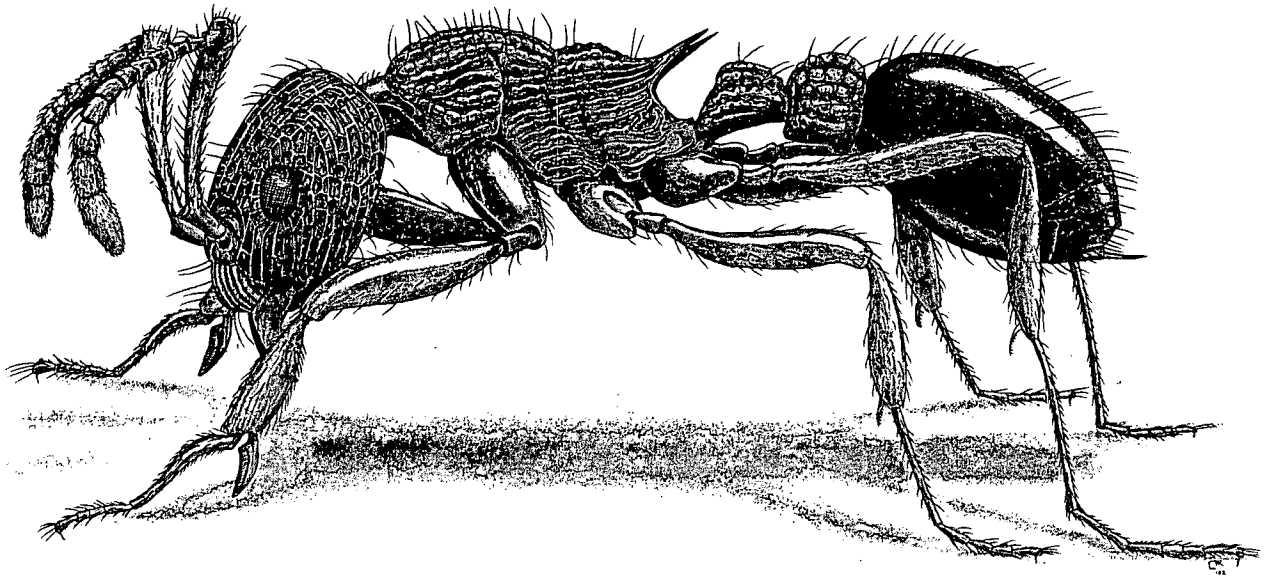
The Ants of Ohio

(Hymenoptera: Formicidae)



by

Gary A. Coovert

Ohio Biological Survey, Inc.

2005

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Acknowledgments

First and foremost, I want to thank and dedicate this volume to Brian S. Rayburn. It was Brian's visit to the Dayton Museum of Natural History early in 1996 that resulted in our mutual initiation of the Ohio Ant Survey, leading to this publication. Brian worked tirelessly on the project with me for a number of years and I was fortunate to share many a memorable field trip in his company. Life pulled him in other directions but I am glad to have been able to see our mutual project come to fruition. Thanks, Brian.

I would next like to thank Holly K. Coovert, wife, scientific illustrator, and partner on more than half of the field trips. Besides helping throughout the project on numerous details, all of the original illustrations in this work are hers for which I am deeply grateful.

I wish to thank the Ohio Department of Natural Resources, Divison of Wildlife whose funds donated to the Wildlife Diversity and Endangered Species Program enabled me to write this volume. I would especially like to thank the Dayton Museum of Natural History for continuing support throughout this project. And I am particularly pleased to thank and acknowledge the Friends of the Dayton Society of Natural History for their support.

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I would like to thank the editors of American Midland Naturalist for permission to use illustrations from Smith (1947a) and especially the artists Sara H. DeBord and Arthur D. Cushman. I would also like to thank the editors of Annals of the Entomological Society of America for permission to use the *Smithistruma* illustrations from Smith (1931) and again the artist Sara H. DeBord.

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Abstract

A comprehensive state-wide survey and identification manual of the Ants (Hymenoptera: Formicidae) of Ohio is presented. Initial sections include acknowledgements, history of Ohio myrmecology, methods and results, and newly revised illustrated keys to subfamilies and genera. The main body of the paper is a systematic treatment of the 118 species of ants recorded from Ohio (15 of which are newly recorded for the state) plus an additional 60 species possibly occurring in the state. The inclusion of these additional species increases the utility of this work in areas outside of Ohio.

Each generic account includes notes on identification, immatures, taxonomy, and the included key, plus a list of the most recent revisions. Newly revised keys to all included species are provided.

Each species account includes synonymy, notes on identification, taxonomy, ecology (including habitat, food resources, associates, and behavior), nests (including colony organization and reproductives), range, Ohio distribution, Ohio references, and comments. A distribution map of each Ohio species is provided. Illustrations of many of the included species follows. The paper concludes with appendices discussing rare species and another detailing the ecological interrelationships of *Formica subsericea*, plus a glossary and references cited sections.

Key words: Formicidae, ants, Ohio, systematics, identification keys.

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The Ants of Ohio

(HYMENOPTERA: FORMICIDAE)

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Figure 1. Map identifying Ohio counties.

Introduction

Of all the groups of insects, ants (Hymenoptera, Formicidae) are one of the most familiar and commonly encountered. Because of their sheer numbers and the ecological roles that they play, ants are one of the most important groups of terrestrial invertebrates. They are a premier survey group because they are ubiquitous and numerically dominant in terrestrial ecosystems, where they play key ecological roles in predation of other arthropods, seed dispersal (Beattie, 1990; Beattie & Culver, 1981), turning and aerating soil (Lyford, 1963), and promoting decomposition and nutrient cycling of dead wood (Hölldobler & Wilson, 1990). From a practical standpoint, ants can be collected throughout the entire collecting season, and are thus not limited seasonally like most other insects, again making them an ideal survey group. Ants have economic importance as structural, household, and garden pests, but are beneficial as general predators of agricultural and forest pests. They have been used in important studies in behavior, social organization, and complex biochemical communication systems (Hölldobler & Wilson, 1990).

Ants are potentially highly useful as habitat indicator species (e.g. Agosti et al., 2000; Browne & Gregg, 1969; Cole, 1940b; Dennis, 1938; Gadagkar, 1997a), as well as an evaluation tool for habitat quality assessment (Gadagkar, 1997b; Majer & Beeston, 1996) because of their great diversity, range of habitats, and ecological importance (Beattie & Culver, 1977; Oinonen, 1956). This large, diverse family has already been successfully used in habitat fragmentation studies, forest ecology studies, and forest canopy studies. This faunal survey of the ants of Ohio provides baseline data on diversity, distribution, and ecology necessary for any future work in the state.

There have only been a few small, regional faunal studies conducted in Ohio (Amstutz, 1943; Headley, 1943a, 1952; Wesson & Wesson, 1939, 1940), and a number of species were initially described from Ohio, but no state-wide survey has ever been done. These earlier studies were restricted in scope, are prior to more modern taxonomic studies, and had previously not been summarized. Consequently, there is a need for a modern survey of ant taxa based on recent revisions and wide-spread collecting efforts. The Dayton Museum of Natural History, with continued support from the Ohio Biological Survey, embarked on a survey of the ants of Ohio in 1996. Since that time, all of the pertinent literature has been reviewed and summarized, all 88 counties have been visited, nearly 14,000 specimens have been collected, pinned, labeled, and identified (in addition to thousands of specimens stored in alcohol), and 15 state records have been added to date. Every county in Ohio is now represented by a minimum of 13 species. Compared to the only recent state-wide surveys in northeastern North America (Illinois - DuBois & LaBerge, 1988; Indiana - Munsee et al. 1986; and, Michigan - Wheeler et al., 1994), this Ohio survey is far more complete as far as distribution, not only in counties surveyed, but in average numbers of species per county. Furthermore, none of these publications contained keys for identification, thus greatly limiting their usefulness.

Ants are a group of animals that interest many people for many different reasons. Since there has never been a comprehensive state-wide survey on ants published for NE North America, this work attempts to fill that void. This work will enable other workers and the general public to identify specimens of this important group of animals. This will hopefully result in ants being used in many more ecological and faunal studies. It is hoped that this work will serve as an informational and educational resource for professionals and the general public, and encourage more study of this fascinating group of animals in Ohio and adjoining areas.

History of Ohio Myrmecology

This report summarizes a total of 74 references which contain records of Ohio ants. These references range from a single record of Ohio for a particular species to detailed regional studies, the most comprehensive of which is Laurence G., Jr. and Robert G. Wesson's 1940 "A Collection of Ants from Southcentral Ohio."

The earliest record of which I am aware is the inclusion of Ohio in the original description by Carlo Emery in 1895 for *Leptothorax curvispinosus* subsp. *ambiguus* (but the type locality was later restricted to South Dakota). This record was repeated by Wheeler (1903). It was not until 1930 that the next reference was published (Wheeler, 1930). A few years later the first Ohio species of ant was described by Clarence Hamilton Kennedy and Mabel Mary Schramm in 1933 along with notes on other species. This began a descriptive phase for Ohio myrmecology, with a total of eleven species being described from Ohio material between 1933 and 1940:

Strumigenys ohioensis Kennedy & Schramm, 1933, now *Smithistruma ohioensis*; Type locality: Tuppers Plain, Meigs Co., Ohio

Leptothorax duloticus L. G. Wesson, 1937; Type locality: Jackson, Jackson Co., Ohio

Formica prociliata Kennedy & Dennis, 1937;Type locality: Catawba Point (Port Clinton), Ottawa Co., Ohio

Formica querquetulana Kennedy & Dennis, 1937;Type locality: Holland, Lucas Co., Ohio

Strumigenys (Cephaloxys) abdita Wesson & Wesson, 1939, now *Smithistruma abdita;* Type locality: Jackson, Jackson Co., Ohio

Strumigenys (Cephaloxys) bimarginata Wesson & Wesson, 1939, now *Smithistruma bimarginata;* Type locality: Cedar Mills, Adams Co., Ohio

Strumigenys (Cephaloxys) manni Wesson & Wesson, 1939, now *Smithistruma ohioensis;* Type locality: Sinking Spring, Pike Co., Ohio

Strumigenys (Cephaloxys) medialis Wesson & Wesson, 1939, now *Smithistruma pilinasis;* Type locality: Beaver, Pike Co., Ohio

Strumigenys (Cephaloxys) reflexa Wesson & Wesson, 1939, now *Smithistruma reflexa;* Type locality: Jackson, Jackson Co., Ohio

Strumigenys (Cephaloxys) venatrix Wesson & Wesson, 1939, now *Smithistruma talpa;* Type locality: Kitts Hill, southern Lawrence Co., Ohio

Leptothorax ambiguus pinetorum Wesson & Wesson, 1940, now *Leptothorax ambiguus;* Type locality: Jackson, Jackson Co., Ohio

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Note that the Wessons figure prominently in this period, describing a number of *Smithistruma* in addition to their valuable 1940 paper previously mentioned. L. G. Wesson also published a number of important papers on the biology of some interesting species such as *Smithistruma pergandei* (1936), *Leptothorax duloticus* (1937, 1940), and *Protomognathus americanus* (1939). Most of the Wesson types are at the Museum of Comparative Zoology (MCZ) at Harvard University (fide Brown, 1953).

C. H. Kennedy was another prominent contributor in this period, working with Clyde A. Dennis, Mabel Mary Schramm, and Mary Talbot. Some of Kennedy's material is at The Ohio State University's Museum of Biological Diversity, the alcoholic material is at the MCZ, while the bulk of his pinned collection is now at the Dayton Museum of Natural History. Clyde Dennis' 1938 paper on Tennessee ants contains a number of references to Ohio material. Also during this period and later, Marion R. Smith published a number of important revisions plus the important 1951 Hymenoptera catalog treatment of ants which cites Ohio records.

The 1940's saw continuing work on Ohio ants. A. E. Headley published a number of studies on nesting behavior (1941, 1943b, 1949) which contained Ohio records, as did his 1943a "The Ants of Ashtabula County, Ohio" and 1952 "Colonies of Ants in a Locust Woods" (Seneca Co.). Mary Elizabeth Amstutz published "The Ants of the Kildeer Plain Area of Ohio" in 1943. Mary Talbot also published a number of papers on ant behavior and population studies based on Ohio material (Talbot, 1943a, 1943b, 1945a, 1945b, 1957, and 1963).

Two unpublished Masters theses (Gorham, 1956 and Fernandes, 1986) provided a number of Ohio county records. The remainder of published records were gleaned from a wide range of revisions, natural history and population studies, and other regional studies outside of Ohio.

The single most important contribution to American myrmecology was *Ants of North America*, published in 1950 by William Steel Creighton. This landmark publication (a Bulletin of the Museum of Comparative Zoology, Harvard University) straightened out much of the overly complicated nomenclature of the past and put future work on a firm foundation. The taxonomy of the family was further progressed by the David R. Smith, 1979 section of the new *Catalog of Hymenoptera of America North of Mexico*. This catalog not only updated classification and nomenclature, but is a tremendous resource for literature citations on taxonomy, biology, and morphology. Various revisions have continued to improve the taxonomy of this family and were vital in putting together this present treatment. See Creighton (1950) for a history of North American myrmecology.

Good general information on ants can be gleaned from William Morton Wheeler's book *Ants, Their Structure, Development and Behavior* (Wheeler, 1910b). And, of course, the modern bible of myrmecology is Bert Hölldobler and Edward O. Wilson's monumental tome, *The Ants* (Hölldobler and Wilson, 1990), which Wilson (1994:306) himself describes as "a book which when dropped from a three-story building is big enough to kill a man."

History of the Ohio Ant Survey

This study is a direct result of the Ants of Ohio Survey begun in 1996 by Gary A. Coovert and Brian S. Rayburn. Early in the year Brian came in to the Dayton Museum of Natural History seeking information on local ants. As Curator of Biology, I was eager to share information. However, the Museum's collection at that time only consisted of three Cornell drawers with little of the material fully identified. I explained to Brian my long interest in the family but lack of necessary systematic literature. During that initial contact we both became enthused over future possibilities and we mutually agreed to begin a state-wide survey.

The first necessary step was to assemble a preliminary state checklist. Using the D. R. Smith, 1979 catalog as a basis, we assembled such a list and then began researching the literature for published records. We also began acquiring pertinent systematic literature.

The field season in 1996 was largely spent at the Cooverts' 35 acres in Benton Twp., Hocking Co., Ohio perfecting collecting techniques, familiarizing ourselves with Ohio's diverse ant fauna, and building up a systematic collection. A few other short trips were taken to areas surrounding Dayton, but from the Cooverts' property alone, 44 species were eventually collected which is considerably more then a third of the state's total. Field notes, in addition to the usual date and locality data, contained detailed habitat, nest structure, behavior, food resources, ecological associations, and presence of reproductives.

In the 1997 collecting season, we sought to collect representative samples throughout Ohio's five physiographic regions. In a seven week span, Brian and I visited 39 counties in 14 trips, covering over 4,000 miles, and collecting over 2,100 specimens which were pointed. In all, 44 counties (half of the total) were visited in 1997. A number of new state record species were found. The year ended with a collecting trip by the Cooverts to Florida (to collect comparative material) and a visit to the Florida State Collection of Arthropods in Gainesville (to glean Ohio records and exchange material).

Reduced general Ohio collecting occurred in 1998, although a thorough survey of Greene Co. was made. Emphasis was placed on developing keys and assembling a comprehensive systematic collection. A number of larger institutional collections were visited, including Michigan State University (E. Lansing), University of Michigan (Ann Arbor), and the Carnegie Museum of Natural History (Pittsburgh). This work was supported by an Ohio Biological Survey Institutional Small Grant, which is gratefully acknowledged. Not only were Ohio records gleaned, but exchanges for material were made to enlarge the Dayton Museum reference collection. Several out-of-state collecting trips to Michigan and Florida were also conducted to obtain comparative material, as well as a visit to Archbold Biological Station where Mark Deyrup has assembled an impressive ant collection.

The emphasis in 1999 was to further state-wide collecting efforts. Another Ohio Biological Survey grant supported visits to selected sites but the net was cast much wider. In all, 69 counties were visited and 5,368 specimens were collected and point mounted (in addition to excess material in alcohol). By the end of 1999, all 88 Ohio counties had been visited at least once in the four-year period since the survey began. A total of over 11,000 specimens had been carefully point mounted under a microscope and fully labeled by year's end.

The following year, 2000, saw renewed collecting effort as well as an Ohio Biological Survey grant to completely survey the Ohio State University collection. Much important material was represented, especially C. H. Kennedy material. A total of 1,260 specimens of Ohio ants of 65 species were identified from the OSU collection, representing 68 new county records and one new state record. The collection was enriched from the Dayton Museum collection with nearly 500 specimens of 86 species being added, 20 of which were new to the OSU collection. The field season that year concentrated on poorly collected counties and an effort was made to obtain records of several common target species from all 88 Ohio counties. I was accompanied on several trips by Peter D. Reese. These goals were realized with a total of 45 counties being visited in that year, plus over 2,000 additional specimens collected and pointed. Also, in that year a grant was submitted to the Ohio Department of Natural Resources, Division of Wildlife for funds to support the writing of this report. This grant was subsequently awarded and is gratefully acknowledged.

A grant in 2001 from the Friends of the Dayton Society of Natural History, whose support is gratefully acknowledged, enabled me to properly curate all of the Ohio material, plus much of the Michigan material, in the C. H. Kennedy pinned ant collection which is now housed at the Dayton Museum of Natural History. Besides numerous additional county records, a new state record (*Pheidole bilimeki*) was discovered. This is an important historical collection and I am very thankful to have been given the opportunity to properly curate it.

Additional collecting in 2002 concentrated on Crane Hollow State Nature Preserve, which yielded the greatest diversity of any single locality in Ohio (56 species). Other counties were visited to bolster low totals. Another 829 specimens were added to the survey.

The Ohio Ant Survey from 1996 through 2002 resulted in 13,906 specimens being collected, pointed, labeled, and identified (with much more excess material preserved in alcohol), and all 88 Ohio counties being visited (Fig. 2). Thousands of additional specimens from other collections were added to this total, and a complete review of all prior published Ohio ant records were summarized. From this large quantity of personally collected material, a large amount of ecological, behavioral, and natural history data had been amassed. All pertinent systematic literature was acquired, and a very large amount of published behavioral and natural history studies had also been obtained. Throughout the project, my personal interest in improving and revising keys expanded. Eventually all of the modern revisions were obtained and a synoptic

collection of species, both recorded from and possible for Ohio, was assembled. All of this was necessary in order to completely revise all of the identification keys, which I felt was of paramount importance.

It was out of this relatively short but intensive period of the Ohio Ant Survey that this present publication was formed. It should be mentioned at this point that most groups of insects, with relatively short and often highly seasonal adult stages, could not possibly be adequately surveyed in this short span. But ants lend themselves to this type of survey better than perhaps any other group of insects.

Methods

The History of the Ohio Ant Survey details the process employed. The field methods found most efficient, and used throughout this survey, consisted of: 1) searching for individual nests and collecting a nest series, which was collected into a separate numbered killing vial – this was how most associated reproductives were obtained; 2) collecting individual "strays" on the ground, in leaf litter, tree trunks, and foliage, keeping each habitat in a separate numbered killing vial; 3) baiting, most often using small pieces of watermelon rind or cookie crumbs, but other baits were often tried, and 4) searching leaf litter by sieving (sifting) into a pan or onto a cloth and picking up individual ants. The numbers on the killing vials were keyed to field notes and information on ecology, nest construction, behavior, and reproductives were recorded. Methods 1-3 above were found to yield the most species in the least amount of time and were consistently used on the road, since a number of localities were often sampled in a single day. But other methods were employed, and material was also collected from Malaise traps, Berlese funnel extractions (of leaf litter or decaying wood, in some cases measured quadrat samples), pitfall traps, and sweeping vegetation.

All voucher material was carefully mounted on points under the low power of a dissecting microscope to insure neat and accurate mounts, and then appendages were maneuvered where appropriate. Duplicate material (e.g. additional specimens of a nest series) was preserved in alcohol in glass vials. Care was always taken to keep the specific field numbers with all specimens. Pointed specimens were subsequently labeled with standard insect labels, consisting of locality, date, and collector, plus the field note number (e.g. GAC 2079#8) which refers back to more detailed information contained in the field notes (copy in possession of the author and also at the Dayton Museum of Natural History). See Agosti, et al. (2000) for additional details on collecting and preparing ants. This useful publication was received after much of the field work had been completed.

