

A MONOGRAPH OF IOWA ANTS (FORMICIDAE, HYMENOPTERA)

By

William F. Buren

A Thesis Submitted to the Graduate Faculty
for the Degree of

MASTER OF SCIENCE

Entomology

Signatures have been redacted for privacy

Iowa State College
1942

TABLE OF CONTENTS

	Page
Introduction	1
Distribution of the ants of Iowa	3
Method of collecting ants	5
Glossary	6
Classification of the Formicidae	8
Taxonomic foreword	10
Family Formicidae	11
Key to the subfamilies of Formicidae	13
Subfamily Ponerinae	14
Key to genera of Ponerinae	15
Genus Stigmatomma	15
pallipes subterranea Creighton	16
Genus Sysphincta	17
pergandei Emery	18
Genus Ponera	19
Key to species of Ponera	20
coarctata pennsylvanica Buckley	20
trigona opacior Forel	21
Subfamily Dorylinae	24
Genus Eciton	25
Key to species of Eciton	25
Subgenus Neivamyrmex	25
nigrescens (Cresson)	26
opacithorax Emery	27
Subfamily Myrmicinae	29
Key to genera of Myrmicinae	30
Genus Myrmica	31
Key to species of Myrmica	32
sabuleti trullicornis n. subsp.	32
sabuleti americana Weber	35
schencki emeryana Forel	35
punctiventris Roger	36

Subfamily Myrmicinae (Continued)

Genus Pogonomyrmex	37
Subgenus Pogonomyrmex s. str.	37
occidentalis (Cresson)	38
Genus Stenamma	39
Key to species of Stenamma	40
brevicorne (Mayr)	40
brevicorne impressa Emery	41
Genus Aphaenogaster	42
Key to species of Aphaenogaster	42
Subgenus Attoomyrma Emery	43
fulva aquia (Buckley)	44
fulva picea Emery	45
mariae Forel	46
tennesseensis (Mayr)	47
treatae Forel	48
Genus Pheidole	49
Key to species of Pheidole	49
Subgenus Pheidole s. str.	49
bicarinata Mayr	51
pilifera (Roger)	53
sitarches Wheeler	54
Genus Leptothorax	56
Key to species of Leptothorax	56
Subgenus Leptothorax s. str.	57
curvispinosus Mayr	57
ambiguus Emery	58
longispinosus laeviceps n. subsp.	59
fortinodis melanotica Wheeler	60
tricarinatus Emery	61
Subgenus Mychothorax	62
acervorum canadensis Provancher	62
Subgenus Dichothorax	63
pergandei Emery	64
Genus Crematogaster	65
Key to species of Crematogaster	66
Subgenus Crematogaster s. str.	66
lineolata (Say)	67
Subgenus Orthocrema	68
minutissima missouriensis Emery	68
Genus Monomorium	69
Key to species of Monomorium	70
Subgenus Monomorium s. str.	70
minimum (Buckley)	70
pharaonis (Linné)	71

Subfamily Myrmicinae (Continued)

Genus <i>Solenopsis</i>	72
Subgenus <i>Diplorhoptrum</i>	72
<i>molesta</i> (Say)	73
Genus <i>Myrmecina</i>	75
<i>americana</i> Emery	76
Genus <i>Strumigenys</i>	77
Key to species of <i>Strumigenys</i>	77
Subgenus <i>Cephaloxys</i>	78
<i>pergandei</i> Emery	79
<i>pulchella</i> Emery	80
Subfamily Dolichoderinae	81
Key to genera of Dolichoderinae	82
Genus <i>Iridomyrmex</i>	82
<i>pruinorum analis</i> (Emm. André)	83
Genus <i>Dorymyrmex</i>	84
Key to species of <i>Dorymyrmex</i>	85
<i>pyramicus</i> (Roger)	85
<i>pyramicus niger</i> Pergande	87
Genus <i>Tapinoma</i>	88
<i>sessile</i> (Say)	89
Subfamily Formicinae	91
Key to genera of Formicinae	92
Genus <i>Brachymyrmex</i>	93
Subgenus <i>Brachymyrmex</i> s. str.	93
<i>depilis</i> Emery	94
Genus <i>Camponotus</i>	95
Key to species of <i>Camponotus</i>	95
Subgenus <i>Camponotus</i> s. str.	96
<i>herculeanus pennsylvanicus</i> (Degeer)	97
<i>herculeanus novaeboracensis</i> (Fitch)	99
<i>castaneus</i> (Latreille)	99
<i>castaneus americanus</i> Mayr	100
<i>sansabeanus iowensis</i> n. subsp.	101
Subgenus <i>Myrmentoma</i>	102
<i>caryae nearcticus</i> Emery	103
<i>caryae rasilis</i> Wheeler	104
<i>caryae discolor</i> (Buckley)	104
<i>caryae subbarbatus</i> Emery	105

Subfamily Formicinae (Continued)

Genus Paratrechina	106
Key to species of Paratrechina	106
Subgenus Nylanderia	106
arenivaga (Wheeler)	107
parvula (Mayr)	108
Genus Prenolepis	109
imparis (Say)	110
Genus Lasius	111
Key to species of Lasius	112
Subgenus Lasius s. str.	113
niger neoniger Emery	114
niger americanus Emery	115
brevicornis Emery	115
flavus nearcticus Wheeler	116
Subgenus Chthonolasius	117
umbratus aphidicolus (Walsh)	118
lucidiventris n. sp.	119
Subgenus Acanthomyops	120
claviger (Roger)	120
interjectus Mayr	122
latipes (Walsh)	123
plumopilosus Buren	124
Genus Formica	126
Key to species of Formica	126
Subgenus Formica s. str.	129
fusca subsericea Say	131
fusca subaenescens Emery	132
fusca argentea Wheeler	133
fusca neoclara Emery	133
cinerea neocinerea Wheeler	134
rufa obscuripes Forel	135
rufa melanotica Emery	136
rufa obscuriventris Mayr	136
rufa clivia Creighton	137
fossiceps Buren	138
prociliata Kennedy and Dennis	139
dakotensis montigena Wheeler	141
reflexa Buren	142
obliqua n. sp.	143
microgyna spatulata n. subsp.	146
indianensis Cole	148
nepticula Wheeler	149
difficilis Emery	150
exsectoides Forel	151
ulkei Emery	153

Subfamily Formicinae (Continued)

Subgenus <i>Formica</i> s. str. (Continued)	
<i>sanguinea aserva</i> Forel	153
<i>sanguinea rubicunda</i> Emery	154
<i>sanguinea subintegra</i> Emery	156
<i>sanguinea subnuda</i> Emery	157
<i>sanguinea angusticeps</i> n. subsp.	157
Subgenus <i>Proformica</i>	158
<i>neogagates</i> Emery	160
<i>neogagates vetula</i> Wheeler	161
<i>neogagates vinculans</i> Wheeler	161
<i>neogagates morbida</i> Wheeler	162
Subgenus <i>Neoformica</i>	163
<i>pallidefulva incerta</i> Emery	163
<i>pallidefulva dolosa</i> Wheeler	165
<i>pallidefulva nitidiventris</i> Emery	165
<i>pallidefulva fuscata</i> Emery	166
Genus <i>Polyergus</i>	167
Key to species of <i>Polyergus</i>	168
<i>lucidus</i> Mayr	168
<i>rufescens breviceps</i> Emery	169
<i>rufescens bicolor</i> Wasmann	170
Selected references	172
Acknowledgments	175

INTRODUCTION

Systematic work on the Formicidae of Iowa was started in the fall of 1939 at the suggestion of Dr. H. H. Knight, of the Department of Zoology and Entomology, Iowa State College, while the writer was an undergraduate student. At that time no list of Iowa ants had ever been published. On the basis of about 1,000 specimens collected during the summer of 1939, and a few specimens reposing in the College collection, the author published (1941a) a preliminary list of 48 species, subspecies, and varieties. This list contained species collected chiefly around Ames, and their identification was made from the literature.

The work was then carried forward as a graduate research project. Extensive collecting was done in all parts of Iowa during the summers of 1940 and 1941. Ninety-nine species and subspecies, including ten new to science, were collected in Iowa. Descriptions of three of the new species have been published in separate papers (Buren 1941b and 1942). The remaining new species and subspecies are treated under manuscript names in this thesis.

After identifying most of the forms by the use of the literature, the writer checked his determinations at the National Museum at Washington, D. C., the Museum of Comparative Zoology at Cambridge, Mass., and the American Museum of Natural History at New York, N. Y. These institutions possess types of most of the described North American ants. Examples of

all the Iowa material were compared with type specimens and with other authoritatively identified material. A few errors in identification made in the writer's preliminary list have now been corrected.

DISTRIBUTION OF THE ANTS OF IOWA

The writer believes that the treated forms comprise a large percentage of the ants which exist in Iowa. Ten or perhaps even twenty additional species might be collected. To do so, however, would take years of intensive collecting and a systematic survey of every county. No such survey was possible to the writer. Instead, an attempt was made to collect in all the different ecological areas, and to find as many good collecting areas as possible. In the search for the latter the numerous state parks of Iowa proved very helpful. Backbone State Park in Delaware County deserves particular mention. At this park a new and extraordinary species, Lasius (A.) plumopilosus Buren, was found, along with several other species rare or lacking in other parts of the state.

In general there are only two main faunal areas in Iowa. The first and by far the largest may be termed the Mississippi area. It occupies the large portion of Iowa within the Mississippi River drainage system. It is characterized by an ant fauna much like that of the states farther east. The genera richest in species are Formica and Lasius, and to a lesser extent Camponotus, Leptothorax, Aphaenogaster, and Myrmica.

The second area is much smaller, comprising only the bluffs along the Missouri River. These bluffs consist of loess soil and are very steep and quickly drained, ecologically simulating the arid Southwestern States or the Great Plains. This condition is reflected in the ant fauna.

Eciton and Iridomyrmex, two genera found in these bluffs, are not represented in the rest of the state. Also found in this region are Pheidole sitarches Wheeler, Paratrechina (N.) arenivaga Wheeler, Dorymyrmex pyramicus (Roger), Crematogaster minutissima missouriensis Emery, Camponotus sabsabeanus lowensis n. subsp., Camponotus caryae rasilis Wheeler, and Formica pallidefulva dolosa Wheeler, species not found in the Mississippi area.

The area drained by the rivers and streams which flow into the Missouri River seems transitional between the Mississippi River drainage area and the Missouri River bluff area.

At least two species, Aphaenogaster treatae Forel and Ponera trigona opacior Forel, have a discontinuous distribution, being found only in the bluffs of the Mississippi and Missouri rivers. These are southern species which appear to have crept northward only along the large rivers.

Two species, Pogonomyrmex occidentalis (Cresson) and Formica fusca neoclara Emery, were found in the College collection labeled Sioux City, Iowa. Since both these species have heretofore been known only from the Great Plains and Rocky Mountains, their existence in Iowa should remain in doubt until validated. If these two species do occur in Iowa, they belong to the Missouri River bluff fauna.

METHOD OF COLLECTING ANTS

In exchanging specimens with other myrmecologists, the writer has found that there is a distinct difference in the color, the pubescence, and sometimes the general appearance of ants if they have been collected by different methods. Most myrmecologists collect ants in alcohol. However, unless the specimens are removed from this fluid within a short time, the color may be somewhat altered, the pubescence matted, or the appearance otherwise changed.

The writer has found that when ants are collected by means of an aspirator and placed in a cyanide bottle just long enough to kill them, there is no alteration of color or matting of pubescence, the appearance of the specimens remaining entirely natural. Ants thus collected can be placed in test tubes, with small wads of cotton to separate the colonies. If all the ants are not mounted, the excess ants can be stored in small gelatin capsules, and pinned into the box with the mounted specimens.

Ants should never be collected singly if it is possible to collect a representative series from a colony, as such specimens may be extremely difficult to identify accurately.

GLOSSARY

Antennal fossae	The depressions surrounding the antennal foramina.
Cheeks	See genae.
Clypeal fossae	If present, the pit on each side of the head on the suture between the clypeus and genae.
Clypeus	The sclerite at the front of the head anterior to the front and the antennal insertions.
Epinotum	Morphologically, the first segment of the abdomen which has become inseparably fused with the metathorax. It bears a pair of spiracles, the third pair of the so-called thorax or alitrunk.
Front or frons	The area between the frontal carinae or that area prolonged back to the ocellar triangle. Not a definite sclerite in ants.
Frontal area	If present, the small, more-or-less triangular area between the frontal carinae just behind the clypeus.
Frontal carinae	The ridges which border the antennal fossae medially.
Funiculus	The part of the antennae beyond the scape. It is articulated to the scape by an elbow joint.
Gaster	The abdomen of an ant; morphologically, the first segment of the gaster is the third or fourth of the true abdomen.
Genae	In ants the indefinite area at the sides of the head, bordered in front by the lateral prolongations of the clypeus, medially by the antennal fossae, and behind by the eyes.
Gula	As used in myrmecology, the underside of the head. There is no true gular sclerite in ants, however.
Hypopygium	The ventral sclerite of the last segment of the gaster. This bears at its apex the notch for the sting or the opening for the ejaculation of poison.

Mayrian furrow	The Y-shaped furrow on the mesonotum of many male ants, especially of the more primitive genera.
Mesonotum	In worker ants, the rather small, ill-defined, or not at all defined area occupying the dorsum of the mesothorax. It often reaches the epinotum behind.
Occiput	The area behind the vertex and eyes; not a distinct sclerite in ants.
Petiole	The joint of the abdomen forming its pedicel. If there are two such joints, the first is called the petiole. It is usually node-like or bears a node or scale.
Postpetiole	The second of the two joints (if there are two joints) of the abdominal pedicel.
Pronotum	In worker ants, the sclerite covering the entire dorsal and pleural surfaces of the prothorax.
Pygidium	The dorsal sclerite of the last apparent segment of the gaster.
Scape	The first joint of the antennae; in ants approaching in length the rest of the joints together.
Strigil	The mechanism for cleaning the antennae, formed by a large, movable, pectinate spur at the apex of the tibia, and the concave, bristly surface of the metatarsus opposite the spur. Strigils are always present on the fore legs, and in certain primitive genera, on the hind legs as well.
Vertex	The area within and immediately surrounding the ocellar triangle.

CLASSIFICATION OF THE FORMICIDAE

The ants constitute a very large distinctive family comprising about 10,000 described species, subspecies, and varieties. Although the body form is extremely diverse, seven distinct subfamilies can be recognized, based chiefly on major differences in the abdomen, such as the number of joints in the pedicel, the presence or absence of a sting, etc. Other fundamental characters are used as well, however. For instance, the subfamily Dorylinae, commonly called the "driver ants" or "army ants," are mainly differentiated by having no true females, the functional egg-layers being dichthadiigynes, relatively enormous worker-like forms without traces of wings or the thoracic sclerites common to winged ants.

In delimiting the genera large differences in the shape of the head and thorax, and of the sclerites composing them are employed, as well as important dissimilarities in the proportions of the antennae, mandibles, and the abdominal pedicel. Sometimes the various structures of the male, including the genitalia, are useful.

In specific delimitation smaller variations in the shape and proportion of the head, thorax, antennae, and pedicel, as well as differences in sculpture, pilosity, pubescence, and color are used. The male genitalia are rarely of value.

On the whole the taxonomy of the Formicidae has been very conservative. Many ants now considered as subspecies or even varieties may prove

to be good species. For this reason no clear-cut criteria for the recognition of infraspecific variants can be given.

TAXONOMIC FOREWORD

In the taxonomic section which follows, the writer has recognized only one infraspecific variant, the subspecies, in contradistinction to most of the older, and many of the recent, authors who recognize both subspecies and varieties. The writer follows Dr. William S. Creighton in this respect. Dr. Creighton has recently published an article (1938) stating clearly the necessity and reasons for such a change.

All descriptions of species have been drawn from Iowa specimens unless otherwise stated. Descriptions of genera and subfamilies have been drawn from specimens in the author's collection, with the help of Emery's descriptions in the "Genera Insectorum" (1910, 1911, 1912, 1922b, and 1925).

No species or records have been included unless the specimens were seen and studied by the author. All collections were made by the author unless otherwise stated.

No attempt is made to give an extended review of the biology of each species, except in so far as the author had anything new or pertinent to say.

Descriptions and keys for the separation of all forms are given.

FAMILY FORMICIDAE

WORKER. Minute to medium-sized insects. Monomorphic, dimorphic, or polymorphic.

Mandibles extremely variable, in the commonest type subtriangular, the apical border long, straight, and toothed; usually rather large and strong compared with most insects. Other mouth parts small in comparison to the mandibles. Labrum small, bifurcate, and hidden beneath the clypeus, which is often large. Antennae usually inserted close behind the clypeus, their insertions sunk into fossae which are bordered medially by carinae. Antennae with the first joint very long, elbowed between the first and second joints. Eyes rather small, usually smaller than in most other insects, sometimes absent, large only in rare cases. Ocelli present or absent.

Thorax rather simple and reduced in size and structure, no trace of wings in normal individuals; in some genera entirely without sutures or impressions on the dorsum, in others with promesonotal and mesoepinotal sutures or impressions. Usually no distinguishable metanotum. Mesonotum not distinctly set off by sutures, if distinguishable at all. The epinotum or propodeum, which is the morphological first segment of the abdomen, is fused to the thorax and appears to be the metanotum. The second morphological segment of the abdomen is reduced to a pedicel (called the petiole) which is node-like, or surmounted by a node or scale. It is movably articulated in front and behind to the thorax and gaster. A

constriction present or absent between the third and fourth abdominal segments, or the third segment reduced to a node-like joint (the postpetiole) similar to the petiole. Gaster of 4-5 segments. Hypopygium bearing at the apex a notch or opening for the extrusion of the sting or for the ejaculation of poison. Fore legs with a strigil for cleaning the antennae, consisting of a large, movable, pectinate spur at the end of the tibia and opposite it, a concavity in the metatarsus densely covered with stiff hairs. In certain primitive genera this condition may be duplicated on the middle and hind legs.

FEMALE. Almost always monomorphic.

Generally larger than the worker, and the thorax bearing wings. Other characters usually similar to those of the worker of the same species. Ocelli are present and the eyes are larger than in the worker.

Pronotum reaching the tegulae laterally as in the other Vespoidea. Metanotum reduced to a mere band.

MALE. Usually larger or about the same size as the worker.

Head and mandibles almost always reduced in size, the latter often edentulous. Eyes and ocelli ~~larger than~~ larger than in the female. Antennae ordinarily 13-jointed, or with one more joint than in the worker and female. Scapes short to long, but there is always an elbow joint between the scape and the funiculus. Frontal carinae reduced. Thorax much as in the female and bearing wings. A Y-shaped (Mayrian) furrow often present on the mesonotum. Pedicel not as highly specialized as in the worker and female, but similar. Gaster with one more segment than in the corresponding worker and female. Genitalia consisting of three pairs of lobes, the stipes,

volsellae, and sagittae, the outer, middle, and inner lobes respectively.

The members of the family Formicidae can be easily distinguished from all other Hymenoptera by their node-like, or node- or scale-bearing pedicel which is movably articulated to both the thorax and the gaster, by the presence of an apterous worker cast, and by their social habits.

Key to the Subfamilies of Formicidae

1. Pedicel of abdomen 2-jointed. 2
Pedicel of abdomen 1-jointed. 3
2. Clypeus variable in size but distinct; frontal carinae usually somewhat covering antennal insertions. Myrmicinae
Clypeus atrophied, the anterior borders of the antennal fossae and the cheeks forming the anterior border of the head; frontal carinae approximate, not at all covering antennal insertions. Dorylinae
3. A distinct constriction between the first and second segments of the gaster; sting developed. Ponerinae
Without a constriction between first and second segments of gaster; sting vestigial or absent. 4
4. Apex of hypopygium with a circular, hair-fringed opening for the ejaculation of the poison. Formicinae
Hypopygium without such an opening. Dolichoderinae

SUBFAMILY PONERINAE (LEPELETIER)

1836 Ponerites Lepeletier, Hist. Nat. Ins. Hym., 1:185.

1893 Ponerinae Dalla Torre, Cat. Hym., 7:13.

1911 Ponerinae Emery, Gen. Insec., fasc. 118:2.

WORKER. Usually monomorphic.

Mandibles variable, often subtriangular with long, denticulate apical borders. Frontal carinae usually more or less covering the antennal insertions. Antennae generally 12-jointed. Eyes often rather small or vestigial, variable in position. Epinotum generally without spines. Petiole node-like, or surmounted with a strong scale or node. Gaster 5-segmented. A constriction between the first and second segments; in only a few genera the first segment so reduced in size as to become the postpetiole. A stridulating organ is formed at the constriction by the sharp, overlapping hind edge of the first segment and the fine transverse striations at the base of the second segment. Sting present and ordinarily large. In a few genera there is no constriction between the first and second gastric segments, but a well-developed sting is present. Pectinate spurs usually developed on middle and hind legs.

FEMALE. Usually little larger than the worker, and differing insignificantly from it except in the possession of larger eyes, ocelli, and wings. The thorax is somewhat larger and has the sclerites necessary for bearing wings.

MALE. Similar in size to the worker. Mandibles small and weak.

Antennae 13-jointed; scapes short. Eyes large; ocelli present. Mesonotum often with Mayrian furrows. A constriction usually between first and second segments of gaster; gaster 6-segmented. Wings usually of a primitive type with two closed cubital cells.

PUPAE. Always enclosed in cocoons.

Key to Genera of Ponerinae

- 1. Mandibles falcate, their teeth bifurcated. Stigmatomma
(one Iowa species, S. pallipes subterranea Creighton)
- Mandibles and their teeth normal. 2
- 2. Tip of gaster strongly deflected ventrally and anteriorly; petiole nodiform. Sysphincta
(one Iowa species, S. pergandei Emery)
- Tip of gaster not bent anteriorly underneath; petiole with a large erect scale. Ponera

Genus Stigmatomma Roger

1859 Stigmatomma Roger, Berl. Ent. Zeitschr., 3:250.

1911 Stigmatomma Emery, Gen. Insec., fasc. 118:23.

GENOTYPE. Stigmatomma denticulatum Roger.

WORKER. Medium-sized or rather small species.

Head wider in front than behind, with a short spine on each anterior lateral corner. Mandibles falcate, acute, their middle teeth bifurcated into dorsal and ventral parts. Clypeus toothed and convex in front. Frontal carinae much farther apart than in Ponera or Sysphincta, entirely covering the antennal insertions. Antennae 12-jointed, funiculi clavate.

Eyes atrophied, placed on the sides somewhat closer to the hind border of head than to the mandibular insertions. Pronotum long, followed by a distinct promesonotal suture. Mesonotum very short. Mesoepinotal suture distinct. Epinotum long. Petiole large, nodiform, joined to the thorax only ventrally but to the gaster by nearly its whole posterior surface; a rounded lamina beneath. All parts punctate and pubescent. Middle and hind tibiae with two apical spurs; middle spurs of hind legs forming a strigil with the concave metatarsus.

FEMALE. Differing from the worker in having small but well-developed eyes, ocelli, and in having the necessary thoracic sclerites for wings. The mesonotum and its scutellum are rather small, the pronotum and base of epinotum together occupying nearly one half of the dorsal surface.

Stigmatomma pallipes subterranea Creighton

1940 S. pallipes subterranea Creighton, Amer. Mus. Nov., No. 1079:8.

WORKER. Length, 4.5-5.0 mm.

Head, excluding mandibles, somewhat longer than broad, distinctly wider in front than behind, the posterior border somewhat excised. Middle portion of inner border of the falcate mandibles feebly convex and fitted with five bifurcate teeth. Another large tooth close to the insertion. Clypeus with six subequal median teeth well separated from a larger tooth on each side. Scapes scarcely thickened distally, in repose reaching a little past the eyes. All joints of the funiculi except the first and last distinctly broader than long. In profile dorsum of thorax nearly straight. In profile anterior and dorsal faces of petiole meeting at a

right angle, seen from above the petiole rounded in front, about as broad as long.

All parts punctate, head more densely so than the thorax and gaster, which are more shining. All parts rather densely pubescent, thorax less so than head and gaster. Some fine, erect hairs on all parts, including the scapes. Clypeus with two very long, anteriorly projecting hairs.

Brown; head and thorax more or less infuscated.

FEMALE. Differing little from the worker except in the characters given in the generic description. Slightly larger in size. The posterior border of the head scarcely excised. Ocellar triangle much longer than broad.

RECORDS. Ames, Burlington, Bellevue. Also Sioux City (C. N. Ainslie).

The writer has taken this form under rocks in woodlands at Burlington and Bellevue and in an open field at Ames. It can be found only in the spring or fall when the ground is moist. Never more than seven specimens were found at one time.

Genus Sysphincta Roger

1863 Sysphingta Roger, Berl. Ent. Zeitschr., 7:175.

1865 Sysphincta Mayr, Reise Novara, Formic., p. 12.

1911 Sysphincta Emery, Gen. Insec., fasc. 118:50.

GENOTYPE. Sysphincta micrommata Roger.

WORKER. Rather small species.

Head about as broad as long. Mandibles moderate in size, apical

borders oblique and with about seven teeth. Clypeus strongly produced dorsally and anteriorly in the middle. Frontal carinae produced into feeble lobes not covering the antennal insertions. Antennae 12-jointed; scapes thickened distally; funiculi moderately incrassated, last joint long. Eyes atrophied, placed on the sides about halfway between mandibular insertions and posterior border of head. Thorax without sutures or impressions on the dorsum. Carinae border the sides of the epinotal declivity. Petiole node-like. Second segment of gaster very large, strongly reflexed behind so that the three small apical segments point anteriorly. Stridulating organ vestigial. All parts punctate and pubescent.

Sysphincta pergandei Emery

1895 S. pergandei Emery, Zool. Jahrb. Syst., 8:264. Worker.

WORKER. Length, 3.7 mm.

Head, excluding mandibles, a little longer than broad, with convex posterior border and straight sides. Clypeus projecting anteriorly and dorsally in the middle into a quadrate process. Scapes in repose nearly reaching the posterior lateral corners of the head, incrassated distally. Funicular joints 2-10 about as broad as long; last joint about as long as the three preceding. Dorsum of thorax evenly convex in profile. Epinotum without spines. Petiole sloping in front, a large, ventrally projecting spine beneath. Second gastric segment twice as long as first, very strongly reflexed behind so that the small terminal segments project straight forward.

All parts densely punctate and pubescent. Second gastric segment

more shining than other dorsal regions. Moderately numerous, short, erect hairs also covering all parts.

Concolorously ferruginous.

RECORD. Bellevue.

Apparently this species is extremely rare in Iowa as it is in all parts of its range. The writer possesses only a single specimen found under a log in wooded pasture land. Much digging and searching failed to produce any more specimens. This ant is extremely hypogeic.

Genus Ponera Latreille

1805 Ponera Latreille, Hist. Nat. Crust. Ins., 13:257.

1901 Ponera Emery, Ann. Soc. Ent. Belg., 45:41.

1911 Ponera Emery, Gen. Insec., fasc. 118:88.

GENOTYPE. Ponera coarctata Latreille.

WORKER. Small species.

Head rather elongate, the sides feebly convex. Mandibles triangular, large; apical borders fairly long and not oblique, the teeth small. Clypeus rather convexly projecting in front. Frontal carinae short, close together, produced laterally into semicircular lobes covering the antennal insertions. Eyes small or atrophied, placed on the sides near the mandibular insertions. Antennae 12-jointed. Funiculi strongly clavate. Maxillary palpi 1- or 2-jointed. Mesoepinotal suture distinct but not breaking the outline of the dorsum. Petiolar scale very thick, large, and blunt. All parts punctate and pubescent.

FEMALE. Scarcely differing from the worker. Eyes small but

well-developed. Ocelli present. Mesonotum and its scutellum occupying most of the thoracic dorsum. Petiolar scale usually thinner than in the worker.

MALE. Mandibles small, not meeting in repose. Anterior borders of eyes close to mandibular insertions. Clypeus convex. Antennae 13-jointed, scape about as long as second joint of funiculus, second to eleventh joints slightly increasing in length and thickness. Mesonotum without Mayrian furrows. Scale of petiole large and blunt. Pygidium produced into a spine behind.

Key to Species of Ponera

1. Middle tibial spurs more than one half the length of hind tibial spurs; erect hairs numerous. . . . coarctata pennsylvanica Buckley
Middle tibial spurs less than one half the length of hind spurs; erect hairs sparse. trigona opacior Forel

Ponera coarctata pennsylvanica Buckley

1866 P. pennsylvanica Buckley, Proc. Ent. Soc. Philad., 6:171. Worker.

1895 P. coarctata pennsylvanica Emery, Zool. Jahrb. Syst., 8:267. Worker, female, male.

WORKER. Length, 3-3.5 mm.

Head, excluding mandibles, distinctly longer than broad, posterior border faintly sinuate, lateral borders moderately convex. Scapes slightly incrassated, in repose not quite reaching posterior border of head. Funiculus strongly clavate, each joint except the first and last broader than long. Dorsum of thorax nearly straight in profile. Petiolar scale about one fourth to one third wider at the base than at the top; quadrangular

when seen from behind. The ventral lamina of the petiole is tricornered when seen from below. Tibial spurs of middle legs about two thirds to three fourths as large as hind spurs.

