Wheeler Collection (unpublished records).

sandy elevation bearing beard grass, cactus (*Opuntia*) and yucca, and fronting the Ohio river in southern Adams County. Here workers from a few of the colonies were pale brownish-yellow in color in contrast to the dark-brown color of the workers in the majority of colonies. Winged phases were taken in the middle of July.

*Crematogaster lineolata* (Say)—Very common in all but the most dense and moist woods. Colonies inhabit dry logs, sticks or stumps and are often found nesting under stones, especially in fields. They appear strongly polydomous. One nest of this species was built almost entirely of carton. The ants had constructed a thick, flaky and rather fragile carton between the diverging stems of a loose clump of beard grass in an open meadow. The nest was built in the form of an upright cigar-shaped structure about 18 cm. high, bluntly pointed above, about 10 cm. in diameter at the widest point a little below the middle and with the narrower bottom resting in the middle of the base of the clump. Within the nest was a dense tangle of stems and blades with occasional small bits of irregular, partitioning carton. Our specimens vary from large forms, 3.8 to 4.0 mm. long, with red, lightly sculptured thoraces, to small forms, 2.5 mm. long, with very coarsely sculptured, nearly black thoraces. Such a range of variation is not present in workers from the same colony, however. The large, paler forms seem to be much more abundant in open woods than elsewhere; the smaller, darker forms are common in both woods and fields.

*Stenammas brevicorne* Mayr—Found occasionally under leaves and debris in moist woods. We have not taken either this or the next species under stones.

*Stenammas brevicorne schmitti* Wheeler—Found on 4 occasions under leaves in woods. It apparently prefers somewhat drier situations than the preceding form.

*Aphaenogaster mariae* Forel—A member of the tree crown fauna, this species was taken frequently in oak trees, often high above the ground. It nests in small stobs or in rotten cavities under the bark. Winged phases were taken in a nest in mid July.

*Aphaenogaster treatae* Forel—Common everywhere in dry fields and open, well drained woods. Sometimes a small, irregular mound is piled outside the nest entrance. Winged females were taken from a nest in September.

*Aphaenogaster treatae pluteicornis* G. C. Wheeler and E. W. Wheeler—We have found this form widely distributed but uncommon. Two workers were taken in a fairly moist pasture. The 4 other collections were from rather dry, broken woods where the soil is poor. A colony from Meigs County contained 40 workers of the typical tawny color, while 20 workers were nearly black in color. The female was dark-brown.

*Aphaenogaster fulva* Roger—*Aphaenogaster fulva aquia* (Buckley)—*Aphaenogaster fulva aquia picea* Emery—Very common in and on the edge of woods. Our specimens vary from forms with yellowish-red or russet head

and thorax, heavier sculpture and numerous transverse rugae on the mesonotum (*fulva*); to forms with russet thorax, darker head, lighter sculpture, few or no transverse rugae on the mesonotum (*aquia*); to uniformly dark-brown forms with still lighter sculpture (*picea*). Between these we find all intergradations, although the workers from a given colony are fairly uniform. The females exhibit similar variations. Colonies of *fulva* seem to be most abundant in dry oak woods where sometimes nearly every stone shelters a colony. *Aquia*, the intermediate form, is more generally distributed, and is most abundant in moister and more open woods. *Picea* is taken commonly in dense or moist woods.

*Aphaenogaster fulva* var. *rudis* Emery—Taken frequently in well drained woods. The colonies are occasionally found in the soil and under stones, but more often in moist, well rotted logs and stumps. On one occasion, a colony was found in a moist rotten portion of a large oak branch about 2½ m. above the ground. Winged phases were taken from a nest in the middle of July.

*Aphaenogaster tennesseensis* Mayr—Often found nesting in logs, stumps and cavities at the base of trees in and on the edge of woods. Winged forms were taken in the nest in the middle of July.

*Myrmica punctiventris* Roger—Common in dry woods. This and the following form nest in very small colonies in the soil. We have never found them under stones. The nest entrance is often surmounted by a turret of crude carton.

*Myrmica punctiventris pinetorum* Wheeler—Common in pine woods on sandy soil. The colonies build carton turrets from the soil up through the pine needles.

*Myrmica sabuleti americana* Weber—Found in open fields and meadows and along the edge of woods. It is most abundant in moist and at the same time sunny situations.