The basis of this study was a comprehensive literature survey, augmented with material in existing collections plus the many thousands of specimens collected and studied during 1996 through 2002. This was used to produce a species list (utilizing the latest nomenclature) and distribution maps for every recorded species. Existing literature and detailed field notes taken during 1996 through 2002 were used to summarize ecological data. Modern revisions in conjunction with the now substantial collection at the Dayton Museum of Natural History were used to produce newly revised identification keys for all taxa found in Ohio. Many newly discovered diagnostic characters have been incorporated into these keys. This will enable future workers to more accurately and confidently identify material in all subsequent studies.

Vouchers of all samples collected have been deposited in the Dayton Museum of Natural History collection, now comprising the largest collection of Ohio ants in existence and a resource of national significance. A large amount of duplicate material has been deposited in the many other institutional collections visited (below), so that access to Ohio material is made easier.

Material Studied

The following are the collections of ant material that have been utilized in this study. The institution name, location, curator responsible, and abbreviation where appropriate are given for the institutional collections.

Archbold Biological Station, Lake Placid, Florida (Mark Deyrup)

Carnegie Museum of Natural History, Pittsburgh, Pennsylvania (John E. Rawlins)

Cleveland Museum of Natural History. Cleveland, Ohio (Joe Keiper)

Florida State Collection of Arthropods, Gainesville, Florida (Howard V. Weems, Jr.), FSCA

Michigan State University, East Lansing, Michigan (Frederick W. Stehr), MSU

Ohio State University, Museum of Biological Diversity, Columbus, Ohio (Norman F. Johnson), OSUC

University of Michigan, Ann Arbor, Michigan (Mark F. O'Brien), UM

The ant collection of the Dayton Museum of Natural History, Dayton, Ohio (Gary A. Coovert, Curator Emeritus), DMNH is composed of a number of separate collections and donations from individuals, filling over 30 Cornell drawers. These include:

- Dayton Museum of Natural History, original collection

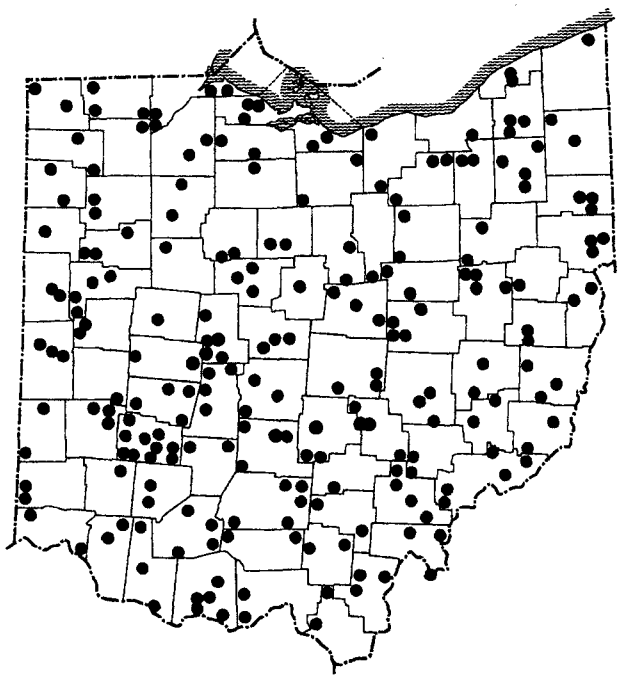

Figure 2. Collecting localities visited during 1996-2002 from the Ohio Ant Survey. Dots are accurate to township and represent one or more collecting sites.

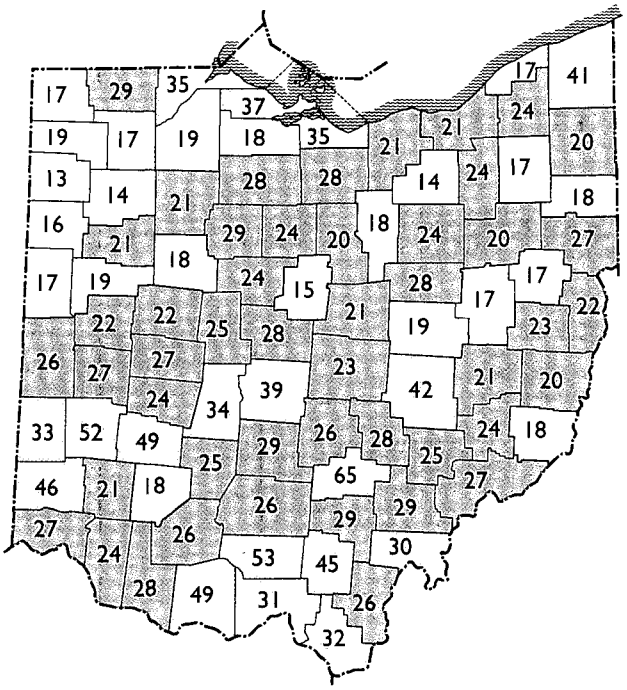

Figure 3. Cumulative county records from the Ohio Ant Survey. Key: 13-19 species (white); 20-29 species (blue-green); and, 30+ species (green).

- The Ohio Ant Survey collection, material collected 1996 - 2002 primarily by Gary A. Coovert and Brian S. Rayburn (field notes designated GAC and BSR respectively), with Greene Co. material from Gregg K. Moser (GKM)
- Roger S. Boone collection (largely Greene Co., OH)
- U.S. Forest Service prescribed burning project, Vinton & Lawrence Cos., donated by David J. Horn (pit fall trap collections) (largely in alcohol, termed the "gazillions")
- Ohio Division Wildlife grant, 1997, soil & litter samples, donated by Hans Klompen (Klompen, Parmalee, Bu, & Gerdeman)
- C. H. Kennedy pinned collection (transferred from Ohio State University collection)
- Material from numerous individuals, including Richard Bradley, James M. Buchkovich, Eric Eaton, David Riepenhoff, Thomas Watters; donated specifically for this study
- Pickaway Co. material collected by the 6th grade, Pickaway Elementary School
- Material exchanged with the above institutional collections to fill in species otherwise not represented

Finally, material loaned from several individuals, including B. D. Phillips and Eric Eaton

All of the above named individuals are gratefully acknowledged for their generosity in loaning or donating material.

Results

Ohio's ant fauna now totals 118 recorded species, 15 of which are new records for the state. Six Ohio species are introduced. An additional 60 species, some of which could possibly occur in Ohio, are included in this report (four of which are introduced). Their inclusion makes this report more widely applicable for much of the northeastern United States, especially south of boreal regions.

A total of 2,310 county records have been accumulated. A county record is a single or multiple record of a species from a particular county (a record being a single or usually multiple specimens). All 88 counties are represented, with the least number of species from any one county being 13 and the largest number being 65 (Hocking Co.). The average is thus 26.3 species per county, well above any comparable state ant survey in the northeastern United States. This level of coverage was sought in order to more closely represent actual species distributions. All too often distribution maps merely represent the efforts of collectors. Although unavoidable, it is hoped that this artifact has at least been minimized. Invariably, the counties with the highest number of species recorded do reflect greater collecting effort, showing that with increased effort, most counties could have similar totals, although the highly agricultural counties will never reflect the diversity that they undoubtedly once had.

Identification Keys

All of the keys are based on the worker caste but can usually be reliably used for queens (females). All of the keys strive to use multiple characters, allowing higher confidence in their use. The most important, and usually most obvious and easy-to-use, identification character is placed first, followed by progressively more obscure characters. Some characters used in the past, which are too obscure or unreliable, have been omitted. Taxa (subfamilies, genera, subgenera, and species) occurring in Ohio are printed in bold italic type, while taxa not recorded for Ohio are in plain italics.

Keys To Subfamilies And Genera

The keys to subfamilies and genera were drawn from a wide variety of sources and in most cases restructured, rearranged, or recombined. The classic starting point is Creighton (1950), but other keys of importance include Smith (1947a), Wheeler and Wheeler (1963, 1986), Ross et al. (1971), Hölldobler and Wilson (1990), and Bolton (1994). Data from numerous revisions were also freely utilized. The attempt was to produce keys that are not only highly accurate but relatively easy to use.

For keys to subfamilies and genera based on queens and males refer to Ross et al. (1971) and on males see Smith (1943b).

Keys To Species

Again, the keys to species were drawn from a wide range of sources, usually using Creighton (1950) as a starting point, then modified by using more modern revisions, cited under each genus. A much greater degree of modification occurred with the species keys. A great deal of effort was expended hunting for new, reliable diagnostic characters. All of the keys were, at the very least, modified, and in many cases completely rewritten, with a number of new diagnostic characters being utilized. To illustrate the extreme need for this, Ohio's four most common ant species (*Lasius alienus*, *Lasius neoniger*, *Camponotus pennsylvanicus*, and *Formica subsericea*) would have all been plagued with major identification problems using previously existing keys. *Lasius neoniger*, arguably the most common Ohio species, would have been misidentified as *L. alienus* in more than half the cases. All unusually dark *Camponotus chromaiodes* (formerly *C. ferrugineus*) would have passed as *C. pennsylvanicus*, and all *Formica glacialis* could easily have been misidentified as *F. subsericea* simply out of frustration (to the point that Wheeler & Wheeler, 1986 formally synonymized *glacialis* under *F. subsericea*). The included new keys address these deficiencies and many more, and will hopefully facilitate much more accurate, consistent, and painless identification.

All of these keys include all known and all reasonably possible Ohio species. In most cases, they will cover all of "Northeast North America," defined as the area of the United States east of the Mississippi River, and north of the southern borders of Kentucky and Virginia. This includes the New England states and extreme southern Ontario. In some cases typically boreal species largely outside of this range have not been included in the keys but are mentioned and reference given to appropriate keys. Any other exclusions are mentioned and the key is titled as to the region covered. This has been done to make the keys as widely applicable as possible.

For keys based on males and queens, see revisions, some of which contain keys to these castes. A number of draft keys to these castes were produced in various genera and were used to identify material in this study. More work is needed, especially on males.

Systematic Section

The systematic section has individual genus accounts, keys to species, and species accounts. Genera and subgenera occurring in Ohio are printed in bold type. Notes on the major diagnostic characters are given in the identification section. The type of larva and pupa are given next. The taxonomy section, where pertinent, contains notes on differing treatments, synonymies, systematic placement, and subgenera. The most recent and useful revisions are cited next. This is followed by notes on the included key.

The Ohio species are sequentially numbered and printed in bold type for easy recognition. Notes on the major diagnostic characters and a brief description are given in the identification section. "TL" refers

to total length, a sum of the lengths of all of the body parts. This is not the same as the length of a pinned, partially drooped specimen as used in earlier works. See Brown (1953) for discussion. Colors given are common sense terms, with a color modifying a base color (e.g. "brownish-yellow" is basically yellow with a brown tinge, whereas "yellowish-brown" is basically brown with a yellow tinge). The terms "paler" and "darker" are in reference to an adjacent body area (e.g. "mandibles darker" means darker than the adjacent lower head). Color is usually followed by notes on surface sculpturing. Unless otherwise stated, the gaster is smooth and glossy. This supplementary description is given as an aid to further verify an identification made from the key, but the diagnostic key characters should always be consulted first. The identification section is followed by notes on taxonomy. The ecology, behavior, and nests sections summarize all of the data collected in the Ohio Ant Survey plus notes from the Ohio literature. Field note references utilize GAC for field note numbers of Gary A. Coovert, and BSR for field note numbers of Brian S. Rayburn. This information is supplemented from literature outside Ohio where needed. The reproductives section lists dates of occurrence for winged (alate) males and females from Ohio data, supplemented as necessary from the literature. The range is adapted from D. R. Smith (1979) with modifications from recent revisions and faunal surveys. This description outlines the range by state or province, proceeding from north to south, thence west and south. The Ohio distribution is based primarily on material actually examined and keyed. These are summarized in the county distribution maps. A colored overlay has been placed on each map, indicating Ohio's ecoregions. The symbols indicate county records, not precise collection localities. Solid symbols represent material personally identified. Solid circles indicate material in the Dayton Museum of Natural History collection, while solid triangles represent other institutional and private collections. Literature records, largely unverified, are indicated by open circles. A list of these Ohio references gives county records first, with citations in chronological order, followed by more general references. An attempt was made to locate and summarize all published Ohio county records. The final comments section is utilized for various remarks, including mention of new state records and significance of the species name.

Species not recorded from Ohio are unnumbered and not in bold type. They have the same sections as Ohio species but usually with reduced information that is largely based on the literature. This information will hopefully be of aid in attempts to locate these species which could be found in Ohio. Most of these species were added because they occur in adjoining states and could possibly be found in Ohio. But many species were added to make the keys more complete for northeastern North America. Most of these will probably not be found in Ohio.

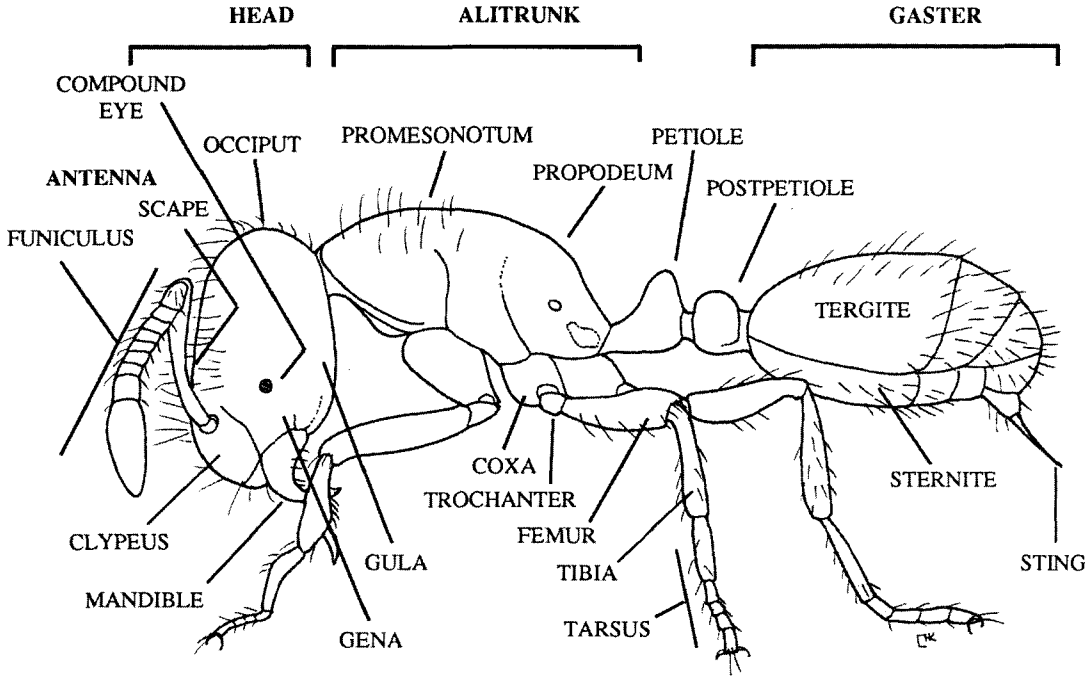

Figure 4. Morphological features of an ant.

Checklist of the Ants of Ohio

Family Formicidae

Subfamily Ponerinae
- Tribe Amblyoponini
  - Genus ***Amblyopone*** Erichson
    - 1 ***A. pallipes*** (Haldeman)
- Tribe Proceratiini
  - Genus ***Proceratium*** Roger
    - *P. croceum* (Roger)
    - 2 ***P. pergandei*** (Emery)
    - 3 ***P. silaceum*** Roger
- Tribe Ponerini
  - Genus ***Ponera*** Latreille
    - 4 ***P. pennsylvanica*** Buckley
  - Genus ***Hypoponera*** Santschi
    - 5 ***H. gleadowi*** (Forel) *
    - *H. opaciceps* (Mayr)
    - 6 ***H. opacior*** (Forel)

Subfamily Ecitoninae
- Tribe Ecitonini
  - Genus ***Neivamyrmex*** Borgmeier
    - 7 ***N. carolinensis*** (Emery)
    - *N. nigrescens* (Cresson)

Subfamily Myrmicinae
- Tribe Myrmicini
  - Genus ***Myrmica*** Latreille
    - 8 ***M. americana*** Weber
    - *M. detritinodis* Emery
    - 9 ***M. fracticornis*** Forel
    - *M. incompleta* Provancher
    - 10 ***M. latifrons*** Stärcke
    - *M. lobifrons* Pergande
    - *M. nearctica* Weber
    - 11 ***M. pinetorum*** Wheeler
    - 12 ***M. punctiventris*** Roger
    - *M. spatulata* Smith
- Tribe Stenammini
  - Genus ***Stenamma*** Westwood
    - 13 ***S. brevicorne*** (Mayr)
    - *S. diecki* Emery
    - 14 ***S. impar*** Forel **NEW STATE RECORD**
    - *S. meridionale* Smith
    - 15 ***S. schmittii*** Wheeler
- Tribe Pheidolini
  - Genus ***Aphaenogaster*** Mayr
    - *A. ashmeadi* (Emery)
    - *A. flemingi* Smith
    - *A. floridana* Smith
    - 16 ***A. fulva*** Roger
    - 17 ***A. lamellidens*** Mayr
    - 18 ***A. mariae*** Forel
    - 19 ***A. picea*** (Wheeler) Complex

Genus ***Aphaenogaster*** Mayr, continued.

20 ***A. rudis*** (Enzmann) Complex
21 ***A. tennesseensis*** (Mayr)
22 ***A. treatae treatae*** Forel

Genus ***Pheidole*** Westwood

23 ***P. bicarinata*** Mayr
24 ***P. bilimeki*** Mayr **NEW STATE RECORD** *
P. crassicornis Emery
P. davisi Wheeler
P. dentata Mayr
P. dentigula Smith
P. morrisii Forel
25 ***P. pilifera pilifera*** (Roger)
26 ***P. tysoni*** Forel

Tribe Crematogastrini

Genus ***Crematogaster*** Lund

27 ***C. cerasi*** (Fitch)
28 ***C. lineolata*** (Say)
29 ***C. pilosa*** Emery **NEW STATE RECORD**

Tribe Solenopsidini

Genus ***Monomorium*** Mayr

M. emarginatum DuBois
30 ***M. minimum*** (Buckley)
M. pergandei (Emery)
31 ***M. pharaonis*** (Linnaeus) *
M. talbotae DuBois
M. viride Brown

Genus ***Solenopsis*** Westwood

32 ***S. carolinensis*** Forel
33 ***S. molesta molesta*** (Say)
34 ***S. texana texana*** Emery **NEW STATE RECORD**

Tribe Formicoxenini

Genus ***Leptothorax*** Mayr

Subgenus ***Myrafant*** Smith

35 ***L. (M.) ambiguus*** Emery
36 ***L. (M.) curvispinosus*** Mayr
L. (M.) davisi Wheeler
37 ***L. (M.) longispinosus*** Roger
38 **L. (M.) minutissimus** Smith **NEW STATE RECORD**
39 ***L. (M.) schaumii*** Roger
40 ***L. (M.) smithi*** Baroni Urbani
41 ***L. (M.) texanus*** Wheeler

Subgenus ***Dichothorax*** Emery

42 ***L. (D.) pergandei*** Emery

Subgenus ***Leptothorax*** Mayr

43 ***L. (L.) duloticus*** Wesson
44 ***L. (L.) muscorum*** (Nylander) Complex

Genus *Formicoxenus* Mayr

F. hirticornis (Emery)
F. provancheri (Emery)

Genus *Harpagoxenus* Forel

H. canadensis Smith

Genus ***Protomognathus*** Wheeler

45 ***P. americanus*** (Emery)

Tribe Myrmecinini

Genus ***Myrmecina*** Curtis

46 ***M. americana*** Emery

Tribe Tetramoriini
Genus ***Tetramorium*** Mayr
47 ***T. caespitum*** (Linnaeus) *
Genus ***Anergates*** Forel
48 ***A. atratulus*** (Schenck) **NEW STATE RECORD** *
Tribe Blepharidattini
Genus *Wasmannia* Forel
W. auropunctata (Roger) *
Tribe Dacetini
Genus *Strumigenys* F. Smith
S. louisianae Roger
Genus ***Smithistruma*** Brown
49 ***S. abdita*** (Wesson and Wesson)
S. angulata (Smith)
50 ***S. bimarginata*** (Wesson and Wesson)
S. cloydi Pfitzer
51 ***S. clypeata*** (Roger)
S. creightoni (Smith)
52 ***S. dietrichi*** (Smith)
S. filitalpa Brown
S. laevinasis (Smith)
S. memorialis Deyrup
53 ***S. missouriensis*** (Smith)
54 ***S. ohioensis*** (Kennedy and Schramm)
55 ***S. ornata*** (Mayr)
56 ***S. pergandei*** (Emery)
57 ***S. pilinasis*** (Forel)
58 ***S. pulchella*** (Emery)
59 ***S. reflexa*** (Wesson and Wesson)
60 ***S. rostrata*** (Emery)
61 ***S. talpa*** (Weber)
Tribe Attini
Genus ***Trachymyrmex*** Forel
62 ***T. septentrionalis*** (McCook)

