FORMICOIDEA.

FORMICIDÆ.

By William Morton Wheeler.

The ants (family Formicidæ) are social Hymenopterous insects, and may be distinguished from the social bees and wasps by having workers, or neuters, as they are less appropriately called, without wings. They are, moreover, readily distinguished from these and all other Hymenopterous insects by the following characters:

1. The first antennal joint in the workers and females, and often also in the males, is greatly elongated and forms what is known as the scape. The remaining shorter joints, constituting the funiculus, or flagellum, are articulated at an angle with the scape and can be folded up against it.

2. One or two of the segments of the base of the abdomen are much reduced in size to form a pedicel, and these segments are either nodiform or bear an erect or inclined scale. When only one of these segments is present, it is known as the petiole; when two are present, the first is the petiole, the second the postpetiole. The swollen portion of the abdomen behind the pedicel is known as the gaster, and has one more visible segment in the male than in the female (queen).

3. The legs of ants are distinguished from those of many other Hymenoptera in having only one instead of two small joints (trochanters) between the hip (coxa) and femur.

4. The venation of the wings of male and female ants is much simplified and differs considerably from that of other Hymenoptera. The female, or queen ant, unlike the queens of the social bees and wasps, loses her wings after fertilization.

The colonies of all our northern ants nest either in the ground or in decaying wood. The nests, or formicaries, may be under stones or logs, and always consist of irregularly excavated, intercommunicating cavities, unlike the regular paper or waxen combs of other social Hymenoptera. Often the nests are surmounted

by earthen craters or dome-shaped mounds, or "hills." The latter are perforated with cavities which serve as incubators for the young, that is, for the minute eggs, the legless, grub-like larvæ, and the pupæ. The pupæ are either naked or enclosed in elliptical cocoons which are spun by the mature larvæ.

Many species of ants harbor in their nests messmates or parasites belonging to various groups of insects. Some of these so-called myrmecophiles are fed and cared for by the ants, others prey upon the ants or their brood. Certain species of ants may themselves become parasitic on other ants. A few of these parasitic species have lost their worker caste completely, and are, therefore, represented only by male and female individuals like the non-social Hymenoptera.

The food of ants consists primarily of other insects found dead or in a moribund or helpless condition on the ground or vegetation. Many species, however, feed on honey-dew, and either collect this sweet liquid directly from the plant-lice and scale insects of which it is the excrement, or lap it up from the surfaces of the leaves on which it has fallen. Ants are, on the whole, beneficial insects, since they consume enormous numbers of dead and decomposing organisms. Many of the less abundant species are neither beneficial nor noxious. A few, like the little red house-ant (*Monomorium pharaonis*) and the large black carpenter-ant (*Camponotus pennsylvanicus*), are sometimes a pest in houses. Both of these species are very fond of feeding on sweets in pantries, kitchens, etc., and the carpenter-ant also has the injurious habit of excavating its galleries in the beams and rafters of houses. A few species, like the garden ant (*Lasius americanus*) and the silky ant (*Formica subsericea*), disfigure lawns and garden beds with their burrows and craters.

The following list of ants occurring in Connecticut has been prepared at the suggestion of Dr. W. E. Britton from material collected by himself, Mr. H. L. Viereck, and others in various parts of the state, and from my own collections made during several summers in the vicinity of Colebrook, Winsted, and Norfolk in the Litchfield Hills. This list is probably very incomplete, as I have found several species in adjacent portions of New York (*e. g.*, near White Plains), not represented in the material from Connecticut. Previous authors have recorded from the

latter state several species which I have had to discard. Mayr ascribed to Connecticut *Pogonomyrmex subdentatus*, an ant known to occur only in the arid deserts of the Southwest; and Buckley described the following species from the same state: *Formica nortonii, F. americana, F. connecticutensis, F. gnava, F. occidentalis*, and *Myrmica* (*Diplorhoptrum*) *scabrata*. With the exception of *F. gnava*, none of these forms can be recognized from Buckley's abominable descriptions. Under *F. gnava* he evidently included several different ants. One of these, a form of *F. fusca* intermediate between the varieties *subsericea* Say and *neorufibarbis* Emery, I have been able to recognize in the Texan fauna, and I have therefore restricted Buckley's name to this particular variety. With this single exception, however, all of the above names of Buckley's Formicidæ may be consigned to oblivion.

As the worker caste is the best known and most commonly met with, it is the only one used for identification in the tables published in the following pages. These tables include the subfamilies, genera, and subgenera known to occur in North America north of Mexico. Of the five subfamilies only four are represented in the Northern States, the remaining one (Dorylinæ) being confined to tropical and subtropical regions.

Key to Subfamilies.

1. Cloacal orifice ventral, slit-shaped; sting well developed or vestigial; abdominal pedicel consisting of one or two segments 2

   Cloacal orifice terminal, circular, surrounded by a fringe of hairs; abdominal pedicel consisting of only a single segment; no constriction between the first and second gastric segments; pupæ usually enclosed in cocoon ..... CAMPONOTINÆ p. 590

2. Sting developed, sometimes very small but nevertheless exsertile; abdominal pedicel consisting of one or two segments; when of only one, a distinct constriction between first and second gastric segments 3

   Sting vestigial; abdominal pedicel consisting of a single segment; no constriction between first and second gastric segments; anal glands which produce a secretion with a peculiar rancid-butter odor ("Tapinoma odor") often present; pupæ naked ..... DOLICHODERINÆ p. 589

3. Pupæ always enclosed in cocoons; abdominal pedicel consisting of a single segment; gaster with a distinct constriction between its first and second segments; frontal carinæ

separated or close together; when close together, dilated to form oblique or horizontal laminæ partly covering insertions of antennæ .....PONERINÆ p. 580
Pupæ naked; abdominal pedicel consisting of two segments 4
4. Frontal carinæ very close together, almost vertical, not at all covering antennal insertions; eyes always very small or absent; tropical and subtropical .....DORYLINÆ
Frontal carinæ of a different conformation and covering the antennal insertions; eyes rarely vestigial or absent; cosmopolitan .....MYRMICINÆ p. 581

PONERINÆ.