*Myrmica schencki emeryana* Forel—Found rather often along the edge of, or in dry, open woods.

*Myrmica lobicornis fracticornis* Emery—We have taken this species occasionally in low, moist sunny spots, on the edge of woods or among scattered trees, and on the edge of dry fields. This and the two preceding species nest in the soil although rarely under objects.

*Leptothorax duloticus* Wesson—Three colonies were taken in the type locality, a steep, dry oak woods in Jackson County. The habits of this slave-maker are described in a separate paper.<sup>4</sup>

*Leptothorax schaumii* Roger—*Leptothorax fortinodis* Mayr—*Leptothorax fortinodis* var. *melanoticus* Wheeler—To this group belong more than 35 colonies and many stray workers, all collected from living or recently felled trees, especially oak. We have yet to find a large oak tree which does not have colonies of at least one of these forms on it. The nests are located in cavities in the bark or dead stobs. The colonies fall into 3 groups, as follows:

<sup>4</sup> Wesson, L. G., Jr., Observations on *Leptothorax duloticus* Wesson. Bull. Brooklyn Ent. Soc. In press. 1940.

1) *Yellow form*.—Seven of our colonies were found to contain only yellow individuals. Among these colonies, the coloration of the workers varies from pale yellow to a dark yellow with the gaster infuscated. The epinotal spines, even in workers from the same colony, vary from 1.5 to 0.66 times as long as broad at the base. The sculpture also is variable, being distinctly coarser and more rugose, especially on the thorax, in some specimens than in others. The relative sizes of the petiole and postpetiole vary distinctly, although not greatly. In all specimens, the petiole is at least slightly larger in profile than the postpetiole.

2) *Black form*.—In 20 colonies, the gaster of the workers is shining black and the color of the thorax ranges from a dull red to black among different colonies. With these, the same variations hold as with the yellow colonies; sculpture, color of the thorax and size varying distinctly among workers of the same colony, but not so markedly as between workers of different colonies. We have found little or no correlation between color, size, and length of spines. The comparative sizes of petiole and postpetiole are as in the yellow colonies.

3) *Mixed yellow and black form*.—Eight of the colonies contain both yellow workers and black workers, recalling the condition described by Wheeler<sup>5</sup> for *L. fortinodis* var. *gilvus*. We are completely unable to distinguish the two worker phases from one another and from the workers of the pure yellow or pure black colonies by any other character than the color. These mixed colonies are composed as follows:—

- A) 1 yellow dealated female; 35 yellow workers; 30 black workers; 8 black alate females; 3 yellow alate females; 1 alate yellow female with infuscation on the head and thorax.
- B) 1 yellow dealated female; 65 yellow workers; 60 black workers; 27 black alate females; 12 alate yellow females.
- C) 1 yellow dealated female; 1 black dealated female; 2 yellow workers; 1 black worker; 1 worker with dark yellow head and thorax and black gaster.
- D) 1 yellow dealated female; 4 yellow workers; 7 black workers.
- E) 1 yellow dealated female; 6 yellow workers; 1 black worker.
- F) 1 yellow dealated female; 14 yellow workers; 16 black workers.
- G) 1 yellow dealated female; 30 yellow workers; 19 black workers; 1 black alate female; 3 yellow alate females.
- H) 3 yellow dealated females; 25 yellow workers; 5 black workers.

After careful examination of series of males, females and workers from yellow, black, and mixed color colonies, we have been unable to find any difference other than color between them carrying the slightest consistency. Aside from this difference, yellow workers often resemble black workers more than they do others in their own colony. Although we have not examined type material of either *schaumi* or *fortinodis*, we have referred the yellow colonies to *schaumi* and the dark colonies to *fortinodis*. But until more satisfactory separatory characters are found, we regard *schaumi* and *fortinodis* as two color races or strains of a single species, which by priority should be *Leptothorax schaumii* Roger. *L. fortinodis* then would become *Leptothorax*

<sup>5</sup> Wheeler, W. M., A Revision of the North American Ants of the Genus *Leptothorax* Mayr. Proc. Acad. Nat. Sci. Phila. 55:236. 1903.



*schaumi* var. *fortinodis* Mayr. Since attempts on our part to distinguish *L. fortinodis* and var. *melanoticus* have given only arbitrary results, we have preferred to include *melanoticus* with *fortinodis*, regarding the two forms as described as representing the ends of a single color series which are not separable on a geographic or ecologic basis.