All surfaces densely pubescent and punctate. Dorsum of head opaque due to the abundant punctures. Dorsa of thorax and gaster more finely and less densely punctate, hence much more shining. Erect hairs moderately numerous.

Dark brownish black, appendages lighter.

FEMALE. Scarcely differing from the worker except in the characters given in the generic description. The petiole is a little thinner.

MALE. Length, 2.6 mm.

Glypeus subtriangular. Eyes hairy. All surfaces less pubescent and smoother than in the worker. Head and thorax black, gaster dark brown. Stipes of genitalia each with a blunt, medially projecting process on the posterior border.

RECORDS. Ames, Clinton, Inwood, Muscatine, Oak Grove State Park, Sabula. Also Sioux City (C. N. Ainslie).

This species is the commonest Ponerine in Iowa. It is common near Ames and probably occurs over much of the state. My list of localities could probably be greatly expanded if a more intensive search were made for it. P. pennsylvanica is rather hypogeic in habit and nests in small colonies.

Ponera trigona opacior Forel

1893 P. trigona var. opacior Forel, Trans. Ent. Soc. Lond., p. 363.
Worker, female.

1895 P. trigona var. opacior Emery, Zool. Jahrb. Syst., 8:268. Worker, female, male.

WORKER. Length, 2.8 mm.

Head, excluding the mandibles, distinctly longer than broad, excised behind, and with feebly convex lateral borders. Scapes weakly incrassated, not quite reaching the posterior corners of the head. Funiculi strongly clavate. Dorsum of thorax slightly convex in profile. Petiolar scale less thick than in pennsylvanica, more subtriangular in profile; rounded above when seen from behind. Lamina below the petiole rather blunt. Tibial spurs of middle legs much smaller than those of hind legs, scarcely one half their length and only feebly pectinate.

All parts densely punctate and pubescent. Punctures on the head finer than in pennsylvanica, the integument distinctly less opaque. Other body surfaces more shining than the head, and more shining than in pennsylvanica. Erect hairs sparse.

Dark brownish black. Appendages lighter.

FEMALE. Length, 3.5 mm.

Scarcely differing from the worker except in the characters given in the generic description. Petiole thinner in profile. Tibial spurs of middle legs larger than in the worker, longer than one half the length of the hind spurs.

MALE, ERGATOMORPHIC. Length, 2.2 mm.

Head, excluding mouth parts, longer than broad, slightly excised behind and with feebly convex sides. Cheeks strongly and suddenly constricted in front. Mandibles atrophied, spiniform when seen from above.

Frontal carinae short and feeble, widely separated, produced into feeble lobes. Antennae 13-jointed. Scapes about as long as the next three joints combined. Funiculi moderately incrassated, but not clavate as in the worker. Pronotum, mesonotum, and epinotum each convex above in profile and separated from each other by deeply impressed sutures. Mesonotum larger than in the worker. Petiole lower and more nodiform than in the worker, in profile roundly subtriangular. Gaster 6-segmented, constriction between the first and second segments rather feeble. The sutures of the gaster appear somewhat fused.

Head whitish; thorax and gaster light yellow.

RECORDS. Clinton, Glenwood, Little Sioux.

Iowa probably marks the northern limit of the range of this species. Since it was found only on opposite sides of the state, opacior has probably managed to creep sporadically northward only along the bluffs of the Mississippi and Missouri rivers.

The description of the ergatomorphic male has been drawn from two specimens from Clinton. They are the first recorded for this species, and will be figured and described in greater detail in a separate paper. Three other species of Ponera in the United States, P. opaciceps Mayr, ergatandria Forel, and oblongiceps M. R. Smith, also are known to have ergatandrous males (Smith, 1939). Of these species, the ergataners of ergatandria and oblongiceps are much more worker-like and appear to be the normal males. In opaciceps and opacior the winged males are the normal males.

SUBFAMILY DORYLINAE (LEACH)

1815 Dorylida Leach, in Brewster Edinb. Encycl., 9(art. Entomology):147.

1893 Dorylinae Dalla Torre, Catal. Hym., 7:1.

1910 Dorylinae Emery, Gen. Insec., fasc. 102:3.

WORKER. Usually polymorphic.

Mandibles variable, sometimes developed into long curved hooks. Clypeus atrophied, the front borders of the antennal fossae and genae forming the anterior margin of the head. Frontal carinae approximate, not at all covering the antennal insertions. Eyes reduced to a single facet or absent. Metathoracic spiracles absent. No spines on epinotum. Pedicel 1- or 2-jointed, if 2-jointed the third true abdominal segment reduced to form the postpetiole. Gaster 4-5-segmented. Sting well-developed.

FEMALE. There are no true females among the Dorylinae. The functional egg-layers are dichthadiigynes. These are relatively enormous, worker-like forms. The head is much like that of the worker except that the antennal insertions are farther apart. The thorax is entirely without trace of wings or the sclerites common to winged ants. There is only one joint in the pedicel and this is of a different shape than in the worker. Gaster large and long. Sting present.

MALE. Relatively enormous in relation to the worker and comparable in size to the female. Mandibles large, variously shaped. Antennal fossae distant. Pedicel of abdomen always 1-jointed and of a different

shape than in the worker. Genitalia retractile, pygidium large, hypopygium bifurcated. Wings much as in Ponerinae.

PUPAE. Usually naked.

Genus Eciton Latreille

1802 Eciton Latreille, Hist. Nat. Crust. Ins., 4:130.

1910 Eciton Emery, Gen. Insec., fasc. 102:17.

GENOTYPE. Eciton hamatum Fabricius.

Eciton s. str. does not occur in Iowa. For many of the characters of this genus see the subgenus Neivamyrmex.

Key to Species of Eciton

1. Head and pleurae of prothorax shining. opacithorax Emery
Head and thorax entirely opaque. nigrescens (Cresson)

Subgenus Neivamyrmex Borgmeier

1894 Acamatus Emery, Bull. Soc. Ent. Ital., 26:181. (nom. praeocc.)

1940 Neivamyrmex Borgmeier, Rev. de Ent. Brasil, 11:606.

GENOTYPE. Eciton (Acamatus) schmitti Emery = Labidus nigrescens Cresson.

WORKER. Tarsal claws simple. Mandibles moderately large, variable in shape. Clypeus very small, turned under the prominent antennal fossae in full face view. Frontal carinae approximate. Carinae of the cheeks laterally bordering the antennal fossae. Scapes thick and heavy. Funiculi 11-jointed, slightly incrassated. One-faceted eyes present. Thoracic

dorsum without sutures. Mesoepinotal impression evident. Epinotal spiracles on the pleurae near the front of the epinotum. Petiole and postpetiole nodiform. All tibial spurs pectinate.

Eciton (Neivamyrmex) nigrescens (Cresson)

1872 Labidus nigrescens Cresson, Trans. Amer. Ent. Soc., 4:194. Male.

1894 Eciton (Acamatus) schmitti Emery, Bull. Soc. Ent. Ital., 26:183. Worker.

1908 Eciton (Acamatus) nigrescens Wheeler, Bull. Amer. Mus. Nat. Hist., 24:417. Male.

1938 Eciton (Acamatus) nigrescens M. R. Smith, Proc. Ent. Soc. Wash., 40(6):157-160. Worker, male.

1940 Eciton (Neivamyrmex) nigrescens Borgmeier, Rev. de Ent. Brasil, 11:606.

WORKER. Length, 2.5-5.0 mm.

Head, excluding mandibles, a little longer than broad, slightly rounded behind and at the sides. Mandibles subtriangular, the apical borders only somewhat rounded behind. Scapes thick, incrassated distally, not quite reaching the posterior lateral corners of the head. Base of epinotum distinctly lower than the rest of the thorax, in profile. Thorax rather quadrate in transverse section. Petiole also rather quadrate in transverse section, in profile evenly convex above, flat beneath. Postpetiole nodiform.

Head, thorax, petiole, and postpetiole strongly punctate and opaque. Gaster shining. Erect hairs long and fine, numerous on all parts.

Ferruginous.

RECORDS. Little Sioux, Sioux City. Also Sioux City (C. N. Ainslie).

This species can be found in Iowa only along the bluffs of the Missouri River. After rains they may be found marching in long columns. Sioux City is the farthest north that any Doryline ant has ever been taken, but since they appear to closely follow the Missouri River bluffs, it is quite possible that the range of nigrescens extends into South Dakota.

Eciton (Neivamyrmex) opacithorax Emery

- 1894 E. (Acamatus) californicum opacithorax Emery, Bull. Soc. Ent. Ital., 26:184. Worker.
- 1900 E. (Acamatus) opacithorax Emery, Mém. Accad. Sci. Bologna, 8(5):23. Worker.
- 1901 E. (Acamatus) opacithorax Wheeler and Long, Amer. Natur., 35:163, 173. Female, male.

WORKER. Length, 2.5-4.2 mm.

Head, excluding mandibles, slightly longer than broad, somewhat narrower behind than in front. Apical borders of mandibles distinctly oblique behind, straight in front. Scapes somewhat thickened distally, in repose reaching only a little beyond the eyes. Epinotum in profile a little lower than the rest of the thorax. Petiole arched above, postpetiole nodiform; both with an anterior ventral projection.

Head, pleurae of pronotum, postpetiole, gaster, and legs shining, or marked only by scattered punctures. Dorsum of thorax opaque, densely punctured. Pleurae of mesothorax and epinotum, and the petiole less densely punctate. Hairs fine and not as long as in nigrescens.

Color as in nigrescens.

RECORD. Glenwood.

This species, found accidentally, was tunneling an inch or two beneath the ground. This is the farthest north this species has been taken. It is rarer than nigrescens, but it is quite possible that its range extends as far north.

SUBFAMILY MYRMICINAE (LEPELETIER)

- 1836 Myrmicites Lepeletier, Hist. Nat. Hym., 1:169.
- 1855 Myrmicidae Mayr, Verh. Zool.-bot. Ver. Wien, 5:290.
- 1865 Myrmicidae (excl. Myrmecia, Eciton and Typhlatta) Mayr, Reise Novara, Formicid., p. 17.
- 1893 Myrmicinae Dalla Torre, Cat. Hym., 7:53.
- 1922 Myrmicinae Emery, Gen. Insec., fasc. 174:3.

WORKER. Monomorphic, dimorphic, or polymorphic.

Mandibles variable, in most genera subtriangular. Clypeus prolonged somewhat between the frontal carinae which cover or partially cover the antennal insertions. Ocelli usually absent. Antennae 4-12-jointed, often the last two or three joints forming a club. Metathoracic spiracles usually atrophied or absent. Epinotum often armed with a pair of spines. Pedicel always 2-jointed. Petiole and postpetiole variable in size and shape. A stridulating organ at the attachment of the postpetiole to the gaster, the latter with transverse striae sometimes so fine they cause dispersion of light. Gaster 4-segmented. Sting always present but occasionally vestigial.

FEMALE. Usually winged and larger or much larger than the worker. Head, pedicel, and gaster much as in the worker. The eyes larger and ocelli present. The thorax is often humped and the mesothorax much more developed than in Ponerinae, the pronotum and epinotum reduced. When epinotal spines are present in the worker, they are usually present in the

female.

MALE. Antennae 9-13-jointed, usually 13. Scapes generally short.

Mayrian furrow often distinct. Pedicel of two joints. Gaster 5-segmented.

PUPAE. Never enclosed in cocoons.

Key to Genera of Myrmicinae

1. Postpetiole articulated to dorsal surface of gaster, which is flattened dorsally, more convex ventrally, and pointed at the tip. Crematogaster
 Postpetiole articulated to anterior end of gaster, which is of a different shape. 2
2. Antennae 6-jointed; the scapes retractible into long scrobes; head cordiform. Strumigenys
 Antennae with more than six joints. 3
3. Antennae 10-jointed, funicular clubs 2-jointed. Solenopsis
 (one Iowa species, S. molesta (Say))
 Antennae different. 4
4. Epinotum with two pairs of spines (anterior pair feeble and dorsally projecting). Myrmecina
 (one Iowa species, M. graminicola americana Emery)
 Epinotum different. 5
5. Last three joints of the funiculus forming a club as long as or longer than the remainder. 6
 Last three joints not as long as the remainder of the funiculus, although the last three joints may form an indistinct club. . . . 8
6. Thorax without any trace of teeth or spines. Monomorium
 Epinotum with at least feeble spines; integument often strongly sculptured. 7
7. Workers strongly dimorphic, usually without intermediates; scapes of minor workers reaching beyond the head. Pheidole

- Workers monomorphic; scapes usually not reaching the hind border of the head. Leptothorax
8. Gula with a basket of long hairs. Pogonomyrmex
(one Iowa species, P. occidentalis (Cresson))
- Gula with only normal hairs. 9
9. Posterior tibial spurs pectinated; head and thorax strongly rugose. Myrmica
- Posterior tibial spurs simple. 10
10. Small hypogeic species with vestigial eyes and two keels on the clypeus. Stenamamma
- Medium-sized epigeic species with well-developed eyes and no keels on the clypeus. Aphaenogaster

Genus Myrmica (Latreille)

1804 Myrmica (part.) Latreille, Nouv. Dict. Hist. Nat., 24:175-179.

1855 Myrmica Mayr, Verh. Zool.-bot. Ver. Wien, 5:396.

1922 Myrmica Emery, Gen. Insec., fasc. 174:36.

GENOTYPE. Formica rubra Linné.

WORKER. Medium-sized species.

Head usually slightly longer than broad. Mandibles rather large, apical borders slightly oblique, and with many teeth. Clypeus rather large. Frontal carinae often produced laterally into lobes. Scape sometimes with a lobe or lamina near the base. Antennae 12-jointed, funiculus clavate, the last three joints forming an indistinct club much shorter than the rest of the funiculus. Eyes convex, placed near the middle of the sides of the head. Mesoepinotal impression usually distinct. Epinotal spines present, variable in length. Petiole not or scarcely pedunculate, an anterior

ventral tooth present. Postpetiole shorter, higher, and wider than petiole; nodiform. Posterior tibial spurs at least slightly pectinate. Head, thorax, petiole, and postpetiole usually strongly rugose. Erect hairs moderate in number.

FEMALE. Somewhat larger than the worker. Head slightly broader. Eyes more convex. Small ocelli present. Pedicel, gaster, and tibial spurs as in the worker.

Key to Species of Myrmica

- 1. Scape without a lobe or lamina at the bend near the base; gaster punctate. punctiventris Roger
- Scape with a lobe or lamina at the bend. 2
- 2. Lamina of the scape carried partially around the bend and then ventrad along the medial side of the base of the scape; postpetiole convex beneath in profile. schencki emeryana Forel
- Lamina carried completely around the bend and attached to both sides of the scape distal to the bend; postpetiole straight beneath. . 3
- 3. Lamina of the scape produced into a large spoon-shaped lobe. sabuleti trullicornis n. subsp.
- Lamina of the scape not produced into a lobe. sabuleti americana Weber

Myrmica sabuleti subsp. trullicornis n. subsp.

WORKER. Length about 5.5 mm.

Head, excluding the mandibles, slightly (about one twentieth) longer than broad, with moderately convex sides, and feebly convex or slightly excised posterior border. Frontal carinae produced into large lobes projecting dorso-laterally from the head; frontal carinae strongly converging behind. Scape bent at right angles near the base, the bend fitted on the

dorsal side with a relatively enormous lobe much larger than in any other previously described North American form except schencki spatulata M. R. Smith. When seen from above, this lobe rather circular in outline and distinctly concave so that it appears much like a ladle. Its very sharp edges produced along each side of the scape for a short distance.

Thorax with obtuse mesoepinotal impression. Epinotal spines about one half again as long (about .38 mm. long) as the distance between their bases. In profile the petiole as high as the distance between its ventral tooth and the postpetiole; dorsal surface of petiole nearly straight for a short distance before dropping abruptly behind. Postpetiole sixth sevenths as long as high, with very convex dorsum in profile, ventral surface nearly straight as in americana.

Glypeus and mandibles longitudinally striate. Frontal area striato-punctate. Front with about 13 strong longitudinal striae which tend to diverge behind and fuse with the strong reticulate sculpture of the rest of the head. Thorax rugose, the rugae longitudinal, larger, and more vermiculate on the pronotum than behind. On the pleurae of the epinotum the rugae converge toward and disappear upon the epinotal spines, about 8-10 rugae taking part in this effect on each side. Dorsa and pleurae of petiole and postpetiole rugose, more irregularly and not so deeply rugose on the dorsa. Gaster smooth and shining.

Pilosity much as in americana, the erect hairs moderately abundant, those on the occiput and thorax with blunt tips. Hairs on the scapes oblique, those on the legs subappressed to oblique. Pubescence sparse on all parts.

Color dark blackish brown; dorsum of the head, and gaster, darker than the other regions.

TYPE LOCALITY. Ames. Also Boone.

The very similar manner in which the ladle-shaped lobes are attached to the scapes, the almost identical shape of the postpetiole, and many other similarities, show trullicornis to be most closely related to americana Weber. M. trullicornis may be distinguished from americana by the large lobe on the scape, which in americana is produced only as a small lamina curved around the bend. The sculpture of trullicornis seems finer, and the color is darker. M. trullicornis also seems to be a woodland form whereas americana prefers prairies and open fields. The writer possesses a series of workers from Sauk Rapids, Minnesota, showing well-marked intergradation between trullicornis and americana. These forms therefore seem to be no more than subspecifically distinct.

The placement of trullicornis and americana under sabuleti Meinert seems somewhat incongruous as the lamina of the scape is quite differently constructed in this species. In all probability americana will prove specifically distinct from sabuleti, and trullicornis can then be placed as a subspecies of americana.

M. sabuleti trullicornis should not be confused with M. schencki spatulata M. R. Smith. The frontal carinae are not at all produced into lobes in spatulata, the shape and attachment of the large lobe on the scape are quite different, the sculpture is coarser, and the postpetiole is convex beneath.

Myrmica sabuleti americana Weber

1939 M. sabuleti americana Weber, Lloydia, 2:144.

WORKER. Length, 5.0-5.5 mm.

Frontal carinae laterally produced into lobes covering the antennal insertions. Bend of the scape with a lamina which is carried completely around the angle of the bend and produced for a short distance along each side of the scape. Mesoepinotal constriction rather shallow. Postpetiole nearly straight beneath.

Front with about 13 striae which merge behind with the reticulate sculpture of the rest of the head. Thorax rugose, the rugae more vermiculate toward the front. Petiole and postpetiole irregularly longitudinally rugose.

Erect hairs often with blunt tips. Color red to dark brown.

FEMALE. Length, 7.0 mm.

Scapes, frontal carinae, postpetiole, sculpture, and color as in the worker. Wings light brownish.

RECORDS. Ames, Boone, Clinton, Keokuk, Jewell, Oak Grove State Park, Granite. Also Sioux City (C. N. Ainslie).

This ant seems common all over Iowa. It prefers to nest in open fields.

Myrmica schencki emeryana Forel

1914 M. scabrinodis schencki var. emeryana Forel, Deutsche Ent. Zeitschr., p. 617. Worker, female, male.

WORKER. Length about 5 mm.

Frontal carinae latero-dorsally produced into feeble lobes scarcely covering the antennal insertions; strongly converging behind. Bend of the scape with a lamina which is carried around the bend and ventrally along the medial side of the base of the scape. Mesoepinotal depression rather shallow. Epinotal spines a little longer than the space between their bases. Postpetiole rather convex beneath.

Front with about seven prominent striae which branch and fuse behind with the reticulate sculpture of the rest of the head. Thorax with robust longitudinal rugae. Petiole and postpetiole strongly sculptured.

Erect hairs often with blunt tips. Color brownish black.

FEMALE. Length, 6.2 mm.

Scapes, frontal carinae, postpetiole, and color as in the worker. Sculpture much like the worker, and coarser than in sabuleti americana.

RECORDS. Ames, Spirit Lake, Boone, Clinton, Sabula, Inwood.

This ant is fairly common in woodlands in Iowa.

Myrmica punctiventris Roger

1863 M. punctiventris Roger, Berlin Ent. Zeitschr., 7:190. Worker.

1886 M. punctiventris Mayr, Verh. Zool.-bot. Ges. Wien, 36:450. Worker, female.

1895 M. punctiventris Emery, Zool. Jahrb. Syst., 8:312. Male.

WORKER. Length, 4.0 mm.

Scapes without a lamina at the bend. Frontal carinae produced laterally into triangular lobes. Head strongly rugose, becoming more reticulate-rugose behind. Mesoepinotal impression distinct. Epinotal spines rather sharp and slender. Thorax strongly rugose, the rugae more vermiculate.

and reticulate on the pronotum. Petiole and postpetiole irregularly sculptured. Postpetiole extremely convex above, moderately convex below.

Gaster with large shallow punctures, especially toward the base.

Erect hairs rather long and slender. Color brownish black.

RECORD. Belle Plaine.

M. punctiventris prefers to live in dense woodlands and is probably much rarer in Iowa than in the Eastern States.

My list of species of Myrmica from Iowa is not satisfactory. In all probability two or three more species could be found.

Genus Pogonomyrmex Mayr

1868 Pogonomyrmex Mayr, Annuar. Soc. Natural. Modena, 3:169.

1922 Pogonomyrmex Emery, Gen. Insec., fasc. 174:44.

GENOTYPE. Formica badia Latreille.

For the characters of this genus see subgenus Pogonomyrmex s. str.

Subgenus Pogonomyrmex Mayr s. str.

1868 Pogonomyrmex Mayr, Annuar. Soc. Natural. Modena, 3:169.

1902 Pogonomyrmex subg. Pogonomyrmex Wheeler, Psyche, 9:390.

1922 Pogonomyrmex subg. Pogonomyrmex Emery, Gen. Insec., fasc. 174:44.

GENOTYPE. Same as the genus.

WORKER. Closely related to Myrmica.

Head subsquare, large. Mandibles strong, the apical border somewhat oblique and with about seven strong teeth. Clypeus proportionally smaller than in Myrmica, the portion in front of antennal fossae somewhat ridge-

like. Frontal carinae parallel, rather far apart, short. Antennae 12-jointed; funiculi incrassated distally. Maxillary palpi 4-segmented. Dorsum of thorax without sutures or impressions. Epinotal spines present or absent. Petiole pedunculate. Posterior tibial spurs feebly pectinate. Head and thorax striate.

All parts covered with abundant hairs. Sides of the gula and inferior inner borders of mandibles with very long, flexuous hairs forming a basket underneath the head.

Pogonomyrmex (Pogonomyrmex) occidentalis (Cresson)

1865 Myrmica occidentalis Cresson, Proc. Ent. Soc. Philad., 4:426. Worker, female.

1882 Pogonomyrmex occidentalis McCook, The Honey Ant, etc., p. 123-162. Worker, female, male.

WORKER. Length about 7.5 mm.

Head slightly broader than long, subsquare. Clypeus broadly and shallowly excised in front. Base of scape with an angular posterior projection which, in repose, fits into a deep angular notch under the frontal carina. Scapes reaching halfway between eyes and posterior corners of head. Moderately developed epinotal spines present. Node of petiole rather conical in profile.

Head and thorax strongly striate, the interspaces between the striations filled with one to several rows of punctures. Head longitudinally striate, pronotum and epinotum transversely striate. Mesothorax longitudinally striate on dorsum, the striations becoming transverse on the pleurae. Node of petiole and postpetiole punctate.

Erect hairs white, numerous, blunt. Gular and mandibular ammochaetae well-developed.

Ferruginous.

RECORD. Sioux City (C. N. Ainslie).

This record may be the result of mislabeling. The writer has failed to take this species in Iowa, even along the Missouri River bluffs area. It is, of course, possible that it may sporadically occur in this area.

Genus Stenamma Westwood

1840 Stenamma Westwood, Intr. Mod. Class. Insects, Synops, 2:219. Male.

1883 Stenamma Ern. André, Spec. Hym. Europe, 2:271, 310. Worker, female, male.

1922 Stenamma Emery, Gen. Insec., fasc. 174:52.

GENOTYPE. Stenamma westwoodi Westwood.

WORKER. Small species.

Head longer than broad. Mandibles moderately large, apical borders slightly oblique. Clypeus small, with two keels in the middle. Frontal carinae rather close together. Antennae 12-jointed; funiculi clavate but without a distinct club. Eyes small, on the sides of the head, a little nearer the antennal insertions than the hind border of the head. Mesoepinotal impression distinct. Epinotum with short spines. Petiole with a fairly long peduncle, a node behind. Postpetiole nodiform, constricted before and behind. Head, thorax, petiole, and postpetiole rather densely and finely striate or rugose. Gaster covered almost entirely by its first segment.

FEMALE. Somewhat larger than the worker. Eyes larger than in the worker, and small ocelli present. Thorax narrower than head; mesonotum not covering pronotum. Other characters much as in the worker.

MALE. About the size of the worker. Mandibles denticulate. Shape of head much like that of the female; eyes larger. Antennae 13-jointed, funiculus more filiform, but scapes nearly as long. Mayrian furrow variable. Epinotum small and sunken, bearing a pair of blunt projections. Genitalia retractile.

Key to Species of Stenamma

1. Eyes with approximately 30 facets, head and thorax uniformly opaque. brevicorne (Mayr)

Eyes with about 15 facets; pronotum somewhat shining; mesoepinotal impression deeper. brevicorne impressa Emery

Stenamma brevicorne (Mayr)

1886 Aphaenogaster brevicorne Mayr, Verh. Zool.-bot. Ges. Wien, 36:447. Worker, female.

1895 Stenamma brevicorne Emery, Zool. Jahrb. Syst., 8:298. Worker, female, male.

WORKER. Length, 3.7 mm.

Head distinctly longer than broad, oblongate. Scapes not quite reaching the posterior lateral corners of the head. Eyes with approximately 30 facets. Mesoepinotal impression distinct on the dorsum, not very distinct on the sides. Epinotal spines rather short and dentiform. Petiole pedunculate.

Front finely striate, the striae merging behind with the reticulate

sculpture of the rest of the head. Thorax, petiole, and postpetiole finely rugose and opaque.

All parts with numerous, fine, slender hairs, most of them somewhat appressed or oblique.

Reddish brown, the head and gaster somewhat infuscated.

FEMALE. Length, 4.8 mm.

Eyes larger than in the worker, and small ocelli present. Antennae, pedicel, sculpture, and color as in the worker. Pilosity more abundant than in the worker.

MALE. Length, 3.5 mm.

Mandibles about 4-toothed. Anterior margins of eyes close to mandibular insertions. Clypeus without carinae. Scape as long as the first six joints of funiculus. Mayrian furrow indistinct on middle portion of mesonotum. Petiolar node low. Pilosity as in the worker. Color black, appendages brown.

RECORDS. Ames, Clinton, McGregor, Dewitt. Also Arnolds Park (Judson McQuire); Sioux City (C. N. Ainslie).

This ant is probably common in woodlands over much of the state. It is hypogeic in habit. The winged forms apparently overwinter in the nests as adults or pupae, as they may be found in the nests in early spring.

Stenamma brevicorne impressa Emery

1895 S. westwoodi diecki var. impressum Emery, Zool. Jahrb. Syst., 8:301. Worker, female.

1901 S. brevicorne diecki var. impressum Forel, Ann. Soc. Ent. Belg., 45:347.

WORKER. Differing from brevicorne in having the frontal carinae slightly closer together, the eyes a little smaller, their facets larger so that there are only about fifteen, and the mesoepinotal impression deeper on the dorsum and distinct on the sides. The integument is more shining, especially on the pronotum, where the sculpture is somewhat obliterated. The epinotal spines are sharper, and the head is a little narrowed behind.

RECORD. Tama.

As this subspecies is represented by only one specimen, it must be a rare form in Iowa. The specimens which the author previously referred to impressa (1941a) belong to the typical brevicorne.

Genus Aphaenogaster Mayr

1853 Aphaenogaster Mayr, Verh. Zool.-bot. Ver. Wien, 3:106.

1922 Aphaenogaster Emery, Gen. Insec., fasc. 174:55.

GENOTYPE. Aphaenogaster sardoa Mayr.

Aphaenogaster s. str. does not occur in Iowa. For many of the characters of this genus see the subgenus Attomyrma.

Key to Species of Aphaenogaster

- 1. Scape with a flattened lobe at the base. treatae Forel
- Scape without a lobe at the base. 2
- 2. Basal third of first gastric segment striate. mariae Forel
- First gastric segment not striate. 3

3. Epinotal spines longer than the base of the epinotum; few or no hairs on gaster; color deep red. tennesseensis (Mayr)
- Epinotal spines much shorter than the base of the epinotum; gaster hairy; reddish brown to black. 4
4. Reddish brown. fulva aquia (Buckley)
- Deep brown or black. fulva picea Emery

Subgenus Attomyrma Emery

1914-1915 Aphaenogaster subg. Attomyrma Emery, Rend. Accad. Sc. Bologna, p. 70.

1922 Aphaenogaster subg. Attomyrma Emery, Gen. Insec., fasc. 174:56.

GENOTYPE. Formica subterranea Latreille.

WORKER. Medium-sized species. Monomorphic.

Clypeus without carinae, notched in front. Mandibles well-developed, apical borders slightly oblique. Frontal carinae not far apart, little produced into lobes. Antennae long. Funiculi slightly incrassated; last four joints much longer and somewhat thicker than preceding joints, forming an elongate club shorter than the remainder of the funiculus. Head rather elongate but not prolonged at the neck.