Key to Genera.

1. Frontal carinæ closely approximated; antennæ inserted very near oral margin; tip of gaster strongly deflected downward 2
Frontal carinæ of a different conformation; tip of gaster not deflected downward 3
2. Front of clypeus projecting in middle; petiole nodiform **Sysphincta**
Clypeus not projecting in middle; petiole surmounted by a scale .....**Proceratium**
3. Mandibles linear, inserted close together at middle of oral border; petiole terminating in a point or spine above **Odontomachus**
Mandibles inserted at corners of head; petiole rounded or flattened above 4
4. Antennæ very thick and robust 5
Antennæ not greatly thickened 6
5. Pygidium with a row of prominent prickles on its lateral border; last antennal joint not greatly enlarged ..... **Acanthostichus**
Pygidium without prominent prickles on its lateral border; last antennal joint greatly enlarged .....**Cerapachys**
6. Mandibles long and slender, with coarse, bidenticulate teeth; clypeus with numerous teeth on its anterior border; petiole not constricted posteriorly .....**Stigmatomma** p. 581
Of a different conformation 7
7. Claws pectinate 8
Claws simple 9
8. Mandibles edentate, slender; without distinct apical border **Leptogenys** (*s. str.*)
Mandibles broader, generally toothed; with distinct apical border .....**Leptogenys (Lobopelta)**
9. Median spur of mid and hind legs alone developed; lateral spurs lacking; small species with vestigial eyes..**Ponera** p. 581

Both spurs of mid and hind legs well developed; medium or large species, with larger eyes 10
10. Cheeks with a longitudinal carina .....**Neoponera**
Cheeks without a carina 11
11. Pronotum more or less marginate on sides; mid tibiæ not abbreviated nor beset with prominent bristles ..... **Pachycondyla** (*s. str.*)
Pronotum not marginate on sides; mid tibiæ short, with prominent bristles on their exterior surfaces ..... **Euponera (Pseudoponera)**

Stigmatomma Roger.

S. pallipes Haldeman, var **wheeleri** Santschi.

This singular and primitive ant is subterranean or hypogæic in its habits, and occurs only in rich, rather damp woods, under stones, leaf-mold, or more rarely under rotten logs. It is by no means common. The colonies are small, comprising in extreme cases from forty to sixty individuals. The males and winged females appear in August and early September.

Suffield (Geo. Dimmock); Colebrook (W. M. W.).

Ponera Latreille.

P. coarctata pennsylvanica (Buckley) Emery.

Like the preceding, this small, slender species lives in small colonies, but is much more abundant. It nests under stones and vegetable mold, in rotten logs, etc., in rather open woods, along hedges, etc. The males and winged females appear in late August and early September.

Colebrook (W. M. W.).

MYRMICINÆ.

Key to Genera.

1. Workers absent .....**Epœcus ; Sympheidole; Epipheidole**
Workers present 2
2. Clypeus not extending back between frontal carinæ, which are closely approximated; antennæ 12-jointed ..... **Pseudomyrma**
Clypeus almost always extending back between frontal carinæ, which are more or less separated; in the opposite case antennæ 11-jointed 3
3. Antennal fossæ prolonged as grooves for antennal scapes

along sides of head dorsal to eyes and covered by extended lateral margins of head; antennæ 11-jointed ..... **Cryptocerus**

Antennal fossæ of a different conformation or antennæ of a different number of joints 4

4. Postpetiole articulated to dorsal surface of gaster, which is flattened dorsally, more convex ventrally, and pointed at tip .....**Crematogaster** p. 585

Postpetiole inserted at anterior end of gaster, which is of the usual shape 5

5. Antennæ 6-jointed; head cordiform, antennal fossæ as long as scapes .....**Strumigenys**

Antennæ with more than six joints 6

6. Antennæ 11-jointed; without a distinct club or with a club consisting of only a single joint 7

Antennal club consisting of several joints, or antennæ not 11-jointed 10

7. Integument rough, bearing stiff or hooked hairs 8

Integument smoother; hairs scale-like and appressed ..... **Cyphomyrmex**

8. Large species; workers highly polymorphic; head with a pair of occipital spines only; thorax with three pairs of dorsal spines or tubercles .....**Atta** (*s. str.*)

Small species; workers monomorphic or feebly polymorphic; thoracic dorsum with four pairs of spines or tubercles 9

9. Head broad with rounded occipital lobes, without supraocular spines or tubercles .....**Atta (Moellerius)**

Head narrow, with angular occipital lobes; body rough, covered with small tubercles .....**Atta (Trachymyrmex)**

10. Antennæ with a 2-jointed club 11

Antennal club, when developed, with more than two joints 12

11. Antennæ 10-jointed, epinotum unarmed.....**Solenopsis** p. 584

Antennæ 11-jointed, epinotum dentate .....**Erebomyrma**

12. Posterior margin of clypeus elevated in the form of a welt or ridge bordering antennal fossa in front 13

Posterior border of clypeus not thus elevated 15

13. Portion of clypeus in front of antennal insertion narrow but not reduced to a mere ridge; antennæ of male 10-jointed.. 14

Portion of clypeus in front of antennal insertion reduced to a mere ridge; antennæ of male 13-jointed ..**Myrmecina** p. 584