We follow Wheeler<sup>5</sup> in regarding the colonies containing workers of both colors as hybrids between the black and yellow forms. This is supported by the facts that 1) both black and yellow individuals continued to appear in nearly equal numbers in a colony in an artificial nest a year after the colony was discovered, although there was only a single yellow female present; 2) in only one instance (colony c) have we found dealated females of both colors in the nest; 3) two individuals with reversed coloration were found in the mixed colonies: the alate female in colony a, and a worker from colony b which was colored brown on the head and thorax and yellow on the gaster and which died soon after emerging from the pupal state. Since in none of these probable hybrid colonies have we found only a black female, and always a yellow female, it would appear that black is a dominant character, and that therefore at least some of the yellow workers in the mixed colonies must be produced parthenogenetically. The crossing of a male from a yellow colony with a female from a black colony would produce only black workers, masking the hybrid nature of the resultant colony.

*Leptothorax wheeleri* M. R. Smith—We have found many colonies of this species in galleries in the hardened, weathered logs on old deserted and tumble-down log cabins exposed to the sun. Two other colonies were found on large oak trees where they were nesting in dead stobs. On one occasion, workers were observed feeding on the exuviae of wood-boring beetles. Winged phases were taken in the early part of August.

*Leptothorax longispinosus* Roger—Colonies of this species are found locally abundant in open woods, and in crevices and under moss and lichen on dry boulders or rock outcrops. We have also found colonies nesting in hollow nuts and acorns on dry wooded hilltops, and in the bark at the base of trees. Winged phases were taken in early July.

*Leptothorax curvispinosus* Mayr—Found abundantly in and on the edge of woods except the very dense and moist. Here it nests on the ground in hollow stems, twigs, nuts, acorns and galls.

We have taken five colonies of an interesting variety of this species from dead twigs or cavities in the bark of living or recently felled oak trees. In all cases, the colonies have been located many feet from the base of the tree. The workers differ from the worker of the typical *curvispinosus* in (1) the short epinotal spines which vary from as long as broad to twice as long as broad at the base; (2) the less convex posterior slope of the petiole; (3) the more uniform rugosity on the sides and dorsum of the thorax; (4) the average paler, smaller and more diffuse dark spots on the gaster. The female, which also seems to be distinct, differs from the female of typical *curvispinosus* in (1) the very short epinotal spines which are shorter than broad at the base; (2)

the somewhat less robust thorax; (3) the paler and less extensive infuscation, particularly on the gaster. In view of the variability of *curvispinosus*, we hesitate to describe this tree-living formula as a distinct variety until we have been able to examine much more material.

Winged phases were taken in early July.

*Leptothorax ambiguus* Emery—This species seems to be typically a meadow ant. We have found it in nearly every growth of beard grass that we have examined, less often in more thickly vegetated fields. Several colonies were found in a moist sunny pasture in the bottom of a gulch. The colonies usually nest in hollow dead stems at the base of grass tufts, although one colony from the low pasture was nesting in the soil. Males were taken in the nest in early July.

Our specimens were identified by Dr. M. R. Smith who compared them with specimens in the Pergande collection in the U. S. National Museum. The Pergande specimens are from Hill City, South Dakota, and are believed to be cotypes. Since Emery's original description is inadequate for the determination of *L. ambiguus*, we add the following separation of this form from *L. curvispinosus*.

*Worker*.—Differs from the worker of *L. curvispinosus* in the following characters: 1) The epinotal spines are shorter, from  $\frac{1}{2}$  to  $\frac{2}{3}$  the length in *L. curvispinosus*, as far apart at the base as they are long, slightly diverging, obtusely pointed. 2) The petiole is proportionately shorter and the node higher than in *L. curvispinosus*, only slightly compressed laterally above when seen from behind, the anterior slope concave and steep, the posterior slope sharply convex or angulate. 3) The postpetiole in profile is larger in proportion to the petiole, and is subquadrate; from above, the postpetiole is rectangular,  $1\frac{1}{4}$  times as broad as long. 4) The sculpture on the thorax is more opaque than in *L. curvispinosus* and more uniform; the rugae are more irregular and the interrugal spaces coarsely and densely reticulate-punctate. 5) The color is uniformly tawny yellow, the spots on the sides of the gaster in *L. curvispinosus* being absent in *ambiguus*.