Mesothorax with a wide, flat depression behind the small mesonotum. Mesoepinotal suture distinctly impressed. Epinotum with a pair of spines. Petiole with an elongate peduncle and a blunt node; postpetiole nodiform.

FEMALE. At least slightly larger than the worker, generally much larger. Eyes larger and ocelli present. Antennae, pedicel, and sculpture usually much as in the worker. Epinotum always with spines. Thorax humped, wider than the head.

MALE. About the size of the worker. Mandibles denticulate. Antennae 13-jointed, scapes about the length of first three joints of funiculi. Eyes large, near the front. Epinotum sunken, with two blunt projections. Petiole and postpetiole nodiform. Stipes of genitalia broad and blunt.

Aphaenogaster (Attomyrma) fulva aquia (Buckley)

1867 Myrmica (Monomarium) aquia Buckley, Proc. Ent. Soc. Philad., 6:431. Worker.

1895 Stenamma (Aphaenogaster) fulva aquia Emery, Zool. Jahrb. Syst., 8: 304. Worker, female, male.

1922 Aphaenogaster (Attomyrma) fulva aquia Emery, Gen. Insec., fasc. 174:57.

WORKER. Length about 5.5 mm.

Head distinctly longer than broad, posterior border and sides slightly convex. Clypeus notched in the center. Scapes without laminae at their bases, surpassing posterior corners of the head by about one fifth of their length. Last four joints of funiculi distinctly larger than preceding joints and forming an elongate club. Epinotal spines shorter than one half the basal length of epinotum. Node of petiole blunt. Postpetiole rounded and convex above.

Head longitudinally and rather weakly rugose. Thorax punctate.

Erect hairs blunt, not abundant.

Brownish to dark brown.

FEMALE. Length, about 7.5 mm.

Antennae, mandibles, head, pedicel, and color much as in the worker.

Pilosity more abundant. Last four funicular joints nearly as long as

the preceding seven.

MALE. Length, 4.4 mm.

Head flattened dorso-ventrally. Mandibles 6-toothed, large. Scapes not reaching past the eyes. Mesonotum and scutellum convex and humped, Mayrian furrow not distinct in the center. Smooth and shining. Black in color. Antennae and wings pale.

RECORDS. Ames, Boone, Holy Cross, Clinton, Dubuque.

Common in all wooded portions of the state.

Aphaenogaster (Attoymrma) fulva picea Emery

1895 Stenamma (Aphaenogaster) fulva aquia var. picea Emery, Zool. Jahrb. Syst., 8:305. Worker, female, male.

1922 Aphaenogaster (Attoymrma) fulva aquia var. picea Emery, Gen. Insec., fasc. 174:57.

WORKER. Head and body more slender than in aquia. Antennae slightly longer in absolute measurement even though picea is a little smaller than aquia. Color much darker.

RECORDS. Ames, Backbone State Park, Glenwood, Waubonsie State Park, Oak Grove State Park, Clinton.

The writer is not sure that this form has any validity. The nests are always much less populous than those of aquia. Picea may therefore merely represent specimens from depauperate nests which can only have an artificial separation from aquia. Since mere color varieties are, in the opinion of the writer, not worth naming, the writer would prefer to drop the name if this proves to be the case.

Aphaenogaster (Attomyrma) mariae Forel

1886 Aph. mariae Forel, Ann. Soc. Ent. Belg., 30(C. R.):41. Worker.

WORKER. Length about 4.8 mm.

Head rather oval, but more rectangular than in treatae. Clypeus notched in front. Contour of the thorax as in the other Iowa species. Epinotal spines about as long as the base of the thorax, subhemispherical in cross section, the inner face nearly flat. Both petiole and postpetiole with distinct ventral keels. Postpetiole a little higher than long.

Head strongly reticulate-rugose, prominently striate on front, cheeks, and clypeus. Thorax strongly, irregularly rugose, both thorax and head with coarser sculpture than on tennesseensis. Epinotal spines striate on the outer side, smooth and shining on the inner flat side. Petiole and postpetiole strongly sculptured on the posterior dorsal faces, otherwise only finely and superficially punctate. Gaster very smooth and shining except at the base, where there are prominent radiating striae. Scapes longitudinally striate.

Erect hairs slender, pointed, not abundant. Numerous oblique hairs on the scapes. Pubescence sparse.

Color red to reddish brown.

FEMALE. Only slightly larger than the worker and with the same regions sculptured. Epinotal spines little longer but much wider and more flattened laterally toward the base. Color as in the worker.

RECORD. Ames.

The host of this ant is Aphaenogaster fulva aquia. The writer on three occasions found mariae with aquia near Ames. It is much rarer than tennesseensis, a very similar and probably closely related species.

Aphaenogaster (Attomyrma) tennesseensis (Mayr)

1862 Atta tennesseensis Mayr, Verh. Zool.-bot. Ges. Wien, 12:743. Worker.

1922 Aphaenogaster (Attomyrma) tennesseensis Emery, Gen. Insec., fasc. 174:60.

WORKER. Length about 5.0 mm.

Head, excluding mandibles, a little longer than broad, with moderately convex posterior border and sides. Outline of frontal carinae somewhat sinuate, distance between them equal to about one fourth to one third of the greatest head width. Eyes only moderately convex. Contour of thorax as in treatae. Epinotal spines very long, smooth, and sharp, circular in cross section, longer than the base of the epinotum. Postpetiole higher than long.

Head and thorax rugose, but without definite striations except on the front and cheeks. Gaster, petiole, postpetiole, declivity of epinotum, and legs smooth and shining.

Erect hairs and pubescence nearly absent.

All parts dark red. Head and thorax sometimes with a tinge of purple.

FEMALE. Length, 5.3 mm.

Little larger than the worker. All surfaces extremely smooth and shining. Epinotal spines very large, rather broad and flattened dorso-ventrally, but becoming more acute near the tip. No hair or pubescence. Bright red in color.

RECORDS. Ames, Oak Grove State Park, Rice Lake State Park, Clinton, Belle Plaine, Dennison, Boone. Also Sioux City (C. N. Ainslie).

The temporary host of this ant is A. fulva aquia, with which it is occasionally found under rocks. When the colonies are fully developed they can be found only in rotting wood.

Aphaenogaster (Attomyrma) treatae Forel

1886 Aph. treatae Forel, Ann. Soc. Ent. Belg., 30(C. R.):40. Worker, female, male.

WORKER. Length about 6.3 mm.

Head oval, excluding mandibles, much longer than broad. Clypeus weakly notched in front. Frontal carinae parallel and close together. Scape slender, a flattened lobe extending along the side at the base for about one fifth of its length. Mesonotum small, a considerable distance between it and the epinotum, which is separated from the rest of the thorax by a distinct impression. Epinotal spines small, short, but sharp. Postpetiole much larger and broader than petiole. Whole body and legs slender.

Head striato-rugose, the interspaces punctured. Thorax punctate and with a few feeble striations. Petiole, postpetiole, and base of gaster feebly punctate, the gaster becoming very smooth and shining toward the apex.

Erect hairs moderate in number, nearly all rather short and blunt. Pubescence very sparse.

Color reddish brown, the gaster often somewhat infuscated.

FEMALE. Length, 8.3 mm.

Heavy bodied. Thorax striate, epinotal spines blunter, pilosity a little denser, pedicel more robust. Other characters as in the worker.

RECORDS. Little Sioux, Glenwood, Sioux City, Princeton, Dewitt.

As has been stated in the Introduction, this species seems to have a discontinuous distribution in Iowa, occurring only in the extreme eastern and western parts of the state.

Genus Pheidole Westwood

1841 Pheidole Westwood, Ann. Mag. Nat. Hist., 6:87.

1922 Pheidole Emery, Gen. Insec., fasc. 174:77.

GENOTYPE. Atta providens Sykes = ? Pheidole indica Mayr.

For the characters of this genus see subgenus Pheidole s. str.

Key to Species of Pheidole

- 1. Thorax and gaster with only sparse, clavate hairs. sitarches Wheeler
- Thorax and gaster with numerous, slender hairs. 2
- 2. Soldiers with occipital lobes of head shining; workers with shining heads. bicarinata Mayr
- Occipital lobes of soldiers reticulate-rugose; workers with heads punctate and opaque. pilifera (Roger)

Subgenus Pheidole Westwood s. str.

1922 Pheidole subg. Pheidole Emery, Gen. Insec., fasc. 174:84.

GENOTYPE. Same as the genus.

Distinctly dimorphic, usually without intergrades.

SOLDIER. Head relatively enormous, deeply notched behind, this

notch carried forward as a groove continuous with the frontal groove. Mandibles large, scarcely overlapping, very convex, usually the teeth worn off. Frontal carinae diverging. Antennae small in proportion to the head, 12-jointed, last three joints of funiculus forming a distinct club. Eyes small, on the sides of the head much nearer mandibular insertions than hind border. Promesonotal suture usually distinct. Promesonotal profile convex above. Mesonotum occasionally with a transverse impression, the portion behind the impression homologous with scutellum of female. Mesoepinotal impression distinct. Epinotum with spines. Petiole pedunculate, with a node behind. Postpetiole large and broad. Femora fusiform. Gaster truncate at base. Head, thorax, petiole, and postpetiole diversely sculptured.

WORKER, MINOR. Much smaller than the soldier.

Head normal in size, without a notch behind. Mandibles always with teeth and with somewhat oblique apical borders; apical tooth large. Antennae much larger proportionally and a little larger in absolute measurement than in the soldier. Scapes surpassing hind borders of head. Promesonotal profile somewhat convex. Mesoepinotal constriction distinct. Epinotum with spines. Petiole as in the soldier, but less robust. Postpetiole proportionally more slender, less broad than in the soldier. Head, thorax, petiole, and postpetiole variously sculptured.

FEMALE. Much larger than the worker.

Head broader than in the worker and soldier, occipital lobes not developed. Ocelli rather large. Mandibles much as in the soldier. Antennae as in the soldier. Thorax robust, wide, flattened above. Epinotum

with spines. Pedicel as in the soldier. Gaster truncate at the base.

MALE. Smaller than the female. About the same size or larger than the soldier.

Head small, narrower behind than in front. Eyes large. Ocelli very large; ocellar triangle raised. Mandibles small, with two or three teeth. Antennae 13-jointed; scapes about as long as first two funicular joints together; distal funicular joints more slender than basal joints. Mesonotum wide, flattened above; Mayrian furrow present. Mesoscutum large and convex. Epinotum without spines. Postpetiole large, broadly applied to gaster.

Pheidole (Pheidole) bicarinata Mayr

1870 Ph. bicarinata Mayr, Verh. Zool.-bot. Ges. Wien, 20:982, 989.
Soldier.

SOLDIER. Length, 3.7 mm.

Head a little longer than broad, with a deeply cleft posterior border, well-developed occipital lobes, and slightly convex sides. Frontal carinae diverging, less than one half as long as the scapes, the latter slightly longer than one half the length of the head. Mesoepinotal constriction deep. Node of petiole somewhat compressed antero-posteriorly, seen from behind the superior border straight or scarcely excised. Postpetiole broad, angularly produced at the sides.

Head longitudinally striate on its anterior half, becoming smooth and shining behind, with only the scattered punctures from which the hairs arise. Thorax striate, the striations transverse on the pronotum, longitudinal on the mesothorax.

Erect hairs numerous, slender, and flexuous.

Head and thorax brown, gaster brownish black.

WORKER. Length, 2.4 mm.

Head about as broad as long. Sculpture much as in the soldier.

Epinotum and mesopleurae strongly punctate. Erect hairs numerous. Color brownish black.

FEMALE. Length, 6.4 mm.

Head broader than long, a little broader behind than in front, with feebly excised or straight posterior border. Scapes in repose reaching slightly past apical ocellus. Eyes extending somewhat on the ventral surface of the head. Pedicel more robust than in the soldier. Head and pleurae of pronotum and epinotum striate; other surfaces smooth except for piliferous punctures. Erect hairs slender, abundant.

Deep castaneous.

MALE. Length, 4.8 mm.

Mandibles with three small teeth. Scape slightly longer than first two joints of funiculus together. First funicular joint rather globose. Eyes extending onto ventral surface of head. Mayrian furrow distinct only at the anterior portions of the arms. Genitalia retractible. Head and epinotum striate; other surfaces smooth. Pilosity and color much as in the female.

RECORDS. Clinton, Ames, Akron, Burlington, Oak Grove State Park, McGregor, Hinton. Also Sioux City (C. N. Ainslie).

This species is common over most of Iowa. It seems to thrive well in our cities and towns, even though it was originally a member of the

prairie fauna. It is less granivorous than pilifera.

In the author's preliminary list (1941a) bicarinata was misidentified as P. vinelandica Forel, a closely related species.

Pheidole (Pheidole) pilifera (Roger)

1863 Leptothorax pilifer Roger, Berlin Ent. Zeitschr., 7:180. Worker.

1886 Pheidole pennsylvanica Mayr, Verh. Zool.-bot. Ges. Wien, 36:455.
Soldier, worker, female, male.

1895 Pheidole pilifera Emery, Zool. Jahrb. Syst., 8:290.

SOLDIER. Length, 4.6 mm.

Head extremely large, nearly equal in volume to the rest of the body. Head, excluding mandibles, about as broad as long; posterior border deeply cleft, the occipital lobes well-developed; sides straight. Frontal carinae diverging. Antennae short, the scapes less than one half the length of the head. Eyes small and flattened, situated on the sides of the head about one fourth the length of a side from the mandibular insertions. Mesoepinotal impression deep, the promesonotum very convex and humped. Epinotal spines short. Node of the petiole rather flattened antero-posteriorly; seen from behind deeply excised. Postpetiole very wide, tapering at each side into a short, blunt spine or projection.

Head longitudinally striate but becoming strongly reticulate-rugose on the occipital lobes. Thorax, petiole, and postpetiole finely punctate, also with some striae and rugae. Gaster smooth and shining.

All parts with moderately numerous, slender, somewhat flexuous hairs.

Head ferruginous except lower cheeks, clypeus, and mandibles, which are infuscated. Thorax brown. Gaster deep brownish black.

WORKER. Length, 2.4 mm.

Head excised behind. Both head and thorax densely punctate. Mesoepinotal impression deep. Deep brownish black.

FEMALE. Length, 6.2 mm.

Head broader than long, a little broader behind than in front; posterior border feebly excised. Scapes in repose reaching slightly beyond apical ocellus. Frontal furrow rather distinct. Postpetiole acutely produced laterally as in the soldier. Head, thorax, and pedicel striate or otherwise roughly sculptured; occiput sculptured as in the soldier; base of gaster opaque. All parts with abundant fine hairs. Color as in the soldier.

RECORDS. Ames, Bellevue, Dewitt, Princeton.

This ant is numerous in prairie lands. It does not thrive well in our cities and towns but the writer has occasionally seen it in such situations. P. pilifera will accept dead insects if offered, but is largely granivorous.

Pheidole (Pheidole) sitarches Wheeler

1908 Ph. sitarches Wheeler, Bull. Amer. Mus. Nat. Hist., 24:440. Soldier, worker, female.

SOLDIER. Length, 3.3 mm.

Head longer than broad, deeply cleft behind, sides feebly convex. Frontal carinae diverging, short. Scapes a little over one half as long as the head. Pro- and mesonotum moderately convex. Mesoepinotal constriction rather shallow. Epinotal spines of moderate size. Lateral projections of pro- and mesonotum scarcely developed. Node of petiole

excised when seen from behind. Postpetiole only one half again as wide as the petiole, bluntly and angularly produced to the sides.

Head finely and closely longitudinally striate, the striae becoming transverse on the occipital lobes and swinging longitudinally again on the sides. Thorax, petiole, and postpetiole densely punctate. Gaster smooth and shining but with faint honeycomb-shaped markings.

Erect hairs sparse and clavate on thorax and gaster, more numerous, and slender or blunt on the head.

Head and thorax brownish red to blackish brown. Gaster brownish black.

WORKER. Length, 2.0 mm.

Head longer than broad, with rather convex sides. Head and thorax densely punctate. Hairs sparse, those on the thorax and gaster clavate. Brownish black.

FEMALE. Length, 4.6 mm.

Except in size, very similar to the female of pilifera. Head broader than long, slightly excised behind. Eyes and ocelli larger than in pilifera. Scapes in repose nearly reaching basal ocelli. Pedicel as in the soldier. Head coarsely striate. Thorax and pedicel striate or with rather opaque sculpture. All parts with numerous slender hairs (less abundant than in pilifera) rather than the sparse clavate hairs of the workers and soldiers. Color as in the soldier.

RECORD. Glenwood.

This species was originally described from Texas and apparently occurs in Iowa only in the extreme southwestern part of the state along

the bluffs of the Missouri River.

Genus Leptothorax Mayr

1855 Leptothorax Mayr, Verh. Zool.-bot. Ver. Wien, 5:431.

1922 Leptothorax Emery, Gen. Insec., fasc. 174:247.

GENOTYPE. Myrmica clypeata Mayr.

For the characters of this genus see the subgenera Leptothorax s. str., Dichothorax, and Mychothorax.

Key to Species of Leptothorax

- 1. Antennae 11-jointed. 2
- Antennae 12-jointed. 6
- 2. Thorax with a faint but distinct mesoepinotal constriction (subgenus Mychothorax). acervorum canadensis Provancher
- Thorax without a mesoepinotal constriction. 3
- 3. Epinotal spines very short, dentiform; color black. fortinodis melanotica Wheeler
- Epinotal spines longer. 4
- 4. Head shining; color black. longispinosus laeviceps n. subsp.
- Head sculptured; color yellow. 5
- 5. Spines long and curved, their bases approximate. curvispinosus Mayr
- Spines shorter and straight, their bases farther apart. ambiguus Emery
- 6. Without mesoepinotal constriction; postpetiole much broader than petiole. tricarinatus (Emery)
- With deep mesoepinotal constriction; petiole pedunculate (subgenus Dichothorax). pergandei Emery

Subgenus Leptothorax (Mayr) s. str.

- 1855 Leptothorax (part.) Mayr, Verh. Zool.-bot. Ver. Wien, 5:431.
1915 Leptothorax subg. Leptothorax Emery, Boll. Labor. Zool. Scuola Agr. Portici, 10:24.
1922 Leptothorax subg. Leptothorax Emery, Gen. Insec., fasc. 174:251.

GENOTYPE. Same as the genus.

WORKER. Monomorphic; size small.

Head usually a little longer than broad. Mandibles moderate in size. Clypeus rather small. Frontal carinae fairly distant, short. Antennae 11- or 12-jointed, the last three joints forming a distinct club longer than the remainder of funiculus. Thoracic dorsum without sutures or impressions. Epinotal spines variable in length. Petiole scarcely pedunculate, subtriangular in profile, with an antero-ventral tooth. Post-petiole usually little if any larger than petiole, constricted behind. Gaster somewhat truncate in front. Sculpture variable. Hairs usually blunt or slightly clavate, not dense, microscopically barbellate.

FEMALE. Usually larger than the worker. Eyes larger and ocelli present. Mesonotum large, hiding the pronotum when seen from above. Epinotal spines usually present. Antennae and pedicel as in the worker. Fore wings with a discal cell.

Leptothorax (Leptothorax) curvispinosus Mayr

- 1866 L. curvispinosus Mayr, Sitz.-ber. Akad. Wiss. Wien, 53:508. Worker.
1886 L. curvispinosus Mayr, Verh. Zool.-bot. Ges. Wien, 36:451, 453. Worker, female.

WORKER. Length, 2.6 mm.

Head a little longer than broad. Frontal carinae slightly diverging. Antennae 11-jointed; scapes nearly reaching posterior corners of the head. Thorax moderately convex above. Epinotal spines long, inserted close together, slightly curved medially at the apices. Petiole larger in profile than the postpetiole, its node somewhat laterally compressed.

Head longitudinally striato-punctate. Thorax longitudinally rugose and with larger punctures. Petiole and postpetiole punctate. Gaster shining.

Erect hairs blunt or slightly clavate on all dorsal surfaces.

Light to brownish yellow except for a triangular, infuscated spot on each side of the dorsum of the gaster.

FEMALE. Length, 3.5 mm.

Head as broad as long; eyes and ocelli large. Antennae and pedicel as in the worker. Epinotal spines shorter and straight. Head and thorax striate. Color darker and gastric infuscation much more extensive, the first segment free from infuscation only at the base, other segments infuscated along the hind borders.

RECORDS. Ames, Clinton, Tama, Waubonsie State Park, Belle Plaine, Dennison, Granite. Also Sioux City (C. N. Ainslie).

A common woodland form. Several colonies have been found nesting in dried hollow stems of plants near Ames.

Leptothorax (Leptothorax) ambiguus Emery

1895 L. curvispinosus ambiguus Emery, Zool. Jahrb. Syst., 8:320. Worker.

1940 L. ambiguus Wesson and Wesson, Amer. Midl. Nat. 24(1):97.

WORKER. Differing in the following characters from curvispinosus with which it is closely related. Head less opaque, the punctures and striations finer. Thorax less opaque on dorsum, longitudinally striato-punctate. Bases of epinotal spines rather far apart, the spines much shorter and not curved. Petiolar node not laterally compressed. Petiole and postpetiole in profile about equal in size. No infuscated spot on each side of the gaster.

RECORDS. Boone, Ames.

A much rarer ant than curvispinosus. No nests were found. All specimens were either caught in sweeping or with an aspirator as they were crawling on the ground.

Leptothorax (Leptothorax) longispinosus subsp. laeviceps n. subsp.

WORKER. Length, 2.2 mm.

Head oblongate, one eighth longer than broad. Antennae 11-jointed; scapes nearly reaching the posterior corners of the head. Funicular joints 2-7 broader than long; club one fifth longer than rest of funiculus. Dorsum of thorax slightly convex in profile. Epinotal spines long, straight, sharp, somewhat diverging seen from above, about one third as long as distance from bases to neck of pronotum. Petiole a little larger in profile than postpetiole, the antero-ventral spine very weak, node blunt in profile.

Head smooth and shining except for the cheeks, which are striate. Median lobe of clypeus rather indistinctly striate. Thorax striato-punctate, especially on the pleurae; the dorsum feebly shining. Petiole

and postpetiole punctate.

Erect hairs slightly clavate.

Dark brownish black.

TYPE LOCALITY. McGregor.

Differs from longispinosus s. str. in being smaller, having the sculpturing distinctly less coarse on all parts, and the epinotal spines shorter. The color of longispinosus is often pitch black.

Probably a rare ant in Iowa as I have not been able to find it in other parts of the state.

Leptothorax (Leptothorax) fortinodis melanotica Wheeler

1903 L. fortinodis var. melanotica Wheeler, Proc. Acad. Nat. Sci. Philad., 55:235. Worker, female.

WORKER. Length, 2.5 mm.

Head longer than broad, oblongate. Antennae short, 11-jointed. Scapes reaching about halfway between eyes and posterior corners of head. Funicular joints 2-7 much broader than long. Thoracic dorsum nearly straight in profile. Epinotal spines dentiform. Petiole larger than postpetiole in profile, its node situated somewhat forward from the posterior border.

Except for the coarsely punctured cheeks, head more densely and finely punctured and a little less opaque than the thorax, petiole, and postpetiole. Erect hairs usually blunt or slightly clavate.

Pitch black.

RECORDS. Ames, Dewitt, Clinton.

As Wesson and Wesson have stated (1940) this form may be synonymous

with the typical fortinodis Mayr, which in turn may be no more than a subspecies of schaumi Roger. The author would point out, however, that even though melanotica may intergrade indistinguishably with fortinodis in the East, it may be a valid geographical race in the Middle West, from which region it was described. All my specimens are pitch black as described.

Leptothorax (Leptothorax) tricarinatus Emery

1895 L. tricarinatus Emery, Zool. Jahrb. Syst., 8:321. Worker.

WORKER. Length, 2.6 mm.

Head a little longer than broad. Median portion of clypeus with three longitudinal carinae. Antennae 12-jointed. Thoracic dorsum slightly convex in profile. Epinotal spines dentiform. Petiole and postpetiole apparently about the same size in profile, but seen from above the postpetiole is much larger, nearly twice as broad, the sides not narrowed behind.

Head, thorax, petiole, and postpetiole roughly sculptured and punctate. Erect hairs blunt or slightly clavate.

Black.

RECORDS. Inwood, Oak Grove State Park. Also Sioux City (C. N. Ainslie).

This species may be distinguished immediately from all the other species of typical Leptothorax in Iowa by its 12-jointed antennae and large postpetiole. L. tricarinatus is not related to the members of the subgenus Dichothorax which also have 12-jointed antennae.

L. tricarinatus nests in the ground in small colonies.

Subgenus Mychothorax (Ruzsky)

1904 Leptothorax subg. Mychothorax (part.) Ruzsky, Fourmis Gouv. Arkangelsk, Bull. Soc. Géogr. Russe (in Russian), p. 288.

1915 Leptothorax subg. Mychothorax Emery, Boll. Labor. Zool. Scuola Agr. Portici, 10:24.

1922 Leptothorax subg. Mychothorax Emery, Gen. Insec., fasc. 174:260.

GENOTYPE. Formica acervorum Fabricius.

WORKER. Differing from the typical Leptothorax in having a distinct but rather shallow mesoepinotal impression, and in having the funiculus strongly clavate but the last three joints not forming as definite a club. Petiole short and high; scarcely pedunculate. The hairs are often more clavate. The antennae are always 11-jointed.

FEMALE. Differing from Leptothorax s. str. in not having the mesonotum large or covering the pronotum when seen from above. The funiculi are strongly clavate but less distinctly clubbed.

Leptothorax (Mychothorax) acervorum canadensis Provancher

1887 L. canadensis Provancher, Addit. Faune Canada, Hym., p. 245. Worker, female, male.

1903 L. acervorum canadensis Wheeler, Proc. Acad. Nat. Sci. Philad., 55: 225. Worker, female.

WORKER. Length, 3.3 mm.

Head longer than broad, oblongate. Scapes not reaching hind corners of head. Mesoepinotal constriction distinct but rather shallow on dorsum, distinct also on the pleurae. Epinotal spines short, with broad bases,

but acute. Petiole larger than postpetiole in profile, anterior face of its node as steep as hind surface. Sides of postpetiole converging behind when seen from above.

Head, thorax, petiole, and postpetiole roughly striate and punctate. Erect hairs on dorsal surfaces blunt or clavate. No erect hairs on scapes.

Dark brownish black.

FEMALE. Length, 4.0 mm.

Head nearly one fifth longer than broad. Eyes and ocelli rather small. Pronotum broadly margining the mesonotum when seen from above. Thorax a little narrower than head. Epinotal spines, pedicel, sculpture, and color as in the worker. Erect hairs less clavate and a little sparser than in the worker.

RECORD. Spirit Lake.

This species was found nesting under the bark of a log. L. acer-
vorum canadensis is a boreal species, apparently rare in Iowa even in the northern part.

Subgenus Dichothorax Emery

1895 Leptothorax subg. Dichothorax Emery, Zool. Jahrb. Syst., 8:323.

1922 Leptothorax subg. Dichothorax Emery, Gen. Insec., fasc. 174:260.

GENOTYPE. Leptothorax (Dichothorax) pergandei Emery.

WORKER. Differing from the typical Leptothorax in having the antennae longer and always 12-jointed, the scapes definitely surpassing the hind border of the head, and the last joint of the funiculus longer than the preceding two. Promesonotum quite convex. Mesoepinotal impression deep.

Epinotal spines usually very small. Petiole strongly pedunculate, its spiracles placed near the node. Postpetiole not narrowed behind. Erect hairs numerous and not barbellate.

FEMALE. Much larger than the worker. Antennae as in the worker. Thorax robust and broad, mesonotum covering pronotum. Scutellum much broader than long. Abdominal pedicel similar to that of the worker. Fore wings with large stigma, no discal cell.

MALE. About the size of the worker. Mandibles denticulate. Antennae 13-jointed; scapes about as long as first five joints of funiculi; last joint of funiculus about as long as preceding three combined. Head distinctly narrower than thorax. Mesonotum overlapping pronotum, without Mayrian furrow. Pedicel similar to that of the worker. Stipes forming a sheathing enclosing the rest of the genitalia. Wings as in the female.

Leptothorax (Dichothorax) pergandei Emery

1895 L. (D.) pergandei Emery, Zool. Jahrb. Syst., 8:318, 323. Worker, female, male.

WORKER. Length, 3.5 mm.

Head longer than broad. Antennae 12-jointed, long and slender, the scapes exceeding the posterior corners of the head. Pro- and mesonotum convex in profile. Mesoepinotal impression deep on the dorsum of the thorax, becoming indistinct on the pleurae. Epinotal spines dentiform. Petiole distinctly pedunculate, its node rather small and when seen from behind somewhat excised. Postpetiole much broader than petiole and the sides not converging behind.

Head shining except for the cheeks, which are strongly striate and

punctured. Pronotum and mesonotum shining. Mesothorax and epinotal pleurae striate and punctate. Dorsum of epinotum punctate. Dorsum of petiole, and the postpetiole and gaster shining. All shining surfaces have numerous, fine, irregular, impressed lines.

Erect hairs numerous, present on all parts, blunt to acute.

Black.

FEMALE. Length, 4.6 mm.

Head almost as broad as long. Joints 2-8 of funiculus about as broad as long. Epinotal spines short and blunt. Pedicel as in the worker but more robust. Sculpture similar to that of the worker but more pronounced; antennal fossae concentrically striate. Hairs abundant, slender. Black in color.