14. Antennæ 12-jointed .....**Tetramorium** (*s. str.*)

Antennæ 11-jointed .....**Tetramorium (Xiphomyrmex)**

15. Antennæ 11-jointed 16

Antennæ 12-jointed 19

16. Thorax and petiole without any traces of teeth or spines; pronotum never angular 17

Epinotum armed with spines or teeth 18

17. Petiole distinctly pedunculate .....**Monomorium** p. 584

Petiole not pedunculate .....**Xenomyrmex**

18. Mesoëpinotal constriction distinct; males ergatomorphic **Symmyrmica**

Mesoëpinotal constriction faint or lacking; males not ergatomorphic .....**Lepthothorax** p. 588

19. Workers strongly dimorphic, usually without intermediates connecting the extreme forms; antennal club 3-jointed, longer than remainder of funiculus .....**Pheidole** p. 584

Workers monomorphic or polymorphic, *i. e.*, with mediæ intermediate between major and minor forms; antennal club indistinct or shorter than remainder of funiculus 20

20. Last three antennal joints much shorter than remainder of funiculus and not forming a distinct club 21

Last three antennal joints forming a distinct club nearly as long as remainder of funiculus 26

21. Thoracic dorsum impressed at mesoëpinotal suture; promesonotal suture usually distinct 22

Thoracic dorsum without any traces of suture or impressions **Pogonomyrmex**

22. Posterior tibial spurs pectinated .....**Myrmica** p. 587

Posterior tibial spurs simple 23

23. Small hypogæic species, with vestigial eyes and two keels on clypeus .....**Stenamma** p. 585

Medium-sized epigæic species with well-developed eyes and no keels on clypeus 24

24. Workers monomorphic 25

Workers polymorphic .....**Novomessor**

25. Cosmopolitan species with moderately slender thorax and legs .....**Aphænogaster** (*s. str.*) p. 585

Tropical and subtropical species with very slender thorax and legs .....**Aphænogaster (Deromyrma)**

26. Clypeus armed with a pair of ridges which project forward in the form of teeth, rarely without teeth, but then the epinotum quite unarmed; mesoëpinotal suture marked **Monomorium** p. 584

Clypeus of a different conformation, rarely 2-toothed, but then the mesoëpinotal suture indistinct 27

27. Postpetiole campanulate, not constricted behind, but applied with its whole posterior surface to first gastric segment **Macromischa**

Postpetiole constricted behind .....**Leptothorax** p. 588

Myrmecina Curtis.

M. graminicola americana var. **brevispinosa** Emery.

Rare; nesting in small colonies under stones in shady woods. Males and winged females appear during August. It is a timid species which "feigns death" when rudely handled.

Colebrook (W. M. W.).

Monomorium Mayr.

M. minimum (Buckley) Emery.

This very small jet-black ant nests in small crater nests in sandy or gravelly places. The workers move in files, visiting plants in search of honey-dew and the secretion of the extrafloral nectaries. The species seems to be absent from the hilly portions of the State.

New Haven, North Haven (H. L. V.).

°**M. pharaonis** Linnæus.

This little "red" or "yellow house ant," though not recorded from Connecticut, can hardly be absent from the seaport towns, as it is common on ships and has been carried to all parts of the world from its original home in the warmer regions of the Old World.

Solenopsis Westwood.

S. molesta Say.

A species with minute yellow workers and much larger brown females and blackish males. It is common in open grassy places, where it may live either in independent formicaries under stones, or as a thief ant in the walls separating the galleres of the formicaries of larger ants belonging to the genera *Formica, Myrmica, Aphænogaster,* etc. The males and winged females appear late in August.

New Haven (E. B. Whitttlesey); North Haven (H. L. V.); Colebrook (W. M. W.).

Pheidole Westwood.

P. pilifera Roger.

This ant undoubtedly occurs in sandy regions in the southern portion of the State, as it is common on Long Island (Cold Spring Harbor) and has been found in Massachusetts. It is a true harvesting ant, storing the chambers of its nest with seeds of grass

and other plants. The huge-headed soldiers undoubtedly function as seed-crushers.

New Haven (W. E. B.).

Crematogaster Lund.

C. lineolata Say.

A very common species, nesting under stones in open places, under stumps, boards, the bark of old logs, etc. There is a vestigial tendency in this ant to construct carton partitions or cells in its nest or over aphids and coccids on plants. The workers, which have a disagreeable odor, move about in loose files and often carry the triangular gaster over the thorax with the tip turned forward. The males and winged females may be found in the nests from the latter part of July to September.

Connecticut (Mayr); Branford, West Haven (H. L. V.); New Haven, New Canaan (W. E. B.); Suffield (Geo. Dimmock); Colebrook (W. M. W.).

C. lineolata var. **cerasi** Fitch.

Differs from the preceding in its paler color.

Colebrook (W. M. W.).

Stenamma Mayr.

S. brevicorne Mayr.

Rare; nesting in small colonies under stones or vegetable mold in rich woods.

Colebrook (W. M. W.).

Aphænogaster Mayr.

Key to Species.

1. Antennal scape with a long, flattened lobe at its base ....**treatæ**
   Antennal scape without a lobe 2
2. Basal third of first gastric segment longitudinally striated **mariæ**
   Basal third of first gastric segment smooth 3
3. Epinotal spines at least as long as base of epinotum; color red .....**tennesseensis**
   Epinotal spines shorter than base of epinotum; color reddish brown or black 4
4. Epinotal spines somewhat longer than half the base of epinotum; length 4.5-5 mm. .....(typical) **fulva**
   Epinotal spines shorter; length 4-4.5 mm. 5

5. Color reddish brown ..... **fulva** subspecies **aquia**
   Color pitchy black ..... **fulva aquia** var. **picea**

A. tennesseensis Mayr.

This species differs from our other species of *Aphænogaster* in having very small and very smooth females with huge epinotal spines. These aberrant females probably establish their colonies in nests of *Aphænogaster fulva* or some one of its varieties, in the same way that *Formica difficilis* var. *consocians* establishes its colonies in nests of *F. schaufussi* var. *incerta* (*vide infra*). At least *tennesseensis* is known to occur only in regions where *fulva* is unusually abundant, and several mixed colonies of the two species, containing queens of *tennesseensis* only, have been recorded. When living in unmixed colonies it always nests in rotten wood.