Subfamily Dolichoderinae
Genus ***Dolichoderus*** Lund
D. mariae Forel
63 ***D. plagiatus*** (Mayr)
64 ***D. pustulatus*** Mayr
65 ***D. taschenbergi*** (Mayr)
Genus ***Linepithema*** Mayr
66 ***L. humile*** (Mayr) *
L. iniquum nigellum (Emery) *
Genus ***Forelius*** Emery
67 ***F. pruinosus*** (Roger)
Genus ***Dorymyrmex*** Mayr
D. bureni (Trager)
68 ***D. grandulus*** (Forel) **NEW STATE RECORD**
D. insanus (Buckley)
Genus ***Tapinoma*** Foerster
69 ***T. sessile*** (Say)

Subfamily Formicinae
Tribe Plagiolepidini
Genus ***Brachymyrmex*** Mayr
70 ***B. depilis*** Emery

Genus ***Paratrechina*** Motschulsky
P. arenivaga (Wheeler)
71 ***P. faisonensis*** (Forel) **NEW STATE RECORD**
P. flavipes (F. Smith) *
P. longicornis (Latreille) *
72 ***P. parvula*** (Mayr)
P. terricola (Buckley)
Genus ***Prenolepis*** Mayr
73 ***P. imparis imparis*** (Say)
Tribe Lasiini
Genus ***Lasius*** Fabricius
Subgenus ***Lasius*** Fabricius
74 ***L. (L.) alienus*** (Foerster)
75 ***L. (L.) neoniger*** Emery
L. (L.) pallitarsis (Provancher)
Subgenus ***Cautolasius*** Wilson
76 ***L. (C.) flavus*** (Fabricius)
77 ***L. (C.) nearcticus*** Wheeler
Subgenus ***Chthonolasius*** Ruzsky
78 ***L. (C.) minutus*** Emery
79 ***L. (C.) speculiventris*** Emery **NEW STATE RECORD**
L. (C.) subumbratus Viereck
80 ***L. (C.) umbratus*** (Nylander)
Genus ***Acanthomyops*** Mayr
81 ***A. claviger*** (Roger)
82 ***A. interjectus*** (Mayr)
83 ***A. latipes*** (Walsh)
A. murphyi (Forel)
A. plumopilosus (Buren)
A. subglaber (Emery)
Tribe Formicini
Genus ***Formica*** Linnaeus
Species group Neogagates
84 ***F. lasioides*** Emery **NEW STATE RECORD**
85 ***F. neogagates*** Viereck
86 ***F. vinculans*** Wheeler **NEW STATE RECORD**
Species group Pallidefulva
87 ***F. nitidiventris*** Emery
88 ***F. pallidefulva*** Latreille
F. schaufussi dolosa Buren
89 ***F. schaufussi schaufussi*** Mayr
Species group Fusca
90 ***F. argentea*** Wheeler
F. fusca Linnaeus
91 ***F. glacialis*** Wheeler
92 ***F. montana*** Wheeler
F. neorufibarbis Emery
F. podzolica Francoeur
93 ***F. subsericea*** Say
Species group Exsecta
94 ***F. exsectoides*** Forel
95 ***F. ulkei*** Emery
Species group Rufa
F. ferocula Wheeler
96 ***F. integra*** Nylander
F. obscuripes Forel

Genus ***Formica*** Linnaeus, continued.
Species group Rufa, continued.
97 ***F. obscuriventris obscuriventris*** Mayr
98 ***F. prociliata*** Kennedy and Dennis
Species group Microgyna
99 ***F. dakotensis*** Emery
100 ***F. difficilis*** Emery
F. indianensis Cole
F. nepticula Wheeler
101 ***F. postoculata*** Kennedy and Dennis **NEW STATE RECORD**
102 ***F. querquetulana*** Kennedy and Dennis
F. talbotae Wilson
Species group Sanguinea
103 ***F. aserva*** Forel
F. creightoni Buren
F. gynocrates Snelling & Buren
104 ***F. pergandei*** Emery **NEW STATE RECORD**
105 ***F. rubicunda*** Emery
106 ***F. subintegra*** Emery
Genus ***Polyergus*** Latreille
P. breviceps Emery
107 ***P. lucidus lucidus*** Mayr
Tribe Camponotini
Genus ***Camponotus*** Mayr
Subgenus ***Camponotus*** Mayr
108 ***C. (C.) americanus*** Mayr
109 ***C. (C.) castaneus*** (Latreille)
110 ***C. (C.) chromaiodes*** Bolton
C. (C.) herculeanus (Linnaeus)
111 ***C. (C.) noveboracensis*** (Fitch)
112 ***C. (C.) pennsylvanicus*** (De Geer)
Subgenus ***Myrmentoma*** Forel
113 ***C. (M.) caryae*** (Fitch)
114 ***C. (M.) discolor*** (Buckley)
115 ***C. (M.) nearcticus*** Emery
116 ***C. (M.) subbarbatus*** Emery
Genus ***Colobopsis*** Mayr
117 ***C. impressa*** Roger **NEW STATE RECORD**
118 ***C. mississippiensis*** (Smith) **NEW STATE RECORD**

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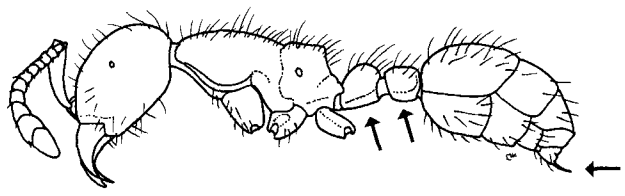
* = introduced in N.E. North America

Totals:

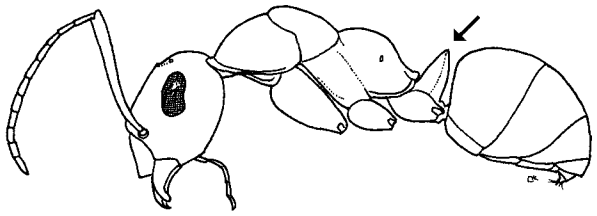
118	species recorded from Ohio (incl. 15 new State records)
60	additional species from northeastern United States, some possible from Ohio
178	Total species

Key to the Subfamilies of Formicidae of Northeastern North America

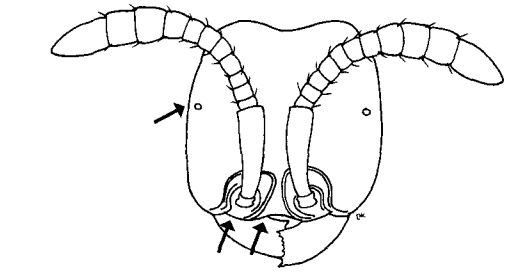
1. Abdominal pedicel (waist) composed of two distinctly differentiated segments, the petiole and postpetiole; sting usually functional **2**

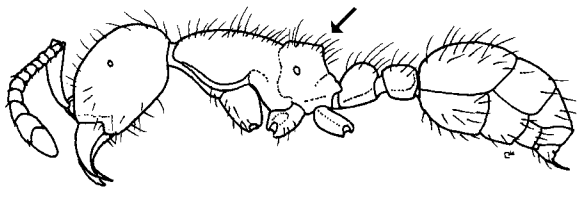


Abdominal pedicel (waist) composed of a single distinctly differentiated segment, the petiole; sting vestigial or absent in most genera **3**

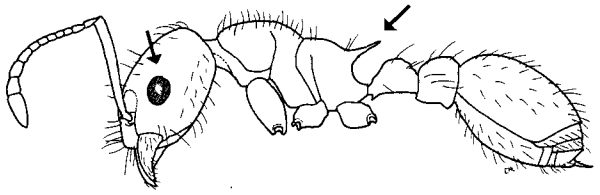


2. Eyes absent or represented by a single facet (ommatidium); antennal sockets placed close together and completely open in full-face view, not at all concealed or covered by the frontal lobes which are absent or greatly reduced; clypeus short; propodeum (epinotum) unarmed ..... **Ecitoninae** (p. 30)

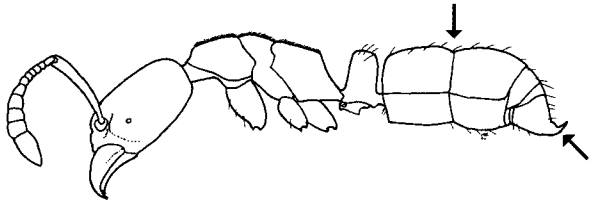




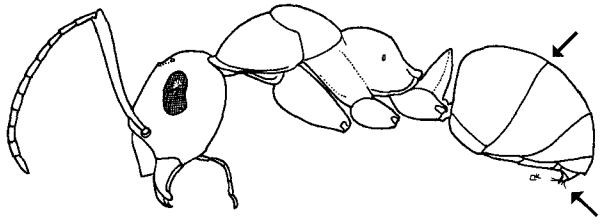
Eyes present and conspicuous, if reduced, of more than one facet (ommatidium); antennal sockets not placed close together, always partially or completely covered by the frontal lobes in full-face view and never completely open; clypeus usually prolonged back between the frontal lobes; propodeum usually with a pair of distinct teeth or spines ..... **Myrmicinae** (p.15)



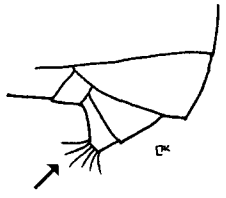
3. Gaster with a distinct constriction between the first and second segments; sting present and well-developed ..... **Ponerinae** (p.14)



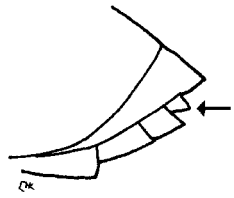
Gaster without any constriction between the first and second segments; sting vestigial **4**



4. Apex of gaster projecting conically as a semicircular to circular opening (acidopore) formed from the hypopygium (last lower plate of the gaster), this nozzle-like structure usually with an encircling fringe of short, stiff hairs (setae) around the opening ..... **Formicinae** (p. 19)

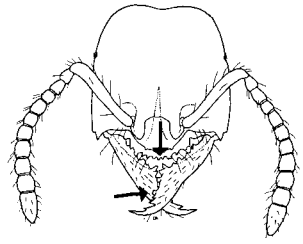


Apex of gaster lacking an acidopore, opening (cloacal oriface) slit-like, often obscure, hairs, when present, not forming an encircling fringe ..... **Dolichoderinae** (p. 18)

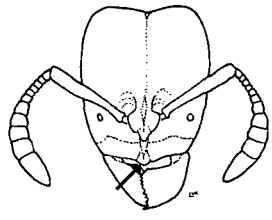


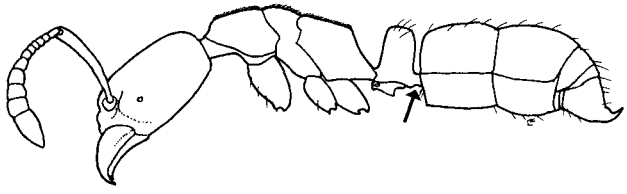
Key to the Genera of Ponerinae of Northeastern North America

1. Mandible with a row of coarse bidenticulate teeth; petiole broadly attached to first gastral segment, the two separated dorsally and laterally only by a constriction; ventral border of clypeus denticulate..... ***Amblyopone*** (p. 23)

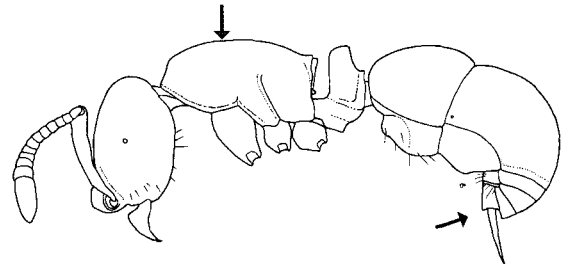


Mandibular teeth (when present) single; petiole narrowly attached to first gastral segment, the two joined via a slender articulatory junction; ventral border of clypeus not denticulate..... **2**

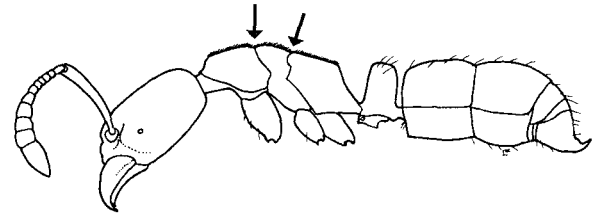




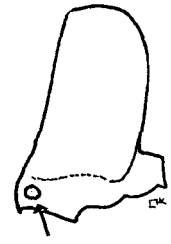
2. Apex of gaster directed ventrally or anteroventrally; dorsal sutures of alitrunk absent or vestigial, promesonotal suture always absent ..... ***Proceratium*** (p. 24)



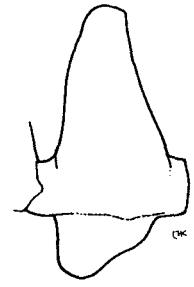
Apex of gaster not directed ventrally or anteroventrally; promesonotal suture always present, usually metanotal suture present as well **3**



3. Subpetiolar process with anteroventral corner blunt or rounded and posterior bidentate, and with a circular or oval fenestra or thin area anteriorly on each side evident when viewed by transmitted light; maxillary palp 2-segmented ..... ***Ponera*** (p. 27)



Subpetiolar process a simple lobe without a fenestra or teeth; maxillary palp 1-segmented..... ***Hypoponera*** (p. 28)

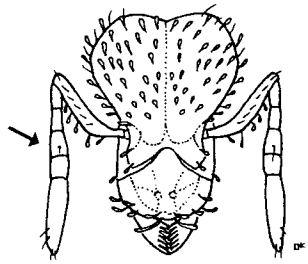


Key to the Genera of Myrmicinae of Northeastern North America

1. Workers absent, strictly parasitic form; gaster of the female with a deep longitudinal furrow extending its full length dorsally ..... ***Anergates*** (p. 85)

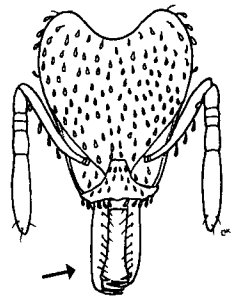
   Workers present (or females not as above) **2**

2. Antenna with 6 segments; petiole and postpetiole with spongiform tissue present; body hairs usually clavate or spatulate; head wedge- or heart-shaped in full-face view **3**

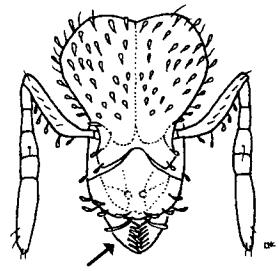


   Antenna with 10 to 12 segments; otherwise not as above **4**

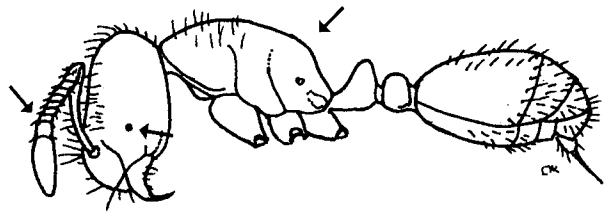
3. Mandibles linear, long and slender, the apex of each with a fork of 2 spine-like teeth, arranged one above the other, the remainder of the inner border unarmed except for a single, small, subapical tooth ... . (*Strumigenys*; p. 86)



   Mandibles somewhat curved, much shorter, triangular or subtriangular, the inner border armed with more than 2 teeth along its distal half and with a single, large triangular tooth at the base .... ***Smithistruma*** (p. 87)



4. Antenna with 10 segments, the last two forming a very distinct club; propodeum (epinotum) unarmed; eyes very small, with 15 ommatidia or less .... ***Solenopsis*** (p. 66)



   Antenna with 11 or 12 segments; antennal club either undifferentiated or composed of 3 or more segments (if with an indistinct 2-segmented club, then antenna 11-segmented, propodeum with distinct spines, and head with faint antennal scrobes) **5**

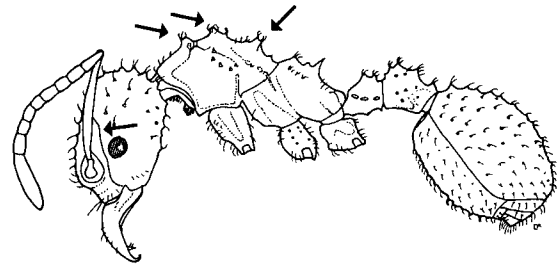
5. Antenna with 11 segments **6**

   Antenna with 12 segments **12**

6. Postpetiole attached to dorsal surface of the base of the gaster; gaster subcordate, flattened dorsally, much more convex ventrally, acute apically, capable of bending forward over the alitrunk .... ***Crematogaster*** (p. 60)

   Postpetiole attached to the anterior end of the first gastral segment; gaster not subcordate, about equally convex above and below, not notably pointed apically, not capable of bending forward over the alitrunk **7**

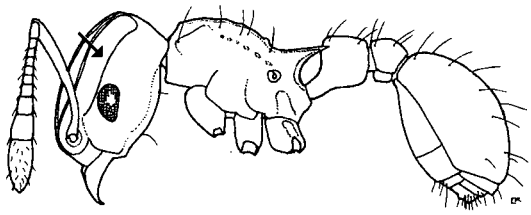
7. Promesonotal dorsum with 3 or more elongate, sharp spines or teeth; entire body, including the antennal scapes and legs, covered with numerous small tubercles; frontal carinae conspicuous, extending almost to the posterior corners of the head .... ***Trachymyrmex*** (p. 101)



Promesonotal dorsum smooth to coarsely sculptured but not equipped with spines or teeth; otherwise not as above **8**

8. Frontal carina short, not reaching the posterior border of the eye, lacking antennal scrobes **9**

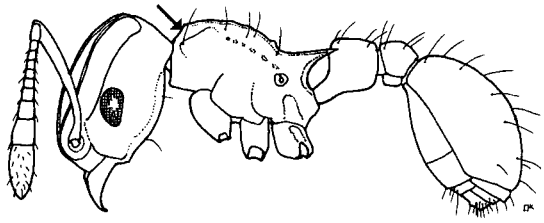
Frontal carina elongate, extending well beyond the posterior margin of the eye, forming a shallow scrobe for the reception of the antennal scape **10**



9. Eyes with conspicuous, short, erect pubescence projecting between the ommatidia .. *(Formicoxenus; p. 79)*

Eyes without erect pubescence projecting between the ommatidia ..... ***Leptothorax*** (in part; p.69)

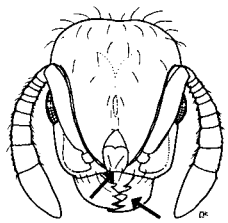
10. Minute yellow species, total length 1.5 to 2.0 mm; humeri ("shoulders" of prothorax) distinctly angular; anterior border of clypeus convex; mandible with 5 teeth ..... *(Wasmannia*; p. 86)



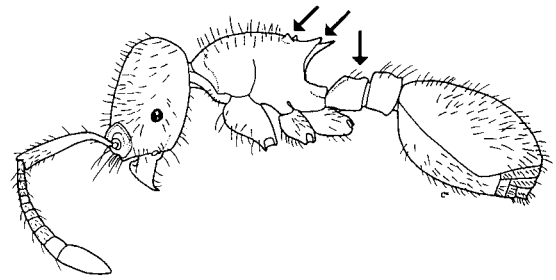
Larger species, total length 2.8 mm or longer, darker in color; humeri rounded; anterior border of clypeus with a very distinct median emargination; mandible with 0-4 teeth **11**

11. Mandibles lacking teeth and dorsal surfaces flattened; clypeus with narrow, deep median notch; front of the head with delicate longitudinal rugae ..... (*Harpagoxenus*; p.80)

Mandibles bearing 4 teeth and dorsal surfaces strongly convex; clypeus with broad, very shallow median impression; front of the head finely punctate ..... ***Protomognathus*** (p. 81)