MALE. Length, 2.8 mm.

Mandibles 4-toothed. Head broader in front than behind, with prominent eyes. Scapes curved, as long as first five joints of funiculi. Scutellum convex and humped in profile. Node of petiole very low. Sculpture as in the female. Hairs sparser than in the worker. Color black except for the whitish mandibles, funiculi, and tarsi. Legs very slender.

RECORDS. Boone, Elkader, Glenwood, Bellevue, Dubuque, Sabula.

This ant nests in soil on sunny hillsides. It seems more xerophilous and moves more rapidly than the species of typical Leptothorax. It is common nowhere but nevertheless, cannot be considered very rare in Iowa.

Genus Crematogaster Lund

1831 Crematogaster Lund, Ann. Sci. Nat., 23:132.

1922 Crematogaster Emery, Gen. Insec., fasc. 174:127.

GENOTYPE. Formica scutellaris Olivier.

For the characters of this genus see the subgenera Crematogaster s. str. and Orthocrema.

Key to the Species of Crematogaster

1. Black in color; thorax opaque (subgenus Crematogaster s. str.). . .
lineolata (Say)

Mostly yellow; thorax shining (subgenus Orthocrema).
minutissima missouriensis Emery

Subgenus Crematogaster Lund s. str.

1852 Acrocoelia Mayr, Verh. Zool.-bot. Ver. Wien, 2:146.

1922 Crematogaster subg. Acrocoelia Emery, Gen. Insec., fasc. 174:140.

GENOTYPE. Same as the genus.

WORKER. Mostly small species.

Head about as broad or broader than long. Mandibles about 4-toothed.

Frontal carinae far apart, the clypeus convexly prolonged between them.

Antennae 11-jointed, last three joints of funiculus forming a club. Eyes

on the sides nearer the hind border of the head than the mandibular insertions. Mesoepinotal suture distinct and carried down on the pleurae.

Epinotal spines rather large, far apart. Petiole rather heart-shaped and

flat above, wider than the postpetiole, the latter attached to the apparent

dorsal surface of the first gastric segment. Postpetiole with a longi-

tudinal furrow. Gaster heart-shaped, more convex below than above, pointed behind.

FEMALE. Much larger than the worker. Ocelli present. Head, antennae, and pedicel much as in the worker. Gaster voluminous. Thorax robust. Epinotum precipitous, overhung by the scutellum and metanotum.

Crematogaster (Crematogaster) lineolata (Say)

1836 Myrmica lineolata Say, Boston Jour. Nat. Hist., 1:290. Worker, female, male.

1863 Crematogaster lineolata Roger, Verz. Formicid., p. 37.

WORKER. Length, 3.1 mm.

Head rounded, a little broader than long. Scapes surpassing posterior border of head by about one ninth of their length. Club of funiculus distinctly 3-jointed. Pro- and mesonotum slightly convex in profile. Mesoepinotal impression rather shallow. Epinotum with a short base. Dorsal surface of petiole much broader in front than behind, rather heart-shaped, somewhat concave.

Cheeks longitudinally striate. Thorax longitudinally rugose on the dorsum, a median carina on the promesonotum. Pleurae striato-punctate. Scattered erect hairs present on nearly all surfaces. Some sparse, long, appressed pubescent hairs on the gaster, and other less distinct pubescence on other parts.

Black.

FEMALE. Length, 6.6 mm.

Head as broad as long, with nearly straight posterior border and sides. Mandibles 5-toothed. Thorax narrower than head but robust dorso-ventrally; pronotum and epinotum precipitous and overhung by the mesothorax. Integument more shining than in the worker, except on head; mesonotum

smooth and shining. Erect hairs and pubescence more dense than in the worker. Black in color.

RECORDS. Ames, Mt. Vernon, Sabula, Keokuk, Muscatine, McGregor, Dubuque, Glenwood.

This species occurs all over the state but does not seem especially common.

Subgenus Orthocrema (Santschi)

1918 Crematogaster subg. Orthocrema Santschi, Bull. Soc. Ent. Fr., p. 132.

1922 Crematogaster subg. Orthocrema Emery, Gen. Insec., fasc. 174:130.

GENOTYPE. Myrmica sordidula Nylander.

WORKER. Funiculi with 2-jointed clubs. Petiole subrectangular when seen from above, not broader in front than behind. Postpetiole without a longitudinal impression. Otherwise much as in Crematogaster s. str.

FEMALE. Antennae and pedicel as in the worker. Otherwise similar to female of Crematogaster s. str.

Crematogaster (Orthocrema) minutissima missouriensis Emery

1895 C. victima missouriensis Emery, Zool. Jahrb. Syst., 8:288 (in footnote). Worker.

1939 C. (O.) minutissima missouriensis Creighton, Psyche, 46(4):138.

WORKER. Length, 2.8 mm.

Head rounded, about as long as broad. Clypeus feebly notched in the middle. Frontal carinae diverging a little behind. Eyes coarsely faceted, nearer the hind border of the head than the mandibular insertions. Antennal

club apparently 2-jointed, the penultimate much larger than the preceding joint. Pro- and mesonotum moderately convex in profile. Base of epinotum very short. Dorsal face of petiole flat, sides slightly convex when seen from above. Postpetiole nearly as wide as petiole.

Smooth and shining. A few longitudinal striae on cheeks. Weak carinae bordering the pro- and mesonotum when seen from above; short, diverging carinae margining the clypeal notch. Erect hairs long, yellow, somewhat bristle-like, rather sparse.

Yellow; dorsum of head and apex of gaster infuscated.

FEMALE. Length, 4.8 mm.

Head a little broader than long. Eyes prominent. Antennae and pedicel as in the worker. Thorax slightly narrower than head. Epinotal spines dentiform. Integument smooth and shining. Erect hairs long and slender, more abundant than in the worker. Color as in the worker.

RECORDS. Little Sioux, Glenwood, Sioux City. Also Sioux City (C. N. Ainslie).

This ant is abundant along the Missouri River bluffs but lacking in other parts of the state. It nests in the ground in small colonies.

Genus Monomorium Mayr

1855 Monomorium Mayr, Verh. Zool.-bot. Ver. Wien, 5:452.

1922 Monomorium Emery, Gen. Insec., fasc. 174:166.

GENO TYPE. Monomorium minutum Mayr.

For the characters of this genus see subgenus Monomorium s. str.

Key to Species of Monomorium

1. Black; all surfaces shining. minimum (Buckley)
Yellow; head and thorax finely reticulate-punctate.
pharaonis (Linné)

Subgenus Monomorium (Mayr) s. str.

1855 Monomorium Mayr, Verh. Zool.-bot. Ver. Wien, 5:452.

1922 Monomorium subsp. Monomorium Emery, Gen. Insec., fasc. 174:170.

GENOTYPE. Same as the genus.

WORKER. Monomorphic; small species.

Head longer than broad. Mandibles with strongly oblique apical borders. Clypeus with two keels which usually project forward as teeth. Antennae 12-jointed, the last three joints forming a club longer than the rest of the funiculus. Eyes fairly well-developed. Mesoepinotal impression distinct. Epinotum without spines. Petiole pedunculate. Node of petiole and postpetiole convex and rounded above.

FEMALE. Generally much larger than the worker; usually winged but sometimes ergatomorphic. Eyes in the middle of the sides of the head. Thorax and gaster robust. Pedicel, antennae, and clypeus as in the worker.

Monomorium (Monomorium) minimum (Buckley)

1867 Myrmica (Monomorium) minima Buckley, Proc. Ent. Soc. Philad., 6: 338. Worker, female.

1895 Monomorium minutum var. minimum Emery, Zool. Jahrb. Syst., 8:274. Worker, female, male.

1914 Monomorium minimum Wheeler, Jour. New York Ent. Soc., 22:42.

WORKER. Length, 1.7 mm.

Head longer than broad. Mandibles in repose hidden under the clypeus. Clypeal teeth developed. Scapes nearly reaching hind corners of head. Mesoeipinotal impression distinct on the dorsum and sides. Petiole much larger in profile than postpetiole, with a short peduncle. Postpetiole a little wider than petiole, seen from above.

All surfaces shining. Erect hairs long, slender, and flexuous; present on all parts of the body. Antennal scapes with numerous hairs.

Black.

FEMALE. Length, 3.9 mm.

Thorax large and robust, rather slender seen from above but as wide as head. Clypeal teeth strong. Ocelli small. Pedicel more robust than in the worker. Head and thorax punctured. Declivity of epinotum concave and transversely striate. Erect hairs abundant. Color black.

RECORDS. Little Sioux, Inwood, Tama, Ames, Boone. Also Sioux City (C. N. Ainslie).

This minute species usually builds small crater nests in the ground. The writer has once taken it from beneath the bark of a log.

Monomorium (Monomorium) pharaonis (Linné)

1758 Formica pharaonis Linné, Syst. Nat., ed. 10, 1:580.

1862 Monomorium pharaonis Mayr, Verh. Zool.-bot. Ges. Wien, 12:752.

WORKER. Length, 2.2 mm.

Head elongate. Mandibles not hidden under the clypeus in full face

view. Clypeal teeth undeveloped. Eyes rather small. Antennae slender; scapes surpassing the hind corners of the head. Thorax slender, meso-epinotal impression distinct but not deep on dorsum and sides. Petiole distinctly pedunculate. Base of gaster somewhat excised.

Head, thorax, petiole, and postpetiole punctate. Gaster shining. Erect hairs sparse, slender. Only appressed pubescence on scapes.

Head and thorax light yellow. Gaster infuscated.

RECORD. Ames.

This species does not live out-of-doors in these latitudes. It is occasionally found in buildings and houses, where it apparently nests in walls.

Genus Solenopsis Westwood

1841 Solenopsis Westwood, Ann. Mag. Nat. Hist., 6:87.

1922 Solenopsis Emery, Gen. Insec., fasc. 174:195.

GENOTYPE. Solenopsis mandibularis Westwood = Atta geminata Fabricius.

Solenopsis s. str. does not occur in Iowa. For many of the characters of this genus see the subgenus Diplorhoptum.

Subgenus Diplorhoptum (Mayr)

1855 Diplorhoptum Mayr, Verh. Zool.-bot. Ver. Wien, 5:449.

1930 Solenopsis subg. Diplorhoptum Creighton, Proc. Amer. Acad. Arts Sci., 66(2):42-43.

GENOTYPE. Formica fugax Latreille.

WORKER. Monomorphic to polymorphic. Very small to medium-sized

species.

Head a little longer than broad. Mandibles with strongly oblique borders, 4-toothed. Clypeus with two keels projecting in the form of teeth. Antennae 10-jointed, the last two joints forming a distinct club longer than the rest of the funiculus; second and third joints about as broad as or broader than long. Eyes very small; on the sides rather near the mandibular insertions. Mesoepinotal suture more or less distinct. Epinotum without spines. Petiole pedunculate. Node of petiole and postpetiole convex and rounded above. Postpetiole little wider than the petiole.

FEMALE. Much larger than the minor worker. Eyes large; ocelli present. Antenna 11-jointed, but its proportions and the club similar to that of the worker. Clypeus similar to that of the worker. Postpetiole little wider than petiole.

MALE. Mandibles weak, but with two or three teeth. Head wider in front than behind. Eyes large and close to mandibular insertions. Antennae 12-jointed; scape very short; second joint globular; other joints gradually becoming longer and more slender. Mayrian furrow absent. Stipes and sagittae of genitalia short and blunt.

Solenopsis (Diplorhoptrum) molesta (Say)

1836 Myrmica molesta Say, Boston, Jour. Nat. Hist., 1:293. Female.

1895 Solenopsis molesta Emery, Zool. Jahrb. Syst., 8:277. Worker, female, male.

WORKER. Length, 1.3 mm.

Head longer than broad, with feebly excised posterior border, and

slightly convex sides. Clypeus somewhat covering mandibles; clypeal teeth distinct. Frontal carinae short. Scapes short, about eight elevenths as long as the head. Funicular joints 2-7 slightly broader than long; club distinctly longer than rest of funiculus. Eyes vestigial. Mesoepinotal suture impressed. Epinotum rounded. Petiole with rather short peduncle. Postpetiole a little wider than petiole.

Except for scattered punctures on the head, smooth and shining. Erect hairs slender, pointed, present on all parts including scapes. Some subappressed pubescence also on scapes.

Light yellow.

FEMALE. Length, 4.0 mm.

Head slightly broader than long, small in proportion to rest of body. Clypeal teeth weak. Scapes nearly reaching hind corners of head. First joint of funiculus as long as next four joints combined. Eyes hairy. In profile, node of petiole steeply sloping in front, perpendicular behind.

Erect hairs much more abundant than in the worker. All surfaces more punctate.

Tan or brown, usually much darker than the worker.

MALE. Length, 3.7 mm.

Mandibles with about three indistinct denticuli. Ocelli rather prominent. Eyes hairy. Petiole with a much lower node than in the worker or female. Erect hairs more sparse than in the female. Color black; legs much lighter; antennae light yellow. Veins of wings clear.

RECORDS. Ames, Sioux City, Boone, Marshalltown, Inwood, Tama, Belle Plaine. Also Sioux City (C. N. Ainslie).

Probably very abundant over the entire state.

Genus Myrmecina Curtis

1829 Myrmecina Curtis, Brit. Ent., 6:226.

1922 Myrmecina Emery, Gen. Insec., fasc. 174:230.

GENOTYPE. Myrmecina latreillei Curtis = Formica graminicola
Latreille.

WORKER. Head about as broad as long. Mandibles rather large, convex when seen in profile. Clypeus very small, reduced to a mere ridge in front of the antennal fossae; middle portion elevated above lateral ridges. Frontal carinae moderately produced laterally into lobes. Antennae 12-jointed, last three joints forming a club longer than rest of funiculus. Eyes small, on the sides of the head nearer the mandibular insertions than the hind border. Maxillary palpi with four segments, labial palpi with three segments. Thorax without sutures on the dorsum, somewhat quadrate in transverse section; pronotal corners angulate. Epinotum spinose. Petiole not pedunculate, rectangular seen from above, without a distinct node, with an anterior ventral spine. Postpetiole not constricted behind. Femora and tibiae fusiform. First segment enclosing much of the gaster. Head, thorax, petiole, and postpetiole rather strongly rugose.

MALE. About the same size as the worker. Head broader in front than behind, with large eyes near the anterior angles. Ocellar triangle raised. Mandibles vestigial. Antennae 13-jointed; scape short. Mesonotum covering pronotum; Mayrian furrow distinct. Pedicel much as in

the worker.

Myrmecina americana Emery

1895 M. latreillei americana Emery, Zool. Jahrb. Syst., 8:271. Worker.

1922 M. graminicola americana Emery, Gen. Insec., fasc. 174:232.

WORKER. Length about 3.0 mm.

Head slightly broader than long, posterior border notched in the middle. Clypeus rather feebly excised in the middle; lateral projections of median lobe rather feeble. Apical borders of mandibles oblique behind. Scapes normal in shape, slightly exceeding posterior corners of the head. Thorax much wider in front than behind. Epinotum with two short, blunt, dorsally directed spines on the front of its base. Posterior pair of spines strongly diverging. Petiole subcylindrical, except for the oblique anterio-dorsal face.

Head, thorax, petiole, and postpetiole irregularly rugose. Gula obliquely striate and limited on each side by a longitudinal carina. All surfaces with abundant slender hairs.

Black.

MALE. Length, 3.1 mm.

Mandibles reduced to very short, blunt stumps. Scapes not as long as first two funicular joints together. Funiculi robust, of nearly even thickness throughout their length. Thorax narrower than head. Epinotal spines short and blunt. Pedicel very similar to that of the worker. Stipes of genitalia very blunt and short. Sculpture less coarse than in the worker; mesothorax mostly smooth and shining. Erect hairs abundant,

slender. Black. Wings dark brown.

RECORDS. Dewitt, Clinton, Ames, Boone.

Winged males were found in a nest in late August. This ant is strictly hypogeic.

Although americana has always been treated as a subspecies of graminicola Latreille, several differences lead the writer to believe it should be considered distinct. The scapes are not flattened and broad at the base but are circular in cross section. The median lobe of the clypeus is not greatly produced on each side. The head is slightly broader than long rather than a little longer than broad, and is also distinctly notched behind. The thorax is a little broader in proportion to its length. The anterior epinotal spines are better developed, and the posterior pair are much more diverging.

Genus Strumigenys Fred. Smith

1860 Strumigenys Fred. Smith, Jour. Ent., 1:71.

1922 Strumigenys Emery, Gen. Insec., fasc. 174:319.

GENOTYPE. Strumigenys mandibularis Fred. Smith.

Strumigenys s. str. does not occur in Iowa. For many of the characters of this genus see the subgenus Cephaloxys.

Key to Species of Strumigenys

1. Visible portion of mandibles one third as long as the head, a basal tooth visible just before the clypeus. pergandei Emery
Visible portion of mandibles one fifth as long as the head, no basal tooth visible. pulchella Emery

Subgenus Cephaloxys Fred. Smith

1864 Cephaloxys Fred. Smith, Jour. Linn. Soc. Lond. Zool., 8:76.

1922 Cephaloxys subg. Cephaloxys Emery, Gen. Insec., fasc. 174:323.

GENOTYPE. Cephaloxys capitata Fred. Smith.

WORKER. Minute species, monomorphic.

Head cordate, longer than broad; hind border with a deep, convex notch. Mandible subparallel, only distal portion denticulate, although there may be a large, isolated tooth near the base; bases covered by the projecting clypeus. Clypeus produced anteriorly and somewhat laterally, the edges joined behind by laterally projecting laminae which longitudinally divide the fore part of the antennal scrobes. Frontal carinae far apart, on the sides of the head, bordering the antennal scrobes. Eyes at the lower border of the scrobes. When fully retracted the scapes fit into the upper parts of the scrobes, and the funiculi lie just below the laterally projecting laminae, with their tips covered by the lateral projections of the clypeus. Front between the scrobes very large and expanded.

Antennae 6-jointed, last joint of funiculus about as long or longer than other four joints together. Epinotum with rather weak spines but strong, infraspinal lamellae. Petiole pedunculate, with a node behind. Postpetiole large, node-like. Head strongly punctate. Pilosity very diverse. At least the venter of petiole and postpetiole with extremely dense hairs making a spongiform mass.

FEMALE. Much as in the worker. Ocelli and wings present.

The subgenus Cephaloxys apparently has much shorter mandibles than Strumigenys s. str. This, however, may sometimes be caused by the greatly produced clypeus which hides the basal portions rather than by any large differences in absolute measurement. Cephaloxys may be separated from Strumigenys s. str. by the following three characters: Distal portion of mandibles denticulate rather than with large interlocking teeth. Clypeus produced in front and to the sides, covering bases of mandibles. Antennal scrobes larger, the fore parts divided by laminae; capable of receiving both scapes and funiculi, the distal portions of the latter received below the laterally projecting scrobal laminae and the clypeus.

Strumigenys (Cephaloxys) pergandei Emery

1895 S. pergandei Emery, Zool. Jahrb. Syst., 8:326. Worker, female, male.

1931 S. (C.) pergandei M. R. Smith, Ann. Ent. Soc. Amer., 24(4):698.

WORKER. Length, 2.6 mm.

Mandibles long, visible portion one third the length of the head, a strong basal tooth visible. Clypeus broad, four sevenths as broad as broadest part of the head, angularly produced behind. Last joint of funiculus longer than other joints together.

Head covered by numerous squamiform, flexuous, subappressed hairs; hairs especially numerous on the clypeus. Squamiform hairs also present on scapes, dorsa of thorax, petiole, and postpetiole. Hairs on legs spatulate and appressed. Spongiform hair mass of pedicel well-developed; present on venters and posteriors of petiole and postpetiole. Head and dorsum of thorax strongly and densely punctate.

Ferruginous.

RECORDS. Boone, Holy Cross, Bellevue.

A rare species in Iowa. It is usually found near the nests of other ants.

Strumigenys (Cephaloxys) pulchella Emery

1895 S. pulchella Emery, Zool. Jahrb. Syst., 8:327. Worker.

1931 S. (C.) pulchella M. R. Smith, Ann. Ent. Soc. Amer., 24(4):702.

WORKER. Length, 2.0 mm.

Mandibles short, visible portion about one fifth the length of the head. Clypeus evenly rounded, not greatly produced laterally, angulate behind. Last joint of funiculus longer than rest of funiculus combined.

Clypeus fringed on each side by three flexuous, spatulate hairs. Flexuous, spatulate hairs also scattered on the surface of clypeus, front, occipital lobes, scapes, and pronotum. A few, very long and slender hairs present on head, thorax, petiole, postpetiole, and gaster. Spongiform hair mass of pedicel well-developed, present on venters and posteriors of petiole and postpetiole.

Head and dorsum of thorax densely punctate.

Ferruginous.

FEMALE. Length, 2.4 mm.

Very similar to the worker. Eyes larger and small ocelli present. Pronotum with anterio-lateral angles. Veination of wings greatly reduced.

RECORD. Ames.

This species is either extremely rare or extremely hypogeic in Iowa. In the spring, single workers can rarely be found under rocks in damp soil.

SUBFAMILY DOLICHODERINAE (FOREL)

1878 Dolichoderidae Forel, Zeitschr. Wiss. Zool., 30(Suppl.):54.

1893 Dolichoderinae Dalla Torre, Catal. Hymen., 7:156.

1912 Dolichoderinae Emery, Gen. Insec., fasc. 137:2.

WORKER. Usually monomorphic and of rather small size.

Mandibles commonly subtriangular. Clypeus somewhat prolonged between the frontal carinae which are usually feeble and not covering the antennal insertions. Eyes ordinarily of medium size. Antennae nearly always 12-jointed. Metathoracic spiracles present. Epinotum usually without spines. Pedicel 1-jointed, surmounted by a scale of various size and shape. Gaster 5-segmented; no constriction between first and second segments. Hypopygium without a circular opening. Pygidium often ventral in position. Sting vestigial. Anal glands present, which secrete a fluid for defense. Spurs of middle and hind legs often pectinated.

FEMALE. Usually much larger than the worker. Eyes larger and ocelli present. Pronotum and epinotum much more reduced than in Ponerinae. Petiole and gaster as in the worker, except for the voluminous size of the gaster.

MALE. Mandibles often denticulate. Clypeus somewhat produced between the frontal carinae. Antennae 13-jointed; scapes short or sometimes longer than is usual in Ponerinae. Mayrian furrows absent. No constriction between first and second segments of the gaster. Gaster 6-segmented.

PUPAE. Never enclosed in cocoons.

Key to Genera of Dolichoderinae

1. Epinotum with a conical point. Dorymyrmex
Epinotum without a conical point. 2
2. Petiolar scale very small and strongly inclined forward, not distinct. Tapinoma
(one Iowa species, T. sessile (Say))

Petiolar scale distinct, more erect, sharply pointed above.
Iridomyrmex
(one Iowa species, I. pruinorum analis (Ern. André))

Genus Iridomyrmex Mayr

1862 Iridomyrmex Mayr, Verh. Zool.-bot. Ges. Wien, 12:702.

1912 Iridomyrmex Emery, Gen. Insec., fasc. 137:21.

GENOTYPE. Iridomyrmex purpureus (Fred. Smith) = Formica detectus (Fred. Smith).

WORKER. Head elongate. Apical borders of mandibles somewhat oblique. Clypeus rather projecting. Frontal carinae rather short and feeble. Antennae 12-jointed; all the funicular joints a little longer than broad. Eyes rather close behind and to the sides of the antennal fossae. Mesoepinotal suture distinct. Epinotal base and declivity about equal. Petiole with a distinct but rather small scale, which is inclined forward. Base of gaster sometimes with a concavity for the partial reception of the petiole. Pygidium small and ventral in position.

FEMALE. Much larger than the worker. Head broader. Eyes larger and ocelli present. Petiole, gaster and pygidium as in the worker.

MALE. As small as or smaller than the worker. Mandibles acute or with a few teeth. Scapes usually short. Mesonotum overhanging the pronotum and to a certain extent, the head. Hypopygium small. Genitalia small; volsellae spiniform.

Iridomyrmex pruinosum analis (Em. André)

1893 Tapinoma anale Em. André, Rev. Entom., p. 148. Worker.

1895 Tapinoma pruinosum var. anale Emery, Zool. Jahrb. Syst. 8:333.

1912 Iridomyrmex analis Emery, Gen. Insec., fasc. 137:26.

WORKER. Length about 2.5 mm.

Head, excluding mandibles, longer than broad, somewhat broader behind than in front, with excised posterior border and nearly straight sides. Mandibles with about five teeth. Clypeus convex in front. Scapes surpassing posterior corners of head by about one eighth of their length. Second and penultimate joints of funiculi a little longer than the middle joints. Pro- and mesonotum only slightly convex in profile. Epinotum evenly rounded, its base and declivity subequal. Scale of petiole narrowed toward the top and forming a bluntly pointed apex.

All parts densely pubescent. Erect hairs sparse but present on all parts, including scapes.

Grayish brown; first and second segments of gaster usually more yellowish.

FEMALE. Length, 4.6 mm. Slender bodied.

Head as broad as long, with straight posterior border and slightly convex sides. Scapes surpassing posterior border of head by one tenth

of their length. Front margin of eye rather close to insertion of mandible. Petiole sharp, convex above. Pubescence denser than in the worker. Erect hairs similar to those of the worker.

Colors reversed, the head and thorax yellow while the gaster is infuscated.

MALE. Length, 2.2 mm.

Mesonotum greatly swollen and overlapping the pronotum, which is very narrow in front. Scape as long as first three joints of funiculus. Head almost ventral in position. Epinotum with a large base. Petiole attached by nearly its whole posterior surface to the gaster. Front margins of eyes close to mandibular insertions. Veination of wings indistinct.

RECORDS. Glenwood, Inwood, Oak Grove State Park, Little Sioux. Also Sioux City (C. N. Ainslie).

This species is common along the Missouri River bluffs and also in prairie remnants in the area drained by the Missouri River system. It does not occur in central or eastern Iowa.

Genus Dorymyrmex Mayr

1866 Dorymyrmex Mayr, Sitz. Akad. Wiss. Wien, 53:494.

1912 Dorymyrmex Emery, Gen. Insec., fasc. 137:36.

GENOTYPE. Dorymyrmex flavescens Mayr = Dorymyrmex planidens Mayr.

WORKER. Mandibles with strongly oblique, apical borders, apical tooth long; lateral borders convex. Clypeus straight in front. Frontal

carinae rather feeble. Antennae 12-jointed, scapes exceeding hind border of head, basal joints a little more slender than distal joints. Eyes placed close behind and to the sides of the antennal fossae. Maxillary palpi 6-jointed, third joint curved and by far the longest. Mesoepinotal constriction distinct. Seen in profile, base of epinotum raised behind into a conical projection. Petiole with a distinct scale somewhat inclined forward. Gaster with a concavity at the base for the partial reception of the petiolar scale. Pygidium small and ventral in position. Gula with ammochaetae.

FEMALE. Much larger than the worker. Ocelli present. Head broader than in the worker. Palpi as in the worker. Epinotum without a trace of conical point. Petiole and pygidium as in the worker.

MALE. Comparable in size to the worker. Mandibles denticulate. Eyes close to the front. Palpi as in the worker. Scape at least as long as first three joints of funiculus. Mesonotum overhanging pronotum and head. Hypopygium small. Genitalia larger in proportion to gaster than in Iridomyrmex. Stipes short.

Key to Species of Dorymyrmex

1. Color uniformly black. pyramicus niger Pergande
Head and thorax brown, lighter than gaster. . . . pyramicus (Roger)

Dorymyrmex pyramicus (Roger)

- 1863 Prenolepis pyramica Roger, Berl. Ent. Zeitschr., 7:160. Worker.
1886 Dorymyrmex pyramicus Mayr, Verh. Zool.-bot. Ges. Wien, 36:365, 433.
Worker, female.

1895 Dorymyrmex pyramicus Emery, Zool. Jahrb. Syst., 8:331. Male.

WORKER. Length, 2.5-3.0 mm.

Head, excluding mandibles, slightly longer than broad, feebly excised behind, and with moderately convex sides. Clypeus slightly convex in the middle. Frontal carinae parallel for most of their length, diverging behind. Scapes surpassing posterior corners of the head by one seventh of their length. Second funicular joint much longer than third. Mesoepinotal suture rather strongly impressed. Base of epinotum raised behind in a conical projection. Petiolar scale rather egg-shaped seen from behind, widest at about the middle, narrowed above and below. Gaster somewhat laterally compressed.

All parts densely and finely pubescent. A few long, erect hairs on clypeus and front, and apex and venter of gaster. Ammochaetae short, placed toward front of gula.

Head and thorax brownish. Gaster black.

FEMALE. Length, 6.1 mm.

Head a little broader than long, with nearly straight posterior border, and moderately convex sides. Apical tooth of mandibles very long. Eyes little larger than in the worker. Funicular proportions as in the worker. Epinotum evenly rounded. Petiole cuneate, convex above when seen from behind. Gaster somewhat flattened laterally. Head and thorax darker in color than in the worker.

MALE. Length, 2.5 mm.

Mandibles with about three teeth, apical tooth very long. Head a little broader than long, broader behind than in front. Scapes reaching

only a little past the eyes; scarcely as long as first three funicular joints. Mesonotum with a saddle-shaped impression on dorsum and sides. Petiole nodiform. Hypopygium very small.