*Female*.—Differs from the female of *L. curvispinosus* as follows: 1) The epinotal spines are obtuse, as broad as long at the base. 2) Petiole and postpetiole as in the worker, and differing from the *curvispinosus* female in the same manner as do the workers of the two forms. 4) The sculpture is less shining.

*Male*.—Differs as follows from the male of *L. curvispinosus*. 1) Smaller size (2.2-2.4 mm). 2) The epinotum lacks spines, bearing instead small, low, broadly rounded tuberosities. 3) Front and vertex are rather delicately reticulate-rugose, without the more prominent longitudinal rugae of *L. curvispinosus*. 4) Color is lighter than in *L. curvispinosus*, very pale yellow, gaster and head slightly darker.

***Leptothorax ambiguus pinetorum* var. nov.** ✓

*Description*.—*Worker*: differs from *ambiguus* in the length of the epinotal spines and in the sculpture. The epinotal spines are longer in proportion to the thorax than in our specimens of *ambiguus*, the length of the spine divided

by the length from the declivity of the pronotum to the base of the spine being .33 to .24 in *pinetorum*, while the corresponding ratio in *ambiguus* is .24 to .15. The coarse longitudinal rugae on the thorax are less conspicuous in *pinetorum*.

*Female*: Differs from the female of *ambiguus* in smaller size and in the length of the epinotal spines. The length is 2.5-2.9 in *pinetorum*, 3.2-4.2 mm. in *ambiguus*. The epinotal spines are rather slender, twice as long as broad at the base; they are about as long as broad in *ambiguus*. The *pinetorum* females also average slightly darker than *ambiguus*.

*Male*: Differs from the male of *ambiguus* in smaller size, 1.95-2.2 mm. (length of *ambiguus* male .2.2-2.4 mm.), and in the fewer erect hairs on the surface of the body.

Described from a colony comprising 12 workers, 1 dealate female, 2 alate females and 5 males, taken July 10, 1938, Jackson County. The colony was nesting in a small, hollow, dead root covered by pine needles on the edge of a dry piney bluff.

Four colonies and several stray workers of this form have been taken in or near the type locality. All have been small, comprising 10 to 25 workers. Besides the type colony, one nest consisted of a small hollow twig, another of a curled-up dead leaf, both just under the pine needles. The fourth colony was nesting in the bark of a pine log.

*Leptothorax texanus* Wheeler—Several colonies of this species were found nesting in sandy soil under pine needles on the edge of dry, open sandstone bluffs in Jackson County. The workers ran about very rapidly in the sun over the pine needles. Winged phases were taken from a nest in early July.

*Leptothorax (Dichothorax) pergandei* Emery—Seen everywhere in dry, sunny fields and meadows, sometimes in dry open woods. Winged phases were taken from nests in early July.

*Harpagoxenus americanus* (Emery)—Found throughout the area occurring approximately in a ratio of 1 colony to every 15 of its host, *Leptothorax curvispinosus*. The habits of this slavemaker are described in a separate paper.<sup>6</sup>

*Tetramorium caespitum* Linneus—A few colonies of this ant were found in alleyways and along sidewalks near the business district of Jackson.

*Strumigenys (Cephaloxys) pergandei* Emery—Our notes on species of this genus are presented in a separate paper.<sup>2</sup>

*Strumigenys (Cephaloxys) rostrata* Emery  
*Strumigenys (Cephaloxys) abdita* Wesson and Wesson  
*Strumigenys (Cephaloxys) manni* Wesson and Wesson  
*Strumigenys (Cephaloxys) venatrix* Wesson and Wesson  
*Strumigenys (Cephaloxys) pulchella* Emery  
*Strumigenys (Cephaloxys) missouriensis* M. R. Smith  
*Strumigenys (Cephaloxys) reflexa* Wesson and Wesson

<sup>6</sup> Wesson, L. G., Jr., Contribution to the Natural History of *Harpagoxenus americanus* Emery. Trans. Amer. Ent. Soc. 65:97-122. 1939.