Colebrook (W. M. W.).

A. treatæ Forel.

The female and worker are easily recognized by the remarkable lamella on the base of the antennal scape.

Poquonock (H. L. V.), almost the northernmost locality in which this species has been found.

A. mariæ Forel.

A single winged female that had just descended from her nuptial flight was taken 8 September, 1901.

Colebrook (W. M. W.).

A. fulva Roger.

Nesting in rotten wood in rather dense forests; rarer than the following subspecies and variety.

Connecticut (Mayr); Colebrook (W. M. W.).

A. fulva aquia (Buckley) Emery.

Under stones in shady woods, often in the same stations as the following variety.

Branford (H. L. V., H. W. W.); New Haven (H. L. V.); Colebrook (W. M. W.).

A. fulva aquia var. **picea** Emery.

Apparently common throughout the State. The males and winged females appear during July and August.

Connecticut (Emery); Colebrook (W. M. W.).

Myrmica Latreille.

Key to Species.

1. First gastric segment with coarse, scattered punctures ..... **punctiventris**
   First gastric segment without such punctures 2
2. Antennal scape not dilated to form a tooth or lobe at base, but merely curved ..... **brevinodis** and varieties
   Antennal scape toothed or lobed at base ..... **scabrinodis** and varieties

M. punctiventris Roger.

A rare species nesting in small colonies under stones or moss in moist shady woods. It is easily recognized by the coarse punctures on the gaster of the worker and female. The winged phases appear during August and September.

Colebrook (W. M. W.).

M. brevinodis Emery, var. **canadensis** Wheeler.

In Connecticut this form is confined to the bogs and low-lying pastures among the Litchfield Hills where it nests in grassy hummocks or under stones. It is the host of a species of *Leptothorax, L. emersoni* (see p. 588). The males and winged females appear during August.

Colebrook (W. M. W.).

M. scabrinodis Nylander, var. **sabuleti** Meinert.

This variety of the palearctic *scabrinodis* is reddish in color and in the male phase has the antennal scape somewhat more than a third the length of the funiculus. It nests in sandy or gravelly, sunny places, such as open pastures, roadsides, etc. The males and winged females may be found in the nests in the latter part of August.

West Haven, Branford (H. L. V.); New Haven (W. E. B.); Colebrook (W. M. W.).

M. scabrinodis var. **schencki** Emery.

This form sometimes passes in the literature as *lobicornis*. The male has short, thick antennal scapes, shorter than those of *sabuleti* and rarely longer than one-fourth of the funiculus.

Stafford (W. E. B.); Colebrook (W. M. W.).

M. scabrinodis var. **fracticornis** Emery.

A form which is occasionally found nesting in the grass of

cool bogs or meadows, and is small and dark colored, with the antennal scape bent at a right angle.

Connecticut (Pergande, Emery).

Leptothorax Mayr.

Key to Species.

1. Thorax faintly but distinctly impressed at mesoëpinotal suture 2
   Thorax not impressed at mesoëpinotal suture 3
2. Post petiole opaque, sculptured **acervorum** subspecies **canadensis**
   Postpetiole smooth .....**emersoni**
3. Color black or dark brown; epinotal spines very long and straight .....**longispinosus**
   Color yellow; epinotal spines curved 4
4. Epinotal spines long and thin .....(typical) **curvispinosus**
   Epinotal spines short and nearly straight .....
   curvispinosus subspecies **ambiguus**

L. acervorum subspecies **canadensis** Provancher.

A rather rare boreal form nesting in bark in small colonies.

Colebrook (W. M. W.).

L. emersoni Wheeler.

Living only in xenobiosis with colonies of *Myrmica brevinodis*. It obtains its food by licking the surfaces and mouth-parts of the *Myrmica* workers, and brings up its brood in little cells which communicate by means of slender galleries with the larger chambers and runways of the *Myrmica*. The males and winged females appear during August.

Colebrook (W. M. W.).

L. longispinosus Roger.

A black species nesting under small stones lying on large boulders, in the clefts of rocks, in hollow nuts lying on the ground, and more rarely under bark. The workers seek their food, which consists of small insects and honey-dew, on the low vegetation in the shade of the trees.

Colebrook (W. M. W.).

L. curvispinosus Mayr.

Nesting in hollow twigs, galls, etc. Easily recognized by its yellow color and the two black or brown spots on the first gastric segment.

Branford, Rockville (H. L. V.).

L. curvispinosus Mayr, subspecies **ambiguus** Emery.

Very similar to the preceding but with shorter and straighter epinotal spines.

West Haven (H. L. V.); Stafford (W. E. B.); Colebrook (W. M. W.).

Tetramorium Mayr.

°**T. cæspitum** Linnæus.

Though this form has not yet been recorded from Connecticut, there can be little doubt that it occurs within the state. I have found it at Mamaroneck and Cold Spring Harbor, N. Y., both localities very near the Connecticut boundary. It has been introduced into America from Europe.

Dolichoderinæ.

Key to Genera.