RECORDS. Sioux City, Little Sioux, Oak Grove State Park, Inwood. Also Sioux City (C. N. Ainslie).

The distribution of this species in Iowa is the same as that of Iridomyrmex analis. Some of my specimens seem somewhat transitional to D. pyramicus niger.

Dorymyrmex pyramicus niger Pergande

1895 D. pyramicus var. niger Pergande, Proc. Calif. Acad. Sci., 5(2):871.

WORKER. Differing from the typical form in having the head a little more elongate, the scapes slightly longer, the second funicular joint little longer than the third, the mesoepinotal suture not deeply impressed, the petiole smaller and blunter, and the color of the head and thorax not lighter than the gaster.

RECORD. Ames.

If I have identified this form correctly, it is certainly more than a color variety as originally described. The differences I have given may not prove constant, however.

This form nests only in virgin prairie or open fields. On a virgin prairie remnant near Ames it was especially abundant, more abundant than any other ant. There is little doubt in the writer's mind that this form was a dominant species in the original prairie fauna of Iowa, before cultivation extinguished it. D. niger can be occasionally found in pasture

lands but does not thrive in such situations. Recently the virgin prairie remnant mentioned above has been overgrazed and the prairie flora has disappeared. The writer has noticed a decrease in the number of D. niger there, apparently correlated with this change.

Genus Tapinoma Förster

1850 Tapinoma Förster, Hymen. Stud., 1:43.

1912 Tapinoma Emery, Gen. Insec., fasc. 137:38.

GENOTYPE. Tapinoma collina Förster = Formica erratica Latreille.

WORKER. Mandibles with somewhat oblique apical borders; with numerous teeth. Clypeus feebly convex in front. Frontal carinae rather feeble, far apart. Antennae 12-jointed, funiculus slightly incrassated, joints 2-10 about as broad as long. Eyes rather close behind and to the sides of the antennal fossae. Maxillary palpi 6-jointed, the joints subequal in length. Mesoepinotal depression distinct. Scale of petiole so reduced and inclined forward as to be nearly absent. Base of gaster covering the petiole and with a concavity for the latter's reception. Pygidium very small and ventral in position.

FEMALE. Usually much larger than the worker; in some species (T. sessile, for example) rather small. Head broader. Ocelli present. Petiole and pygidium as in the worker.

MALE. In general about the same size as the worker, but in a few species (T. sessile, for example) about the same size as the female. Mandibles variable, sometimes robust and denticulate. Scapes long,

surpassing posterior border of head. Mesonotum not overhanging pronotum. Petiole nodiform. Genitalia large. Hypopygium not reduced.

Tapinoma sessile (Say)

1836 Formica sessilis Say, Boston Jour. Nat. Hist., 1:287. Female.

1863 Tapinoma boreale Roger, Berl. Ent. Zeitschr., 7:165. Worker, female.

1895 Tapinoma sessile Emery, Zool. Jahrb. Syst., 8:332. Female, male.

WORKER. Length about 3 mm., rather variable in size.

Head longer than broad, with moderately convex sides; hind border slightly excised in the middle. Clypeus notched. Scapes exceeding hind border of head by one fifth of their length. First funicular joint not as long as joints two and three, the latter a little shorter and somewhat narrower than the penultimate joint. Mesoepinotal suture distinct but not deeply impressed. Petiolar scale nearly lacking.

Pubescence dense on all parts, giving a pruinose appearance. Erect hairs nearly absent; a few on apex and venter of gaster, two elongate hairs on the clypeus.

Color black.

FEMALE. Length, 4.0-4.5 mm.

Head a little broader than long; posterior border much wider than in the worker. Frontal carinae farther apart. Eyes somewhat larger. Petiole as in the worker. Pilosity and color as in the worker.

MALE. With about the same size, color, and pilosity as in the female. Mandibles with numerous small teeth. Frontal carinae as in the worker. Scapes surpassing posterior border of head even more than in the worker.

Petiole as in the worker. Hypopygium bifurcated. Stipes large and blunt.

RECORDS. Ames, Clinton, Burlington, Tama, Inwood. Also Sioux City (C. N. Ainslie).

This species is so common in woodlands near Ames that it undoubtedly is common over most of the state. The writer has not seen it on the Missouri River bluffs, where Iridomyrmex analis apparently takes its place.

SUBFAMILY FORMICINAE (LEPELETIER)

1836 Formicites (part.) Lepeletier, Hist. Nat. Ins. Hym., 1:197.

1855 Formicidae (part.) Mayr, Verh. Zool.-bot. Ver. Wien, 5:286.

1874 Formicidae α Forel, Fourmis Suisse, p. 22.

1920 Formicinae Wheeler, Psyche, 27:53.

1925 Formicinae Emery, Gen. Insec., fasc. 183:2.

WORKER. Monomorphic to polymorphic.

Mandibles variable. Clypeus large, not ordinarily prolonged between frontal carinae. Frontal area often distinct. Frontal carinae usually not well-developed or covering antennal insertions. Antennae with a variable number of joints, the common number, 12; funiculi generally filiform. Eyes small to medium-sized; in rare cases large. Ocelli sometimes present. Pro- and mesonotum often distinct areas. Metathoracic spiracles present. Epinotum usually without spines. Petiole 1-jointed, surmounted by a scale or node. Gaster 5-segmented, no constriction behind first segment. Hypopygium at the apex with a circular, hair-fringed opening for the ejaculation of poison. Poison vesicle enormously developed. The active ingredient of the poison is formic acid, which is not present in the poison of the other subfamilies of Formicidae.

FEMALE. Monomorphic, rarely dimorphic. Always winged.

Usually much larger than the worker; in a few species smaller than the largest worker. Thorax robust. Eyes larger than in the worker; ocelli present. Other characters much as in the worker.

MALE. Of variable size. Always winged.

Mandibles often denticulate. Clypeus large and not prolonged between the frontal carinae. Eyes often distant from anterior corners of head. Antennae 10-13-jointed. Scapes long. Mayrian furrow lacking. Pedicel much as in the worker. Gaster 6-segmented. Genitalia not retractile.

Key to Genera of Formicinae

1. Antennae 9-jointed. Brachymyrmex
(one Iowa species, B. depilis Emery)
- Antennae with 12 joints. 2
2. Metathoracic spiracles on the sides of the thorax; insertions of the antennae relatively distant from the clypeus. . . . Camponotus
- Metathoracic spiracles on the dorsum near the mid-line; insertions of the antennae close behind the clypeus. 3
3. Clypeal fossae separate from the antennal fossae; petiolar scale inclined forward. 4
- Clypeal fossae confluent with the antennal fossae; petiolar scale erect. 5
4. Mesothorax strongly constricted. Prenolepis
(one Iowa species, P. imparis (Say))
- Mesonotum not constricted; an impressed suture just behind metathoracic spiracles. Paratrechina
5. Second and third funicular joints together at least slightly shorter than the first; second to fifth joints shorter than the succeeding joints; ocelli usually absent. Lasius
- Second and third funicular joints together at least slightly longer than the first; second to fifth joints at least as long as succeeding joints; ocelli present. 6
6. Mandibles falcate, their teeth vestigial. Polyergus
- Mandibles normal in shape, with broad dentate apical borders. . . . Formica

Genus Brachymyrmex Mayr

1868 Brachymyrmex Mayr, Ann. Soc. Nat. Modena, 3:163.

1925 Brachymyrmex Emery, Gen. Insec., fasc. 183:40.

GENOTYPE. Brachymyrmex patagonicus Mayr.

For the characters of this genus see subgenus Brachymyrmex s. str.

Subgenus Brachymyrmex Mayr s. str.

1923 Brachymyrmex subg. Brachymyrmex Santschi, An. Mus. Hist. Nat. Buenos Aires, 31:651.

1925 Brachymyrmex subg. Brachymyrmex Emery, Gen. Insec., fasc. 183:41.

GENOTYPE. Same as the genus.

WORKER. Very small species.

Head usually longer than broad. Mandibles small, with strongly oblique apical borders, sometimes entirely hidden beneath the clypeus. Clypeus somewhat projecting. Frontal carinae small and feeble, rather close together. Antennae 9-jointed. Funiculi slightly incrassated. Eyes near the sides, almost midway between mandibular insertions and hind border. Maxillary palpi 6-jointed. Pro- and mesonotum convex above. Declivity of epinotum much longer than the short base. Scale of petiole small, inclined forward. Base of gaster covering petiole.

FEMALE. Much larger than the worker. Eyes larger, ocelli present. Head, antennae, and petiole as in the worker.

MALE. About the size of the worker. Antennae 10-jointed. Mandibles small, edentulous. Head subsquare.

Brachymyrmex (Brachymyrmex) depilis Emery

1893 B. heeri depilis Emery, Zool. Jahrb. Syst., 7:635. Worker, female, male.

1923 B. (B.) depilis Santschi, An. Mus. Hist. Nat. Buenos Aires, 31:653, 663. Worker.

WORKER. Length, 1.5 mm.

Head longer than broad, with nearly straight posterior border and sides. Mandibles in repose hidden under the clypeus. Frontal carinae partially covering antennal insertions. Scapes surpassing posterior borders of head by about one eighth of their length. Funiculi moderately incrassated, last joint about as long as the three preceding combined. Pro- and mesonotum rather evenly convex in profile. Mesonotum much wider than long seen from above. Epinotum with very short base and long sloping declivity. Petiolar scale small, inclined forward and covered by the base of the gaster.

Erect hairs nearly absent on most parts of the body, rather numerous toward the apex of the gaster. Pubescence not dense enough to conceal the surface of any part, sparse on the thorax.

Pale yellow.

FEMALE. Length, 4.4 mm. Large and voluminous compared to the worker.

Head as broad as long. Antennae more slender than in the worker, last joint not as long as the three preceding together. Gaster very voluminous. Pubescence dense, especially on the gaster. A few erect hairs on thorax as well as posterior borders of gastric segments and apex of gaster. Brown in color.

MALE. Length, 1.5 mm.

Mandibles not meeting in repose. Last joint of 10-jointed antennae as long as three preceding combined. Mesonotum large, convex in front and overhanging the pronotum. Mesosternum equally enlarged and convex below so that the profile of the thorax is indeed tortuous. Light grayish brown.

RECORDS. McGregor, Oak Grove State Park.

Besides the two listed localities I have also seen fragments of these ants in excreta of shrews from the vicinity of Ames. It is probably a common species but because of its extremely small size and hypogeic habits, not often found.

Genus Camponotus Mayr

1861 Camponotus Mayr, Europ. Formic., p. 35.

1925 Camponotus Emery, Gen. Insec., fasc. 183:59.

GENOTYPE. Formica herculeana Linné.

For the characters of this genus see the subgenera Camponotus s. str. and Myrmentoma.

Key to Species of Camponotus

- 1. Clypeus entire anteriorly or only very broadly notched, large species up to 13 mm. 2
- Clypeus notched; small species up to 7 mm. (subgenus Myrmentoma). . 6
- 2. Clypeus carinate; scapes flattened at the base.
- sansabeanus iowensis n. subsp.
- Clypeus ecarinate; scapes not flattened at the base. 3

3. Head of major worker longer than wide; body somewhat shining. . . . 4
Head of major worker wider than long; body more opaque. 5
4. Head black, thorax and gaster dark brown. castaneus americanus Mayr
Head dark brown; thorax and gaster tan, scarcely infuscated.
castaneus (Latreille)
5. Thorax black, gaster with long pubescence.
herculeanus pennsylvanicus (Degeer)
- Thorax red, gaster with only short pubescence.
herculeanus novaeboracensis (Fitch)
6. Cheeks and clypeus with elongate, piligerous foveolae. 7
Cheeks and clypeus without elongate, piligerous foveolae. 8
7. Head and thorax largely black or dark brown. caryae subbarbatus Emery
Head and thorax red. caryae discolor (Buckley)
8. Head and thorax largely black. caryae nearcticus Emery
Head and thorax red. caryae rasilis Wheeler

Subgenus Camponotus (Mayr) s. str.

1912 Camponotus subg. Camponotus (part.) Forel, Mém. Soc. Ent. Belg.,
20:90.

1920 Camponotus subg. Camponotus Emery, Rev. Zool. Afr., 8:235, 255.

1925 Camponotus subg. Camponotus Emery, Gen. Insec., fasc. 183:71.

GENOTYPE. Same as the genus.

WORKER. Polymorphic; smaller workers with small, slender heads,
maxima with large campaniform heads, the latter up to 13 mm. in length.
Mandibles about 5-toothed. Clypeus trapezoidal. Frontal carinae usually
lyrate. Antennal insertions distant from the clypeus and frontal area.
Antennae 12-jointed; funiculi filiform. Eyes of major workers flat, well

away from the sides, about on a level with the posterior ends of the frontal carinae. Head very convex above in profile, rather flat beneath. Thoracic dorsum evenly convex in profile. Metathoracic spiracles on the pleurae. Epinotal spiracles rather close to the posterior ventral corners of the epinotum. First gastric segment not much larger than the second. All parts finely shagreened. Erect hairs and pubescence usually rather sparse.

FEMALE. Much larger than the minor workers and somewhat larger than the maxima. Thorax and gaster robust. Wings without discal cell. Head antennae, and petiole much as in the large workers. Eyes small; small but distinct ocelli present.

MALE. Smaller than the female. Clypeus and frontal carinae similar to those of the worker. Antennae 13-jointed, long; basal joints of funiculus much longer than penultimate joints. Mandibles edentulous. Scale of petiole more node-like than in the worker. Parts of genitalia small and slender.

Camponotus (Camponotus) herculeanus pennsylvanicus (Degeer)

1773 Formica pennsylvanica Degeer, Mém. Hist. Insect., 3:603. Worker, female, male.

1879 Camponotus herculeanus pennsylvanicus Forel, Bull. Soc. Vaud. Sci. Nat., 16:57.

WORKER. Length up to 12.0 mm.

Head of major worker broader than long, excised behind, the occipital corners developed, somewhat narrower in front than behind. In small workers head as long as broad and not narrowed in front. Clypeus

in front rather straight or slightly excised in the middle, without a carinae. Frontal carinae lyrate. Dorsal thoracic profile evenly convex.

All parts densely shagreened and rather opaque, especially the gaster. Erect hairs long, slender, pointed, and not very abundant. Pubescence sparse on head, less so on thorax; rather dense, very long, and yellowish on gaster.

Black, legs brown.

FEMALE. Length about 15.5 mm.

Head with posterior border not excised and sides straighter. Gastric pubescence not long and yellow. Whole body more shining. Legs and pleurae of thorax reddish black.

MALE. Length about 10.5 mm.

Black. Mandibles edentulous. Eyes rather small but convex and projecting beyond the sides of the head. Clypeus and frontal carinae much as in the worker. Stipes of genitalia spiniform. A little less shining than the female.

RECORDS. Ames, Princeton, Little Sioux, Glenwood, Sioux City, Ruthven. Also Sioux City (C. N. Ainslie).

This species always lives in galleries which it excavates in solid or rotten wood. It occasionally nests in the beams of frame houses, weakening them considerably. Incipient colonies consisting of a female and several minor workers can often be found just under the bark of logs. The above list of localities could be considerably lengthened as pennsylvanicus is common in every woodland.

Camponotus (Camponotus) herculeanus novaeboracensis (Fitch)

- 1854 Formica novaeboracensis Fitch, Trans. New York State Agric. Soc., 14:52. Worker.
- 1910 Camponotus herculeanus ligniperda var. noveboracensis Wheeler, Ann. New York Acad. Sc., 20:340. Worker, female, male.
- 1925 Camponotus (C.) herculeanus var. novaeboracensis Emery, Gen. Insec., fasc. 183:72.

WORKER. Differing from pennsylvanicus in being somewhat smaller, having the thorax, petiole, and legs ferruginous, the integument more shining, and the pubescence on the gaster sparser and much shorter.

FEMALE. A little more shining than pennsylvanicus. The gastric pubescence a little sparser. The thorax is reddish except for the scutellum, metanotum, and areas on the pro- and mesonotum.

RECORDS. Ames, Estherville, Holy Cross, Spirit Lake, Backbone State Park, Rice Lake State Park. Also Indianola (D. T. Jones).

This ant nests in wood as pennsylvanicus does. It appears to have a more boreal distribution than pennsylvanicus and does not occur in the southern part of Iowa. C. novaeboracensis and pennsylvanicus sometimes occur in the same locality, apparently without intergradation. It seems, therefore, that they could be considered specifically, rather than only subspecifically distinct.

Camponotus (Camponotus) castaneus (Latreille)

- 1802 Formica castanea Latreille, Fourmis, p. 118. Worker, female, male.
- 1886 Camponotus castaneus Mayr, Verh. Zool.-bot. Ges. Wien, 36:420.

WORKER. Length up to 11.2 mm.

Head of major worker a little longer than broad, straight behind and with moderately convex sides. Clypeus ecarinate. Frontal carinae moderately lyrate. Antennae slender. Heads of minor workers elongate, broader in front than behind. Palpi long. Thoracic profile evenly rounded. Petiole blunt. Integument rather thin.

All parts finely shagreened, smooth and shining, especially the gaster. Erect hairs rather sparse, long, and slender. Pubescence very sparse and short.

Head dark brown. Rest of body lighter or yellowish brown.

RECORD. Burlington.

This southern species seems to reach its northern limit in southeastern Iowa. The colony the writer found was nesting under a flat rock in woodland.

Camponotus (Camponotus) castaneus americanus Mayr

1862 C. americanus Mayr, Verh. Zool.-bot. Ges. Wien, 12:661. Worker, female.

1893 C. castaneus americanus Emery, Zool. Jahrb. Syst., 7:674.

WORKER. Differing from the typical form in having the head of the major worker a little more robust, the antennae less slender, and all parts darker in color. The head is black and the rest of the body brown to brownish black. Cheeks with a few short, erect hairs.

FEMALE. Length, 14.0 mm.

Color as in the darkest workers. Head as broad as long, with straight posterior border and straight converging sides. Apex of petiole broadly notched. Integument shining. Cheeks with some short erect hairs.

MALE. Length, 10.2 mm.

Brown to brownish black. Antennae and palpi slender. Petiole excised above. About as shining as the worker. Remaining characters similar to those of the subgenus.

RECORDS. Ames, Clinton, Backbone State Park, Inwood.

This ant nests in the ground, never in wood. It prefers woodlands, however. Winged males and females were taken in nests in early April and May, so evidently these casts overwinter as adults. The winged casts of herculeanus pennsylvanicus often overwinter as adults, also.

Camponotus (Camponotus) sansabeanus subsp. lowensis n. subsp.

WORKER. Length up to 13.5 mm.

Largest workers with the head a little broader than long, much broader behind than in front, with moderately convex sides and slightly excised posterior border. Clypeus weakly and bluntly carinate. Frontal carinae lyrate, less than one half again as far apart at the broadest part than in front. In smaller workers the head is more elongate, with subparallel sides and feebly lyrate frontal carinae. Scapes flattened somewhat at the base. Profile of thorax evenly convex. Epinotum rounded but declivous surface becoming concave.

All surfaces shagreened, but more shining than in related variants of sansabeanus (Buckley). Nearly as shining as castaneus americanus.

Erect hairs rather sparse, present on vertex, front, clypeus, dorsum of thorax, petiole, and gaster. The punctures from which the hairs arise are very shallow and indistinct. Pubescence very sparse.

Head black or dark reddish black. Thorax, petiole, and legs ferruginous. Gaster black, in large workers the base reddish.

RECORDS. Sioux City, Turin.

This subspecies seems to occur in Iowa only along the bluffs of the Missouri River where it nests in the loess soil. C. iowensis is probably most closely related to sansabeanus nitidiventris Emery and may even be synonymous with it. However, the frontal carinae seem distinctly less strongly lyrate, the pubescence somewhat sparser, and the integument more shining. If these differences prove constant, iowensis may be considered a geographical subspecies.

At first sight iowensis resembles the common sansabeanus vicinus Mayr of the Rocky Mountains. Close comparison reveals many small but constant differences. The size of vicinus is somewhat larger, the head is not as distinctly narrowed toward the front, the occiput is not as concave, the frontal carinae are more strongly lyrate, the integument is less shining, the pilosity is less sparse, the punctures from which the hairs arise are deeper, and the color tends to be darker.

Subgenus Myrmentoma (Forel)

1912 Camponotus subg. Myrmentoma (part.) Forel, Mém. Soc. Ent. Belg., 20:92.

1920 Camponotus subg. Myrmentoma Emery, Rev. Zool. Afr., 8:243, 257.

1925 Camponotus subg. Myrmentoma Emery, Gen. Insect., fasc. 183:116.

GENOTYPE. Formica lateralis Olivier.

WORKER. Differing from typical Camponotus only in the much smaller size (majors up to 7 mm.), and in the possession of an anterior, median

clypeal notch.

FEMALE. Clypeus as in the worker. Much smaller in size than the females of Camponotus s. str.

MALE. Much smaller in size than the males of Camponotus s. str. Basal funicular joints not greatly longer than penultimate joints. Stipes of genitalia often less slender than in typical Camponotus.

Camponotus (Myrmentoma) caryae nearcticus Emery

1893 C. marginatus var. nearcticus Emery, Zool. Jahrb. Syst., 7:675. Worker, female.

1910 C. fallax var. nearcticus Wheeler, Jour. New York Acad. Sci., 18: 222. Worker, female, male.

1917 C. (Camponotus) caryae Wheeler, Psyche, 24:27.

WORKER. Length, up to 7.0 mm.

Head, excluding mandibles, as broad as long, with feebly concave posterior border and convex sides. Clypeus notched in front. Frontal carinae lyrate, a little farther apart behind than in front. Scapes surpassing slightly the hind corners of the head. Basal funicular joints longer than the penultimate joint. Pronotum, mesonotum, and base of epinotum in profile forming an unbroken convexity. Declivity of epinotum precipitous. Superior border of petiole rather sharp, seen from behind very convex above.

All surfaces rather shining.

Erect hairs sparse, present on clypeus, front, vertex, gula, epinotum, petiole, and gaster. No elongate, piligerous foveolae on cheeks and clypeus. Pubescence sparse.

Very deep castaneous or black except for cheeks, antennae, legs, and

pronotum, which are more brown or yellowish.

FEMALE. Length, 8.7 mm.

Black. Integument smooth and shining, sparsely pilose and pubescent. Clypeus as in the worker. Cheeks without erect hairs.

MALE. Length, 5.7 mm.

Black. Integument smooth and shining. Clypeus feebly emarginate. Funicular joints two and three little longer than penultimate joints. Petiole much as in the worker.

RECORDS. Ames, Tama, Holy Cross, Clinton.

This ant nests in the dead branches of hickory and oak trees. Specimens are not often taken, but it is probably a fairly common woodland form in Iowa.

Camponotus (Myrmentoma) caryae rasilis Wheeler

1910 C. fallax rasilis Wheeler, Jour. New York Ent. Soc., 18:227. Worker, female, male.

1917 C. caryae rasilis Wheeler, Psyche, 24:28.

WORKER. Much like nearcticus except that the color of the head, thorax, petiole, and legs is ferruginous.

RECORD. Sioux City (C. N. Ainslie).

This is another of the southern forms which appear to have extended their range northward along the Missouri River bluffs.

Camponotus (Myrmentoma) caryae discolor (Buckley)

1866 Formica discolor Buckley, Proc. Ent. Soc. Philad., 6:166. Worker, female.

1893 Camponotus marginatus discolor Emery, Zool. Jahrb. Syst., 7:277.
Worker, female, male.

1917 Camponotus caryae discolor Wheeler, Psyche, 24:28.

WORKER. Closely resembling nearcticus except that the frontal carinae are more arcuate than lyrate, and distinctly diverging. There are numerous elongate, piligerous foveolae on the cheeks, and the color of the head, thorax, petiole, and legs is ferruginous.

RECORDS. Ames, Boone.

This subspecies apparently has the same nesting habits as nearcticus.

It is rarer in Iowa than nearcticus.

Camponotus (Myrmentoma) caryae subbarbatus Emery

1893 C. marginatus subbarbata Emery, Zool. Jahrb. Syst., 7:676. Worker, female, male.

1917 C. caryae subbarbatus Wheeler, Psyche, 24:28.

WORKER. Like nearcticus except that the head is slightly broader than long, and feebly convex behind. The head is also more convex above in profile, the clypeus more declivate. The frontal carinae are somewhat lyrate and much farther apart behind than in front. There are elongate, piligerous foveolae on the cheeks and clypeus, but these are not so numerous as in discolor. The petiole is rather blunt. The color is much as in nearcticus except that there are distinct, whitish, transverse bands near the hind border of the first and second gastric segments.

FEMALE. Length, 9.2 mm. More robust than nearcticus.

Color much as in nearcticus, but the gaster has broad whitish bands along the anterior border of each segment, and the venter of the gaster

is entirely whitish except at the apex. Cheeks with some elongate, piligerous foveolae.

RECORDS. Ames, Boone.

The two colonies of this rare ant that the writer has found have been under or in rotting wood on the ground. It may thus prove to have different nesting habits than the tree-dwelling nearcticus and discolor.

Genus Paratrechina Motschoulsky

1863 Paratrechina Motschoulsky, Bull. Soc. Natural. Moscou, 36:13.

1921 Paratrechina Wheeler, Psyche, 28:112.

1925 Paratrechina Emery, Gen. Insec., fasc. 183:216.

GENOTYPE. Paratrechina currens Motschoulsky = Formica longicornis Latreille.

Paratrechina s. str. does not occur in Iowa. For many of the characters of this genus see the subgenus Nylanderia.

Key to Species of Paratrechina

1. Scapes without erect hairs; black. parvula (Mayr)
Scapes with erect hairs; yellow. arenivaga (Wheeler)

Subgenus Nylanderia Emery

1906 Prenolepis subg. Nylanderia (excl. Paratrechina longicornis Latreille) Emery, Ann. Soc. Ent. Belg., 50:134.

1925 Paratrechina subg. Nylanderia Emery, Gen. Insec., fasc. 183:217.

GENOTYPE. Formica vividula Nylander.

WORKER. Monomorphic. Small in size.

Mandibles with strongly oblique apical borders; with about six teeth; somewhat hidden beneath the clypeus. Clypeal and antennal fossae not confluent. Frontal carinae feeble. Antennae 12-jointed, rather long and slender, funiculi slightly incrassated, joints 2-10 gradually increasing in length. Maxillary palpi 6-jointed. Mesonotum not or scarcely constricted. Mesoepinotal suture distinct. Scale of petiole inclined forward. Base of gaster partially covering petiole and with a concavity for the latter's reception. Erect hairs microscopically barbellate.

FEMALE. Much larger than the worker; thorax and gaster robust. Fossae, antennae, and petiole as in the worker.

MALE. About the size of the worker. Mandibles edentulous. Antennae 13-jointed, scape very long. Shape of head and petiole much as in the worker. Eyes small. Cerci absent. Wings without discal cell.

Paratrechina (Nylanderia) arenivaga (Wheeler)

1905 Prenolepis arenivaga Wheeler, Bull. Amer. Mus. Nat. Hist., 21:391.
Worker, male.

1925 Paratrechina (N.) arenivaga Emery, Gen. Insec., fasc. 183:221.

WORKER. Length, 2.2 mm.

Head slightly longer than broad, with moderately convex sides. Scapes exceeding posterior corners of head by about two fifths of their length. Clypeal and antennal fossae feeble. Eyes close behind and to the sides of antennal fossae. Eyes scarcely convex as a whole but each individual facet strongly convex. Mesoepinotal suture distinct. Petiolar scale small, inclined, blunt, covered by base of gaster.

Erect hairs long, bristle-like, microscopically plumose, numerous, present on all parts including scapes and tibiae. Pubescence very sparse on thorax and gaster, less so on head; dense on legs.

Light to brownish yellow.

FEMALE. Length, 4.4 mm.

Large and robust compared to the worker. Head a little broader than long, slightly narrower than the thorax. Petiolar border sharper than in the worker and somewhat excised. Erect hairs proportionally shorter but more numerous than in the worker, present on same regions. Pubescence dense on all parts. Color much deeper than in the worker.

RECORDS. Sioux City, Blencoe, Little Sioux.

A rather common member of the Missouri River bluff fauna but not found in any other part of the state. It builds small crater nests in the loess soil of these bluffs.

Paratrechina (Nylanderia) parvula (Mayr)

1870 Prenolepis parvula Mayr, Verh. Zool.-bot. Ges. Wien, 20:948. Worker, female, male.

1925 Paratrechina (N.) parvula Emery, Gen. Insec., fasc. 183:222.

WORKER. Very similar to arenivaga, but head slightly more elongate with its sides less convex; palpi longer; color brownish black; and bristle-like, microscopically plumose hairs a little sparser and not present on the scapes.

FEMALE. Like the female of arenivaga. Erect hairs not present on scapes and sparser in general. Color dark brownish black.

MALE. Strikingly similar to the worker in shape of head and petiole,

pilosity, color, and size. Mandibles hidden beneath the clypeus. Scapes extending beyond the head by almost one half of their length. Stigma of wing vestigial.

RECORDS. Ames, Clinton, Inwood, Dubuque, Dewitt.

This species is fairly common in Iowa. It usually nests under rocks in sunny places. The sexual phases apparently overwinter in the nests since they may be found in the nests in early spring.