- Strumigenys* (*Cephaloxys*) *deitrichi* M. R. Smith  
*Strumigenys* (*Cephaloxys*) *ornata* Mayr  
*Strumigenys* (*Cephaloxys*) *bimarginata* Wesson and Wesson  
*Strumigenys* (*Cephaloxys*) *clypeata* Roger  
*Strumigenys* (*Cephaloxys*) *medialis* Wesson and Wesson.

*Trachymyrmex septentrionalis* (McCook)—Taken occasionally in the southern and western portions of the area. Colonies have usually been found on dry, shaly clay hillsides in open woods, often under stones. Workers were found a few times in scattered woods on limestone soil. Numerous colonies of this species were found on a sandy elevation in southern Adams County, described under *Pheidole vinelandica*, where they were nesting in the sand in partial shade; and again on the sandy loam slides, bearing scattered pitchpines, beardgrass and huckleberry at the base of a sandstone bluff in Jackson County. Winged phases were taken from a nest in late August.

#### *Dolichoderinae*

*Dolichoderus* (*Hypoclinea*) *taschenbergi* var. *gagates* Wheeler—We have found this species occasionally along the edge of woods or in dry, brushy fields where it usually seems to be associated with the sandy soil on which pine is the predominating tree. The nests found were similar to those described by Wheeler<sup>7</sup> from the New Jersey pine barrens, consisting of irregular funnels filled with vegetable detritus, often in and under a clump of grass.

*Dolichoderus* (*H.*) *plagiatus* Mayr—Found widely but not abundantly throughout the region in open woods where the workers forage over the foliage of low bushes and herbs. The nests found have consisted of a curled-over dead leaf or a hollow weed stem, the gaps sealed with carton. Some specimens found in Scioto County verge toward the variety *inornatus* in having the gaster entirely black except for a dull reddish spot at the base of the first gastric segment. Males were found in the nest in the middle of August.

*Dolichoderus* (*H.*) *plagiatus pustulatus beutenmuelleri* Wheeler—This ant is found rather commonly running over the grass and low bushes of dry, upland meadows. Some of the nests found are of special interest as they are made largely of carton. Built around the dead and living stalks at the base of a clump of grass, they are irregular, oval or oblong carton chambers about an inch in length. The chamber rests on the ground which is scooped out into a shallow basin. No galleries enter the soil. The entrance is a small tube, wide enough to admit a single ant, projecting 6-18 mm. out from the side of the nest, somewhat like the spout on a teakettle. The chamber may be partially divided into two or more compartments depending on the number and arrangement of the intersecting grass stalks. The carton is hard and firm, thinner and made of smaller particles than that of *Crematogaster lineolata*. Other colonies have been found nesting merely in an opening among dead pine needles on the ground or in the detritus at the base of a clump of grass. Winged forms are found in the nest in late August.

<sup>7</sup> Wheeler, W. M., An Annotated List of the Ants of New Jersey. Bull. Amer. Mus. Nat. Hist. 21:371-403. 1905.

*Tapinoma sessile* (Say)—This species nests in about every available, but preferably dry situation throughout the area. Our specimens vary from pale, small (1.5 mm.) forms with shallow mesoepinotal constriction to large (3.2 mm.), dark forms with deep mesoepinotal constriction. At the same time, individuals from a given colony are rather uniform. The variation can scarcely be due to environmental influence, since on one occasion colonies of both the largest and the smallest forms were taken from similar nesting sites within 3 feet of each other.

*Iridomyrmex analis* (André)—Numerous colonies of this ant were found on a dry hilltop in Adams County on which the limestone and clay soil is sparsely covered by beard grass and cedars. We have not been able to find it in similar, intensively examined places in the eastern portion of the area.

#### *Camponotinae*

*Brachymyrmex heeri depilis* Emery—A versatile ant in habitat, it seems to be most abundant in open woods, but we have also taken it in rotten logs in dense moist woods, and in meadows and dry fields.

*Prenolepis imparis* (Say)—This ant is predominantly nocturnal but is often seen through the day during cool or cloudy weather or in damp shaded situations. The colonies are abundant in all types of woods. Workers from different colonies vary in color from tawny to nearly black. We have never taken this species under stones or logs.