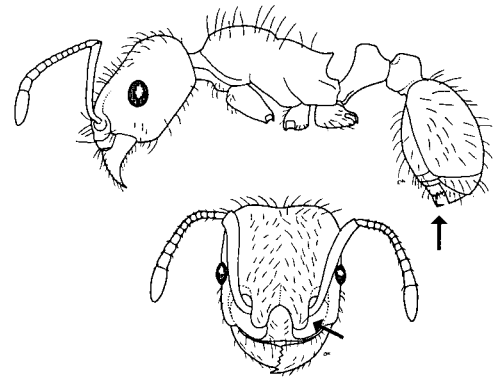


12. Petiole short and subcylindrical in profile, lacking an anterior peduncle, and with node absent or rudimentary; propodeum with 2 pairs of spines ..... ***Myrmecina*** (p. 82)



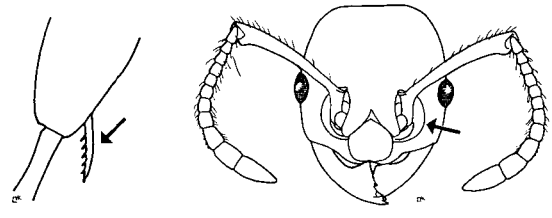
Petiole with a distinct node, the anterior peduncle distinct, although may be short; propodeum with a single pair of spines or unarmed (exclusive of the pair of sharp angles often present on the metasternum) **13**

13. Clypeus with the posterolateral portions raised into a sharp, narrow ridge or carina which forms an abrupt, semicircular boundary at the front of the antennal socket, creating the impression of a deep pit surrounding the socket; sting with a small, transparent triangular appendage at tip dorsally ..... ***Tetramorium*** (p.83)



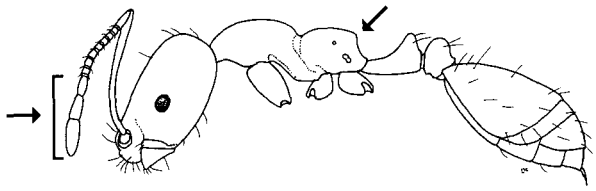
Clypeus not raised into a sharp, narrow ridge posterolaterally, thus antennal socket does not appear to be surrounded by a deep pit, especially anteriorly; sting simple, without an appendage at tip **14**

14. Spurs of middle and hind tibiae very finely pectinate, the teeth regular but often too small to be seen at magnifications of less than 100 X; posterior border of clypeus with a distinct, semicircular, deep sharp impression; maxillary palp 6-segmented, labial palp 4-segmented ..... ***Myrmica*** (p. 32)



Spurs of middle and hind tibiae simple or absent; posterior border of clypeus with a short, shallow depression or its margin merging smoothly into the rest of the head; maxillary palp 5-segmented or less, labial palp 3-segmented or less **15**

15. Propodeum unarmed, without spines or teeth; clypeus with a pair of longitudinal carinae which are extended on the anterior border as more or less distinct teeth; masticatory margin of mandible with 3 or 4 teeth or denticles in total; antennal club of 3 segments ..... ***Monomorium*** (p. 63)

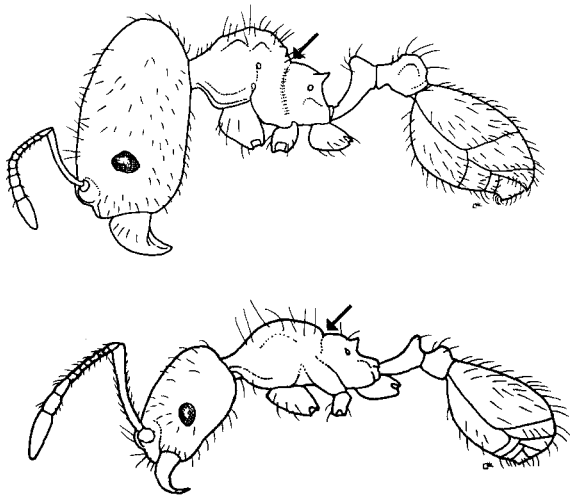


Propodeum armed with a pair of teeth or spines; clypeus usually lacking longitudinal carinae (may be rugulose), but if carinae present, not extended on the anterior border as teeth; masticatory margin of mandible usually with 5 or more teeth or denticles in total; antennal club indefinite or composed of 3 or 4 segments **16**

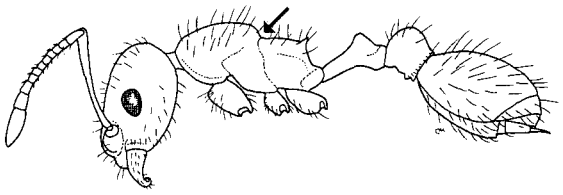
16. Antenna with a distinct 3-segmented club **17**

Antenna with an indistinct or 4-segmented club .. **18**

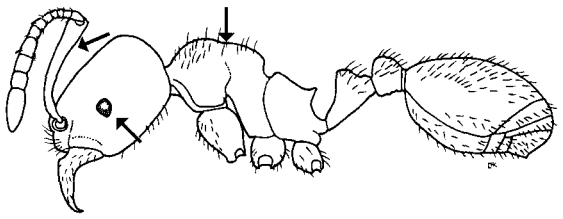
17. Worker caste dimorphic (rarely polymorphic) with the head of the major disproportionately large, and usually developed posteriorly into two prominent occipital lobes; dorsum of alitrunk in profile interrupted by one or more sutural impressions ..... ***Pheidole*** (p. 52)



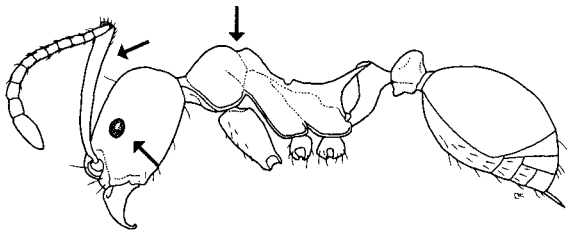
Worker caste not dimorphic, lacking major with a disproportionately large head; dorsum of alitrunk in profile flattened or convex, forming a continuous surface not interrupted by sutural impressions (if metanotal suture present (see below), then dorsal surface of head and pronotum smooth and glossy black) ..... ***Leptothorax*** (in part; p. 69)



18. Clypeus with a pair of fine longitudinal carinae which diverge anteriorly; antennal scapes short, not reaching the occipital border; eyes vestigial or small; antenna thickened distally to form an indistinct 4-segmented club; 2nd antennal segment as long as next 2 or 3 combined; promesonotal suture indistinct or absent; small species, 2.5 to 4.3 mm in total length ..... ***Stenamma*** (p. 39)

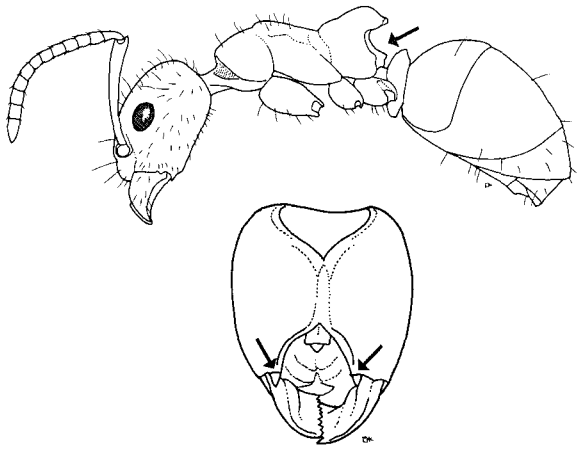


Clypeus without a pair of longitudinal carinae although may be rugulose or with a single median carina; antennal scapes long, distinctly surpassing the occipital border; eyes well developed, prominent; antenna not thickened distally to form a club, although last 4 segments may be differentiated in color; 2nd antennal segment not much longer than 3rd segment; promesonotal suture distinct; larger species, 4.0 to 7.6 mm in total length ..... ***Aphaenogaster*** (p. 43)



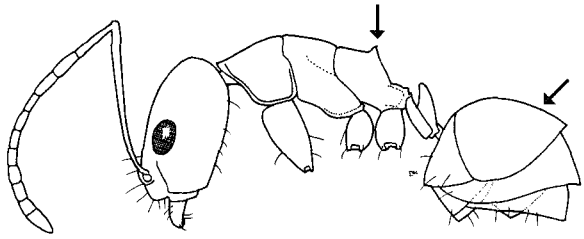
Key to the Genera of Dolichoderinae of Northeastern North America

1. Propodeum (epinotum) with a strong dorsal projection extending posteriorly and forming an overhang, thus strongly concave in side-view, meeting the posterior (declivitous) face at a sharp angle; propodeum and often much of the remainder of the alitrunk heavily sculptured; integument thick, hard, and brittle; hypostoma on each side with tooth-like projection adjacent to the ventral surface of mandibular insertion ..... ***Dolichoderus*** (p. 102)



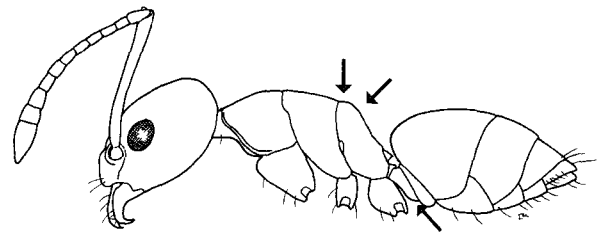
Propodeum convex, straight, or weakly concave, not meeting the posterior (declivitous) face at a sharp angle; propodeum, as well as remainder of body, finely sculptured; integument thin and flexible; hypostoma lacking tooth-like projection **2**

2. Propodeum with a prominent, sharp, conical or tubercular protuberance projecting vertically at juncture of the dorsal and posterior (declivitous) faces; gaster distinctly and strongly compressed laterally; maxillary palp with 3rd segment unusually elongate, commonly as long as or longer than the next 3 segments combined ..... ***Dorymyrmex*** (p. 109)



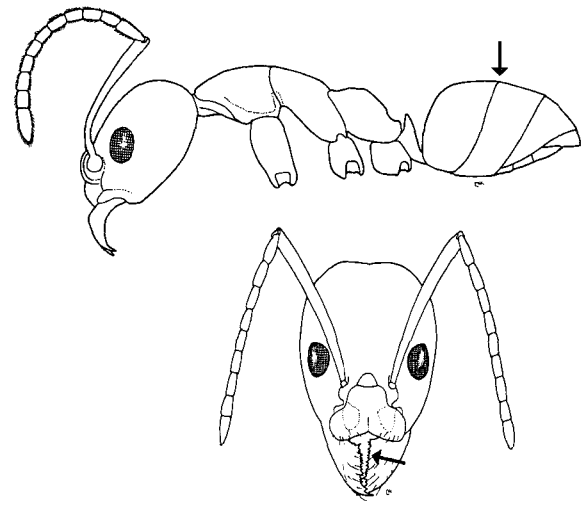
Propodeum unarmed, evenly convex or angulate at juncture of dorsal and posterior (declivitous) faces; gaster normally inflated, not laterally compressed; maxillary palp with 3rd segment not unusually elongate, notably shorter than next 3 segments combined **3**

3. Petiolar scale or node very small and indistinct, strongly inclined forward and fused to anterior peduncle; dorsal face of propodeum shorter than posterior (declivitous) face; without hairs on dorsum of alitrunk or head ..... ***Tapinoma*** (p. 111)

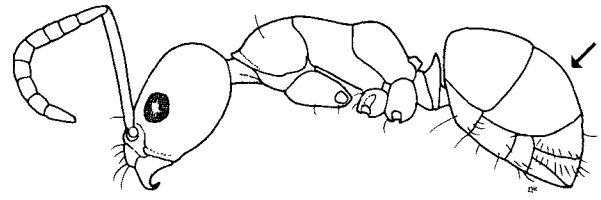


Petiolar node distinct but small, erect or suberect; dorsal face of propodeum as long or longer than the posterior (declivitous) face; a few coarse hairs on head and alitrunk **4**

4. Hairs on anterior border of clypeus short, straight, much shorter than the closed mandibles; gaster not compressed, round in cross-section; mandibles with several minute denticles between each of the larger teeth, except between apical and preapical ..... ***Linepithema*** (p. 106)

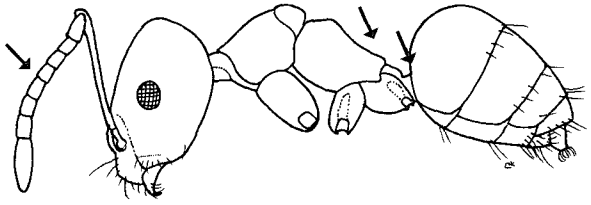


Hairs on anterior border of clypeus long, curved, about the same length as closed mandibles; gaster compressed dorsoventrally; mandibles with denticles between basal and subbasal teeth only ..... ***Forelius*** (p. 108)



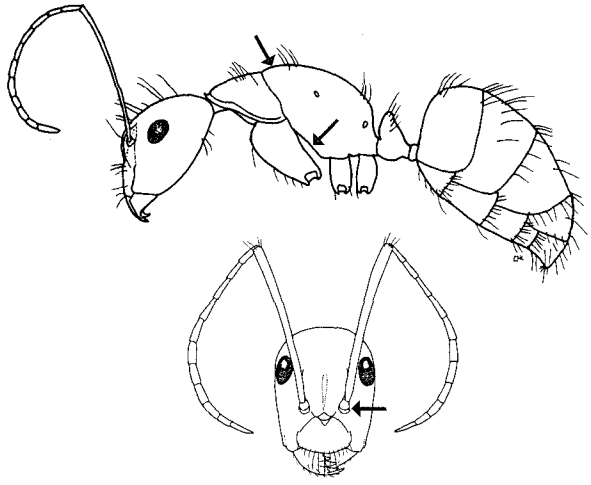
Key to the Genera of Formicinae of Northeastern North America

1. Antenna with 9 segments; petiolar node inclined, usually concealed from above by the base of the gaster; propodeum with a very short dorsum and an unusually long declivity; small species, 1.2 to 1.4 mm in total length ..... ***Brachymyrmex*** (p. 113)

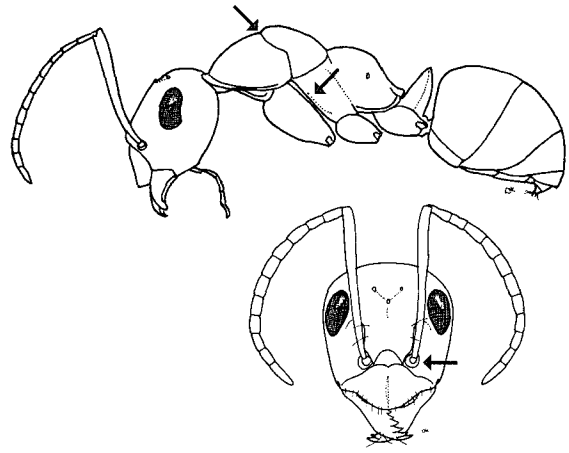


Antenna with 12 segments; without above combination of characters **2**

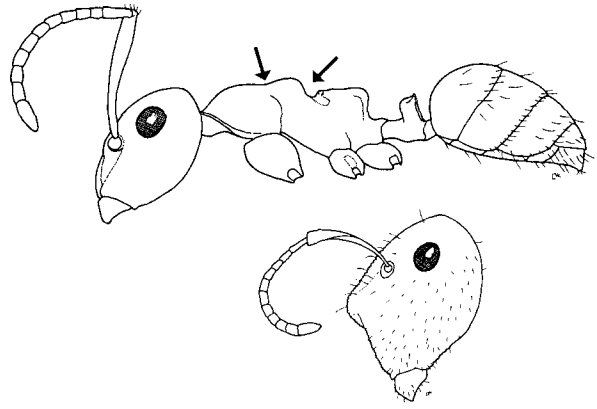
2. Mesopleuron with anteroventral edge formed as a sharp carinate ridge; dorsum of alitrunk in profile usually evenly convex and continuous, the propodeum not depressed below the level of the promesonotum, the metanotal suture usually unimpressed or very slightly impressed (only in *Colobopsis*); antennal sockets situated well behind the posterior margin of the clypeus; metapleural gland orifice absent, thus metapleural surface uninterrupted above the hind coxa, the orifice lacking guard setae; workers usually polymorphic or dimorphic **3**



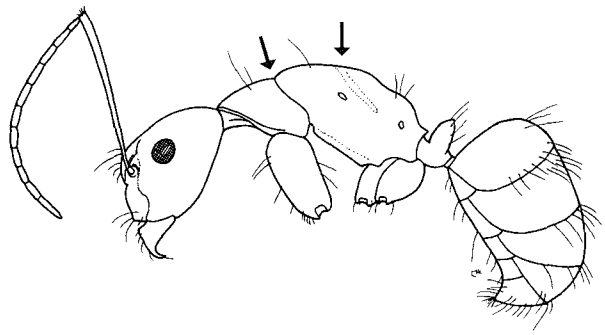
Mesopleuron with anteroventral edge rounded, not formed as a sharply carinate ridge; dorsum of alitrunk in profile clearly discontinuous, constricted to some degree and thus not evenly convex, the propodeum often distinctly depressed below the level of the promesonotum, the metanotal suture moderately to strongly impressed; antennal sockets situated close to posterior margin of clypeus; metapleuron with a distinct, wide orifice for the metapleural gland situated above the hind coxa; orifice of metapleural gland usually protected by a line or tuft of generally conspicuous guard setae; workers usually monomorphic, sometimes weakly polymorphic **4**



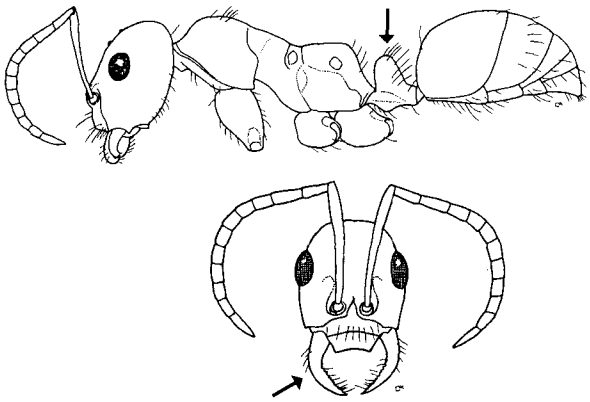
3. Promesonotal and metanotal sutures present and usually distinctly impressed; head of major obliquely truncate in front with the borders of the truncated zone sharply marginate, forming a functional cork or plug; crest of petiole slightly to distinctly concave dorsally; workers completely dimorphic (two distinct forms, medias absent) ..... ***Colobopsis*** (p. 179)



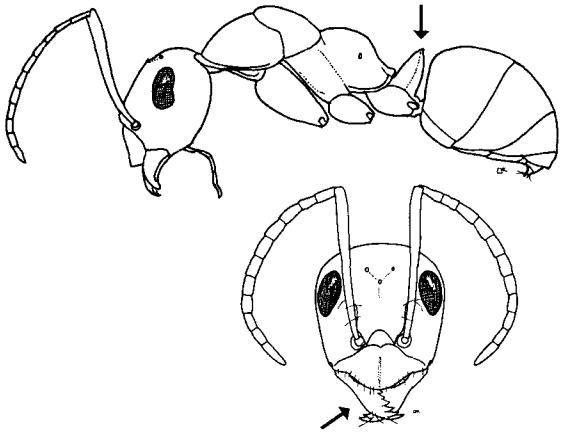
Promesonotal and metanotal sutures absent or very weakly impressed; head of major not distinctly obliquely truncate in front (if somewhat truncate, the truncated zone not sharply marginate); crest of petiole convex dorsally; workers continuously polymorphic, rarely dimorphic ..... ***Camponotus*** (p. 162)



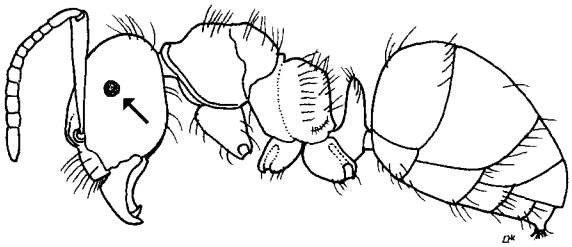
4. Mandible narrow, falcate (sickle-shaped), with pointed apex, internal border minutely serrated but lacking teeth; petiole with prominent, rounded node, not scale-like; maxillary palp 4-segmented, labial palp 2-segmented ..... ***Polyergus*** (p. 160)