1. Chitinous integument hard and brittle, often strongly sculptured; thorax and petiole often spinose or angular ..... **Dolichoderus** p. 589
   Chitinous integument thin and flexible, smooth or very finely sculptured; thorax and petiole always unarmed 2
2. Scale of petiole very small, strongly inclined forward, or even altogether absent 3
   Scale of petiole more or less inclined, but well developed 4
3. Scale of petiole small but distinct; gizzard with a convex, 4-lobed calyx .....**Forelius**
   Scale vestigial or absent; gizzard with a depressed calyx, without lobes .....**Tapinoma** p. 590
4. Epinotum with a conical elevation .....**Dorymyrmex**
   Epinotum without a conical elevation 5
5. Body not conspicuously hairy or pubescent; gizzard very short with a large reflected calyx; ocelli absent ..**Iridomyrmex**
   Body densely pubescent; gizzard at least as long as broad; ocelli usually present in large workers .....**Liometopum**

Dolichoderus Lund.

D. mariæ Forel.

Readily distinguished from our other species of *Dolichoderus* by the bright red head and thorax in the worker and female. It forms large colonies, nesting in sandy places about the roots of grasses and bushes. The workers ascend trees in files and attend aphids and coccids.

Connecticut (Emery).

D. plagiatus Mayr.

The head and thorax of the worker are coarsely punctate or foveolate and the gaster has large yellowish red spots. It nests in the ground in small colonies. In other respects its habits resemble those of the preceding species.

Rockville (H. L. V.); Colebrook (W. M. W.).

Tapinoma Foerster.

T. sessile Say.

Evidently very common, especially in the southern portion of the state. It nests under stones, dead leaves, logs, bark, etc., usually in sunny places. The larvæ and pupæ are salmon-colored. The workers emit a peculiar rancid-butter odor, the characteristic "Tapinoma odor," which serves to distinguish them from all our other eastern ants.

Branford, New Haven, Stony Creek, Double Beach (H. L. V.); Orange (W. E. B.); Colebrook (W. M. W.).

Camponotinæ.

Key to Genera.

1. Antennæ 9-jointed ..... **Brachymyrmex** p. 591
   Antennæ with more than nine joints 2
2. Workers strongly polymorphic, *i. e.*, with large-headed workers (majores) and small-headed workers (minores) and intermediate forms (mediæ) ..... **Camponotus** p. 600
   Workers not polymorphic though often of variable size 3
3. Clypeal fossa distinctly separated from antennal fossa 4
   Clypeal fossa confluent with antennal fossa 5
4. Antennal scapes and tibiæ with erect hairs; mesonotum constricted but not subcylindrical . **Prenolepis (Nylanderia)** p. 591
   Antennal scapes and tibiæ without erect hairs; mesonotum strongly constricted and subcylindrical ..... **Prenolepis** (*s. str.*) p. 591
5. Second to fifth joints of funiculus shorter or not longer than succeeding joints; ocelli usually absent 6
   Second to fifth joints of funiculus longer than succeeding joints; ocelli distinct 7
6. Maxillary palpi 6-jointed ..... **Lasius** (*s. str.*) p. 591
   Maxillary palpi 3-jointed ..... **Lasius (Acanthomyops)** p. 594
7. Fourth joint of maxillary palpi nearly as long as fifth ..... **Myrmecocystus**
   Fourth joint of maxillary palpi a little longer than fifth 8
8. Mandibles with broad dentate apical border .... **Formica** p. 594
   Mandibles narrow, falcate and pointed ..... **Polyergus** p. 599

Brachymyrmex Mayr.

B. heeri depilis Emery.

The smallest of the New England ants. It nests under stones in shady woods and has habits similar to those of *Lasius*. It attends root Coccidæ. The males and winged females make their appearance about the middle of August.

Colebrook (W. M. W.).

Prenolepis Mayr.

P. imparis Say.

I have not found this ant in the Litchfield Hills. It makes small crater nests in shady oak woods in soil usually containing more or less clay. The workers visit trees for the purpose of attending aphids, obtaining the secretion of extrafloral nectaries, etc. After imbibing these liquids, the gaster often becomes so distended that it is four or five times its normal size and the insects walk with difficulty. In this replete condition *imparis* workers may be said to represent a temporary stage of the more extraordinary enlargement of the gaster seen in the honey ants (*Myrmecocystus*) of the Southwestern States and Mexico. The males and females of *imparis* often pass the winter in the parental nest and celebrate their nuptial flight early in the spring.

New Haven, Yalesville (H. L. V.); Branford (H. W. W.); New Haven (W. E. B.).

P. imparis var. **minuta** Emery.

Differs from the preceding merely in the smaller size of the worker. It is probably not a true variety but merely a nest variation (incipient colony form).

New Haven, Yalesville (H. L. V.).

Subgenus Nylanderia.

°**P. (N.) parvula** Mayr.

Undoubtedly occurs in southern Connecticut. I have taken it as far east as Mamaroneck and Cold Spring Harbor, N. Y., but have never been able to find it in the Litchfield Hills.

Lasius Fabricius.

Key to Species.

1. Maxillary palpi 6-jointed (**Lasius** *s. str.*) 2
   Maxillary palpi 3-jointed (subgenus **Acanthomyops**) 7

2. Last three joints of maxillary palpi elongated, of nearly equal length 3
   Last three joints of maxillary palpi short, successively diminishing in length 4
3. Scapes and legs without erect hairs .....**niger** var. **americanus**
   Scapes and legs beset with erect hairs .....**niger** var. **neoniger**
4. Tips of scapes not quite reaching to posterior corners of head .....**brevicornis**
   Tips of scapes surpassing posterior corners of head..... 5
5. Tips of antennal scapes but slightly surpassing posterior corners of head; color pale yellow **flavus** subspecies **nearcticus**
   Tips of antennal scapes extending some distance beyond posterior corners of head; color brownish yellow..... 6
6. Gaster subopaque; with appressed hairs ..... **umbratus** subspecies **mixtus** var. **aphidicola**
   Gaster smooth and shining, without appressed hairs ..... **umbratus mixtus** var. **speculiventris**
7. Petiole low and blunt above in profile.....**latipes**
   Petiole higher, thin, and acute above in profile 8
8. Penultimate joints of distally incrassated antennal funiculus somewhat broader than long; gaster with abundant long hairs .....**claviger**
   Penultimate joints of but slightly incrassated antennal funiculus not broader than long; gaster with sparse long hairs .....**interjectus**