*Paratrechina* (*Nylanderia*) *parvula* Mayr—Common nearly everywhere except in very cool, moist woods. Our material shows considerable variation which we have been unable to refer to any but this species on comparison with material in the Wheeler collection at the Museum of Comparative Zoology, Harvard University. Specimens from wooded places are usually dark brown or black and have few or no hairs on the antennal scapes. They agree with typical *parvula*. Specimens from dry or exposed situations, on the other hand, are usually paler and have a variable number of hairs on the antennal scapes. These latter may prove to be a distinct form, but in the absence of males we cannot decide. Nevertheless, we have occasionally found colonies in which some of the workers bore a variable number of hairs on the antennal scapes while others bore none, suggesting that this character may not be entirely reliable.

*Lasius niger* var. *neoniger* Emery—*Lasius niger* var. *americanus* Emery.—Common nearly everywhere. Specimens bearing erect hairs on the antennal scapes, referable to *neoniger*, are much less abundant than *americanus*, but are found over the same range of habitat.

*Lasius brevicornis* Emery—Found occasionally in dry woods, usually under stones. Workers from one colony have the antennal scapes longer than usual, reaching nearly to the posterior border of the head.

*Lasius flavus nearcticus* Wheeler—A moderately abundant species found under stones and logs in upland woods.

*Lasius (Chthonolasius) umbratus mixtus aphidicola* Walsh—Common in practically all kinds of woods, and especially in open ones. Often found nesting in and under logs and stumps as well as in the soil.

*Lasius (Acanthomyops) interjectus* Mayr—Galleries are occasionally found under stones on the edge of or in scattered woods.

*Formica sanguinea rubicunda* Emery—Occurs occasionally in open woods with its slave, *Formica subsericea*. During a raid of these ants in mid July, a great number of small braconid wasps (*Elasmosoma* n. sp.) was seen hovering above the *rubicunda* army as it attacked a *subsericea* nest. The wasp continually sought to mount the gasters of the ants, particularly the *rubicunda*, and those that were successful thrust the tips of their abdomens to the ventral surface of the ants' gasters. The ants attacked them fiercely. We were unable to find eggs deposited on the surface of the ants.

*Formica sanguinea subintegra* Emery—More abundant than the preceding form and usually found in more open and drier woods.

*Formica sanguinea subintegra gilvescens* Wheeler—A single colony referable to this form was found in an open pine grove in Hocking County in mid August in the act of raiding a small nest of *Formica subsericea*. Although the colony comprised (perhaps) 200 or 300 *gilvescens*, the raid was much more disorganized than that of the typical *subintegra*. The workers were compared with type specimens of *gilvescens* and agree with these in all characters except color. Here they approach typical *subintegra* but closely resemble specimens taken by Wheeler in Wisconsin which he referred to *gilvescens*.

*Formica truncicola obscuriventris* Mayr—A number of workers belonging to this form were taken in a small clearing in moist, deep woods in Scioto County.

*Formica truncicola integra* Nylander— Found occasionally in the southern and western portions of the collecting area. Colonies nest in and under logs and stumps in fields and open, well drained woods.

*Formica difficilis* Emery—Found occasionally in dry, bushy fields under stones and logs which it banks with vegetable debris. A migratory female was taken in mid July.

*Formica microgyna rasilis* Wheeler—Common in very open, dry woods and in upland fields, especially where there are scattered bushes and small trees. Isolated workers are extremely difficult to follow since their established trails invariably lie under leaves and grass on the ground. Migratory females have been taken in early July. A single female was found in a nest of *Formica subsericea*, suggesting that this species is the temporary host of *rasilis*. Males, females and workers agree well with type material of *rasilis* in the Wheeler collection, and also with paratype specimens of *F. querquetulana* Kennedy and Dennis.

*Formica exsectoides* Ford—The characteristic dome-shaped mounds of this

species are found occasionally on dry, grassy or bushy hillsides. None of the mounds that we have seen have been more than 50 cm. high and 1 m. in diameter.

*Formica pallidefulva* Latreille.—*Formica pallidefulva schaufussi* Mayr—*Formica pallidefulva schaufussi incerta* Emery—Very common; the small colonies nest in open, sunny spots including lowland pastures, clearings in the woods and the driest and most barren upland fields. They are much more abundant in the drier situations.