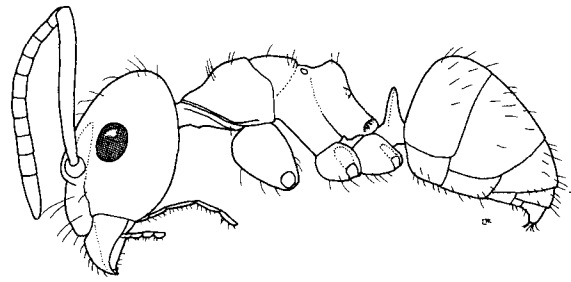
Mandible more or less triangular, masticatory margin with 5 to 12 distinct teeth; petiole usually scale-like, sometimes with a rounded node; palp formula 6, 4 or 3, 3, never 4, 2 ..... **5**



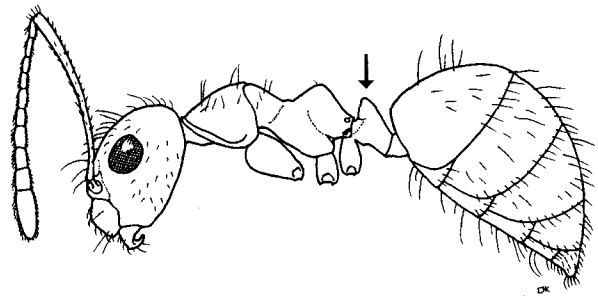
5. Maxillary palp 3-segmented and very short; eye width generally less than that of the last antennal segment; yellow or orange subterranean ants ..... ***Acanthomyops*** (p. 128)



Maxillary palp 6-segmented and moderately to exceptionally long; usually otherwise not as above.. **6**

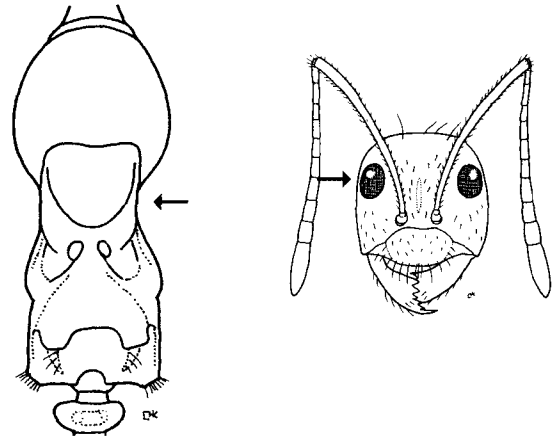


6. Petiolar node low and sloping anteriorly, forming a low anteriorly directed triangle; erect body hairs long, often coarse and brown or black in color; mandibles with 5 or 6 teeth **7**

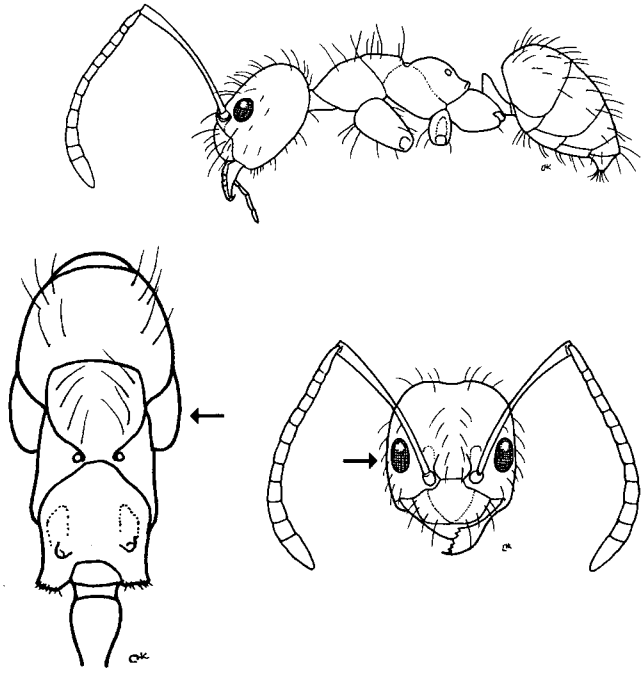


Petiolar node upright, forming a high triangle; erect body hairs short and pale, not coarse and dark in color; mandibles with 7 or more teeth **8**

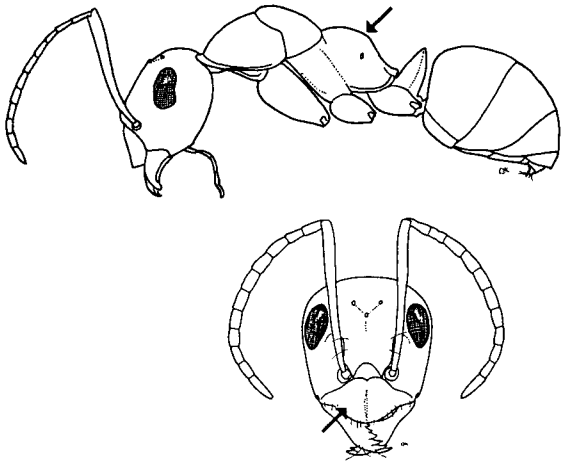
7. Alitrunk strongly constricted and subcylindrical at mesothorax, swollen in front of and behind constriction, giving a distinctive hourglass-like shape when viewed from above; eyes situated above the middle of the head in full-face view; pilosity not conspicuously coarse or bristle-like; erect hairs mostly slender and golden or brownish, not distinctly paired; femora and tibiae without erect hairs ..... ***Prenolepis*** (p. 117)



Alitrunk only slightly constricted at mesothorax, lacking obvious hourglass-like shape; eyes situated at or below the middle of the head in full-face view; pilosity coarse and bristle-like; erect hairs often dark brown or black and arranged in distinct pairs; femora and tibiae with erect hairs ..... ***Paratrechina*** (p. 114)



Clypeus narrower and longer, slightly more than 2 X as wide as long; dorsum of propodeum rounded; propodeal spiracle elliptical to broadly oval; ocelli conspicuous; frontal carinae short but distinct, each a small ridge with a moderately to sharply angulate summit that is sometimes slightly reflected upward; larger species, 3.5 to 9.0 mm in total length, usually 4.5 to 9.0 mm ..... ***Formica*** (p. 132)



8. Clypeus broad and short, nearly 3 X as wide as long; dorsum of propodeum somewhat angulate; propodeal spiracle circular to subcircular; ocelli indistinct or absent; frontal carinae indistinct or absent, if present, lateral margin rounded or nearly flat; smaller species, 2.2 to 5.2 mm in total length, usually 2.2 to 4.1 mm ..... ***Lasius*** (p. 119)

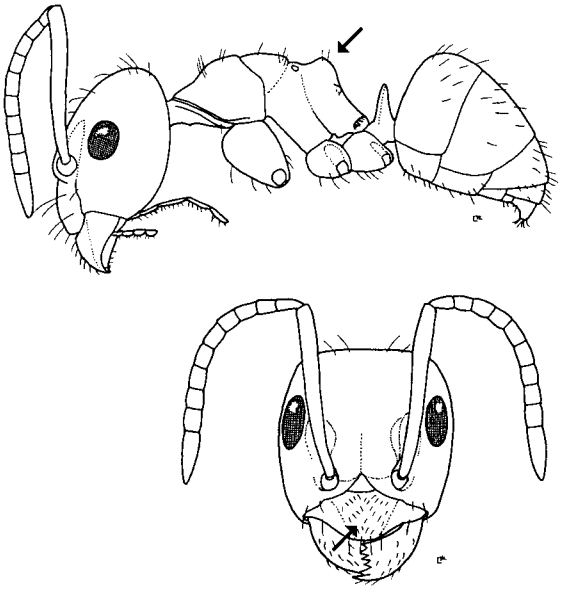


Figure 5. Map of Level III Ecoregions in Ohio.* **SMNIDP**—Southern Michigan/ Northern Indiana Drift Plain; **HELP**—Huron /Erie Lake Plains; **ECBP**—Eastern Corn Belt Plains; **IP**—Interior Plateau (Level IV - Northern Bluegrass); **WAP**—Western Allegheny Plateau; **EOLHP**—Erie / Ontario Lake Hills and Plain.

* Woods, A.J., J.M. Omernik, C.S. Brockman, T.D. Gerber, W.D. Hosteter, and S.H. Azevedo. 1998. Ecoregions of Indiana and Ohio. Map and table produced by Ohio EPA, Ohio DNR, U.S.Geological Survey, USEPA, and others. USGS, Reston, VA.

Family Formicidae

Nomenclature: Generic and specific nomenclature (including the correct attribution of authors) follows the excellent catalogue of Bolton (1995). Only the generic and specific synonyms commonly encountered in relevant regional literature are listed. For more complete coverage, including synonyms and additional references, see D. R. Smith (1979) and Bolton (1995, 2003).

Taxonomy: Higher classification largely follows Bolton (1994, 1995, 2003) with exceptions noted in the text. Many other sources were consulted, including the classification in Hölldobler & Wilson (1990) and the catalog of D. R. Smith (1979).

Subfamily Ponerinae

Taxonomy: Tribes of the Ponerinae were raised to subfamily rank by Bolton (2003), but collectively grouped as "poneromorph subfamilies." This is equivalent to the well-established Ponerinae that is used here.

Tribe Amblyoponini

Genus *Amblyopone* Erichson

Amblyopone Erichson, 1842
Stigmatomma Roger, 1859

Identification: The very distinctive bidenticulate mandibles and denticulate clypeus are diagnostic.

Immatures: Larvae pogonomyrmecoid; pupae in cocoons (Wheeler & Wheeler, 1976).

Taxonomy: According to Wheeler & Wheeler (1976), Brown's (1960) synonymy of *Stigmatomma* with *Amblyopone* is not supported by larval characters. Most recent authors have followed this synonymy as is done here.

Revision(s): Brown (1960) and Lattke (1991), both of which have keys to New World species of workers and females.

Key: A single species is found in our area. *A. trigonignatha* was described from a single specimen from North Carolina and is not included in this report.

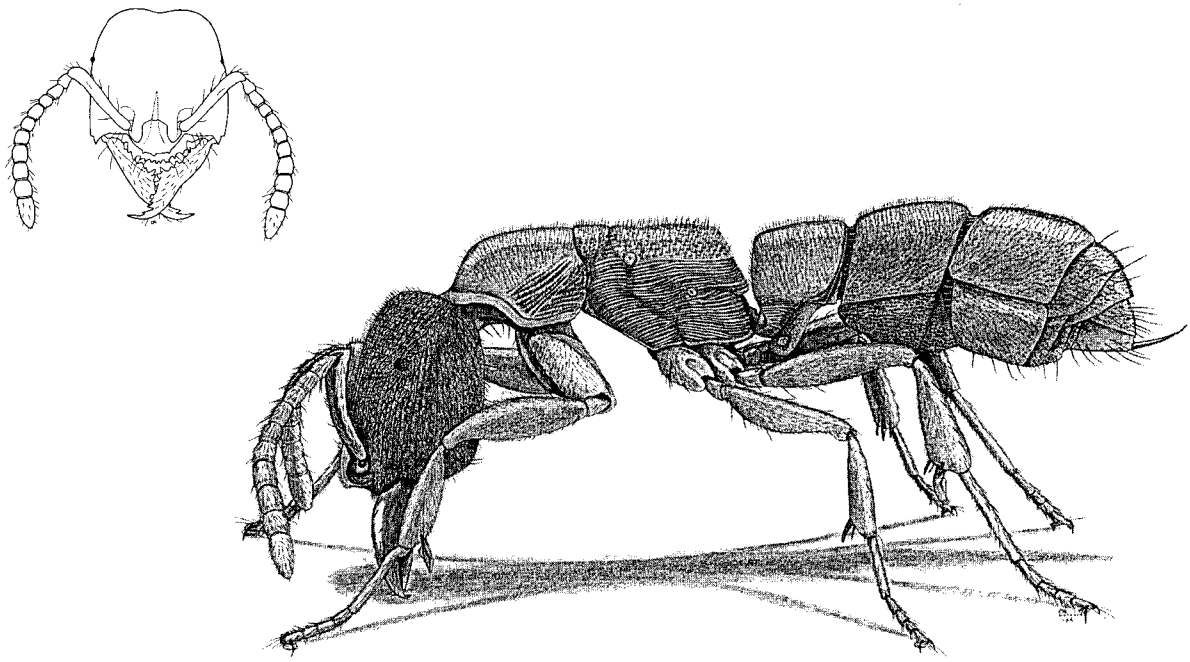
Comments: These primitive, slow-moving ants are largely subterranean. The large jaws are distinctive.

1 *Amblyopone pallipes* (Haldeman)

Typhlopone pallipes Haldeman, 1844
Stigmatomma pallipes (Haldeman)

Identification: TL 4.5-6.5 mm. Variable, but typically brown to very dark reddish-brown with mandibles, antennae, and legs yellowish-brown; tenerals (incompletely pigmented adults) common, paler, mottled with yellowish-brown; head and alitrunk distinctly sculptured (punctate), surface dull or only very weakly glossy; body with fine, short pubescence. This is the only species found in our area and is easily recognized by the characters given for the genus.

Taxonomy: Most earlier references placed this species in the genus *Stigmatomma*, now a synonym of *Amblyopone*. See Brown (1960).



***Amblyopone pallipes* (Haldeman),** full face view of head and habitus. Drawing by Holly K. Coovert.

Ecology:

— Habitat: Prefers moist, shaded woodlands. DuBois & LaBerge (1988) note "shaded areas in deciduous forest, usually on south-facing slopes" for Illinois.

— *Food Resources:* Centipedes (chilopods), usually lithobiids or geophilomorphs, are the main food source and the ant larvae are apparently transferred to the prey to feed (Brown, 1960; D. R. Smith, 1979).

— Associates: Further data lacking.

Behavior: Slow-moving workers forage in leaf litter, under bark of logs, and under rocks, rarely, if ever, being found on the surface (hypogaeic). Females also forage for food during the period of nest founding which is an archaic habit in ants. Centipede prey is paralyzed by stinging, then brought back to the nest where it can be stored for some time (Hölldobler & Wilson, 1990).

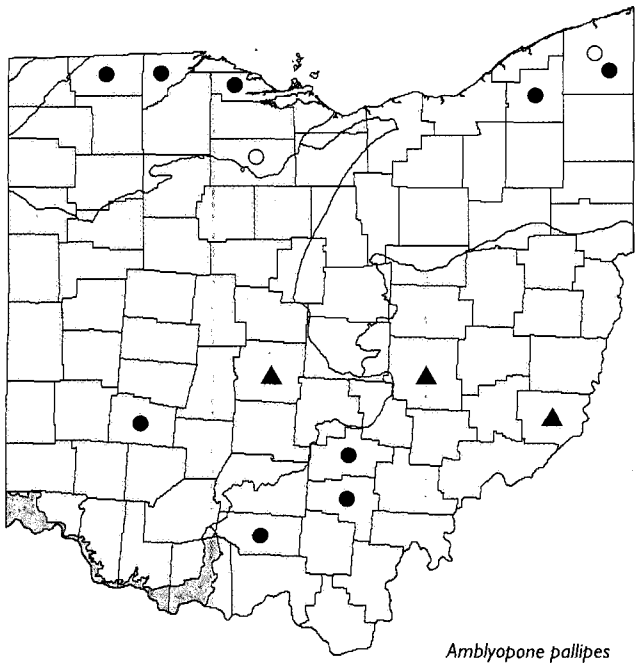
Nests: Under rocks and stones, under bark of logs, in ground in leaf litter.

— Colony Organization: Colonies are small, consisting of 9 to 16 workers and one or more queens (Traniello, 1978); Hölldobler & Wilson (1990) cite colony size of 1-35. GAC 2154#21 with 6 dealate females.

— Reproductives: Males - Aug. 28-Oct. 15; Aug. 22 (in colony, with 6 dealate females, GAC 2154 #21). Females - Aug. 5, Sept. 2-Oct. 31. Females "call" males not far from the nest by releasing pheromones; after mating, females usually return to the home nest (Hölldobler & Wilson, 1990).

Range: Ontario, Quebec south to Georgia, Florida, west to Wisconsin, Iowa, Oklahoma, Colorado, Texas, Arizona.

Ohio Distribution: Widespread in Ohio. Recorded from 13 counties.



Amblyopone pallipes

Ohio References: Ashtabula (Headley, 1943a), Seneca (Headley, 1949, 1952), southcentral Ohio (Wesson & Wesson, 1940), northern Ohio (Dennis, 1938), Ohio (Gorham, 1956).

Comments: This species, our most primitive ant, is exclusively subterranean (hypogaeic). The bidentate jaws of this ant are very distinctive.

Tribe Proceratiini

Taxonomy: Although the inclusion of *Proceratium* in the Ectatommini was disputed by Wheeler & Wheeler (1971b: 1213, 1976:97) based on the unusual larvae, most classifications have followed Brown (1958). But Bolton (1995) recognizes the Proceratiini as is done here.

Genus *Proceratium* Roger

Proceratium Roger, 1863
Sysphingta Roger, 1863
Sysphincta Mayr, 1865, and most subsequent authors [incorrect subsequent spelling]

Identification: The shape of the gaster, with the apex directed ventrally or anteroventrally, along with the absence of dorsal sutures on the alitrunk is diagnostic.

Immatures: Larvae platythyreoid; pupae in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Brown (1958) contains revisionary notes; Brown (1979) includes a key to New World workers; and Ward (1988) includes a key to New World workers and queens.

Key: The key below contains all of the species of eastern North America (the record of the European *P. melinum* is apparently in error).

Comments: These unusual ants are a reddish color that matches the rotten wood in which they live. They spend all of their lives hidden in the leaf litter, or under logs or stones (hypogaeic), and do not come out into the open. Like other members of the subfamily, the eyes are greatly reduced in the workers.

Key to *Proceratium* of Eastern North America

1. Petiolar node low and much rounded above, nodiform or "bun-shaped"; 2nd gastral segment strongly inflated and extended posteriorly with the terminal gastral segments arising near anterior end below; anterior border of clypeus with a strongly projecting median lobe ..... ***P. pergandei***

   Petiolar node in the form of a thick, erect scale with nearly parallel anterior and posterior faces which are flattened or concave; 2nd gastral segment curved downward with the terminal abdominal segments

arising from near posterior end; anterior border of clypeus not projecting medially **2**

2. Smaller species, total length 2.75 mm or less; petiolar node slender in profile, the base distinctly thicker than the crest; edges of crest rounded, not sharply formed; propodeal (epinotal) teeth very short, scarcely more than angles ..... ***P. silaceum***

   Larger species, total length 3.75 to 4.0 mm; petiolar node thick and blunt in profile, the base very little thicker than the crest; edges of crest sharp and well-defined, especially posteriorly; propodeal teeth prominent ..... (*P. croceum*)

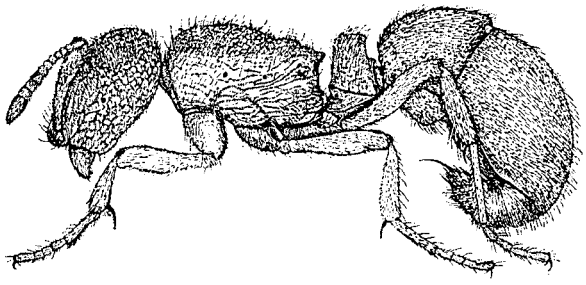
Proceratium croceum (Roger)

Ponera crocea Roger, 1860

Identification: TL 3.7-4.0 mm. Brownish-orange to reddish-brown, including mandibles and appendages; head and alitrunk coarsely sculptured. Recognized by the shape of the petiolar node and the larger size.

Taxonomy: Long recognized as distinct.

Ecology:



Proceratium croceum (Roger). From Smith (1947a).

— Habitat: In wet, densely shaded area of mixed cove hardwoods in Tennessee (Cole, 1940b).
— Food Resources: Presumed to be a predator of spider eggs.
— Associates: Further data lacking.

Behavior: Strictly found underground or beneath cover (hypogaeic). Cole (1940b) reports that they are sluggish in their movements.

Nests: Gregg (1944) reports this species as being collected under dung in Indiana. Cole (1940b) found a nest in a moss-covered, well-decayed log. See Van Pelt (1958) for Florida habitats.
— Colony Organization: Colonies are small, ca. 30 workers (Cole, 1940b) and one queen (Van Pelt, 1958).
— Reproductives: Males and females present in nest in Tennessee Aug. 4 (Cole, 1940b).

Range: Virginia to Florida, west to Indiana, Illinois, Texas.