L. niger Linnæus, var. **americanus** Emery.

This ant, which passes in much of our entomological literature as *L. alienus,* is not only the commonest of our numerous species of *Lasius,* but the most abundant of our ants, and hence, of all our insects. It occurs over the whole of North America except the extreme southern and southwestern portions, from timberline on the highest mountains to the sands of the seashore. Even in circumscribed localities it shows in its nesting sites great adaptability to different physical conditions, from the damp rotten wood of dense forests to the sandy soil of dry, sunny roads. Usually the workers living in the latter stations are much paler in color than the woodland forms. The nests are indifferently under bark, logs or stones, in rotten wood or in soil. When in the open soil, they are surmounted by small single or clustered craters. Like all of our other species of *Lasius, L. niger* var. *americanus* is much given to cultivating root aphids in the chambers and galleries of its nests; but, with the exception of the variety *neoniger,* it is the only one of our forms that is not exclusively subterranean in its habits. It may often be seen visiting the foliage of trees and bushes in search of aphids and small insects. Professor S. A. Forbes has shown that it is of considerable economic importance on account of its noxious habit of cultivating the root aphids of maize, or Indian corn (*Aphis maidiradicis*). The males and winged females appear in August.

New Haven, West Haven, Branford (H. L. V.); New Haven (W. E. B., B. H. W.); Colebrook, Winsted, Norfolk (W. M. W.).

L. niger Linnæus, var. **neoniger** Emery.

Differs from the preceding variety in having erect hairs on the legs and antennal scapes in the workers and females.

New Hartford, Stafford (W. E. B.); Colebrook, Winsted, Norfolk (W. M. W.).

L. flavus nearcticus Wheeler.

The American representative of the European *flavus,* under which name it is sometimes recorded in the literature. The bodies of the workers have a milky white appearance. The colonies, which are rather small, nest under stones or leaf-mold in damp, shady woods. The males and winged females appear during the first week of August.

Connecticut (Mayr); Colebrook (W. M. W.).

L. brevicornis Emery.

The worker of this species differs from that of the preceding in having the antennal scapes not reaching beyond the posterior corners of the head. The colonies nest under stones on hill slopes and in pastures where the soil is rather dry and sandy. The males and winged females appear about the middle of August.

Branford (H. W. W.); Colebrook (W. M. W.).

L. umbratus mixtus Nylander, var. **aphidicola** Walsh.

Nesting under stones or in old logs and stumps in damp, shady woods. The colonies, which are rather populous, cultivate snow-white root aphids and coccids in great numbers, especially during the winter and early spring. The males and females appear during August and early September.

Westport (W. E. B.); Colebrook, (W. M. W.).

L. umbratus mixtus var. **speculiventris** Emery.

This form, originally described as a distinct species, is scarcely

more than a variety. Its habits, according to my observations, are very similar to those of *aphidicola*.

Colebrook (W. M. W.).

Subgenus **Acanthomyops** Mayr.

L. (A.) interjectus Mayr.

The yellow *Lasii* of the subgenus *Acanthomyops*, besides having only 3- instead of 6-jointed maxillary palpi in the worker and female phases, have a peculiar and rather agreeable odor like lemon verbena, and quite unlike the odor of the typical *Lasii*. They all form large colonies and lead a subterranean aphidicolous existence. *L. interjectus* is the largest species of the genus. It is found nesting in old logs and stumps in open woods and occasionally makes rough mounds or merely excavates its galleries under large stones.

Connecticut (Mayr); Colebrook (W. M. W.).

L. (A.) claviger Roger.

The commonest of our species of *Acanthomyops*, nesting under stones along the edges of woods where there is plenty of warmth and moisture. The males and winged females may be found in the nests from the middle of August till the latter part of September.

Connecticut (Mayr); Colebrook (W. M. W.).

L. (A.) latipes Walsh.

Rather common in grassy fields under stones. It has been shown by Mr. J. F. McClendon and myself that some colonies of this ant have dimorphic females. One of these females (the β-female) is very hairy, and has much flattened femora and tibiæ. The other female (the α-female) is intermediate in structure between the β-female and the female of *claviger*. The males and winged females are found in the nest during the latter part of August.

Colebrook (W. M. W., J. F. McClendon).

Formica Latreille.

Key to Species.

1. Clypeus with a notch in middle of anterior border (*F. sanguinea*) 2
   Clypeus without a notch in its anterior border 4