Our specimens are exceedingly variable in size, color and pilosity. An examination of the material shows 3 terminal forms in the group: 1) pale, reddish-yellow forms with no hairs on the gula, thoracic dorsum or petiole, and usually smaller in size; 2) pale, reddish-yellow, usually larger forms, with numerous hairs on gula, thoracic dorsum and petiole; 3) darker forms with brownish head, dark-brown gaster and yellowish-red thorax, scattered hairs on thoracic dorsum and few or none on gula and petiole, variable in size. Between these three are all intergradations. Form no. 1 verges on the typical *pallidefulva*, but the yellowish-red females usually show faint darker spots on the mesonotum; form no. 2 is essentially typical *schaufussi*; form no. 3 is var. *incerta*, transitional to *F. nitidiventris* from which it differs in paler color, less shining surface, greater pubescence, and the uniform darker color of the males. The petiole is quite variable in size and shape in all our forms.

*Formica pallidefulva nitidiventris* Emery—*Formica pallidefulva nitidiventris fuscata* Emery—Common; found in the same situations as *schaufussi*, but more abundant than that form on moister hillsides and in open woods. Our material varies from specimens with reddish thorax and darker head and gaster and numerous hairs on the thoracic dorsum (*nitidiventris*) to nearly black specimens with few or no hairs on the upper surface of the thorax (var. *fuscata*). Occasionally the petiole bears 1 or 2 erect hairs.

*Formica fusca subsericea* (Say)—Found abundantly in and on the edge of woods and among scattered trees; especially common on dry, open, wooded hillsides. Workers from small colonies often show transitions to typical *fusca* in the more dilute pubescence.

*Formica neogagates* Emery—A single small colony of this species was found in open, upland oak woods in Pike County.

*Polyergus lucidus* Mayr—Found occasionally in sunny places or open woods nesting with its slaves, which have comprised principally *Formica nitidiventris*. A raid was witnessed in late July at 5:00 P. M. The army, about 150 strong, in a solid body not longer than 50 cm., marched straight to a colony of *Formica nitidiventris*. There were no stragglers and the ants hesitated only once. The *Polyergus* disappeared under some leaves which hid the *Formica* colony, and in a few seconds began reappearing carrying pupae and chasing the frightened *Formica* workers which were emerging from the nest with their brood. There was little, if any fighting. The *Polyergus* did not begin their return until almost all of their number were on the surface with pupae. Then,

as though at a signal, the army started for home nearly as compactly as it had come. Winged females were observed leaving a colony on August 5.

*Camponotus castaneus* (Latreille)—Taken occasionally in open, dry, upland oak woods. On very rocky, barren or washed soil it is commoner than *C. americanus*. Galleries are often found under stones.

*Camponotus castaneus americanus* Mayr—Usually more abundant than the preceding form, it nests in the ground in open, well-drained woods. The workers forage on surrounding trees and bushes.

*Camponotus herculeanus pennsylvanicus* (Degeer)—Found commonly nesting in dead branches or cavities of trees, rarely in dry logs or stumps.

*Camponotus herculeanus pennsylvanicus ferrugineus* (Fabricius)— Found often in woods where it nests in and under rotten logs and stumps.

*Camponotus herculeanus ligniperdus noveboracensis* (Fitch)—A major worker of this form was received from Mr. E. S. Thomas, Columbus, Ohio, having been collected by Dr. J. S. Hine in Columbus, 75 miles north of Jackson.

*Camponotus caryae* Emery—Workers of this species have been seen running on the trunks of nearly every large oak or hickory examined, less often on the trunks of other trees. The nests are cavities in the bark or dead branches, sometimes in the bark of logs lying on the ground.

*Camponotus caryae* var. *pardus* Wheeler—A single female was taken from a cavity in a stick on the edge of some woods. A colony was found in a hollow weed stem in a thicket along a woodland road. Our specimens have the paler areas of the body darker and less extensive than the typical form from New Jersey, possibly verging toward var. *minutus* Emery.

*Camponotus caryae subbarbatus* Emery—Found abundantly in and along the edge of woods. The nests are located in cavities in hollow sticks and stems on the ground. The workers forage over low vegetation.

*Camponotus caryae discolor* Emery—A single colony was taken from an insect gallery in a living branch of a red oak in a field, Gallia County. The head of the majority of the workers is infuscated, especially in the majors, least in the minors, possibly indicating a transition toward *cnemidatus*.

*Camponotus caryae discolor cnemidatus* Emery—Found on several occasions on large oak trees nesting in cavities in the bark.

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