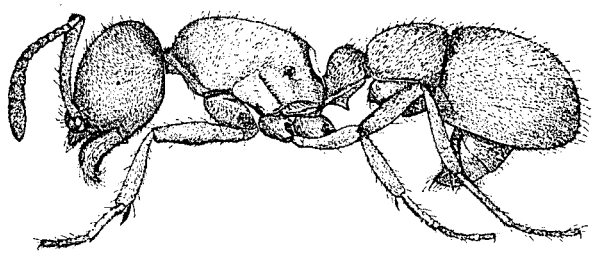
Comments: A more southerly species, not known from Ohio, but occurring in Indiana and Illinois. Gregg (1944) records the species for Indiana (missed in Munsee et al., 1985), thus it could also occur in Ohio.

2 *Proceratium pergandei* (Emery)

Sysphincta pergandei Emery, 1895

Identification: TL 3.6-4.2 mm. Reddish-brown, antennae and legs paler, head and alitrunk finely sculptured, surface moderately dull; body finely pubescent. This very distinct species has a low, rounded petiolar node and a characteristically shaped second gastral segment.

Taxonomy: The distinctive features of this species were such that it was placed in the genus *Sysphincta* for many years.



***Proceratium pergandei* (Emery).** From Smith (1947a).

Ecology:
— Habitat: Found in open woods. Wesson & Wesson (1940) cite dense oak woods. See Carter (1962) for North Carolina habitats, including pine and deciduous woods and grassy broom-sedge fields.

Proceratium pergandei

— Food Resources: A specialized predator on spider eggs (Brown, 1979).
— Associates: Further data lacking.

Behavior: See Wesson & Wesson (1940). Strictly found underground or beneath cover (hypogaeic).

Nests: In red, rotten logs. Under rock (Brown, 1958).
— Colony Organization: Colonies are small; one found by Wesson & Wesson (1940) had a single queen, 11 workers, and 8 males.
— Reproductives: Males - Oct. 4; late Aug., in colony, Wesson & Wesson (1940).

Range: Massachusetts to Florida, west to Iowa, Arkansas, Louisiana.

Ohio Distribution: Recorded from two counties in southwestern Ohio. Regional northern range limit for this species.

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940; Munsee, 1968), southern Ohio (Creighton, 1950; Dennis, 1938), Ohio (Gorham, 1956).

Comments: Named after Theodore Pergande, American entomologist (1840-1916), who sent much of the North American ant material to Carlo Emery. A distinctive reddish-brown species formerly placed in a different genus.

3 *Proceratium silaceum* Roger

Proceratium silaceum Roger, 1863
Proceratium crassicorne Emery, 1895

Identification: TL 2.4-2.8 mm. Orangish- to reddish-brown, legs somewhat paler, head and alitrunk distinctly sculptured but surface largely glossy; body finely pubescent. The smaller size and petiole shape are diagnostic for this species.

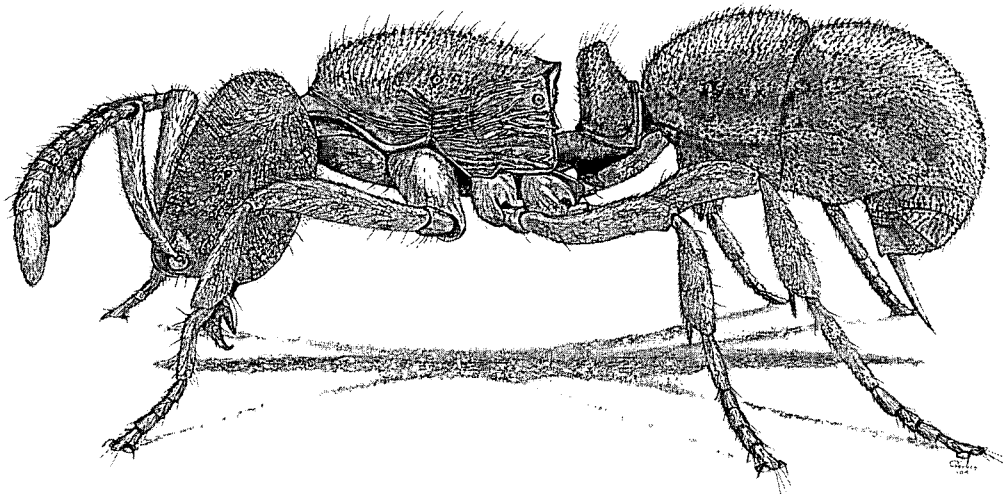
Taxonomy: Some early Ohio literature uses the synonymous *P. crassicorne*. See Creighton (1950).

Ecology:
— Habitat: Found in open woods (Wesson & Wesson, 1940). See also Carter (1962) for North Carolina habitats.
— Food Resources: A specialized predator of eggs of spiders and other arthropods (Brown, 1958), which are stored in the nest for later consumption (Brown, 1979).
— Associates: Further data lacking.

Behavior: Strictly found underground or beneath cover (hypogaeic). The reflexed tip of the gaster is "used to tuck the slippery eggs toward the mandibles when the eggs are being carried" (Brown, 1979).

Proceratium silaceum

Nests: In moist, well-rotted stumps or logs; in rather dry soil under stones or moss (Wesson & Wesson, 1940).
— Colony Organization: Colonies are small; ones



***Proceratium silaceum* Roger.** Drawing by Holly K. Coovert.

found by Wesson & Wesson (1940) had 30 to 40 workers, a dealate female, and several winged males and females, plus brood. Hölldobler & Wilson (1990) report colony size of 9-60.

— Reproductives: Males - Aug. 23 (Pelee Island, Ontario); mid-Aug., colony with "several winged males and females" (Wesson & Wesson, 1940).

Range: Massachusetts, southern Ontario (Pelee Island and vicinity), Michigan, south to northern Florida, west to Illinois, Arkansas, Oklahoma.

Ohio Distribution: Widespread in Ohio. Recorded from 5 counties.

Ohio References: Butler (Gorham, 1956), Geauga (Headley, 1943a), Pike (Wesson & Wesson, 1939), southcentral Ohio (Wesson & Wesson, 1940), northern & southern Ohio (Dennis, 1938), Ohio (Smith, 1951).

Comments: The more common species of *Proceratium*. The cryptic reddish-brown coloration of these slow-moving ants makes them hard to see.

Tribe Ponerini

Genus *Ponera* Latreille

Ponera Latreille, 1804

Identification: This genus is readily identified by the structure of the subpetiolar process. Many specimens may have appendages blocking a clear view, so care must be exercised. Especially look for the bidentate posterior end and the circular fenestra (translucent round indentation on each side anteriorly).

Immatures: Larvae pogonomyrmecoid; pupae in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Taylor (1967) provides a monographic revision, with a key to workers. The earlier revision of Smith (1936) is also quite useful.

Key: A single species is found in our area.

Comments: These small dark brown ants are found in small colonies in rotten wood or soil. The eyes in workers are greatly reduced.

4 *Ponera pennsylvanica* Buckley

Ponera Pennsylvanica Buckley, 1866
Ponera coarctata pennsylvanica (Buckley)

Identification: TL 3.0-3.8 mm. Variable, but typically very dark reddish-brown to nearly black, mandibles, appendages, and tip of gaster paler (brownish-yellow to yellowish-brown); head and alitrunk very finely but densely punctate, surface moderately dull; pubescence very short. The only species in our area; see generic diagnosis.

Taxonomy: See Taylor (1967) for full detail. Most Ohio references wrongly list it as a subspecies of the European *P. coarctata*.

Ecology:

— Habitat: Found in a variety of moist woodlands; less commonly in open habitats.

— Food Resources: Carnivorous (D. R. Smith, 1979), feeding on small insects.

— Associates: Further data lacking.

— Ant Associates: Colony 2.5-5.0 cm from *Camponotus chromaiodes* colony under bark of log (GAC 1930).

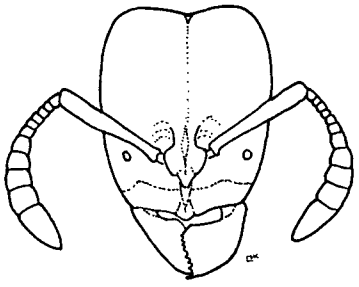
Behavior: The slow-moving workers are found foraging in the woods on the ground, under bark of logs, in rotten logs, and under rocks. They are rarely, if ever, seen on the surface (hypogaeic).

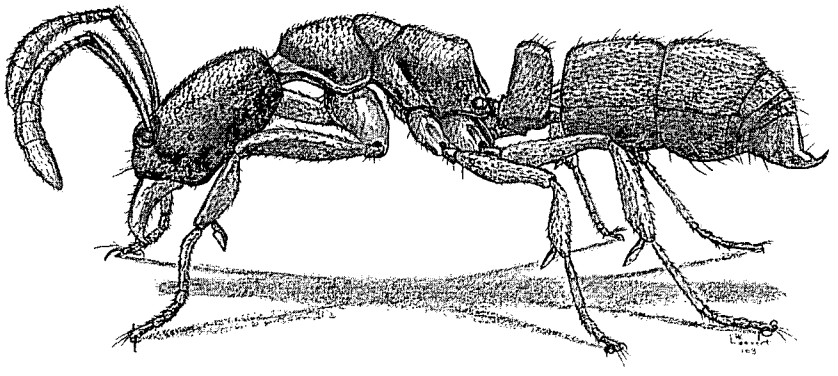
Nests: Nests are most commonly under bark of logs, but in rotten logs or stumps, under rocks, in humus, and in hickory nut shells. See Headley (1952).

— Colony Organization: They form small colonies "seldom more than 40 or 50 workers with 5 to 15 pupae during brood rearing" (Amstutz, 1943). But these small colonies can be abundant in the soil (Headley, 1952). Cocoons are oblong and yellowish in color.

— Reproductives: Males - Aug. 11-Oct. 11. Females - Aug. 23-Oct. 2. Headley (1943a) records Aug. 15 to Oct. 8 for males and females.

A series of four normal males, two workers, and three ergatomorphic males collected by C. H. Kennedy, Aug. 23, 1930 on Pelee Island, Ontario,



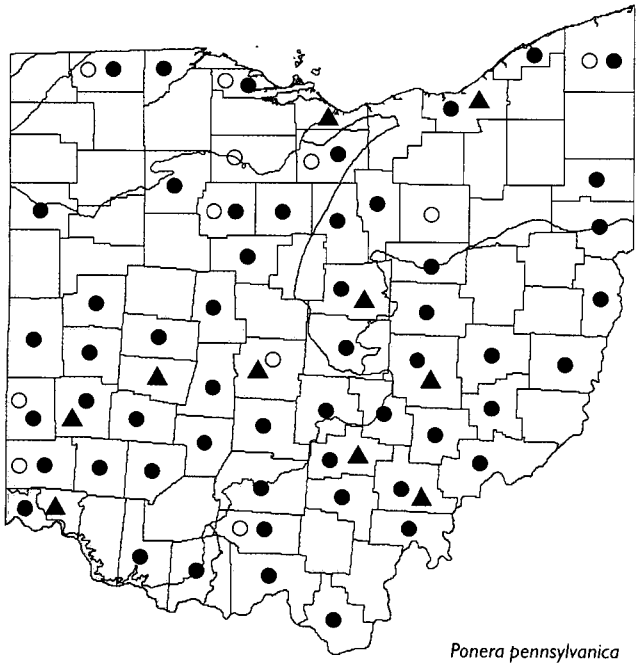


***Ponera pennsylvanica* Buckley**, full face view of head and habitus. Drawing by Holly K. Coovert.

Canada (DMNH colln., Kennedy #3163, which does not correspond to his notes) were examined. Kennedy had referred to these specimens as "antero-posterior gynandromorphs!" Basically they have the head of a male with a worker thorax and abdomen. One specimen appears to have a completely typical worker abdomen while the other two have greatly reduced male genitalia. In Taylor (1967:8) it is stated for the genus *Ponera* that male "ergatoids are apparently not developed." Ergatoid males are known for *Hypoponera* [*H. gleadowi* (as *ergatandria*) and *H. opaciceps* in our area; see Smith & Haug, 1931], so the preceding constitutes the first known record of ergatoid, or worker-like, males for the genus *Ponera*.

Range: Nova Scotia, Quebec south to Florida, west to Ontario, Michigan, North Dakota, Colorado, Utah, New Mexico.

Ohio Distribution: Found statewide. Recorded from 59 counties.



Ponera pennsylvanica

Ohio References: Ashtabula (Headley, 1943a, 1943b; Taylor, 1967), Butler (Gorham, 1956), Franklin (Smith, 1936; Taylor, 1967), Fulton (Fernandes, 1986), Huron (Taylor, 1967), Ottawa (Smith, 1936; Taylor, 1967), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952; Taylor, 1967), Wayne (Taylor, 1967), Wyandot (Amstutz, 1943; Taylor, 1967), southcentral Ohio (Wesson & Wesson, 1940).

Comments: Our most common ponerine ant, it is often found under the bark of logs in forests. A small species that should eventually be recorded from every county. One of the few species described by Samuel B. Buckley (1809-1883) that is actually recognizable.

Genus *Hypoponera* Santschi

Ponera subg. *Hypoponera* Santschi, 1938

Identification: The simple subpetiolar process differentiates this genus from *Ponera*.

Immatures: Larvae pogonomyrmecoid; pupae in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950) provides a revisionary key as part of *Ponera*, while Taylor (1967) separates *Hypoponera*, but no key is provided. See also Smith (1936).

Key: Several species from the southeastern United States are not included in the key below.

Comments: These small brown, slow-moving ants are typically found in soil and not generally in the open (hypogaeic). They were formerly included in *Ponera*.

Key to *Hypoponera* of Northeastern North America

1. Scale of petiole (seen in side view) slender, subtriangular, distinctly narrower apically than at base; moderately to distinctly glossy, color varying from light brown to black ..... ***H. opacior***

   Scale of petiole broad, subrectangular, nearly as broad apically as at base; otherwise various **2**

2. Smaller species, total length 2.3 to 2.9 mm; head very finely punctate, glossy; eyes extremely small, with only 3 to 4 minute facets; color light to medium brownish-yellow ..... ***H. gleadowi***

   Larger species, total length over 3.0 mm; head with coarser punctures, thus semiglossy to dull; eyes small, but with more than 3 to 4 minute facets; color normally brownish-black to black ..... (*H. opaciceps*)

5 *Hypoponera gleadowi* (Forel)

Ponera Gleadowi Forel, 1895
Ponera oblongiceps Smith, 1939

Identification: TL 2.3-2.9 mm. Light to medium brownish-yellow; head very finely punctate, glossy. The broader, subrectangular petiolar scale will distinguish this species from *H. opacior* and the small size and glossier surface will differentiate it from *H. opaciceps*.

Taxonomy: Recorded from Ohio as *Ponera oblongiceps* by Wesson & Wesson (1940).

Ecology:

— Habitat: Found in partial shade.
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: A nest was found under a stone on moist but well-drained soil (Wesson & Wesson, 1940).

— Colony Organization: Smith (1939a) recorded a Maryland colony of 47 workers, 3 ergataners, and 15 alate females.
— Reproductives: Further data lacking.

Range: Maryland (Priest Bridge), Ohio; Asia.

Ohio Distribution: Only known from Jackson Co.

Hyponera gleadowi

Ohio References: Jackson (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951).

Comments: This widespread tramp (introduced) species is found throughout tropical and subtropical areas.

Hypoponera opaciceps (Mayr)

Ponera opaciceps Mayr, 1887

Identification: TL 3.0-3.4 mm. Dark reddish-brown or brownish-black to nearly black, mandibles, appendages, and tip of gaster paler (brownish-yellow to yellowish-brown); head and alitrunk very finely but densely punctate, surface moderately dull; pubescence minute. The broader, subrectangular petiolar scale, larger size, and duller surface will distinguish this species from *H. opacior*. *H. gleadowi* is smaller and glossier, with even tinier eyes.

Taxonomy: Placed in the genus *Ponera* until recently.

Ecology:
— Habitat: Found in marsh, swampland, pine flat-woods, and bayhead in Florida (Van Pelt, 1958).
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: At the base of sawgrass, fallen logs, stumps, bases of trees, and litter in Florida (Van Pelt, 1958).
— Colony Organization: Colonies from Florida are small, from 15 to 84 workers and 1 to 3 ergatogynes, but no queens (Van Pelt, 1958).
— Reproductives: In Florida, males Oct. to Nov., females Sept. to Nov. (Van Pelt, 1958).

Range: South Carolina to Florida, west to Colorado, Arizona, southern Nevada; south to Argentina, West Indies; Southeast Asia, Polynesia.

Comments: A widespread southern and western species not found in Ohio. A tramp species native to the Americas. Probably spread from the New World to the Old World by commerce (D. R. Smith, 1979).

6 *Hypoponera opacior* (Forel)

Ponera trigona var. *opacior* Forel, 1893

Identification: TL 2.0-2.7 mm. Color variable, light to dark reddish-brown, rarely nearly black, mandibles, appendages, and tip of gaster paler (brownish-yellow to yellowish-brown); head and alitrunk very minutely but densely punctate, surface moderately to distinctly glossy; pubescence minute. The shape of the petiolar scale, which is distinctly narrowed apically, will serve to distinguish this species. Compared to *H. opaciceps*, this species is smaller and glossier and normally lighter in color. Superficially similar to *Ponera pennsylvanica*.

Taxonomy: Known as *Ponera trigona* var. *opacior* in all earlier Ohio works.

Ecology:
— Habitat: Found in open prairie & grassland, open woods; Wesson & Wesson (1940) report fields or dry woods. See Carter (1962) for North Carolina habitats.
— Food Resources: Further data lacking.
— Associates: Further data lacking.

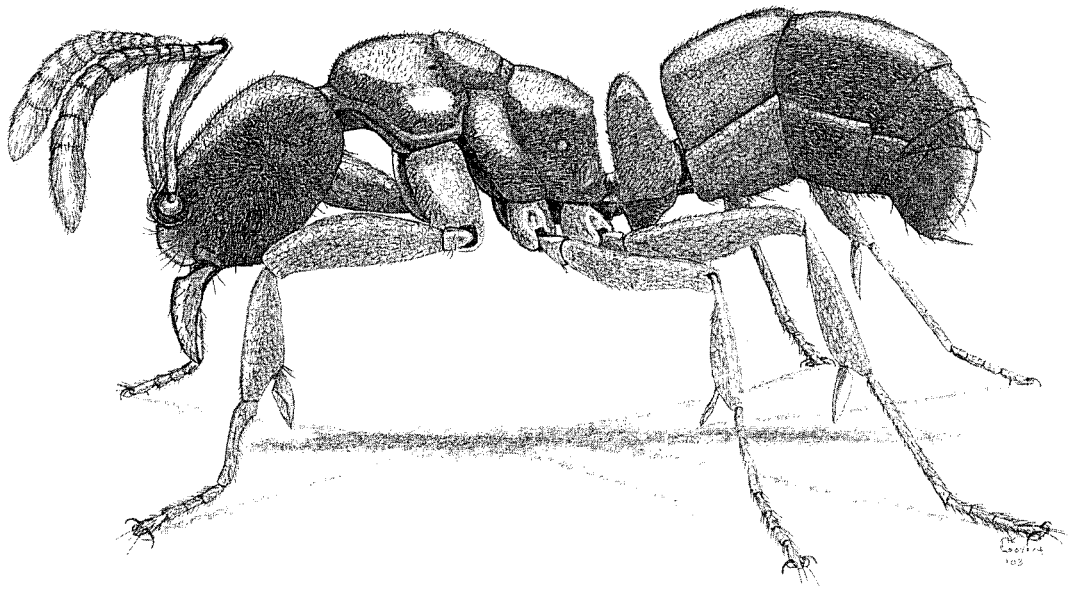
Behavior: Workers were found under a small stone in open prairie (GAC 1923) and on the ground in open woods (GAC 1988).

Nests: In rotten stump in partial shade (Wesson & Wesson, 1940). DuBois & LaBerge (1988) list grass sod in Illinois. Cole (1940b) lists beneath stones or, less often, under logs.
— Colony Organization: Colonies are small, 12 to 20 workers (Cole, 1940b).
— Reproductives: Males - July 22.