2. Color deep red, gaster black 3
   Color light red, gaster brown ..... **sanguinea** subspecies **subintegra**
3. Head and thorax not infuscated; slaves nearly always present in formicaries ..... **sanguinea** subspecies **rubicunda**
   Head and thorax often infuscated above; slaves few or entirely absent ..... **sanguinea** subspecies **aserva**
4. Posterior border of head broadly excised ..... **exsectoides**
   Posterior border of head not excised 5
5. Body rather stout; head of larger workers usually but little longer than broad; second to third funicular joints, much more elongated than sixth to eighth; color red, with brown or black gaster 6
   Body more slender and graceful; head of larger workers distinctly longer than broad; second to third funicular joints but little more elongated than sixth to eighth; color rarely as in preceding 9
6. Petiole broad, with sharp upper border 7
   Petiole narrow, thick and blunt above.... **difficilis** var. **consocians**
7. Gula, or lower surface of head, with erect hairs 8
   Gula and body without erect hairs .. **truncicola** subspecies **integra**
8. Tibiæ with suberect hairs; females large ..... **truncicola** subspecies **obscuriventris**
   Tibiæ without suberect hairs; females very small ..... **nepticula**
9. Middle funicular joints more than one and one-half times as long as broad; scape very slender and nearly straight; petiole with convex anterior and posterior surfaces and blunt upper margin; body smooth and rather shining **(pallide-fulva)** 10
   Middle funicular joints usually less than one and one-half times as long as broad; scape distinctly curved at base; posterior surface of petiole flat, body more densely pubescent **(fusca)** 13
10. Gula and petiolar border with erect hairs 11
    Gula and petiolar border without erect hairs 12
11. Yellowish or reddish brown, gaster but little darker, gula and petiolar hairs numerous .... **pallide-fulva** subspecies **schaufussi**
    Somewhat smaller and darker, with only a few erect hairs on gula and petiolar border **pallide-fulva schaufussi** var. **incerta**
12. Head and thorax deep reddish; gaster brownish black, shining ..... **pallide-fulva** subspecies **nitidiventris**
    Head and thorax as well as gaster dark brown or piceous, surface more opaque ..... **pallide-fulva nitidiventris** var. **fuscata**
13. Gula without erect hairs 14
    Gula with erect hairs 15

14. Gaster finely and densely pubescent, with gray, silky luster **fusca** var. **subsericea**
Gaster scarcely pubescent, finely shagreened, shining with a submetallic luster .....**fusca** var. **subænescens**
15. Color light brown, with darker head and gaster .....**subpolita**
Color black or dark brown, with reddish legs .....**neogagates**

F. sanguinea rubicunda Emery.

This subspecies of the holarctic "blood-red slave-maker," or sanguinary ant, is less common than the next. It usually nests under stones in grassy places along the edges of woods. It obtains slaves, or auxiliary workers, by kidnapping the larvæ and pupæ of *subsericea*. The males and winged females appear during July and August.

New Haven (B. H. W.); Colebrook (W. M. W.).

F. sanquinea subintegra Emery.

This variety has the same auxiliary species as the preceding, and the somewhat smaller males and winged females make their appearance during the same months.

New Haven (H. L. V.); Colebrook (W. M. W.).

F. sanguinea aserva (Forel).

Rarer than the preceding form of *sanguinea*. The slaves, which are present in the colonies only in very small numbers or are altogether absent, belong to *subsericea*.

Colebrook (W. M. W.).

F. exsectoides Forel.

This "mound-building ant of the Alleghanies," as McCook has named it, is found nesting in open glades or clearings and is not uncommon in the more hilly portions of the State. The mounds which it constructs of earth and vegetable débris, are regularly dome-shaped and usually vary from three to four feet in diameter at the base and from one to two feet in height. They are exposed to the sun, though often covered with living grass except at the summit. (See plate v.) The entrances are very numerous and mostly confined to a broad girdle around the base. A single colony often extends over several mounds. The workers, which are easily distinguished from those of our other species of *Formica* by the excised posterior border of the head, are very pugnacious. Like the European *exsecta*, they have a habit of sawing off the heads of other ants. It is known that the

females establish their colonies in depauperate colonies of *fusca* var. *subsericea*.

Connecticut (Mayr); Branford, North Haven, New Haven (H. L. V.); New Hartford, Stafford (W. E. B.); Cromwell, Hartford (Forel); Colebrook (W. M. W.).

F. truncicola obscuriventris Mayr.

A single colony, found near the summit of one of the Litchfield Hills (about 1,400 feet).

Connecticut (Mayr); Colebrook (W. M. W.); Brookfield (E. L. Dickerson).

F. truncicola integra Nylander.

Our largest and most conspicuous form of *truncicola* nesting in great colonies which often comprise several nests. These are in piles of large stones or in old logs and stumps. The ants stuff all the crannies of their abodes with bits of dead grass, leaves, etc. Like most other species of *Formica, integra* is much given to attending aphids. It is most abundant in hilly regions, where it prefers sunny glades or clearings in the forests. The males and winged females appear in July.

Connecticut (Mayr); Colebrook (W. M. W.).

F. difficilis Emery, var. **consocians** Wheeler.

In this interesting species, as I have shown, the females, which are yellow and hardly larger than the largest workers, are temporary parasites in the nests of *schaufussi* var. *incerta*. Soon after fertilization the queen seeks adoption in some depauperate and probably queenless colony of *incerta* and there permits her hosts to bring up her young. Later the *incerta* workers die off, leaving the *consocians* as a pure and independent colony, which grows rapidly in size and shows no evidence of its parasitic origin. The nesting habits of *difficilis* resemble those of *integra* on a small scale.

Colebrook (W. M. W.).

F. nepticula Wheeler.

Like the preceding, this species has very small females, which, in all probability, are social parasites in the colonies of some other *Formica*, probably *neogagates* Emery. The males and winged females make their appearance during July.

Colebrook (W. M. W.).

F. pallide-fulva schaufussi Mayr.

This is one of the commonest species of *Formica*. It nests in rather small colonies under stones or in small, obscure mound nests in sunny and grassy fields. It is timid and runs rapidly. Its food seems to consist very largely of the excrement of aphids and the carcasses of insects.

Connecticut (Mayr and Emery); New Haven (W. E. B.); Winsted, Norfolk, Colebrook (W. M. W.).

F. pallide-fulva schaufussi var. **incerta** Emery.

Common in the same localities as the typical *schaufussi*, from which it differs merely in somewhat darker coloration and in having fewer hairs on the chin and petiolar border. It is the host of *difficilis* var. *consocians*.