Genus Prenolepis Mayr

1861 Prenolepis Mayr, Europ. Formic., p. 52. Worker.

1865 Prenolepis Mayr, Novara Reise, Formic., p. 7. Worker, female, male.

1925 Prenolepis Emery, Gen. Insec., fasc. 183:224.

GENOTYPE. Tapinoma nitens Mayr.

WORKER. Head about as broad as long. Mandibles with strongly oblique apical borders, and about 6 teeth. Clypeal and antennal fossae not confluent. Frontal carinae feeble. Scapes and funiculi very long and slender, funiculi slightly incrassated. Eyes placed a little behind and to the sides of the antennal fossae. Mesothorax strongly constricted, rather subcylindrical just anterior to the metathoracic spiracles. Petiolar scale inclined forward. Base of gaster covering most of petiole and with a concavity for the latter's reception. Hairs simple.

FEMALE. Much larger than the worker.

Clypeal and antennal fossae not confluent. Thorax and gaster voluminous. Except for the greater size, scarcely distinguishable from the females of Paratrechina (Nylanderia).

MALE. Of the size of the worker. Similar to the male of Paratrechina (Nylanderia) but scapes much shorter, head less like that of the worker, and cerci present.

Prenolepis imparis (Say)

1836 Formica imparis Say, Boston Jour. Nat. Hist., 1:287. Female, male.

1886 Prenolepis imparis Mayr, Verh. Zool.-bot. Ges. Wien, 36:431.

WORKER. Length, 3.9 mm.

Head slightly broader than long, hind border and sides moderately convex. Palpi long. Scapes extending beyond posterior corners of head by about one half of their length. First funicular joint as long as second and third; joints 2-10 gradually increasing in length, last joint as long as the two preceding together. Mesothorax strongly constricted, subcylindrical. Mesoepinotal suture not distinct. Petiolar scale inclined, moderately convex above.

Strongly shining except for terminal segments of gaster, which are punctate. Erect hairs long, slender, simple, not barbellate, nor very numerous. Hairs on scapes subappressed. Pubescence very sparse.

Dark brownish black.

FEMALE. Length, 8.0 mm.

Large and robust compared to the worker. Quite similar to and apt to be confused with the female of Lasius niger neoniger. Head small, broader than long, with straight posterior border and nearly straight sides. Scapes exceeding posterior corners of head by about two fifths of their length. Petiole inclined, deeply and angularly excised. Gaster large

and voluminous. Erect hairs more numerous and proportionally shorter than in the worker. Pubescence dense on all regions. Color brown, including the wings.

MALE. Length, 4.0 mm.

Mandibles edentulous. Eyes large and convex. Scapes as long as first four joints of funiculi together. Petiole and base of gaster much as in the worker. Erect hairs abundant, slender. Pubescence denser than in the worker, but integument rather shining. Black in color, wings pale. Stigma of fore wing small. Stipes of genitalia slender. Innermost lobe of volsellae long, slender, curved; outermost lobe short and broad.

RECORDS. Ames, Backbone State Park.

The sexual casts of P. imperis overwinter in the nest and fly in the first warm days of spring. This ant is common in woodlands and also in our cities and towns. It rarely appears above ground except in cool, damp weather.

Genus Lasius (Fabricius)

1804 Lasius (part.) Fabricius, Syst. Piez., p. 415.

1861 Lasius Mayr, Europ. Formic., p. 29, 49.

1915 Donisthorpea Morice and Durrant, Trans. Ent. Soc. Lond., p. 421-423.

1925 Lasius Emery, Gen. Insec., fasc. 183:226.

GENOTYPE. Formica nigra Linné.

For the characters of this genus see the subgenera Lasius s. str., Chthonolasius, and Acanthomyops.

Key to Species of Lasius

1. Maxillary palpi 6-jointed. 2
Maxillary palpi 3-jointed (subgenus Acanthomyops). 7
2. Last three joints of maxillary palpi subequal in length; eyes large. 3
Last two joints shorter than the fourth joint; eyes small. 4
3. Erect hairs present on the scapes. niger neoniger Emery
Erect hairs lacking on the scapes. niger americanus Emery
4. Scapes not reaching the posterior corners of the head.
brevicornis Emery
Scapes surpassing the posterior corners of the head. 5
5. Scapes slightly surpassing the posterior corners of the head; last joint of maxillary palpi as long as the preceding joint; light yellow in color. flavus nearcticus Wheeler
Scapes distinctly surpassing posterior corners; last joint of maxillary palpi shorter than preceding joint; color darker (subgenus Chthonolasius). 6
6. No or very few erect hairs on gula or legs; gastric pubescence sparse revealing the shining surface. lucidiventris n. sp.
Erect hairs present on gula and legs; gastric pubescence dense.
umbratus aphidicolus (Walsh)
7. Hairs plumose at the distal ends. plumopilosus Buren
Hairs at most feebly barbellate. 8
8. Petiole blunt; erect hairs numerous on all femora. latipes (Walsh)
Petiole sharper and notched above; erect hairs not present on all femora. 9
9. Scapes surpassing posterior corners of the head; penultimate joints of funiculi longer than broad. interjectus Mayr
Scapes not or scarcely surpassing posterior corners of the head; penultimate joints slightly broader than long. claviger (Roger)

Subgenus Lasius (Fabricius) s. str.

1913 Lasius subg. Lasius Ruzsky, Arch. f. Naturg., 79(A 9):59.

1925 Lasius subg. Lasius Emery, Gen. Insec., 183:227.

GENOTYPE. Same as the genus.

WORKER. Head about as broad as long, hardly if at all narrower in front than behind. Mandibles usually 6-7-toothed, the apical borders oblique. Clypeus ecarinate or nearly so, smaller and more convex in profile than in Formica. Frontal carinae short and diverging. Antennal insertions close behind the clypeus. First funicular joint longer than the second and third together; joints 2-5 shorter and more slender than those succeeding. Eyes not intercepting the sides in full face view, situated about three fifths the length of the side from the mandibular insertions. Ocelli absent or vestigial. Dorsal and ventral surfaces of head convex in profile. Maxillary palpi 6-jointed. Pro- and mesonotum rather convex in profile. Epinotum generally angular, and the declivity much longer than the short base. Petiole erect, no wider toward the top than at the base. Erect hairs slender. Pubescence usually dense.

FEMALE. More than twice as long as the worker.

Thorax and gaster voluminous. Head narrower than thorax. Eyes large, and ocelli present. Clypeal and antennal fossae confluent. Antennae and mandibles as in the worker.

MALE. About the size of the worker.

Antennae 13-jointed; scapes long. First joint of funiculus longer and thicker than second. Mandibles edentate, or with only an apical

tooth. Maxillary palpi 6-jointed. Head about as broad as thorax. Petiole much as in the worker. Stipes of genitalia blunt and shorter than sagittae. Inner lobes of volsellae much longer than outer lobes, neither of these ever produced into hooks or angular projections. Sagittae with blunt apices and without serrations along anterior margins.

Lasius (Lasius) niger neoniger Emery

1893 L. niger var. neoniger Emery, Zool. Jahrb. Syst., 7:639. Worker, female, male.

WORKER. Length, 3.3 mm.

Head longer than broad, with straight posterior border and slightly or moderately convex sides. Mandibles with about seven teeth. Antennae rather slender, scapes surpassing posterior corners of the head by about one fifth of their length. Basal joints of funiculi little shorter and slenderer than the penultimate joints, the latter a little longer than broad. Maxillary palpi with the last three joints subequal. Epinotum angulate, the base much shorter than the declivity. Petiole sharp and notched above. Pubescence dense on all parts. Erect hairs abundant, present on all parts, including scapes and tibiae.

Dark grayish brown.

FEMALE. Length about 8-9 mm.

Heavy bodied. Head narrower than thorax, broader than long. Petiole deeply and angularly notched. Pilosity, pubescence, and color much as in the worker, the gaster lighter than the head and thorax.

MALE. Length, 3.3 mm.

Mandibles edentate except for an apical tooth. Scapes extending

beyond posterior corners of head by one fourth of their length. Pilosity as in the worker, but pubescence much sparser. Dark brown.

RECORDS. Ames, Marshalltown, Princeton, Spirit Lake.

This species could probably be found in every square mile in Iowa except along the Missouri River bluffs. It may be our commonest species.

Lasius (Lasius) niger americanus Emery

1893 L. niger var. americana Emery, Zool. Jahrb. Syst., 7:639. Worker, female, male.

1917 L. niger alienus var. americanus Wheeler, Proc. Amer. Acad. Art. Sci. Boston, 52:525.

WORKER. Scarcely differing from neoniger except in pilosity. The erect hairs are sparse and not present on the scapes or tibiae. The color is usually a little darker than in neoniger.

FEMALE. Length about 7.2 mm.

Distinctly smaller and less robust than the female of neoniger.

Erect hairs sparse, none on scapes and tibiae. Concolorously dark brownish black.

MALE. Pilosity as in the worker and female. Otherwise like the male of neoniger.

RECORDS. Ames, Clinton.

The paucity of records is due to neglect in collecting the species. In all probability it is at least the second commonest ant in Iowa. It does not thrive well in our cities and towns as neoniger does.

Lasius (Lasius) brevicornis Emery

1893 L. brevicornis Emery, Zool. Jahrb. Syst., 7:639. Worker, female, male.

WORKER. Length, 2.8 mm.

Head as broad as long, subsquare, posterior border straight or slightly excised, sides moderately convex. Frontal carinae relatively well-developed. Scapes not quite reaching posterior corners of the head. Penultimate joints of funiculi somewhat broader than long. Last two joints of maxillary palpi greatly diminishing in length. Thorax rather robust. Epinotum angulate, base very short. Petiole sharp and straight above, posterior face slightly concave. Pubescence dense and fine, especially on the gaster. Erect hairs sparse. Light yellow.

RECORDS. McGregor, Sabula.

This species seems rare in Iowa although undoubtedly many more collections could be made in the northeastern part of the state. It does not occur near Ames.

Lasius (Lasius) flavus nearcticus Wheeler

1906 L. flavus nearcticus Wheeler, Psyche, 13:38.

WORKER. Length, 3.3 mm.

Head a little longer than broad, with straight or slightly excised posterior border and moderately convex sides. Mandibles with about six teeth. Scapes scarcely incrassated distally, surpassing posterior corners of head by about one seventh of their length. Penultimate joints of funiculi about as broad as long. Last joints of maxillary palpi as long or longer than penultimate joints. Eyes very small, with approximately 15-20 facets. Epinotum angulate. Petiole sharp and excised above.

Pubescence dense on all parts. Erect hairs fine, moderately

abundant.

Usually light yellow.

RECORDS. Ames, Belle Plaine, Spirit Lake.

Apparently rather rare in Iowa. It is found in woodlands under rocks or logs in moist soil. The color of this species is usually given as very light yellow with the gaster whitish. In the writer's opinion the whiteness of the gaster is caused by fading in alcohol. Although somewhat lighter than umbratus aphidicolus, the true color of nearcticus is as dark as that of brevicornis.

Subgenus Chthonolasius (Ruzsky)

1913 Lasius subg. Chthonolasius (part.) Ruzsky, Arch. f. Naturg. 79(A 9): 60.

1922 Lasius subg. Chthonolasius Emery, Boll. Soc. Ent. Ital., 54:11.

1925 Lasius subg. Chthonolasius Emery, Gen. Insec., fasc. 183:231.

GENOTYPE. Formica umbrata Nylander.

WORKER. Hypogecic species. Last two maxillary palpal joints each shorter than the preceding joint. Eyes rather small.

FEMALE. Never more than twice as long as the worker. Head broader than thorax. Thorax and gaster not especially voluminous. Palpi as in the worker. Parasitic on species of Lasius s. str.

The characters that separate Chthonolasius from Lasius s. str. are rather weak since the hypogecic habits and shortened palpi are also shared by two species of Lasius s. str., brevicornis and flavus nearcticus.

Lasius (Chthonolasius) umbratus aphidicolus (Walsh)

1862 Formica aphidicola Walsh, Proc. Ent. Soc. Philad., 1:310. Worker, male.

1893 Lasius umbratus mixtus var. aphidicola Emery, Zool. Jahrb. Syst., 7:640. Worker, female, male.

WORKER. Length, about 4.0 mm.

Head a little longer than broad, barely excised behind and with feebly convex sides. Mandibles with about eight teeth. Scapes exceeding posterior corners of head by about one seventh of their length. Penultimate joints of funiculi about as broad as long. Eyes with approximately 70 facets. Base of epinotum short and inclined; declivity much longer, somewhat convex in profile. Petiole cuneate in profile, sharp above and slightly excised. Erect hairs rather numerous and short, none on the scapes or tibiae. Pubescence dense, giving a pruinose effect to all parts.

Yellowish gray brown.

FEMALE. Length about 5.9 mm.

Head somewhat excised behind, the sides slightly convex and narrowed a little toward the front. Scapes surpassing posterior corners of the head by about one tenth of their length. Funiculi less incrassated than in the worker, penultimate joints a little longer than broad. Thorax a little narrower than the head, somewhat flattened above. Petiole cuneate in profile, excised above. Erect hairs arranged as in the worker, numerous, very short, and fine. Pubescence dense on all parts.

RECORDS. Ames, Tama, Rice Lake State Park, Sabula, Belle Plaine, Clinton, Marshalltown.

The writer has found a female of aphidicolus with a depauperate colony of flavus nearcticus. This seems to indicate that nearcticus is the host or at least an alternate host of aphidicolus.

Lasius (Chthonolasius) lucdiventris n. sp.

WORKER. Length, 3.5 mm.

Head a little longer than broad, with straight posterior border and moderately convex sides. Mandibles 8-9-toothed. Scapes extending beyond posterior corners of head by about one fourth of their length. Penultimate joints of funiculi a little longer than broad. Eyes with approximately 65 facets. Epinotum usually rounded and without a distinct angle between the base and declivity, the declivity not greatly longer than the base. Petiole cuneate in profile, ordinarily sharp and excised above. Legs rather elongate.

All surfaces shining, especially the gaster. Erect hairs somewhat thicker and longer than on aphidicolus. Hairs on head and thorax rather long and flexuous, those on the gaster shorter, straight, and numerous. No or very few hairs on gula and legs. Pubescence moderately dense on head and thorax but not concealing the shining surface; rather sparse on the gaster.

Head and thorax sordid yellow; gaster usually infuscated.

TYPE LOCALITY. Bellevue.

This species appears closely related to aphidicolus but the longer, more slender antennae, smaller eyes, more rounded epinotum, sparser pubescence, longer, less fine, rather flexuous erect hairs, which are lacking

on gula and legs, and smaller size show it to be distinct.

Subgenus Acanthomyops Mayr

1862 Acanthomyops Mayr, Verh. Zool.-bot. Ges. Wien, 12:699. Female.

1866 Lasius subg. Acanthomyops Mayr, Verh. Zool.-bot. Ges. Wien, 16:888.

1925 Lasius subg. Acanthomyops Emery, Gen. Insec., fasc. 183:236.

GENOTYPE. Formica clavigera Roger.

WORKER. Hypogeic species.

Eyes very small. Mandibles about 6-7-toothed. Maxillary palpi very short, 3-jointed. Funiculi often more incrassated than in Lasius s. str. or Chthonolasius. Erect hairs simple, feebly barbellate, or plumose. Epinotum rounded, the declivity not greatly longer than the base.

FEMALE. Size and shape extremely variable.

Legs often flattened and funiculi clavate. Maxillary palpi 3-jointed. Hairs as in the worker. Parasitic on other Lasius species.

MALE. Often a little longer than the worker. Maxillary palpi short, 3-jointed. Basal funicular joints shorter than penultimate joints. Otherwise much as in the male of Lasius s. str.

Lasius (Acanthomyops) claviger (Roger)

1862 Formica clavigera Roger, Berl. Ent. Zeitschr., 6:241. Female.

1870 Lasius (A.) claviger Mayr, Verh. Zool.-bot. Ges. Wien, 20:950. Worker, female, male.

WORKER. Length, 4.0 mm.

Head about as broad as long, straight or slightly excised behind and with moderately convex sides. Mandibles with six strong teeth. Scapes

just reaching posterior lateral corners of the head. Funiculi clavate, penultimate joints distinctly broader than long. Eyes with approximately 40-45 facets. Mesoepinotal impression relatively shallow. Petiole cuneate in profile, the superior border rather sharp and excised.

Erect hairs long, pointed, somewhat flexuous, microscopically barbellate, moderately abundant, scattered over surface of gaster, not present on femora of middle and hind legs. Pubescence rather sparse on all surfaces; on the cheeks and gula the pubescent hairs are longer and less fine.

Light to brownish yellow.

FEMALE. Length, 6.8 mm.

Head slightly broader than long. Scapes not reaching posterior corners of head. Funiculi strongly clavate, penultimate joints about $1\frac{1}{2}$ times as broad as long. Mesonotum and scutellum somewhat flattened above. Petiole sharp and excised above. Legs flattened, the fore femora less than three times as long as broad. Erect hairs longer and more plumose than in the worker, not scattered over the surface of the gaster, but arranged in rows at the posterior borders of the segments. Pubescence much as in the worker.

Brownish black.

MALE. Length, 4.6 mm.

Head somewhat broader than long. Scapes surpassing posterior border of head a little. Mandibles edentate except for two strong, apical teeth. Erect hairs moderately abundant. Black.

RECORDS. Ames, Burlington, Muscatine, Bellevue, Sabula, Boone, Belle Plaine, Inwood, Backbone State Park, Marshalltown.

This species is common in woodlands all over the Mississippi drainage area. Very probably it is parasitic on Lasius niger neoniger. Wedding flights take place in late August, September, and even October. Females can sometimes be found in early spring under logs and rocks. These are always without eggs or larvae and probably are females which failed to find a suitable host colony after their wedding flight the previous fall.

Lasius (Acanthomyops) interjectus Mayr

1866 L. (A.) interjectus Mayr, Verh. Zool.-bot. Ges. Wien, 16:888. Female.

1886 L. (A.) interjectus Mayr, Verh. Zool.-bot. Ges. Wien, 36:430. Worker, female, male.

WORKER. Length, 5.0 mm.

Mandibles with 7-8 teeth on masticatory borders and one or two small teeth on basal borders. Scapes exceeding posterior corners of the head by about one fifth to one sixth of their length. Funiculi moderately incrassated, penultimate joint a little longer than broad. Eyes larger than in claviger. Mesoepectal impression relatively deep. Petiole deeply notched above. Gastric pilosity tending to be arranged in rows at the posterior borders of the segments. Pubescence on head rather dense and fine. Remaining characters as in claviger.

FEMALE. Length, 7.5 mm.

Mandibles with a tooth on the basal border. Scapes slightly surpassing posterior corners of head. Penultimate joints of funiculi about as long as broad. Head a little broader than long. Petiole, pilosity, and pubescence as in the worker. Fore femora slightly more than three times as long as broad. Yellowish brown. Other characters as in the female of claviger.

MALE. Length, 4.4 mm.

Scapes slender, greatly surpassing the hind border of head. Masticatory borders of mandibles often with a few denticuli besides the two strong apical teeth. Otherwise, like the male of claviger.

RECORDS. Ames, Boone, Clinton. Also Sioux City (C. N. Ainslie); Des Moines (collector ?).

This species has been previously reported (Buren, 1941a) as undertaking wedding flights in warm basements in midwinter. Females taken in similar circumstances in Des Moines have been sent to the Department of Zoology and Entomology, Iowa State College. The normal wedding flight takes place in July or early August.

Lasius (Acanthomyops) latipes (Walsh)

1862 Formica latipes Walsh, Proc. Ent. Soc. Philad., 1:311. Worker, female, male.

1866 Lasius (A.) latipes Mayr, Verh. Zool.-bot. Ges. Wien, 16:889.

1903 Lasius (A.) latipes Wheeler and McClendon, Biol. Bull., 4:149-155. Female α , female β .

WORKER. Length, 3.5 mm.

Head about as long or slightly longer than broad, posterior border straight, and sides feebly convex. Mandibles with about seven teeth. Scapes surpassing posterior corners of head by about one eleventh of their length; penultimate joints of funiculi as broad as long. Eyes with approximately 20-25 facets. Petiole blunt and rounded above. Other structural characters as in claviger. Erect hairs present on all femora, more abundant and shorter than in claviger.

Light to brownish yellow, the head sometimes reddish.

FEMALE. Length, about 9 mm.

Head rectangular, longer than broad. In profile, the head is strongly convex above. Mandibles with only four teeth. Scapes greatly enlarged distally, not reaching the hind corners of the head. Funiculi strikingly clavate, seventh and eighth joints the broadest, penultimate joints nearly twice as broad as long. Thorax wider than the head, flattened above. Petiole blunt but notched above. Gaster rather elongate. Femora and tibiae very strongly flattened and the femora with lobate laminae which cover the insertions of the tibiae; fore femora only twice as long as broad.

Erect hairs very abundant on head, thorax, petiole, and legs; more sparse on the gaster. Pubescence dense on gaster, sparse on other regions.

Tan or brown.

RECORDS. Ames, Clinton, Spirit Lake.

This species seems rather rare in Iowa. At least the writer has had poor luck in finding it. The wedding flights take place in August, sometimes on the same day as its host, Lasius niger neoniger.

Lasius (Acanthomyops) plumopilosus Buren

1941 L. (A.) plumopilosus Buren, Iowa State Col. Jour. Sci., 15(3):231-235. Worker, female, male.

WORKER. Length, 3.2 mm.

Head about as broad as long, with very slightly excised posterior border and convex sides. Mandibles 6-toothed. Eyes with about 45 facets. Scapes reaching posterior corners of head. Penultimate funicular joints about as broad as long. Mesoepinotal impression relatively shallow.

Petiole feebly notched above.

Erect hairs numerous; often plumose at the tip; plumose hairs best developed on head and thorax. Pubescence much as in claviger.

Light yellow.

FEMALE. Length, 4.6 mm.

Scapes reaching posterior corners of head; funiculi incrassated, penultimate joints slightly broader than long. Thorax narrower than head. Petiole small and faintly notched; blunter than in claviger. Gaster elongate. Legs somewhat flattened; fore femora about three times as long as broad.

Pilosity extraordinary, the erect hairs strongly plumose or branching at the tip. Hairs most strongly plumose on head and thorax. The hairs on the gaster are very numerous and closely set on the dorsum unlike the females of claviger and interjectus. Appressed pubescent hairs long and coarse on genae and gula; a band of very fine, short pubescence along the anterior border of each gastric segment.

Dark grayish brown.

MALE. Length, 3.2 mm.

Mandibles distinctly 6-toothed. Thorax less broad than head. An occasional hair branching at the tip. Otherwise much as in the males of claviger.

TYPE LOCALITY. Backbone State Park.

This species may prove to be a temporary social parasite of L. (A.) claviger, which would make it one of the rare social hyperparasites. Since the publication of the original description the writer has failed to find this species in any other place except on the hillside where it was first

found.

Genus Formica (Linne)

1758 Formica (part.) Linne, Syst. Nat., ed. 10, p. 579.

1861 Formica Mayr, Europ. Formic., p. 45.

1925 Formica Emery, Gen. Insec., fasc. 183:241.

GENOTYPE. Formica rufa Linne.

For the characters of this genus see the subgenera Formica s. str., Neoformica, and Proformica.

Key to Species of Formica

1. Second and third funicular joints together little longer than the first, the third never longer than the penultimate; small shining species (subgenus Proformica). 2

Third funicular joint longer or as long as the penultimate, second and third joints together usually distinctly longer than the first; mostly medium to large-sized species; often opaque or the colors red and black. 5
2. Scapes with erect hairs. neogagates vetula Wheeler

Scapes without erect hairs. 3
3. Gaster yellow or tan like the head and thorax.

neogagates morbida Wheeler

Gaster black or very dark brown. 4
4. Whole body black or very dark brown. neogagates Emery

Thorax lighter than the head and gaster. neogagates vinculans Wheeler
5. Median joints of funiculi $1\frac{1}{2}$ times or more as long as broad; head and thorax long and slender (subgenus Neoformica). 6

Median joints of funiculi less than $1\frac{1}{2}$ times as long as broad; head and thorax usually more robust (subgenus Formica s. str.). 9

6. Erect hairs present on gula and petiole; hairs on gaster slender. 7
Erect hairs absent on gula and petiole; hairs on gaster shorter and blunter. 8
7. Hairs on gula and petiole conspicuous; pubescence on gaster longer and denser. pallidefulva dolosa Wheeler
Hairs often lacking on gula or petiole; pubescence on gaster shorter and sparser; color usually darker. pallidefulva incerta Emery
8. Head and thorax brown or reddish. pallidefulva nitidiventris Emery
Head and thorax black or very dark brown. pallidefulva fuscata Emery
9. Clypeus with an anterior median notch (sanguinea group). 10
Clypeus unnotched. 14
10. Few or no hairs on dorsal surfaces of head and thorax. 11
Erect hairs present on upper surfaces of head and thorax. 12
11. Dorsal surfaces of head infuscated, or the head at least darker than the thorax; both dark red. sanguinea aserva Forel
Head not darker than the thorax; both lighter red. sanguinea subnuda Emery
12. Gaster brown. sanguinea subintegra Emery
Gaster black. 13
13. Petiole notched and sharp above, head and body robust. sanguinea rubicunda Emery
Petiole not or only feebly notched and blunter, head and body slender. sanguinea angusticeps n. subsp.
14. Ground color of head and thorax red, although sometimes heavily infuscated; frontal area smooth and shining. 15
Ground color of head and thorax black or at least not red; frontal area pubescent and rather opaque; hairs on gaster blunt (fusca group). 29
15. Head deeply excised behind (exsecta group). 28
Head at most feebly excised behind. 16

16. Petiole blunt, rather truncate or excised above. 17
Upper border of petiole convexly or angularly produced, although
sometimes with a notch in the middle. 18
17. Eyes hairy. reflexa Buren
Eyes hairless. dakotensis montigena Wheeler
18. Erect hairs and pubescence nearly absent; gaster strongly shining. .
fossiceps Buren
Erect hairs or pubescence more numerous; integument more opaque. 19
19. Clypeal fossae deep; gaster rather sparsely pubescent, the surface
not concealed. 20
Clypeal fossae shallow; gaster often densely pubescent. 21
20. Smaller workers infuscated, majors and medium-sized workers with at
least the scale of the petiole infuscated. . rufa clivia Creighton
Smaller workers hardly darker than the majors, these with the petiole
clear red. rufa obscuriventris Mayr
21. Erect hairs absent from dorsal surfaces of head and gaster.
prociliata Kennedy and Dennis
Erect hairs present on the dorsa of head and gaster. 22
22. Eyes hairy, erect hairs numerous. 23
Eyes hairless, erect hairs moderately abundant or sparse. 25
23. Erect hairs present on cheeks, oblique hairs on scapes.
obliqua n. sp.
No erect hairs on cheeks, no hair other than the pubescence on
scapes; large robust forms. 24
24. Pubescence dense on gaster, concealing the surface.
rufa obscuripes Forel
Pubescence sparse on gaster. rufa melanotica Wheeler
25. Gaster rather shining, sparsely pubescent. nepticula Wheeler
Gaster opaque, densely pubescent. 26
26. Hairs apparently clavate; cheeks densely pubescent. 27

- Hairs slender; cheeks sparsely pubescent. . . . difficilis Emery
27. Hairs numerous, present on occipital corners of head.
microgyna spatulata n. subsp.
- Hairs sparse, not present on occipital corners. . . . indianensis Cole
28. Front and vertex of head heavily infuscated; pronotum with numerous
erect hairs. ulkei Emery
- Head not or scarcely infuscated; pronotum with no or very few hairs.
exsectoides Forel
29. Long erect hairs present on the gula. . . . cinerea neocinerea Wheeler
- Gula without erect hairs. 30
30. Thorax yellowish. fusca neoclara Emery
- Thorax black. 31
31. Pubescence long and dense on all parts, giving a silvery appearance.
fusca argentea Wheeler
- Pubescence shorter or less dense; body without a silvery appearance.
. 32
32. Pubescence dense on the gaster. fusca subsericea Say
- Pubescence on gaster rather sparse; body more shining.
fusca subaenescens Emery

Subgenus Formica (Linné) s. str.

- 1913 Formica subg. Formica Forel, Ann. Soc. Ent. Belg., 57:361.
- 1913 Formica subg. Serviformica Forel, Ann. Soc. Ent. Belg., 57:361.
- 1913 Formica subg. Raptiformica Forel, Ann. Soc. Ent. Belg., 57:361.
- 1923 Formica subg. Coptoformica Müller, Boll. Soc. Adriat. Sc. Nat.,
28:133.

GENOTYPE. Same as the genus.

WORKER. Medium-sized species. Variable in stature.

Head usually about as broad as long or a little longer than broad.

Generally wider behind than in front. Mandibles about 8-toothed. Clypeus large, often carinate, anterior margin usually convexly or angularly produced. Antennal insertions close to the clypeus and frontal area, the latter distinct. Clypeal and antennal fossae confluent. Frontal carinae parallel or diverging, usually about $1\frac{1}{2}$ to $2\frac{1}{2}$ times as long as the diameter of antennal foramina. Antennae 12-jointed; funiculi slender, usually increasing slightly in thickness toward the distal joints; second and third joints together always longer than the first.