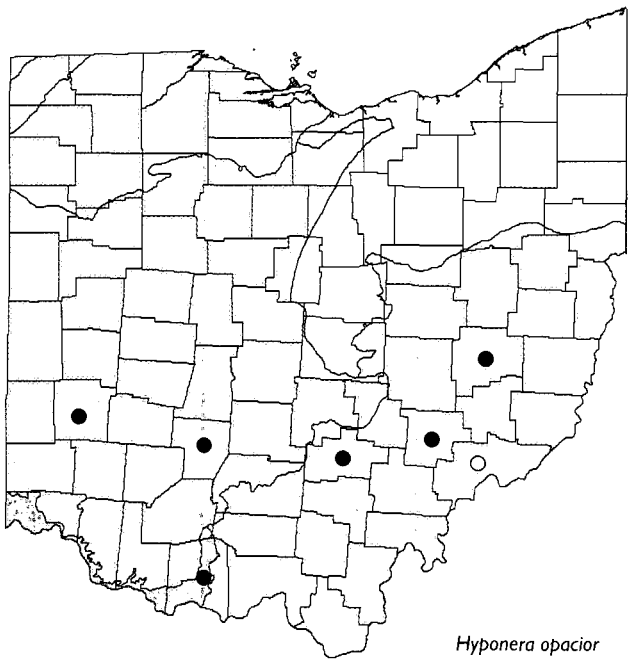
Range: Virginia to Florida, west to Ohio, Indiana, Illinois, Iowa, Colorado, Texas, Nevada; Oregon, California; Mexico south to Chile, Argentina, West Indies.

Ohio Distribution: Recorded from 7 southern Ohio counties. Regional northern range limit for this species.

Ohio References: Washington (Smith, 1936), southcentral Ohio (Wesson & Wesson, 1940; Munsee, 1968), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1979).



***Hyponera opacior* (Forel).** Drawing by Holly K. Coovert.



Hyponera opacior

Comments: The more common *Hypoponera* in Ohio, this wide-ranging species was originally described from the West Indies.

Subfamily Ecitoninae

Taxonomy: This subfamily has been separated from the Dorylinae by most recent authors (although still included by D. R. Smith, 1979), including Hölldobler & Wilson (1990) and Bolton (1994).

Tribe Ecitonini

Genus *Neivamyrmex* Borgmeier

Eciton subg. *Neivamyrmex* Borgmeier, 1940
Eciton subg. *Acamatus* Emery, 1894 [preocc.]

Identification: This is the only genus in the subfamily Ecitoninae in our area. The greatly reduced eyes, represented by a single facet or absent, and the distinctive antennal sockets are diagnostic features. The large, distinctive females are completely wingless.

Immatures: Larvae myrmecoid; naked pupae except for sexual pupae (Wheeler & Wheeler, 1976).

Revision(s): The series of papers by Watkins (1972, 1976, 1985) provides the most recent revisionary treatment for Nearctic species. The earlier work of Smith (1942b) should also be consulted. Keys to all castes are included by both authors.

Key: Most species of *Neivamyrmex* are southwestern, although there are several species found in the southeastern United States as far north as North Carolina and Tennessee which are not included in the key below.

Comments: This is the only group of legionary or army ants that are found in our area. Workers are polymorphic, occurring in a wide size range.

Key to *Neivamyrmex* of Northeastern North America

1. Head densely and completely granulated (i.e. texture like sandpaper), thus completely dull; petiole (as viewed from above) slender, distinctly longer than

wide, and narrower on anterior end; upper posterior corners of head each drawn into an acute point ..... (*N. nigrescens*)

Head smooth, with scattered punctures, thus mostly distinctly glossy, not granulate; petiole (as viewed from above) subquadrate, only slightly longer than wide, broader on anterior end; upper posterior corners of head angularly rounded, not drawn into an acute point ..... ***N. carolinensis***

7 *Neivamyrmex carolinensis* (Emery)

Eciton (Acamatus) carolinense Emery, 1894

Identification: TL 2.0-4.0 mm, polymorphic. Pale to dark yellowish- to reddish-brown, alitrunk often darker posteriorly; head with scattered punctures, surface smooth and mostly distinctly glossy. This species is readily distinguished from the only other species likely to occur in this area by the smooth, glossy head and subquadrate petiole.

Taxonomy: Originally described in the genus *Eciton*. See Smith (1942b).

Ecology:

— Habitat: Found in open grassy and rather dry areas in Tennessee (Cole, 1940b).

— Food Resources: Predaceous, presumably mostly on other insects, including ants.

— Associates: Further data lacking.

Behavior: The workers are extremely active and pugnacious (Cole, 1940b). Dennis (1938) surmised that they forage at night as he had never seen them above ground.

Nests: Beneath large stones, under moss, and boards in Tennessee (Cole, 1940b); bases of stumps in North Carolina (Carter, 1962).

— Colony Organization: Colonies are large, each containing thousands of workers and a single, large queen (Cole, 1940b). Dennis (1938) reports on a colony in Tennessee estimated at 50,000 workers.

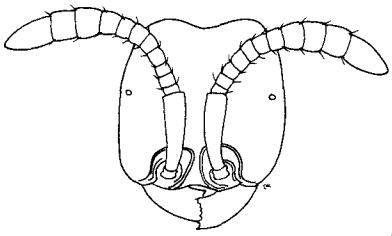
— Reproductives: Males - mid May to early June rangewide (Watkins, 1985). The males leave the colony and fly to another to find the wingless females.

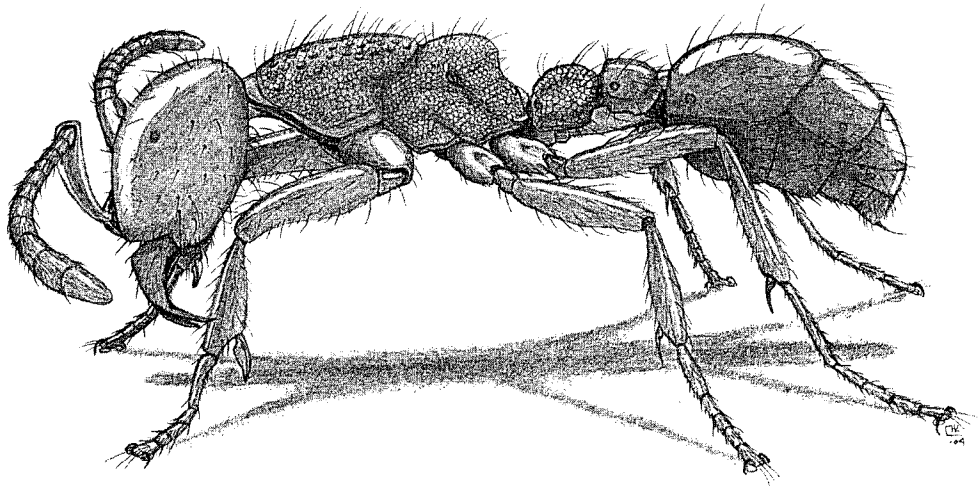
Range: Virginia, North Carolina, South Carolina, Georgia, Florida, Ohio, Tennessee, Alabama, Mississippi, Louisiana, Nebraska, Kansas, New Mexico, Arizona.

Ohio Distribution: Known from a single unspecified southcentral Ohio record (see below). This is the northern range limit for this southern species.

Ohio References: Southcentral Ohio (Watkins, 1976), Ohio (D. R. Smith, 1979; Smith, 1967; Watkins, 1972).

Neivamyrmex carolinensis





***Neivamyrmex carolinensis* (Emery),** full face view of head and habitus. Drawing by Holly K. Coovert.

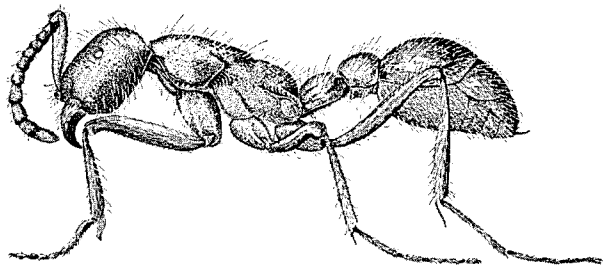
Comments: One of the army or legionary ants. Although recorded for Ohio in Watkins (1976, 1972), Watkins (1985) places a "?" in Ohio in the range map for this species, with the nearest definite records being in Tennessee and North Carolina Thus I would also question this species for Ohio but leave it on the list to encourage active searching.

Neivamyrmex nigrescens (Cresson)
Legionary Ant

Labidus nigrescens Cresson, 1872
Eciton (Acamatus) Schmitti Emery, 1894

Identification: TL 3.0-6.0 mm, polymorphic. Light reddish-brown to very dark brown or nearly black, legs and gaster usually paler; head and alitrunk distinctly and densely sculptured (granulated), the surface dull. This species is readily recognized by the dull, granulate surface of the head and the long, slender petiole.

Taxonomy: Long considered a part of the genus *Eciton*, they were known from the workers as *E. schmitti*. The prior name of *nigrescens*, which has taxonomic priority, was based on the male. See Smith (1942b) and Watkins (1972).



Neivamyrmex nigrescens (Cresson). From Smith (1947a).

Ecology:
- — Habitat: Found in shaded areas near edges of deciduous forests in Illinois (DuBois & LaBerge, 1988); open grassy areas in Tennessee (Cole, 1940b).
- — Food Resources: Predaceous, primarily on other insects, including termites, adults and brood of ants, and carabid beetles (Smith, 1942b). Hölldobler & Wilson (1990) claim that ants are predominantly used as food.
- — Associates: The limulodid beetle (*Paralimulodes wasmanni*) rides on the bodies of workers (Alabama), licking secretions (Hölldobler & Wilson, 1990). The myrmecophilous carabid beetles *Helluomorphoides ferrugineus*, *H. latitarsis*, and *H. texanus* mingle in raiding and emigration columns and feed on booty, larvae, and occasionally adult ants (Kistner, 1982). The phorid fly *Xanionoum hystrix* (and less commonly *Ecitomyia wheeleri*) is found in association, apparently feeding mostly on booty (Rettenmeyer & Akre, 1968).

Behavior: Raids at night or on overcast days in weak dendritic columns, mostly over the surface of the ground, but partly subterranean (Hölldobler & Wilson, 1990). Buren (1944) states "after rains they may be found marching in long columns."

Nests: "Temporary nesting sites [bivouacs] are in decayed logs or stumps or in the ground beneath stones and other objects." (D. R. Smith, 1979).
- — Colony Organization: The large colonies contain 150,000 to 250,000 workers. Each colony has one functional queen (monogyny), and new colonies are formed by splitting (D. R. Smith, 1979). Hölldobler & Wilson (1990) cite 10,000 to 140,000 workers.
- — Reproductives: Males - mid Aug. to mid Nov. range-wide (Watkins, 1985). The males leave the colony and fly to another to find the wingless females.

Range: West Virginia, Kentucky, Tennessee south to Georgia, Alabama, Mississippi, Louisiana, west to Indiana, southern Illinois, Iowa, Nebraska, Kansas, Oklahoma, Texas, Colorado, New Mexico, Arizona, California; Mexico.

Comments: A more southerly species of army ant not currently known from Ohio. This widely distributed species, recorded from West Virginia near the Ohio border, plus Indiana, Kentucky, and southern Illinois (Watkins, 1985), could also be found in Ohio. The map in Watkins (1972) shows the range actually covering the extreme southern tip of Ohio, but no Ohio records are given in his later papers.

Subfamily Myrmicinae
Tribe Myrmicini

Genus *Myrmica* Latreille

Myrmica Latreille, 1804

Identification: This genus is characterized by the 12-segmented antennae, distinct propodeal spines, and distinctly rugose sculpturing. The spurs of the middle and hind tibiae are very finely pectinate under high magnification and, when seen, are diagnostic.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Weber (1947, 1948, 1950) provided a revision of the genus for our area, with the 1947 paper including keys to all three castes, but this series of papers is now very much out-of-date. The boreal *Myrmica lampra* group, not included in the key below, is covered by Francoeur (1981) but not keyed. The genus is greatly in need of revision.

Key: The completely revised key presented below does not include a number of more northerly (boreal) species. Although listed as an Ohio key, it will work for a majority of the northeastern United States south of the boreal zone. The antennal scape character can be a bit tricky until representative material of the various

species are compared. Usually it is best to view the bend in the scape from behind and above.

Comments: This genus contains a number of reddish-brown to brown ants which are often difficult to identify. The strongly sculptured alitrunk and sharp propodeal spines are distinctive. They can often be an abundant element of local faunas.

Key to *Myrmica* of Ohio

1. Antennal scape gradually and evenly bent at the base and never forming a right angle at the bend; lamina at bend absent **2**

   Antennal scape suddenly bent at the base and forming a right angle (or nearly so) at the bend; a conspicuous lamina present at the bend (or at least a weak to distinct carina) **4**

2. Gaster with hairs set in usual, fine punctures; dorsal face of the propodeum forming a descending slope with the dorsum of the mesonotum; frontal lobes lying flat (i.e. same plane as front) and extending out over bases of antennae; frontal lobe with thickened edge angled toward head; propodeal (epinotal) spines shorter than distance between, strongly directed posteriorly ..... (*M. incompleta*)

   Gaster with hairs set in distinct, coarse punctures, especially basally; dorsal face of the propodeum abruptly depressed below the level of the mesonotum; otherwise various **3**

3. Propodeal spines about 1.5X as long as the distance which separates their bases and slightly deflected downward; frontal lobes angled up at ca. 30° from plane of front; antennal scapes longer, surpassing the occipital margin by an amount equal to their greatest thickness; color dark to blackish-brown, coxae paler than alitrunk and contrasting in color; lateral face of fore coxa smooth and glossy, finely sculptured only basally; larger species, total length 4.4 to 5.5 mm ..... ***M. punctiventris***

   Propodeal spines only slightly longer than the distance which separates their bases and not deflected downward; frontal lobes lying flat, in same plane as front; antennal scapes shorter, barely surpassing occipital margin; color brownish-yellow, coxae concolorous with alitrunk; lateral face of fore coxa finely sculptured over most of surface; smaller species, total length 3.5 to 4.4 mm ..... ***M. pinetorum***

4. Scape with a large wide, thick, lobate lamina at the bend which extends distally along the posterobasal third of the scape; smaller species, total length 3.5 to 4.5 mm ..... (*M. nearctica*)

   Scape with a small transverse lamina at the bend or with a lamina that surrounds the bend like a collar and does not extend distally along the basal third of the scape, lamina mostly present basal to bend; larger species, total length usually 3.9 to 6.2 mm **5**

5. Scape with distinct collar-like lamina encircling top of bend, flange below bend absent or very poorly developed and not a continuation of lamina; angle of bend of scape greater than 90° **6**

   Scape with transverse or oblique carina or lamina which continues as a distinct flange below bend; angle of bend of scape various **7**

6. Scape with low collar-like lamina encircling top of bend; face of basal portion of scape straight in profile; ventral surface of postpetiole flat or nearly so in profile, forming a rugose plate ..... ***M. americana***

   Collar-like lamina high, prominent; face of basal portion of scape angulate in profile due to prominent lamina; ventral surface of postpetiole convex, not forming a rugose plate ..... (*M. lobifrons*)

7. Scape angled at bend, with a weak to distinct carina which continues basally as narrow flange, usually slightly notched at bend; angle of bend (angle between flat face of flange and main part of scape) greater than 90°; scape slightly curved just beyond bend ..... ***M. fracticornis***

   Scape truncated at bend by flange that projects above bend and is flared behind on lower part of scape; angle of bend close to 90° or less; scape straight just beyond bend **8**

8. Scape with lamina at bend very prominent, strongly projecting and overhanging bend, resulting in an acute angle at bend; frontal lobes very reduced, leaving antennal insertion exposed ..... (*M. spatulata*)

   Scape with lamina at bend weaker, not strongly projecting, angle at bend essentially 90°; frontal lobes not strongly reduced, partially covering antennal insertion **9**

9. Postpetiole with smooth, glossy longitudinal stripe dorsally; pleural rugae narrow (narrower than median thickness of propodeal spine), more numerous, semiglossy; frontal lobes prominent, projecting upward at 45° angle to plane of front ..... (*M. detritinodis*)

   Postpetiole strongly rugose dorsally, lacking smooth, glossy longitudinal stripe; pleural rugae broader (as wide as median thickness of propodeal spine), fewer, distinctly duller than interspaces; frontal lobes often very low and weakly projecting, greatly reduced above ..... ***M. latifrons***

8 *Myrmica americana* Weber

Myrmica sabuleti americana Weber, 1939

Identification: TL 4.5-6.2 mm. Typically medium to dark reddish-brown, gaster usually mostly darker (brownish-black, paler at base), mandibles and appendages paler (brownish-yellow to yellowish-brown); head and alitrunk coarsely rugose, surface moderately glossy between ridges. The shape of the lamina at the bend of the scape (collar-like and encircling top of bend) and the flat ventral plate-like surface of the postpetiole are diagnostic. This is a species of open areas.

Taxonomy: Prior to Creighton (1950), was treated as a subspecies of the European *M. sabuleti*.

Ecology:

— Habitat: Found in open fields, prairies, meadows, grasslands, and along edges of woods.

— Food Resources: Often taken at baits. Food varied, consisting of animal matter and plant juices (D. R. Smith, 1979).

— Associates: Talbot (1946) reports tending the scale *Kermes* sp. on oak in Michigan and building shelters to protect them from rain. Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*). Bristow (1983, 1984) reports tending the aphid *Aphis vernoniae* and the membracid *Publilia reticulata* on ironweed in New Jersey. Wheeler & Wheeler (1963) note aphids on roots of grass.

Behavior: Workers are often found foraging on the ground in open and taken at bait. Wheeler & Wheeler (1963) describe the effects of the sting of these "slow but aggressive ants." See Talbot (1946) for details on daily activity, with workers most active mid-morning and early evening.

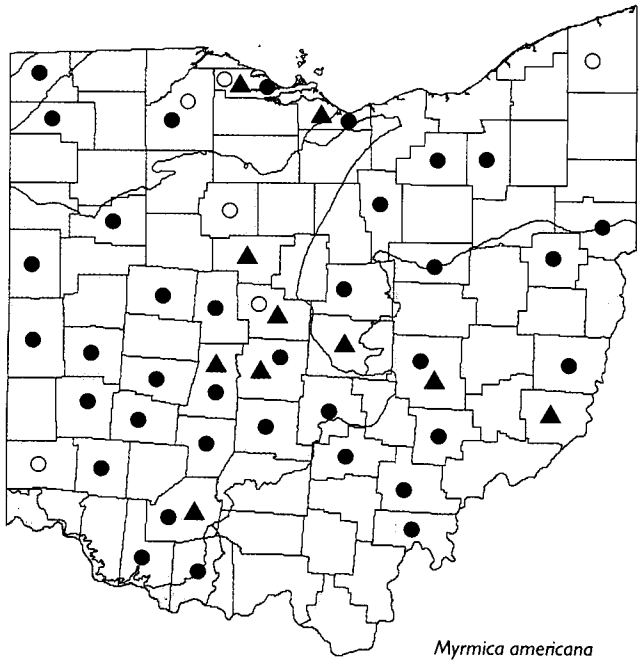
Nests: Mostly in ground in open, but may nest under objects; GAC 1893 with neatly formed chimney; GAC 1732 at base of sm. clump of grass, granular soil pile ca. 5 x 10 cm to one side; GAC 1920 with 12-15 cm mound. Weber (1948) describes a "compact collar or slight mound of small pieces of dried plants" around the nest opening. Nests are moved on average every 48 days (Talbot, 1946).

— Colony Organization: Further data lacking.

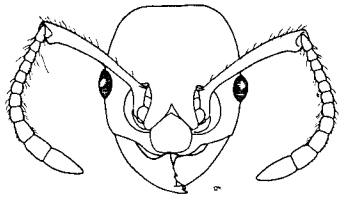
— Reproductives: Males - Aug. 13-Oct. 15. Females - (Apr. 28), Aug. 30-Nov. 2. Kannowski & Kannowski (1957) report on flights between Sept. 11 and Oct. 18. Flights occur in the afternoon between 1230 and 1630 hours (Hölldobler & Wilson, 1990).