Branford (H. W. W.); Rockville (H. L. V.); Winsted, Norfolk, Colebrook (W. M. W.).

F. pallide-fulva nitidiventris Emery.

The workers are smaller than those of the two preceding forms, dark colored, without hairs on the chin and petiolar border, and with more shining and less pubescent gaster. The habits are similar to those of other forms of the species.

New Haven (P. L. B.); Salisbury, New Haven, Orange (W. E. B.); Colebrook (W. M. W.).

°**F. pallide-fulva nitidiventris** var. **fuscata** Emery.

This variety, which is characterized by its dark color and somewhat opaque gaster, can hardly be absent from Connecticut, as it occurs in the adjacent states.

F. fusca Linnæus, var. **subsericea** Say. Silky Ant.

Next to *Lasius niger* var. *americanus*, this is the commonest of our ants and hence also of our insects. It prefers sunny, grassy places, and either constructs dome-shaped mounds which are largest and most definite in outline in the Middle States, or excavates its galleries under stones, boards, the bark of stumps, etc. Except when living in large colonies, it is a very cowardly species. Like the other members of the genus *Formica*, it attends aphids, but is equally fond of feeding on the dead bodies of insects. The males and winged females make their appearance during July and August.

Suffield (Dimmock); Branford, Cheshire, Mt. Carmel, New Haven (H. L. V.); New Haven, Salisbury (W. E. B.); Cromwell, Hartford (Forel); Winsted, Norfolk, Colebrook (W. M. W.).

F. fusca var. **subaenescens** Emery.

A rare species, apparently, in New York and New England, but common in the Northern Middle States (Illinois, Wisconsin, Michigan). It differs from the preceding variety in having a more metallic and less pubescent surface. It prefers to nest under logs and stones in rather shady woods.

Connecticut (Emery); Colebrook (W. M. W.).

°**F. subpolita** Mayr.

I have not seen specimens of the typical form of this species from the State. It is possible that Mayr's specimens may have belonged to the following species.

Connecticut (Mayr).

F. neogagates Emery.

Nesting in rather small colonies under stones only on the hills at an altitude of about 1,000 feet or more, according to my observations. The males and winged females appear during late July and early August.

Kent, Salisbury (W. E. B.); Norfolk, Colebrook (W. M. W.).

Polyergus Latreille.

P. lucidus Mayr.

This rare and beautiful species, the "shining slave-maker" of McCook, or "shining amazon," as it may be called, uses the workers of *Formica schaufussi* as slaves, or auxiliaries. These are bred from pupæ kidnapped from their maternal nests by the warlike *lucidus* workers. The latter are quite unable to feed themselves, excavate their nests, or care for their own brood, but have to depend for these important activities on the *schaufussi* workers. Hence the ants of this species are quite unable to live an independent life and may be regarded as permanently parasitic on fragments of *schaufussi* colonies which they bring together with great skill. The sexual forms make their appearance during August.

Connecticut (Mayr).

Camponotus Mayr.

Key to Species.

1. Clypeus with a distinct notch or impression in the middle of its anterior border .....**fallax** and its varieties
   Clypeus without such a notch or impression..... 2
2. Head of worker major smooth and shining behind; color, at least in part, light red or yellow **(castaneus)** 3
   Head of worker major opaque or feebly shining behind; color black, or black and dark red **(herculeanus)** 4
3. Yellow or light red; gaster slightly darker (typical) **castaneus**
   Head black or dark brown ..... **castaneus** subspecies **americanus**
4. Gaster opaque, with long, appressed pubescence 5
   Gaster shining, with short, sparse pubescence; thorax deep red ....**herculeanus** subspecies **ligniperda** var. **noveboracensis**
5. Deep black throughout ...**herculeanus** subspecies **pennsylvanicus**
   Legs, posterior portion of thorax, petiole, and base of gaster brownish red .....**herculeanus pennsylvanicus** var. **ferrugineus**

C. fallax Nylander, var. **nearcticus** Emery.

Till recently this species has been cited in the literature as *C. marginatus* Latreille. Our American subspecies and varieties nest in the hollow twigs of trees and bushes and attend aphids.

Connecticut (Mayr); Colebrook (W. M. W.).

C. castaneus Latreille.

The typical form of this species is probably confined to the lower, warmer, and southernmost portions of the State, as I have seen no trace of it in the Litchfield Hills. It nests under stones and logs in rather small colonies.

Connecticut (Mayr, Coe); Westville (W. E. B.).

C. castaneus americanus Mayr.

Brookfield (E. L. Dickerson).

C. herculeanus pennsylvanicus Degeer. Carpenter Ant.

The common "carpenter ant," entirely black in color. It nests usually in shady woods in old logs and stumps, whence it may migrate into old farm-houses and suburban residences, and become a pest, both by riddling the wood-work with its large anastomosing galleries and by visiting the pantries and kitchens for sweets.

Connecticut (Mayr); Woodmont (P. L. B.); New Haven, Branford (H. L. V.); Colebrook (W. M. W.).

C. herculeanus pennsylvanicus var. **ferrugineus** Fabricius.

A beautiful color-variety of *pennsylvanicus*, with the legs, inferior and posterior portions of the thorax, petiole, and base of gaster rust-red in the female and worker phases. Its habits are very similar to those of the typical form, but it seems to be less abundant and more local in its distribution. I have been unable to find it in the Litchfield Hills.

New Haven (E. J. S. M., H. L. V.); Orange, New Canaan (W. E. B.).

C. herculeanus ligniperda var. **noveboracensis** Fitch.

Nesting in old stumps and logs like the preceding, from which it differs in having a smoother surface and an entirely red thorax in the worker phases.

New Hartford, Orange (W. E. B.); Colebrook (W. M. W.).