Ocelli present. Anterior margins of eyes about on a line with the posterior ends of the frontal carinae. Maxillary palpi consisting of six subequal joints; labial palpi 4-jointed. Pro- and mesonotum convex. Mesoepinotal impression distinct. Neither base nor declivity of epinotum ever strikingly longer than the other. Petiole scale-like, erect, often much wider toward the top than at the base.

FEMALE. Usually larger than the largest worker, but in some species only as large or even smaller.

Head, mandibles, antennae, and petiole much as in the worker. Thorax and gaster large and voluminous to small and slender according to the species.

MALE. About the size of the female or somewhat smaller, rarely larger than the female.

Antennae 13-jointed; scape long; first funicular joint usually shorter than second. Mandibles feebly toothed or edentate. Petiolar scale blunter than in the worker. Stipes of genitalia longer than volsellae and sagittae. Outer volsellar lobe not much shorter than inner lobe, the latter often sharp and hooked. Sagittae with serrations along anterior borders.

The subgenera Raptiformica Forel, Serviformica Forel, and Coptoformica Müller are, in the writer's opinion, based on characters too weak for subgeneric rank and are therefore included in Formica s. str. in this thesis.

Formica (Formica) fusca subsericea Say

1836 F. subsericea Say, Boston Jour. Nat. Hist., 1:289. Worker, female.

1913 F. (Formica) fusca var. subsericea Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:398, 499. Worker, female, male.

1925 F. (Serviformica) fusca subsericea Emery, Gen. Insect., fasc. 183: 248.

WORKER. Length, 7.5 mm.

Head about as broad as long, with moderately convex posterior border and sides. Clypeus sharply carinate and angularly projecting. Frontal carinae diverging. Antennae slender, basal funicular joints longer than penultimate joints. Eyes rather large, about one third as long as the head. Pro- and mesonotum not very convex, mesoepinotal impression shallow. Base and declivity of epinotum subequal, meeting at an obtuse, rounded angle; base sloping a little downward toward the rear. Petiole fan-shaped seen from behind, the superior border usually moderately sharp and slightly emarginate in the middle.

Erect hairs sparse, present on clypeus, front, vertex, coxae; short and blunt on dorsum of gaster, longer and acute on venter. Pubescence dense and fine on all parts, giving a silky sheen.

Black.

FEMALE. Length, 11 mm.

Heavy bodied. Head with straight, converging cheeks; narrower than the thorax. Petiole sharper than in the worker and more or less produced in the middle. Erect hairs more numerous than in the worker; present also on dorsum of thorax; hairs on dorsum of gaster not short and blunt. Pubescence and color as in the worker. Wings usually heavily infuscated.

MALE. Length, 10 mm.

Rather heavy bodied like the female. Pilosity and pubescence as in the female. Black, the legs yellowish. Wings infuscated.

Formica (Formica) fusca subaenescens Emery

1893 F. fusca var. subaenescens Emery, Zool. Jahrb. Syst., 7:659. Worker.

1913 F. (F.) fusca fusca var. subaenescens Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:399, 504. Worker, female, male.

WORKER. Much like subsericea. The pubescence is distinctly sparser, especially on the head and gaster, so that the surface is clearly visible and the silky appearance is absent. The integument is black but has faint bronze reflections.

RECORD. Backbone State Park.

This variant is an inhabitant of deep woods where it nests in damp soil under rocks and logs. Apparently it is rare or absent in central Iowa where woodlands are rather scattered and usually somewhat open.

F. subaenescens may be the normal host of Polyergus rufescens bicolor, as will be shown in the discussion of the latter.

Formica (Formica) fusca argentea Wheeler

- 1902 F. fusca var. argentea Wheeler, Amer. Natural., 36:952 (in footnote). Worker. (nom. praecoc.).
- 1912 F. fusca var. argentea Wheeler, Psyche, 19:90. (nom. nov.)
- 1913 F. (Formica) fusca fusca var. argentea Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:398, 501. Worker, female, male.
- 1925 F. (Serviformica) fusca subsericea var. argentea Emery, Gen. Insec., fasc. 183:248.

WORKER. Differing from subsericea in the ground color, which is more brownish, and in the appearance of the pubescence, which has a distinct silvery lustre. The short, blunt hairs on the gaster are more numerous, and there are a few blunt hairs on the dorsum of the thorax.

RECORD. Stanhope (from prairie) (G. O. Hendrickson).

This species was probably a member of the original prairie fauna which has now been displaced in a large part by cultivation.

Formica (Formica) fusca neoclara Emery

- 1893 F. fusca var. neoclara Emery, Zool. Jahrb. Syst., 7:661. Worker.
- 1913 F. (Formica) fusca fusca var. neoclara Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:398, 509. Worker, female, male.
- 1925 F. (Serviformica) fusca subsericea var. neoclara Emery, Gen. Insec., fasc. 183:248.

WORKER. Differing from subsericea in color. The thorax clear yellowish in large workers, with the gaster, occiput, vertex, and front of head more or less strongly infuscated. There are a few blunt hairs on the dorsum of the thorax, otherwise, the pilosity and pubescence as in subsericea. The body is a little less robust.

RECORD. Sioux City (C. N. Ainslie).

The validity of this record is somewhat doubtful as this variant is usually found only in the foothills of the Rocky Mountains. The writer suspects the specimens purported to be from Iowa may have been mislabeled.

Formica (Formica) cinerea neocinerea Wheeler

1902 F. cinerea Wheeler, Amer. Nat., 36:947.

1910 F. cinerea var. neocinerea Wheeler, Ants, p. 571. Worker.

1913 F. (Formica) cinerea cinerea var. neocinerea Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:399, 524. Worker, female, male.

1925 F. (Serviformica) cinerea var. neocinerea Emery, Gen. Insec., fasc. 183:246.

WORKER. Length, 6.2 mm.

In structure almost identical with fusca subsericea. The rather short, blunt, erect hairs, however, are abundant and present on all parts of the body; a few long hairs present on the gula. No hairs on scapes or tibiae. Pubescence dense on all parts. Petiole wide, with rather blunt, faintly emarginate or straight superior border.

Color more brownish than in subsericea but all parts, especially the gaster and dorsal posterior parts of the head, infuscated.

RECORDS. Jewell, Ames, Spirit Lake.

This ant prefers to nest in the tops of boggy hummocks in pasture land, and probably could be found in any part of the state where such hummocks are present. It is more aggressive than the forms of fusca and therefore is not as good a host for the dulotic species.

Formica (Formica) rufa obscuripes Forel

1886 F. rufa st. obscuripes Forel, Ann. Soc. Ent. Belg., 30(C. R.):29.
Worker.

1913 F. (F.) rufa aggerans Wheeler, Bull. Mus. Comp. Zool. Cambridge,
53:392, 394, 430. Worker, female, male.

1940 F. rufa obscuripes Creighton, Amer. Mus. Nov., 1055:1, 7.

WORKER. Length, up to 8 mm.

Head slightly broader than long, narrower in front than behind, with nearly straight posterior border and sides. Clypeus rather angularly projecting. Frontal carinae short, diverging. Eyes hairy. Funicular joints two and three a little longer than penultimate joints. Thorax robust. Pro- and mesonotum quite convex. Mesoepinotal impression deep. Base of epinotum slightly convex, declivity slightly concave. Petiole cuneate in profile, superior border angularly produced upward.

Nearly all surfaces more or less opaque. Erect hairs very numerous, slender, and pointed; present on all regions, excluding scapes but including tibiae. Pubescence moderately dense.

In major workers at least the head, and often the head and thorax, ferruginous. Gaster black. In small workers, head and thorax often so heavily infuscated that they become as black as the gaster. All intermediate stages of melanism can be found.

RECORDS. Oak Grove State Park, Inwood, McGregor, Spencer. Also Ruthven (J. B. Low); Thompson (T. S. Baskett); Ocheyedan, Stanhope, Thompson, Westfield (G. O. Hendrickson).

This ant is often called the "thatching ant" because of the large

mound nest composed of twigs and other plant debris which these ants construct. All specimens from Iowa show more melanism, even in the largest workers, than is common in specimens of obscuripes from the Great Plains. Thus they may be considered transitional to the following variant, melanotica.

Formica (Formica) rufa melanotica Emery

- 1893 F. rufa obscuriventris var. melanotica Emery, Zool. Jahrb. Syst., 7:644, 650. Worker.
- 1913 F. (F.) aggerans var. melanotica Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:392, 394, 432. Worker, female, male.
- 1940 F. (F.) rufa melanotica Creighton, Amer. Mus. Nov., 1055:1, 7.

WORKER. Scarcely differing from obscuripes. The melanism of even the largest workers is distinct. The pubescence on the gaster is sparse rather than dense.

RECORD. Dennison.

The several nests of this variant near Dennison were found in pasture land densely covered by scrubby oaks so that all nests were shaded. This is in contradistinction to the nests of the form the writer has referred to obscuripes, whose nests were chiefly in virgin prairie, or at least exposed to the sun.

Formica (Formica) rufa obscuriventris Mayr

- 1870 F. rufa obscuriventris Mayr, Verh. Zool.-bot. Ges. Wien, 20:951. Worker.
- 1913 F. (Formica) rufa obscuriventris Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:392, 394, 445. Worker, female, male.

WORKER. Much as in obscuripes. But clypeal fossae deep. Antennae longer; funicular joints two and three nearly one third again as long as penultimate joints. Erect hairs shorter but more numerous. Head, thorax, and petiole always ferruginous, even in the small workers. Gastric pubescence not very dense.

RECORDS. Backbone State Park, Dubuque, Muscatine, Mt. Vernon.

This variant constructs its nests in old, dry, rotted stumps or logs, filling up the cavities with plant debris. It is very fierce and aggressive in the defense of its nest, like obscuripes and melanotica. In macroscopic aspect, color, size, aggressiveness, nesting habits, etc., this ant is almost identical with F. sanguinea aserva.

Formica (Formica) rufa clivia Creighton

1917 F. (F.) rufa obscuriventris var. aggerans Wheeler, Proc. Amer. Acad. Arts Sci., 52:540.

1940 F. (F.) rufa clivia Creighton, Amer. Mus. Nov., 1055:8.

WORKER. Very similar to obscuriventris. Erect hairs slightly more numerous, and present on the scapes. Clypeal fossae and funicular proportions as in obscuriventris, but funicular joints 5-8 slightly moniliform. Small workers always have the head and thorax heavily infuscated. Large workers may or may not be infuscated but usually have at least the petiole dark or black. Pubescence sparse on the gaster.

MALE. Length, 8.6 mm.

Clypeal fossae rather deep. Funicular joints gradually decreasing in length from the second to the penultimate. Erect hairs numerous. Pubescence moderately dense on gaster.

Color black, except for the yellowish tibiae and tarsi. Wings infuscated.

RECORDS. Spirit Lake. Also Okoboji (F. S. Stancliffe).

The erect hairs of this variant seem rather deciduous. Therefore single workers are not easily identified. The nests found by the writer were under rocks banked with plant debris. This variant is apparently rare in Iowa, as it is more properly a member of Merriam's Transition Zone. The writer has not seen any specimens from Iowa which he considers intergrades between clivia and obscuriventris, although, according to Creighton (1940a), they occur in Minnesota.

Formica (Formica) fossiceps Buren

1942 F. fossiceps Buren, Iowa State Col. Jour. Sci., 16(3):402-405. Worker, female, male.

WORKER. Length, 3.7-7.7 mm.

In major workers head slightly longer than broad, narrower in front than behind, with feebly excised or straight posterior border and nearly straight sides. Clypeus scarcely carinate. Clypeal fossae strikingly deep; antennal fossae also rather distinct. Frontal carinae diverging. Eyes hairless. Funicular joints gradually decreasing in length toward the penultimate, the second approximately four fifths as long as the first and one third again as long as the penultimate, the third slightly shorter than the second; joints 5-8 somewhat moniliform. Promesonotum rather convex. Base and declivity of epinotum subequal. Petiole large, cuneate in profile, angulate or subangulate above when seen from behind.

Gaster smooth and shining. Erect hairs nearly absent. Pubescence very sparse.

Head and thorax ferruginous. Gaster deep black.

In smaller workers the clypeus distinctly carinate, the clypeal fossae more normal in depth, gaster less shining, and head and thorax more or less infuscated.

FEMALE. Length, 7.2-7.8 mm. Slender bodied.

Head even more triangular than in worker, clypeal fossae deeper. Joints 5-8 of funiculi not as moniliform, and second joint only a little shorter than first. Thorax narrower than head. Petiole large and shaped as in the worker. Entire body glabrous and extremely smooth, gaster with a mirror-like polish.

Head and thorax light brownish red except for three infuscated spots on mesonotum and the black scutellum. Gaster deep black.

MALE. Length, 8 mm.

Clypeal fossae deep. Mandibles feebly 3-toothed. Head much broader behind than in front. Head and thorax opaque, gaster feebly shining. Erect hairs nearly absent on all dorsal surfaces. Pubescence rather sparse. Color black, legs brown.

TYPE LOCALITY. Winterset.

The temporary host of this species is probably F. fusca subsericea.

Formica (Formica) prociliata Kennedy and Dennis

1937 F. prociliata Kennedy and Dennis, Ann. Ent. Soc. Amer., 30:531.
Worker, female, male.

WORKER. Length, 7.5 mm.

Head subtriangular in appearance; excluding the mandibles, barely longer than broad, with feebly excised posterior border and slightly convex sides. Frontal carinae short and diverging. Basal funicular joints longer than penultimate joints. Pronotum and mesonotum rather convex in profile. Base and declivity of epinotum subequal; nearly straight in profile. Petiole with a sharp border, angularly produced upward when seen from behind.

All surfaces subopaque or opaque, the head a little more shining than the other regions.

Erect hairs slender and pointed, numerous on the pronotum, crest and venter of petiole, and venter of gaster. Also present on clypeus, posterior portion of mesonotum, epinotum, mesopleurae, coxae, and femora. Pubescence sparse on the head, much less so on the thorax; on the dorsum of gaster dense and long. Spines on the tibiae and tarsi long and numerous.

Head and thorax ferruginous. Gaster black. Legs brown. Smaller workers with the head and thorax infuscated.

FEMALE. Length, 9.5 mm.

Head subtriangular in appearance; excluding the mandibles, as broad as long, with straight posterior border and sides, broader behind than in front. Frontal carinae very short, diverging. First joint of funiculus little longer than either the second or third. Thorax and gaster rather robust but the thorax narrower than the head. Petiole cuneate in profile, sharp above; seen from behind, it is angularly produced upward and either

pointed, truncate, or slightly notched in the middle.

All surfaces smooth and moderately shining.

Pilosity extraordinary, consisting of long, yellow hairs which are tightly curled toward the tips. These hairs dense and numerous on pronotum, scutellum, metanotum, epinotum, crest and venter of petiole, and venter of gaster. They are also present on the clypeus, mesosternum, mesepisternum, coxae, trochanters, and femora.

Pubescence sparse on head, long and dense on dorsum of gaster, and on all regions where the long curling hairs are present. Spines of the tarsi long and numerous, those of the tibiae long and curved.

Color brownish yellow, sometimes with a tinge of red. Posterior borders of gastric segments and a broad stripe along each side of the gaster brown.

RECORDS. Sabula, Bellevue, Winterset, Dennison, Inwood.

This species lives in fairly populous colonies and constructs a low, flattened mound of earth about two or three feet in diameter. At Gotham, Wisconsin, the author found a female of prociliata which had been adopted by a depauperate colony of F. (Neofornica) pallidefulva nitidiventris. F. nitidiventris may therefore be considered as the host or at least as an alternate host of prociliata.

Formica (Formica) dakotensis montigena Wheeler

1904 F. montigena Wheeler, Bull. Amer. Mus. Nat. Hist., 20:374. Worker, female, male.

1913 F. (F.) dakotensis var. montigena Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:391, 394, 463. Worker, female, male.

WORKER. Length, 6.5 mm.

Head a little broader than long, feebly excised behind, sides quite convex. Clypeus rounded in front, feebly carinate. Eyes hairless. Basal funicular joints scarcely longer than penultimate joints. Epinotum angulate in profile, base and declivity straight. Petiole very blunt, superior border truncate or excised.

Erect hairs rather sparse, slightly clavate, present on nearly all parts; none on scapes, occipital corners or tibiae. Pubescence rather sparse on all surfaces.

Head and thorax ferruginous. Gaster black.

RECORD. Cherokee County (Prof. H. K. Jaques' Nat. Hist. Survey).

The writer has not taken specimens of this species from Iowa, but has seen a specimen belonging to this form and collected in Iowa in the National Museum. The description has been drawn from Colorado specimens.

Formica (Formica) reflexa Buren

1942 F. reflexa Buren, Iowa State Col. Jour. Sci., 16(3):399-402. Worker, female, male.

WORKER. Length about 5 mm.

Head a little longer than broad, somewhat broader behind than in front, with moderately convex posterior border and sides. Mandibles 7-toothed. Clypeus scarcely carinate. Apex of frontal area indistinct. Frontal carinae short. Eyes hairy. Funicular joints 2-10 subequal in length. Promesonotum moderately convex. Epinotum angulate and with subequal, straight base and declivity. Petiole small and unusually blunt, the sides and superior border at least slightly convex when seen from

behind.

All surfaces subopaque or feebly shining. Erect hairs sparse, short, blunt, occasionally slightly clavate. Pubescence extraordinary, consisting of fine hairs almost as long as the erect hairs, often arising sub-erectly but sharply reflexed in the middle so that the distal ends strike the surface.

Head and thorax reddish brown. Gaster black.

RECORD. Spirit Lake.

Several colonies of this interesting species were taken at the above locality. In each case the colony consisted of only a few reflexa workers but numerous workers of the host, F. fusca subsericea. As the writer has stated (1942) this species may possibly be a nondulotic, permanent social parasite. This type of parasitism has been hitherto unknown in the genus Formica.

The type locality of F. reflexa is Hibbing, Minnesota.

Formica (Formica) obliqua n. sp.

WORKER. Length of major worker, 7.5 mm.

Head, excluding the mandibles, about as broad as long, with posterior border feebly excised in the middle, the posterior corners rounded, and sides slightly convex; scarcely narrower in front than behind. Mandibles 8-toothed. Clypeus rather angularly produced. Frontal area small, much wider than high. Frontal carinae evenly diverging, their length equal to twice the diameter of the antennal foramina. Eyes hairy. First funicular joint one fourth again as long as the second, the second slightly longer

than the third, and each joint to the penultimate in turn slightly longer than the succeeding; the second almost one half again as long as the penultimate. Promesonotal outline strongly convex. Mesoepinotal impression deep and wide in large workers; marked by sutures before and behind. Declivity of epinotum a little longer than the base, meeting the latter with an angle of approximately 120-130 degrees. Petiole cuneate in profile, anterior and posterior faces weakly convex. Superior border rather sharp; seen from behind angularly produced upward but usually notched at the tip.

All surfaces opaque except the frontal area, which is smooth and shining, and the mandibles, which are moderately shining and longitudinally striate.

Erect hairs numerous, short, bristle-like, yellow, usually pointed at the tip but on the thoracic dorsum and gaster sometimes blunt or slightly clavate. Hairs present on all regions, even a few on the cheeks; few, however, on the gula. The numerous hairs on the scapes and legs short and strongly oblique or subappressed. Pubescence dense on all regions.

Ground color of head and thorax yellowish red, but often heavily infuscated with black, even in the largest workers. Smaller workers have the head and thorax nearly as black as the gaster.

TYPE LOCALITY. Bonaparte.

Described from numerous workers taken from a single nest, July 13, 1941. The nest was located in pasture land covered with a rather dense growth of scrubby oaks. The nest was well hidden under low bushes; considerable plant debris had been used in the construction of a low dome,

immediately under which were numerous workers and the brood.

This species has about the same coloration as F. postoculata Kennedy and Dennis but does not seem closely related to it. F. postoculata has no hairs on the eyes, and no pilosity on the scapes or tibiae. It is much smaller in size, and there are several other differences pertaining to the pilosity and the shape of the head and thorax.

F. obliqua, in the writer's opinion, is most closely related to F. impexa Wheeler, which it strongly resembles in the number and arrangement of the hairs. F. obliqua may be distinguished immediately from impexa by the color of the head and thorax, which is deep red in impexa and hardly infuscated except in the smaller workers. The head of impexa is less robust, more slender, and narrower in front; the clypeus is less produced and is rounded in front; the thorax appears less robust, and the mesoepinotal constriction is shallow and narrow; the petiole is blunter and more rounded when seen from behind; the erect hairs are blunt or clavate, and the hairs on the scapes and legs are blunter and erect. The erect hairs on the gaster are more numerous and much larger and more apparent in impexa. The pubescent hairs also seem a little denser but shorter on impexa. The eyes of impexa are not distinctly hairy as in obliqua.

Since the queen is unknown, there is no actual evidence that obliqua is a microgynous species, but its close resemblance to impexa leads the writer to believe so. It is certainly distinct from any species in the rufa group known to the author. F. obliqua would probably key down to F. oreas Wheeler in the latter's key (1913), but workers of oreas may be

distinguished immediately by the extremely abundant, very fine white hairs covering all parts. Many other differences show that oreas is not closely related to obliqua.

F. obliqua is probably a temporary social parasite of F. fusca subsericea.

Formica (Formica) microgyna subsp. spatulata n. subsp.

WORKER. Length of largest worker, 7.0 mm.

Head a little longer than broad, with slightly convex posterior border and sides, somewhat narrower in front than behind. Clypeus subangularly produced. Basal funicular joints longer than penultimate joints. Pro- and mesonotum moderately convex. Mesoepinotal impression shallow. Epinotum rounded, the declivity rather gently sloped. Petiole narrow, blunt, and angularly produced upward, the apex sometimes truncated or notched, however.

Nearly all surfaces opaque. Frontal area shining. Erect hairs short, spatulate, becoming very wide and flattened toward the apex; rather abundant on nearly all surfaces, including the occipital corners. Not present on scapes or tibiae. Pubescence dense and fine on all parts, adding to the opaque appearance.

Head and thorax orange-red to brownish red, apparently depending on the age of the individual. Gaster black.

FEMALE. Length, 5.7 mm.

Head much smaller than in major worker, posterior border more rounded. Eyes a little smaller in absolute size, but larger and more convex in

proportion to the head. Thorax narrower than the head, elongate. Epinotum rather sloping. Petiole much as in the worker.

Less opaque than in the worker. Erect hairs spatulate but much longer than in the worker; present on the same regions. Pubescence dense.

Ground color of head and thorax yellowish red, but these regions, especially the dorsal surfaces, rather infuscated. Gaster black. Wings pale.

MALE. Length, 7.0 mm.

Mandibles pointed, edentate. Thorax narrower than the head. Petiole blunt, not or only slightly notched. Erect hairs somewhat more abundant than in the female, a little shorter, and only feebly spatulate. Pubescence sparser than in the female. Color black, with tibiae and tarsi yellowish. Wings pale hyaline.

TYPE LOCALITY. Spirit Lake.

This ant seems to be another geographical variant of the widely distributed Formica microgyna Wheeler. Of these variants it seems closely related to rasilis, but can be distinguished by the more numerous, more spatulate hairs. These are not present on the occipital corners in rasilis. The promesonotum is less convex, and the epinotum is more obtuse in spatulata. The female of spatulata is more slender bodied, and has the hairs more spatulate and abundant.

Spatulata may be distinguished immediately from all other Iowa species of Formica by the beautiful, dull, orange-red color of the head and thorax, which is especially striking in the younger workers.

Two nests of this form were found under rocks lining the shore of

a small lake near Spirit Lake, Iowa. F. spatulata was also found at Wheaton, Minn.

The temporary host is Formica fusca subsericea Say.

Formica (Formica) indianensis Cole

1940 F. indianensis Cole, Amer. Midl. Nat. 23:224-226. Worker, male.

WORKER. Length, 6.2 mm.

Head a little longer than broad, a little broader behind than in front, with feebly convex posterior border and nearly straight sides. Clypeus subangularly produced. Frontal carinae evenly diverging. Basal funicular joints longer than penultimate joints. Pro- and mesonotum moderately convex. Base and declivity of epinotum subequal, base slightly convex, declivity slightly concave. Petiole not sharp and with evenly rounded superior border.

Head, thorax, and gaster opaque.

Erect hairs sparse, present on clypeus, front, dorsum of thorax, petiole, gaster, and coxae. Those on the thorax often slightly spatulate. Pubescence dense on all parts.

Head and thorax dull, reddish brown, but usually clouded with black even in the largest workers. Gaster brownish black; appendages dark brown.

RECORD. Oak Grove State Park.

Described from 24 workers from at least two nests on a virgin prairie remnant at Oak Grove State Park. Stray workers were picked up but the actual nests were not found and must have been small and well

hidden.

The writer has taken a series of workers from a single nest at Inwood, Iowa, which shows all possible intergradations with F. nepticula. F. indianensis must therefore be closely related to nepticula in spite of their dissimilar appearance.

F. indianensis is probably a temporary social parasite of F. fusca subsericea or possibly F. fusca argentea.

Formica (Formica) nepticula Wheeler

1905 F. nepticula Wheeler, Bull. Amer. Mus. Nat. Hist., 21:270. Worker, female, male.

1913 F. (F.) nepticula Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53: 394, 396, 475. Worker, female, male.

WORKER. Length, 6.2 mm.

Head a little longer than broad, somewhat narrower in front than behind, with slightly convex posterior border and sides. Clypeus angularly produced. Frontal area rounded behind. Frontal carinae evenly diverging. Basal joints of funiculi longer than penultimate joints. Eyes not intercepting sides of head in full face view. Pro- and mesonotum convex in profile. Mesoepinotal depression shallow. Epinotum rather rounded, its base shorter than its declivity. Petiole sharp and convexly produced above, often distinctly notched in the middle.

Head and thorax subopaque, gaster rather shining.

Erect hairs not numerous, but present on nearly all regions, a few on the scapes, some on the tibiae. Pubescence sparse on head and gaster, more dense on thorax.

Head and thorax ferruginous, gaster black, appendages brown.

FEMALE. Length, 5.5 mm.

Distinctly smaller than the largest worker. Thorax narrower than head. Erect hairs longer, present on same regions as in the worker. Pubescence more sparse, and surfaces more shining than in the worker. Eyes intercepting the straight sides of the head. Posterior border of head more convex than in the worker.

RECORD. Dennison.

The nests of this species are usually located in and under small rotting limbs; some plant debris is used. Winged females were found in the nest in July.

Formica (Formica) difficilis Emery

1893 F. rufa difficilis Emery, Zool. Jahrb. Syst., 7:651. Worker, female, male.

1913 F. (F.) difficilis Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53: 395, 477. Worker, female, male.

WORKER. Length, 6.4 mm.

Head a little longer than broad, scarcely narrower in front than behind, with convex posterior border and nearly straight sides. Scapes greatly surpassing posterior corners of head. Basal funicular joints longer than penultimate joints. Pro- and mesonotum moderately convex. Mesoepinotal impression narrow and rather shallow. Declivity of epinotum sloping. Petiole narrow, blunt, convexly or angularly produced above.

Erect hairs sparse but present on all regions, usually few or none on the occipital corners and tibiae. Pubescence sparse on head, dense

on thorax and gaster. Head and thorax ferruginous in large workers, in smaller workers usually more or less infuscated. Gaster black.

FEMALE. Length, 6.2 mm.

Pure brownish yellow except for black wing insertions. Wings infuscated. Head rounded behind and with straight sides converging somewhat to the front. Thorax narrower than head. Erect hairs more abundant, and much longer than in the worker, present on the same regions. Petiole as in the worker.

MALE. Length, 6.6 mm.

Pilosity much as in the female. Mandibles edentate or very feebly toothed. Scapes flattened somewhat. Petiole blunt. Pubescence moderately dense. Color black except for the yellowish legs. Wings infuscated.

RECORDS. Boone, Ames, Bellevue.

On a smaller scale, the nest architecture is like that of F. rufa obscuriventris. F. difficilis is more timid and less aggressive than many ants of the rufa group. Its host is undoubtedly some form of F. pallidefulva Latreille.

Formica (Formica) exsectoides Forel

1886 F. exsectoides Forel, Ann. Soc. Ent. Belg., 30(C. R.):38. Worker, female.

1913 F. (F.) exsectoides exsectoides Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:396, 481. Worker, female, male.

WORKER. Length, 7.0 mm.

Head, excluding the mandibles, longer than broad, with deeply excised posterior border and straight sides, somewhat narrower in front

than behind. Clypeus angularly produced in front, and rather straight above in profile. Basal funicular joints longer and more slender than the penultimate joints. Pro- and mesonotum moderately convex in profile. MesoePINOTAL impression rather deep. Epinotum rounded. Petiole cuneate in profile, sharp above. Seen from behind, the superior border evenly convex and rounded, the sides straight and converging below.

Head and thorax subopaque. Gaster shining.

Erect hairs very sparse, usually absent on the head and thorax. Some long, slender hairs toward apex and on venter of gaster. Pubescence sparse.

Head and thorax ferruginous. Gaster black.

FEMALE. Length, 9.2 mm.

Head as in the worker but more flattened dorso-ventrally. Thorax distinctly narrower than head. Petiole large, with a sharp expanded superior border.

Erect hairs long, slender, slightly curled or flexuous at the tip, a row present on the pronotum, a few on the scutellum, numerous on the apex and venter of gaster. Pubescence very short and fine, more dense than in the worker.

Head, thorax, petiole, base of gaster, and legs ferruginous. Rest of gaster black.

MALE. Length, 8.8 mm.

Posterior border of head wide and straight. Funiculi becoming slightly more slender toward apex. Petiole blunt and rounded above. Erect hairs very sparse. Pubescence denser and longer than in the worker and

female. Color black except for the yellowish legs.

RECORDS. Inwood, Dennison, Mt. Vernon.

This species does not seem to thrive well in Iowa. The mounds that the writer has seen were rather small and scarcely conical. F. exsectoides often lives in huge aggregate colonies consisting of numerous mounds. In Iowa the writer has been unable to find more than a single mound in any one locality.

Formica (Formica) ulkei Emery

1893 F. ulkei Emery, Zool. Jahrb. Syst., 7:653. Worker.

1913 F. (F.) ulkei Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:396, 485. Worker, female, male.

WORKER. Differs from exsectoides in having the front, vertex, occiput, and hind corners of head black, and the general color of the head and thorax more brownish. The erect hairs are much less sparse, and are numerous on the dorsa of the pronotum and gaster. The pubescence is also more apparent on all parts.

RECORD. Spirit Lake.

F. ulkei is apparently not common in any part of its range, and in Iowa must be very rare even in the northern part. The colony found by the writer was rather depauperate.

Formica (Formica) sanguinea aserva Forel

1901 F. sanguinea aserva Forel, Ann. Soc. Ent. Belg., 45:395. Worker, female.

1913 F. (Formica) sanguinea aserva Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:389, 404. Worker, female, male.

1925 F. (Raptiformica) sanguinea aserva Emery, Gen. Insec., fasc. 183: 260.

WORKER. Length, 7.7 mm.

Head a little broader than long, slightly excised behind and with moderately convex sides. Clypeal notch distinct. Scapes exceeding posterior corners of head by about one third of their length. Funiculi slightly flattened toward the tips so that the last two joints become somewhat oval rather than circular in cross section. Pro- and mesonotum moderately convex. Epinotum angulate, base somewhat inclined posteriorly. Superior border of petiole fairly sharp and convex, scarcely notched.

All parts opaque or only feebly shining. Erect hairs very sparse, usually none on the thorax. Pubescence moderately abundant, sparse on the head.

Head and thorax dark ferruginous, the head always darker than the thorax and usually infuscated on occiput, vertex, and front. Gaster black, appendages brown.

RECORD. Rice Lake State Park.

This form has a rather boreal distribution. The writer has found it to be common in Minnesota and Wisconsin, but it seems rare even in the northern portions of Iowa. This ant is very fierce and aggressive but does not have dulotic habits. Its favorite nesting sites are old rotting stumps, a certain amount of plant debris being used around the base and in the large cavities.

Formica (Formica) sanguinea rubicunda Emery

1893 F. sanguinea rubicunda Emery, Zool. Jahrb. Syst., 7:647. Worker, female.

1913 F. (Formica) sanguinea rubicunda Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:390, 406. Worker, female, male.

1925 F. (Raptiformica) sanguinea rubicunda Emery, Gen. Insec., fasc. 183:260.

WORKER. Length, 7.7 mm.

Head as long or slightly longer than broad, with feebly or moderately excised posterior border and convex sides. Clypeal notch distinct. Frontal carinae little diverging and rather well-developed. Antennae as in aserva. Thoracic profile much as in aserva, mesoepinotal impression well-developed. Upper petiolar border usually distinctly notched in the middle and rather sharp. Gaster rounded seen from above.

Erect hairs slender, pointed, fairly numerous on head, thorax, and gaster. Pubescence dense on thorax and gaster, more dense on head than in aserva.

Head and thorax dark ferruginous. Gaster black.

FEMALE. Length, 9.7 mm.

Head broader than long. Scapes heavy. Petiole large, notched above. Color, pilosity, and pubescence much as in the worker. Wings infuscated.

MALE. Length, 9.7 mm.

Heavy bodied. Mandibles edentulous or bluntly toothed. Clypeus feebly notched. Pilosity and pubescence much as in the worker and female. Black except for the yellowish legs. Wings heavily infuscated.

RECORDS. Dennison, Ames, Sabula, Oak Grove State Park, Clinton.

This ant is much more common in woodlands than subintegra but does not live in cities or towns. This is another example of how civilization has changed the fauna, reducing the numbers of some species, increasing

those of others.

Formica (Formica) sanguinea subintegra Emery

1893 F. sanguinea rubicunda var. subintegra Emery, Zool. Jahrb. Syst., 7:648. Worker, female.

1913 F. (Formica) sanguinea subintegra Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:390, 410. Worker, female, male.

1925 F. (Raptiformica) sanguinea subintegra Emery, Gen. Insec., fasc. 183:260.

WORKER. Length, 7.0 mm.

Much like rubicunda, but the clypeal notch is shallower; the mesoepinotal impression less distinct; the base of the epinotum is more inclined posteriorly and forms a right angle with the declivity; the superior border of the petiole is much blunter; the erect hairs are sparser and those on the gaster are shorter and blunter; and the color of the gaster is distinctly brownish.

MALE. Length, 9.2 mm.

Much more slender than in rubicunda. Mandibles narrow, edentate. Clypeus scarcely emarginate and with a transverse impression near the front. Petiole blunt, somewhat excised above. Gaster brownish. Wings pale hyaline.

RECORDS. Ames, Dewitt.

This form seems to thrive well in lawns in cities and towns, in contradistinction to rubicunda, which is never found in such a situation. It is common within Ames and the writer has also seen it at Clinton.

Formica (Formica) sanguinea subnuda Emery

- 1895 F. sanguinea rubicunda var. subnuda Emery, Zool. Jahrb. Syst., 8: 335. Worker.
- 1913 F. (Formica) sanguinea subnuda Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:389, 409. Worker, female, male.
- 1925 F. (Raptiformica) sanguinea subnuda Emery, Gen. Insec., fasc. 183: 260.

WORKER. Length, 7.7 mm.

Like rubicunda, but differing in having shorter, much sparser, erect hairs, the petiole more produced upward in the middle although the apex is sometimes notched, and the head and thorax more yellowish red in color. There are very few or no hairs on the dorsum of the thorax.

RECORD. Sioux City (C. N. Ainslie).

Represented by only six specimens found in the collection of the late C. N. Ainslie.

The epinotum is angulate in these specimens as in the preceding forms. They do not agree in this particular with Emery's description of subnuda (1894), and therefore may not actually be subnuda. For the present the writer prefers to regard them as such. The pilosity is the same as that of aserva, but aserva has a much darker colored and broader head.

Formica (Formica) sanguinea subsp. angusticeps n. subsp.

WORKER. Length, 7.0 mm.

Head a little longer than broad, having an elongate appearance, with somewhat excised posterior border and slightly convex sides. Clypeus little produced, the notch rather broad and shallow. Clypeal carina feeble,

scarcely distinct. Frontal area higher than broad, all angles sharp. Antennae much as in aserva; second and third joints of funiculus combined little longer than the first. Eyes fairly small, one fourth as long as the head. Thoracic profile as in aserva, but thorax rather slender seen from above. Petiole moderately blunt, sometimes feebly notched in the middle. Gaster, when seen from above, rather narrow and elongate.

All surfaces more shining than the corresponding surfaces of aserva. Erect hairs more numerous than in aserva, slender and pointed, present on clypeus, front, vertex, pronotum, petiole, and gaster. Pubescence short and fine, sparse on head, moderately dense on thorax and gaster. Front, vertex, and occiput infuscated, other parts of head and thorax more brownish or yellowish, and less reddish than aserva.

TYPE LOCALITY. Bevington.

Nothing is known about the biology or host of this form. The writer has described this ant from seven specimens collected in dense woodland. The nest could not be located.

F. angusticeps may be rather closely related to pergandei Emery as seems to be shown by the elongate, slender head and body, and the color. F. pergandei should be easily distinguishable by its concave cheeks, however.

Subgenus Proformica Ruzsky

1903 Formica subg. Proformica Ruzsky, Horae Soc. Ent. Rossic., 36:303.

1925 Formica subg. Proformica Emery, Gen. Insec., fasc. 183:242.

GENOTYPE. Formica nasuta Nylander.

Differing from typical Formica in having the second and third funicular joints shorter than the first, the second to fifth shorter than the succeeding, the mandibles more strongly oblique and with fewer, sharper, more elongate teeth, the frontal carinae very feeble, short, and parallel, and the sides of the petiole not converging below but rather subparallel. The minor workers have an elongate, flat head, and a long, low thorax. The pubescence is sparse and the integument shining unlike many members of typical Formica.

The above description has been drawn largely from the genotype, Formica nasuta Nylander, a European species.

Certain North American species, some of which occur in Iowa, have been placed in Proformica by Wheeler (1913). These species do not really belong in Proformica, in the opinion of the writer. Although the second and third funicular joints are rather short in these species, the funicular proportions are not as in nasuta. The mandibles are identical with Formica s. str. The frontal carinae, while rather parallel, are not feeble or short as in nasuta, the petiole is fan-shaped when seen from behind, and there is no dimorphism in structure between minor and major workers. The writer would therefore restrict Proformica to only the Palaearctic forms.

For the purposes of this thesis it seemed best to retain Wheeler's concept of Proformica. In a separate paper the writer will prove his contention more fully.

Formica (Proformica) neogagates Emery

1893 F. fusca subpolita var. neogagates Emery, Zool. Jahrb. Syst., 7: 661. Worker, female, male.

1913 F. (P.) neogagates neogagates Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:400, 536. Worker, female, male.

WORKER. Length, 5.0 mm.

Head, excluding the mandibles, longer than broad, broader behind than in front, with convex posterior border and straight cheeks. Clypeus carinate, rather angularly produced. Frontal carinae subparallel behind. Second and third funicular joints combined little longer than the first, the third a little shorter than the penultimate. Pro- and mesonotum moderately convex in profile. Mesoeipinotal suture shallow. Base and declivity evenly rounding into each other, subequal in length. Seen from above, both the pronotum and epinotum appear to be broadly and evenly rounded. Petiole blunt above; seen from behind, it is broad, strongly converging below, and the superior border broadly convex.

Smooth and shining, the epinotum more strongly shagreened than other regions. Erect hairs white, slender and pointed, except on the gaster where they are occasionally blunt; not numerous but present on all regions except scapes and tibiae. Pubescence sparse and short.

Color deep brownish black. Legs lighter.

FEMALE. Length, 7.5 mm.

Head, antennae, pilosity, pubescence, and color much as in the worker. Petiole large and sharp above. Thorax as wide as the head. All parts smooth and shining. Hairs slender and pointed.

RECORDS. Ames, Tama, Spirit Lake.

A rather rare species. Only two small nests have been found under stones near Ames. The Tama and Spirit Lake records are from single specimens whose nests could not be located.

The specimens listed as neogagates in the writer's preliminary list (1941a) are neogagates vinculans.

Formica (Proformica) neogagates vetula Wheeler

- 1895 F. lasioides var. picea Emery, Zool. Jahrb. Syst., 8:335. Worker.
(nom. praecoc.)
- 1912 F. (P.) neogagates lasioides var. vetula Wheeler, Psyche, 19:90.
(nom. nov.)
- 1913 F. (P.) neogagates lasioides var. vetula Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:400, 540. Worker.

WORKER. Much like the typical neogagates except the erect hairs are longer, always pointed at the tip, more numerous, and present on the scapes. The pubescence is also noticeably less sparse and much longer.

RECORDS. Ames, Rice Lake State Park, Strawberry Point, Decorah, Inwood.

This ant seems to be the commonest form of neogagates in Iowa. It lives in small colonies in woodlands.

Formica (Proformica) neogagates vinculans Wheeler

- 1913 F. (P.) neogagates var. vinculans Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:400, 539. Worker, female.

WORKER. Much like the typical neogagates except that the hairs are longer, always pointed at the tip, and more numerous. The pubescence

is much less sparse. The color of the thorax of the larger workers is considerably lighter than in typical neogagates. In life the large workers sometimes have a reddish tinge to the thorax.

RECORD. Ames.

This ant is rather common in lawns in Ames, a situation where the typical neogagates does not occur. The nests are rather small but more populous than the nests of typical neogagates seen. The ants will swarm out to defend their nests if provoked.

Formica (Proformica) neogagates morbida Wheeler

1913 F. (P.) neogagates var. morbida Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:400, 538. Worker, female.

WORKER. Pilosity and pubescence as in vinculans. Color brownish yellow, the head and gaster little if any darker. It may always be distinguished from vinculans by the color of the gaster, which in the latter is always deep brownish black as in the typical neogagates.

FEMALE. (After Wheeler.)

"Length, 6 mm.

Sculpture, pilosity, and pubescence as in the worker; mesonotum and scutellum smooth and shining.

Body brownish yellow; gaster with a short, indistinct, transverse, reddish brown band on each segment; head with a band of the same color between the eyes. Mandibles reddish brown, sutures of thorax fuscus or blackish. Legs and antennae, including the funiculi, concolorous with the body."

TYPE LOCALITY. Lennox (P. J. Schmitt).

The writer does not possess specimens of this form but has seen the types in the Museum of Comparative Zoology at Cambridge, Mass.

Subgenus Neoformica Wheeler

1913 Formica subg. Neoformica Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:548.

1925 Formica subg. Neoformica Emery, Gen. Insec., fasc. 183:244.

GENOTYPE. Formica pallidefulva Latreille.

WORKER. Head more oval and slender than in the typical Formica.

Funiculi more filiform, the middle joints about $1\frac{1}{2}$ times as long as broad. Frontal carinae parallel. Thorax not very convex in profile, rather long and slender.

FEMALE. Middle funicular joints $1\frac{1}{2}$ times as long as broad or nearly so. Head longer than broad and narrower than thorax. Frontal carinae subparallel or little diverging. Otherwise much as in Formica s. str.

In the writer's opinion this subgenus is scarcely worth recognizing.

The males (no Iowa specimens were captured) are said by Wheeler (1913) to have the stipes of the genitalia very long and slender.

Formica (Neoformica) pallidefulva incerta Emery

1893 F. pallidefulva schaufussi var. incerta Emery, Zool. Jahrb. Syst., 7:655. Worker, female, male.

1913 F. (N.) pallidefulva schaufussi var. incerta Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:401, 554. Worker, female, male.

WORKER. Length, 7.0 mm.

Head, excluding the mandibles, obviously longer than broad, with

convex posterior border, and moderately convex sides. Head narrowed behind the eyes, broadest across the eyes, no narrower in front than behind. Clypeus one half as high as wide, carinate. Frontal carinae subparallel and close together, the distance apart equal to twice the diameter of the antennal foramina. Scapes long. Funicular joints long and slender, the middle joints about $1\frac{1}{2}$ times as long as broad. Fore margin of the eye at about the middle of the head. Thorax long and low; pro- and mesonotum not very convex in profile. Mesoepinotal impression shallow. Epinotum evenly rounded, the base and declivity subequal in length. Petiole small and blunt above, its anterior and posterior faces convex in profile.

Rather smooth and shining, thorax more strongly shagreened than head or gaster.

Erect hairs moderately numerous, slender and pointed, present on all regions except scapes and tibiae. Hairs on the gula and petiole sparse, or absent on one or the other. Pubescence sparse.

Color brownish yellow, the gaster darker.

RECORDS. Ames, Clinton, Tama, Holy Cross, Rice Lake State Park, Inwood.

A common form in Iowa. There is considerable variation in color in the Iowa specimens. Some are as light as pallidefulva schaufussi Mayr, others as dark as pallidefulva nitidiventris. Nevertheless, the Iowa specimens almost always have the erect hairs lacking on the gula and so all have been placed in incerta. The writer is convinced that nitidiventris can always be distinguished from incerta by its lack of both gular and petiolar hairs, and by its shorter, blunter gastric hairs,

in spite of the frequent convergence in color.

Formica (Neoformica) pallidefulva dolosa Wheeler

1904 F. pallidefulva schaufussi var. meridionalis Wheeler, Bull. Amer. Mus. Nat. Hist., 20:370. Worker. (nom. praeocc.)

1912 F. pallidefulva schaufussi var. dolosa Wheeler, Psyche, 19:90. (nom. nov.)

1913 F. (N.) pallidefulva schaufussi var. dolosa Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:401, 554. Worker, female.

WORKER. Differing from incerta in being larger, nearly concolorous, and having the erect hairs more numerous and always present on the gula and petiole. The pubescence is also a little denser and definitely longer.

RECORD. Glenwood.

This is a southern variant which apparently has managed to creep its way northward into Iowa only along the Missouri River bluffs.

F. pallidefulva dolosa is the only Formica which was found living on these bluffs. This is what one would expect if the Missouri River bluffs really have a southern fauna as has been contended. The genus Formica is poorly represented in the South.

Formica (Neoformica) pallidefulva nitidiventris Emery

1893 F. pallidefulva nitidiventris Emery, Zool. Jahrb. Syst., 7:656. Worker, female, male.

1913 F. (N.) pallidefulva nitidiventris Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:401, 555. Worker, female, male.

WORKER. Length, 7.0 mm.

Head, excluding the mandibles, about one seventh longer than broad.

Outline of head as in incerta except for the cheeks, which appear straighter.

Other structures of head, outline of thorax, and shape of petiole, much as in incerta.

Smooth and shining.

Erect hairs sparse on the head, very sparse on the thorax. Absent on gula and petiole. Moderately numerous, short, and blunt on the gaster. Pubescence sparse and rather short.

Head and thorax castaneous, gaster deep brownish black.

FEMALE. Length, 8.8 mm.

Head a little longer than broad, rounded behind, and with straight cheeks. Thorax wider than head. All surfaces rather shining. Pubescence and color much as in the worker. Erect hairs rather short and sparse, but slender and pointed.

RECORDS. Ames, Sabula, Oak Grove State Park, Princeton.

A common woodland form.

Formica (Neoformica) pallidefulva fuscata Emery

1893 F. pallidefulva var. fuscata Emery, Zool. Jahrb. Syst., 7:656. Worker, female.

1913 F. (N.) pallidefulva nitidiventris var. fuscata Wheeler, Bull. Mus. Comp. Zool. Cambridge, 53:401, 557. Worker, female.

WORKER. Differing from nitidiventris in being concolorously deep brownish black. The erect hairs on the gaster are blunt but seem a little longer and sparser than in nitidiventris.

FEMALE. The writer has been unable to find any character which will separate the females of nitidiventris and fuscata. The color is perhaps darker on an average.

RECORDS. Ames, Clinton, Sabula, Holy Cross.

This form may have no validity other than as a mere color variety of nitidiventris. The females can scarcely be separated.

Genus Polyergus Latreille

1805 Polyergus Latreille, Hist. Nat. Crust. Insect., 13:256.

1925 Polyergus Emery, Gen. Insec., fasc. 183:267.

GENOTYPE. Formica rufescens Latreille.

WORKER. Head usually nearly as broad as long, as broad or broader in front than behind. Mandibles falcate, their inner borders with numerous, vestigial denticuli. Clypeus much smaller than in Formica, transverse in front. Frontal carinae short and feeble. Antennae 12-jointed; scapes clubbed distally; first and second funicular joints each much longer than the third; distal joints more slender than the basal ones. Ocelli present. Maxillary palpi short and feeble, 4-jointed. Labial palpi 2-jointed. Epinotum large, blunt, inclined. Petiole very blunt, erect, little or no wider toward the top than at the base. Erect hairs bristle-like.

FEMALE. Somewhat larger than the worker. Head, antennae, mandibles, and petiole much as in the worker. Thorax narrower than head.

MALE. A little smaller than the worker. Mandibles falcate. Clypeus straight in front. Frontal carinae lacking. Scapes short. Genitalia much as in Formica but quite small. Gaster shorter than thorax.

Key to Species of Polyergus

1. Gaster pubescent. 2
Gaster smooth and shining; pubescence very sparse. . . lucidus Mayr
2. Gaster black. rufescens bicolor Wasmann
Gaster red like the head and thorax. . . rufescens breviceps Emery

Polyergus lucidus Mayr

1870 P. lucidus Mayr, Verh. Zool.-bot. Ges. Wien, 20:952. Worker, female, male.

WORKER. Length, 7.7 mm.

Head, excluding mandibles, longer than broad, narrowed behind the eyes, cheeks slightly concave. Clypeus straight in front. Frontal carinae close together, very feeble and short. Scapes surpassing posterior border a little, somewhat clubbed at the distal portion. Second joint of funiculus much longer than third; distal joints distinctly more slender than basal and middle joints. Pronotum convex in profile. Mesonotum nearly straight. Mesoepinotal impression wide and shallow. Base of epinotum straight and inclined toward the back. Petiole very blunt.

All surfaces shining, the thorax a little more opaque than head and gaster.

Erect, bristle-like hairs sparse on occipital corners, gula, clypeus, pronotum, coxae, and dorsum of gaster. More numerous on petiole and venter of gaster. Pubescence very sparse.

All regions bright ferruginous. Apex of gaster black.

RECORD. Backbone State Park.

This species probably has its western limit in Iowa. The slave of the colony found at Backbone State Park was F. (Neoformica) pallide-fulva incerta. The ants listed as lucidus in the writer's preliminary list are rufescens breviceps.

Polyergus rufescens breviceps Emery

1893 P. rufescens breviceps Emery, Zool. Jahrb. Syst., 7:666. Worker.

WORKER. Length, 7.3 mm.

Head, excluding mandibles, about as broad as long, about as wide behind as in front, subsquare. Frontal carinae short, diverging behind. Scapes not reaching hind border of head. Second joint of funiculus much longer than third; distal joints more slender than basal or middle joints. Thorax and petiole much as in lucidus.

All regions subshining.

Erect, bristle-like, long hairs rather sparse. More numerous on the dorsum of the gaster than in lucidus but otherwise present on the same regions. Pubescence very fine and dense on petiole and gaster, sparser on thorax, very sparse on head.

All regions dull ferruginous.

FEMALE. Length, 9.2 mm.

Head subsquare, a little broader than long; cheeks slightly converging in front. Eyes and ocelli small. Scapes in repose reaching posterior borders of eyes. Petiole large. Pilosity, pubescence, and color as in the worker. Wings rather milky hyaline except for the light brown veins.

MALE. Length, 6.4 mm.

Clypeus convexly humped in the middle, slightly concave in front.

Scape about as long as first two funicular joints combined. Petiole deeply notched above. Head and thorax opaque; gaster shining. Pubescence sparse. Erect hairs numerous on petiole, sparser on other regions. Color black, with whitish tarsi. Wings just reaching tip of gaster, milky hyaline in color, including the veins.

RECORDS. Ames. Also Sioux City (C. N. Ainslie).

This ant is fairly common in lawns in Ames, and the writer has seen it also within Clinton, Des Moines, and Davenport. It does not seem to occur, or at least must be very rare, outside city limits. In this peculiar preference it parallels Formica sanguinea subintegra.

Polyergus rufescens bicolor Wasmann

1901 P. rufescens bicolor Wasmann, Allg. Zeitschr. f. Ent. Neudamm, 6(N): 23. Worker, female, male.

WORKER. Length, 6.8 mm.

Somewhat smaller than breviceps, with black gaster and dark red head and thorax. The head is slightly longer than broad and narrowed behind the eyes. The petiole is wider in proportion to its thickness. Otherwise very similar to breviceps.

FEMALE. Length, 7.9 mm.

Head as broad as long, broadest across the eyes, with convex sides. Scapes nearly reaching basal ocelli, in repose. Gaster black, head and thorax deep red, legs brown. Pilosity and pubescence as in the worker.

RECORD. Backbone State Park.

A single female with a swollen gaster was taken at Backbone State Park. She had been adopted by a medium-sized nest of Formica fusca subae-

nescens. Colonies found by the writer at Akeley and Jenkins, Minnesota, also had the same species as the slave.

Since proper identification of the various species of ants usually cannot be easily accomplished without the worker, the writer has drawn the above description of the worker from Minnesota specimens although this is contrary to the practice, adhered to throughout this thesis, of describing only from Iowa specimens.

SELECTED REFERENCES

Buren, Wm. F.

- 1941a A preliminary list of Iowa ants. Iowa State College Jour. Sci., 15(2):111-117.
- 1941b *Lasius* (*Acanthomyops*) *plumopilosus*, a new ant with plumose hairs from Iowa. Iowa State College Jour. Sci., 15(3):231-235.
- 1942 New ants from Minnesota, Iowa, and Wisconsin. Iowa State College Jour. Sci., 16(3):399-408.

Creighton, Wm. S.

- 1930 The New World species of the genus *Solenopsis*. Proc. Amer. Acad. Arts Sci., 66(2):39-151.
- 1938 On Formicid nomenclature. Jour. New York Ent. Soc. 46(1):1-9.
- 1940a A revision of the North American variants of the ant *Formica rufa*. Amer. Mus. Nov., No. 1055:1-10.
- 1940b A revision of the forms of *Stigmatomma pallipes*. Amer. Mus. Nov., No. 1079:1-8.

Donisthorpe, H. St. J. K.

- 1927 British ants, their life-history and classification. Second edition. G. Routledge and Sons, Ltd., London.

Emery, C.

- 1894 Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna. Zool. Jahrb. Syst., 7:633-681.
- 1895 Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna. Zool. Jahrb. Syst., 8:257-360.
- 1910 Family Formicidae, subfamily Dorylinae. Wytsman's Genera Insectorum, fasc. 102.
- 1911 Family Formicidae, subfamily Ponerinae. Wytsman's Genera Insectorum, fasc. 118.
- 1912 Family Formicidae, subfamily Dolichoderinae. Wytsman's Genera Insectorum, fasc. 137.

- 1922a L'ouverture cloacale des Formicinae ouvrières et femelles. Bul. Soc. Ent. Belg., 4:62-65.
- 1922b Family Formicidae, subfamily Myrmicinae. Wytzman's Genera Insectorum, fasc. 174.
- 1925 Family Formicidae, subfamily Formicinae. Wytzman's Genera Insectorum, fasc. 183.
- Kennedy, C. H. and Dennis, C. A.
1937 New ants from Ohio and Indiana, *Formica prociliata*, *F. querquetulana*, *F. postoculata* and *F. lecontei*. Ann. Ent. Soc. Amer., 30(3):531-544.
- Mayr, G.
1886 Die Formiciden der Vereinigten Staaten von Nordamerika. Verh. Zool.-bot. Ges. Wien, 36:419-464.
- Smith, M. R.
1931 A revision of the genus *Strumigenys* of America, north of Mexico, based on a study of the workers. Ann. Ent. Soc. Amer., 24(4):686-710.
- 1936 Ants of the genus *Ponera* in America, north of Mexico. Ann. Ent. Soc. Amer., 29(3):420-430.
- 1938 Notes on the legionary ants (*Eciton*, subgenus *Acamatus*) with a record of new specific synonymy. Proc. Ent. Soc. Wash., 40(6):157-160.
- 1939 A new species of North American *Ponera*, with an ergatandrous form. Proc. Ent. Soc. Wash., 41(3):76-78.
- 1940 The identity of the ant *Camponotus* (*Myrmantoma*) *caryae* (Fitch). Proc. Ent. Soc. Wash., 42(7):137-141.
- Weber, N. A.
1939 Descriptions of new North American species and subspecies of *Myrmica* Latreille. Lloydia, 2:144-152.
- Wesson, L. G., Jr. and Wesson, R. G.
1939 Notes on *Strumigenys* from southern Ohio, with descriptions of six new species. Psyche, 46(2-3):91-112.
- 1940 A collection of ants from southcentral Ohio. Amer. Midl. Nat., 24(1):89-103.
- Wheeler, Wm. M.
1903 A revision of the North American ants of the genus *Leptothorax*. Proc. Acad. Nat. Sci. Philad., 55:215-260.

Wheeler, Wm. M.

- 1904 A new type of social parasitism among ants. *Bul. Amer. Mus. Nat. Hist.*, 20:347-375.
- 1910a The North American ants of the genus *Camponotus* Mayr. *Ann. New York Acad. Sci.*, 20:295-354.
- 1910b The North American forms of *Lasius umbratus* Nylander. *Psyche*, 17:235-243.
- 1910c Ants, their structure, development and behavior. Columbia Univ. Press, New York.
- 1913 A revision of the ants of the genus *Formica*. *Bul. Mus. Comp. Zool. Cambridge*, 53(10):377-565.
- 1916 Formicoidae. Guide to the insects of Connecticut. III. The Hymenoptera, or wasp-like insects of Connecticut, 5(22):577-644. State Geological and Natural History Survey, Hartford, Conn.
- 1917 The mountain ants of western North America. *Proc. Amer. Acad. Boston*, 52:457-569.
- 1920 The subfamilies of Formicidae and other taxonomic notes. *Psyche*, 27:46-55.

Wheeler, Wm. M., and collaborators.

- 1922 Ants of the American Museum Congo expedition. A contribution to the myrmecology of Africa. *Bul. Amer. Mus. Nat. Hist.*, 45:1-1139. (Includes keys to genera of the world.)

ACKNOWLEDGMENTS

The writer is deeply indebted to Dr. H. H. Knight, Professor of Zoology and Entomology, Iowa State College, whose guidance at all stages made this study possible.

The writer is also deeply indebted to Dr. M. R. Smith, Associate Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C., who gave valuable suggestions and criticisms concerning taxonomy, whose many courtesies at the National Museum made the writer's visit there a profitable one, and at whose recommendation certain Iowa material from the National Museum was loaned the writer.