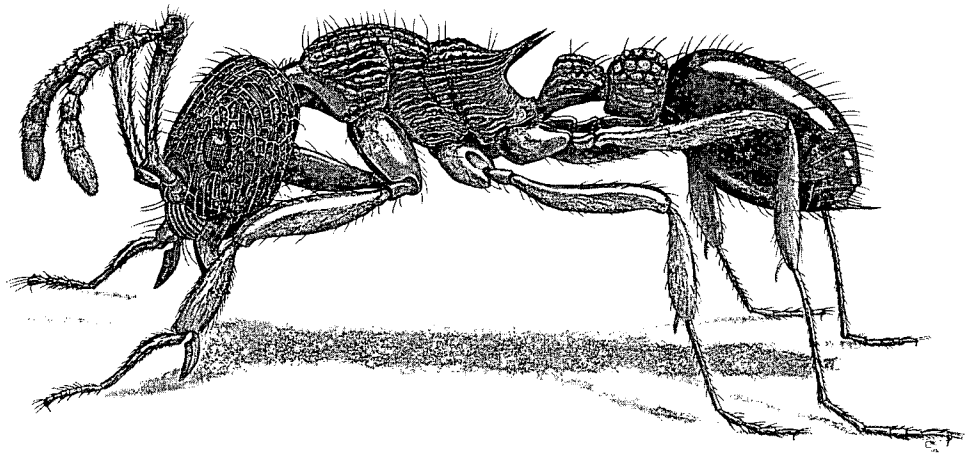
Range: Quebec, Maine south to North Carolina, Tennessee, west to Manitoba, North Dakota, Colorado, Utah, Nevada, Arizona.

Ohio Distribution: Recorded from 43 counties throughout Ohio.



Myrmica americana





***Myrmica americana* Weber,** full face view of head and habitus. Drawing by Holly K. Coovert.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Delaware (Burns, 1964), Ottawa (Weber, 1948), Wood (Kannowski & Kannowski, 1957), Wyandot (Amstutz, 1943; Weber, 1948), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This species is commonly encountered in open areas.

Myrmica detritinodis Emery

Myrmica rubra scabrinodis var. *detritinodis* Emery, 1895

Identification: TL 3.9-6.0 mm. Dark reddish-brown to brownish-black, mandibles and apendages usually paler, sometimes alitrunk posteriorly and gaster apically paler; head and alitrunk coarsely rugose, surface moderately glossy between ridges. The characters given in the key will distinguish this species. It is most similar to *M. latifrons*, but can be distinguished by the smooth, glossy, dorsal longitudinal stripe on the postpetiole and the angle of the frontal lobes.

Taxonomy: Previously synonymized under *M. fracticornis* and not previously keyed.

Ecology:

— Habitat: Found in moist woods in Michigan (Wheeler et al., 1994).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In logs and stumps (Wheeler et al., 1994).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Quebec and Michigan [previously confused with and included in *M. fracticornis* and *M. emeryana* (q.v.), thus extent of range unknown].

Comments: Until recently, this species was not recognized. The numerous records in Michigan (Wheeler et al., 1994) indicate that this species could also be found in Ohio.

9 *Myrmica fracticornis* Forel

Myrmica rubra scabrinodis var. *fracticornis* Emery, 1895
Myrmica lobicornis var. *fracticornis* Forel, 1910
Myrmica scabrinodis lobicornis var. *fracticornis* Emery

Identification: TL 3.9-5.2 mm. Dark yellowish-brown to brownish-black, mandibles and appendages usually paler, alitrunk sometimes paler; head and alitrunk weakly to moderately coarsely rugose, surface moderately glossy between ridges. The weaker carina on the bend of the scape and the angle of the bend are diagnostic for this species. As in most *Myrmica*, these features are subtle, but once seen and learned, are consistent and diagnostic.

Taxonomy: This could represent a complex of two sibling species. I had, for a time, segregated two lots from northern Ohio bogs (GAC 1958 #11 and GAC 2160 #12) as a separate species based on weakly carinate scapes at the bend rather than with distinct laminae; anterior corner of anepisternum smooth, glossy, sculpturing reduced; concavity between propodeal spine and metapleural lamina narrow, smaller than width of eye; and postpetiole smooth and glossy dorsally, devoid of sculpturing. But other specimens seem to be intermediate between these and the more common, non-bog associated form, and many of these characters now appear to be variable. More study is needed, but for now I am considering all of these as *M. fracticornis*.

Ecology:

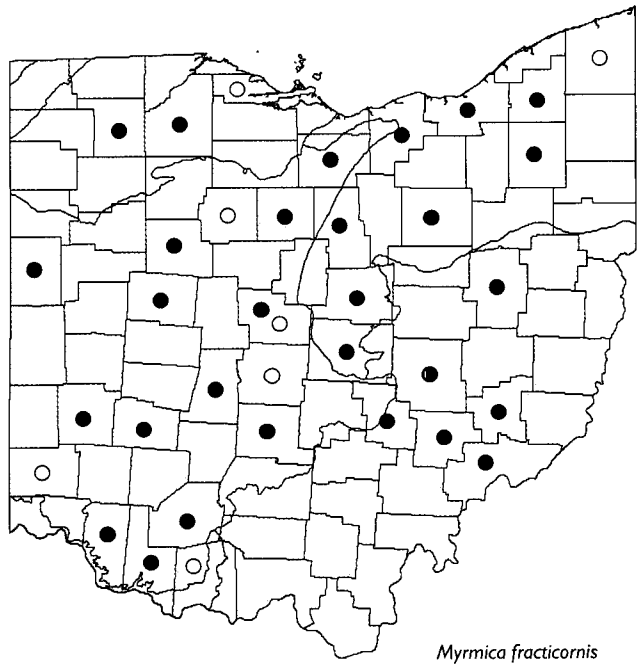
— Habitat: Found in woodlands, open woods; GAC 1958 in sphagnum bog; low, moist sunny spots, on the edge of woods or among scattered trees, and on the edge of dry fields (Wesson & Wesson, 1940). Found by Wheeler, et al. (1994) in Michigan in edges of marshes and in sedge hummocks in marshes.

— Food Resources: Mostly honeydew (below).

— Associates: Burns (1964) reports tending of tulip tree scale (*Toumeyella liriodendri*). Bristow (1983, 1984) reports tending the aphid *Aphis vernoniae* and the membracid *Publilia reticulata* on ironweed in New Jersey.

— Ant Associates: Host of the xenobiotic *Formicoxenus provancheri*.

Behavior: The slow-moving workers are found foraging on the ground in open woods, on foliage in woods, or on sphagnum in bog (GAC 1958).



Myrmica fracticornis

Nests: GAC 1918 under rock. Ohio literature records include "nest in the soil although rarely under objects" (Wesson & Wesson, 1940), and "shallow, grass covered mounds of the prairie" (Amstutz, 1943). In Michigan it is recorded from soil hummocks (Wheeler et al., 1994; Kannowski, 1970).

— Colony Organization: Kannowski (1970) reported on colonies from Michigan with up to 627 workers and 1 to 15 dealate queens.

— Reproductives: Males - July 9-12-Oct. 4. Females - July 9-12. Stray dealate female - Sept. 7. "Winged males and females appear during August and were taken abundantly..." (Amstutz, 1943). Weber (1948) cites Oct. 8 for Ohio and notes the "winged castes frequently appear in huge, dense swarms from late June to October." Kannowski (1970) reports nuptial flights in Michigan occurring in early evening hours (1800 to 1930 hours) between July 22 and Aug. 6.

Range: Newfoundland and Quebec, south to Tennessee, Michigan, Ohio, west to Rocky Mountains of Colorado, New Mexico, Nevada, Utah, Arizona [probably represents a composite range of *M. fracticornis* + *M. detritinodis*].

Ohio Distribution: Widespread in Ohio. Recorded from 35 counties.

Ohio References: Adams ? (Dennis, 1938, see *incompleta*), Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Delaware (Burns, 1964), Franklin (Weber, 1948), Ottawa (Weber, 1948), Wyandot (Amstutz, 1943; Weber, 1948), southcentral Ohio (Wesson & Wesson, 1940), Ohio (D. R. Smith, 1979).

Comments: A fairly common woodland *Myrmica*. The name "fracticornis" translates to "broken horn" in reference to the carinate bend on the antennal scape.

Myrmica incompleta Provancher

Myrmica incompleta Provancher, 1881
Myrmica rubra brevinodis Emery, 1895

Identification: TL 4.5-5.3 mm. Pale yellowish-brown to brownish-black, the alitrunk generally paler than head and gaster, mandibles, appendages, and gaster apically usually paler; head and alitrunk moderately coarsely rugose, surface moderately glossy between ridges. This species is more reliably identified than many *Myrmica*. The non-punctate gaster and the evenly bent antennal scape which lacks a lamina or flange plus the frontal lobes which lay flat and have the outer edge slightly deflected will readily differentiate this species.

Taxonomy: Many earlier works called this species *M. rubra brevinodis*.

Ecology:

— Habitat: Prefers moist, grassy habitats (D. R. Smith, 1979). In Michigan in bogs and swamps (Wheeler et al., 1994; Kannowski, 1970).

— Food Resources: Mostly honeydew (Weber, 1950) and dead insects.

— Associates: Root aphids and coccids tended (Weber, 1950). Host to the larvae of the myrmecophilous syrphid *Microdon albicomatus* (cf. Paulson & Akre, 1994 for details).

— Ant Associates: Host of the xenobiotic *Formicoxenus provancheri*.

Behavior: Further data lacking.

Nests: Usually nests under objects (D. R. Smith, 1979). In Michigan in soil and moss hummocks (Wheeler et al., 1994; Kannowski, 1970).

— Colony Organization: Usually of several hundred workers, but Weber (1950) records several very large colonies, one polydomous colony in Canada extended over a 100 sq. m. area and consisted of over 100,000 adult ants. Kannowski (1970) reported on colonies from Michigan with up to 837 workers and 1 to 16 dealate queens.

— Reproductives: Alates appear during Aug. in Connecticut (Wheeler, 1916). Alates are in nests in Michigan from mid-July to mid-Aug. (Kannowski, 1970).

Range: Alaska, Canada, Labrador, Michigan, south to New Jersey, west to Rocky Mountains, Colorado, Utah, New Mexico, Nevada.

Comments: This is a species typical of northern regions. I have studied material of true *M. incompleta* from Michigan and find it distinctive. This is apparently a bog and swamp associated species. *M. fracticornis*, which has only a very slight flange at the bend of the scape, has been confused with *M. incompleta* in the past. I believe that the Kennedy material from Adams Co., Ohio mentioned by Dennis (1938:288) (as *M. rubra* subsp. *brevinodis*) and Weber (1950:192) is actually *M. fracticornis*. Although I could not locate these particular specimens, I am very familiar with the Kennedy material and have found more than one species of *Myrmica* misidentified. I have seen no genuine material of *M. incompleta* from Ohio and thus do not currently consider it an Ohio species, but it could occur in northern Ohio, especially in association with bogs.

10 *Myrmica latifrons* Stärcke

Myrmica scabrinodis schencki var. *emeryana* Forel, 1914
Myrmica schencki latifrons Starcke, 1927
Myrmica schencki emeryana Forel

Identification: TL 3.9-5.4 mm. Dark yellowish-brown to brownish-black, mandibles and appendages usually paler; head and alitrunk coarsely rugose, surface moderately glossy between ridges. The truncated flange-like lamina at the bend of the scape is diagnostic. Also, look for the greatly reduced frontal lobes in most specimens.

Taxonomy: Long known as *M. schencki emeryana*, Bolton (1995) shows that *M. latifrons* has priority since *emeryana* was originally used as a quadrinomial which is nomenclatorially unavailable. Including "sp. 1" of Wheeler et al. (1994) from Michigan. The treatment herein could possibly include two species, one with greatly reduced frontal lobes and one with typical lobes.

Ecology:

— Habitat: Found in woodlands. Wesson & Wesson (1940) report it "along the edge of, or in dry, open woods." "Nests are usually in woodlands in moist, shady situations" (D. R. Smith, 1979). In low fields and mesic woods in Michigan (Wheeler et al., 1994).

— Food Resources: Often taken at baits, feeding on dead *Camponotus* (GAC 2121), feeding on apples (GAC 2211, 2220), group of workers on goldenrod (GAC 2173). Davis & Bequaert (1922) mention attending extrafloral nectaries of bigtooth aspen in New York. See also Fellers (1987).

— Associates: Further data lacking.

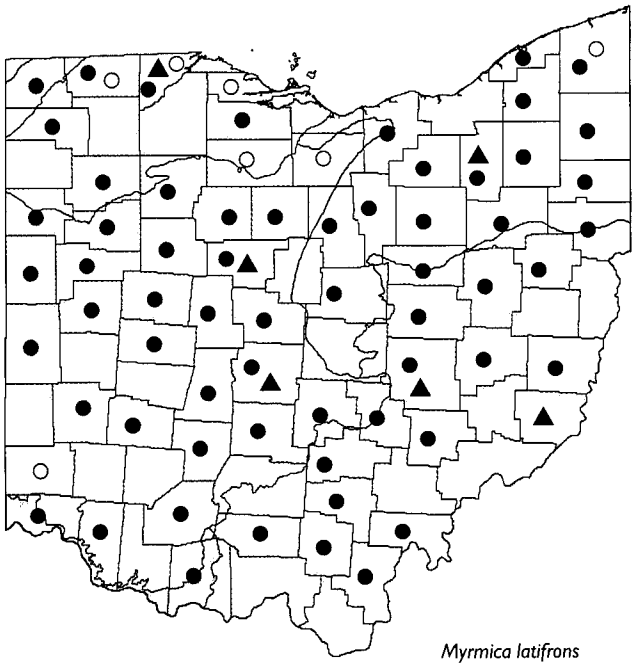
Behavior: Workers are found foraging on foliage or on ground. Weber (1948) describes them as "timid, 'feigning death' when disturbed, and are generally slow-moving." See also Talbot (1945b).

Nests: Under bark of log (GAC 1925), under leaves (GAC 1965, 2015), under branch (GAC 2171). Under stones or other objects (D. R. Smith, 1979). Talbot (1945a, b) describes nests in the soil with a single turret-like opening of grass blades.

— Colony Organization: Colonies are moderately small, from 35 to 561 workers and usually one but up to 4 queens (Talbot, 1945b). Kannowski (1970) reported on colonies from Michigan with up to 555 workers and 1 to 15 dealate queens.

— Reproductives: Males - June 29-Sept. 22. Females - Aug. 1-Oct. 2. Numerous dealate female strays - June 22-27, Aug. 28-Oct. 8. Talbot (1945a) describes the flights of alates from July 16 to 21. Weber (1948) cites Aug. 1 to Sept. 21 for Ohio alates. Flights can often be quite extensive, and occur in the morning (0600 to 0800 hours) (Hölldobler & Wilson, 1990).

Range: Newfoundland south to Georgia, west to Manitoba, Idaho, Colorado, Arizona, Nevada.



Myrmica latifrons

Ohio Distribution: Found throughout Ohio. Recorded from 68 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Huron (Weber, 1948), Lucas (Weber, 1948), Ottawa (Weber, 1948), Seneca (Headley, 1949; Talbot, 1943a, 1945a, 1945b), southcentral Ohio (Wesson & Wesson, 1940).

Comments: Our most common species of *Myrmica*, long known as *emeryana*. It certainly occurs in all 88 counties. The synonym was named for Carlo Emery (1848-1925), an Italian myrmecologist who named a large number of North American ants.

Myrmica lobifrons Pergande

Myrmica sabuleti var. *lobifrons* Pergande, 1900

Identification: TL 4.4-5.6 mm. Medium reddish-brown to brownish-black, alitrunk slightly paler, especially ventrally, mandibles and appendages usually paler; head and alitrunk coarsely rugose, surface weakly glossy between ridges. The prominent, high collar-like lamina on the bend of the scape is diagnostic. This is apparently a bog and swamp associated species.

Taxonomy: Another species originally treated as a subspecies of the European *M. sabuleti*.

Ecology:

— Habitat: Found in bogs and swamps in Michigan (Wheeler et al., 1994).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Host of the xenobiotic *Formicoxenus provancheri* (Wheeler et al., 1994).

Behavior: Further data lacking.

Nests: In moss hummocks in Michigan (Wheeler et al., 1994; Kannowski, 1970); under stones in Nevada (Wheeler & Wheeler, 1986).

— Colony Organization: Kannowski (1970) reported on colonies from Michigan with up to 1243 workers and 2 to 32 dealate queens.

— Reproductives: Alates are found in colonies in Michigan from late July to early Sept. (Kannowski, 1970).

Range: Quebec, Michigan, Colorado, New Mexico, Nevada, Utah, Arizona, north and west to Alaska.

Comments: This is a northern and western wetland species with a distinct antennal lobe. The records from Michigan include the southern part of the state (Wheeler et al., 1994) so this species could possibly be found in northern Ohio in bogs and swamps.

Myrmica nearctica Weber

Myrmica sabuleti nearctica Weber, 1939

Identification: TL 3.5-4.5 mm. Medium reddish-brown to dark brown, alitrunk usually lighter, mandibles and

appendages usually paler; head and alitrunk rugose. The large, thick lobate lamina at the bend of the scape is distinctive and diagnostic.

Taxonomy: Another species originally treated as a subspecies of the European *M. sabuleti*, and only recently recognized as valid.

Ecology:

— Habitat: Found in woodlands (Weber, 1948).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Workers feign death when disturbed (Weber, 1948).

Nests: Under cover of objects (D. R. Smith, 1979). In Michigan under bark of logs and stumps (Wheeler et al., 1994).

— Colony Organization: Colonies are small (Weber, 1948).

— Reproductives: Males and females Aug. 22 in Michigan (Weber, 1948).

Range: Quebec, Michigan west to Manitoba, North Dakota, Colorado.

Comments: A northern and western species with a distinct, lobate antenna. Found in southern Michigan (Wheeler et al., 1994) and should be sought in northern Ohio under bark of logs and stumps in woods.

11 *Myrmica pinetorum* Wheeler

Myrmica punctiventris pinetorum Wheeler, 1905

Identification: TL 3.5-4.4 mm. Brownish-yellow to yellowish-brown, sometimes darker, alitrunk often somewhat paler, especially ventrally with coxae concolorous, mandibles, antennae, and legs paler; head and alitrunk rugose, surface glossy between ridges. This smaller species has shorter propodeal spines than *M. punctiventris*, and the frontal lobes lay flat rather than angled upward. Coxal characters are not as reliable as others.

Taxonomy: Long treated as a subspecies of *punctiventris*, it has been shown to be clearly distinct by Creighton (1950).

Ecology:

— Habitat: Found in woods' edges, open woods. Taken in pine woods in sandy soil and dry oak openings (Wesson & Wesson, 1940).

— Food Resources: Further data lacking.

— Associates: Strays taken several times on mound of *Formica subsericea*.

Behavior: Workers were found foraging on ground in woods and at woods' edges.

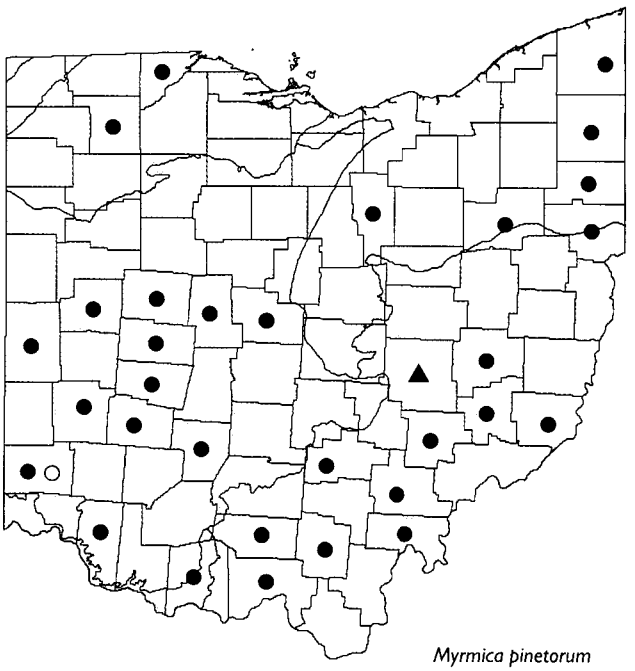
Nests: Wesson & Wesson (1940) reported that they "build carton turrets from the soil up through the pine needles."

— Colony Organization: Forms very small colonies (Wesson & Wesson, 1940).

— Reproductives: Female - Sept. 7. Stray dealate females - Aug. 30-Oct. 10.

Range: Quebec, Massachusetts south to South Carolina, west to Michigan, Ohio, Indiana, Oklahoma, Mississippi.

Ohio Distribution: Widespread in Ohio. Recorded from 32 counties.



Myrmica pinetorum

Ohio References: Butler (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940; Munsee et al., 1985; Weber, 1950), Ohio (Creighton, 1950; D. R. Smith, 1979).

Comments: One of two species with a punctate gaster and lacking a lamina at the bend of the antennal scape. Although found in various woodland types, the specific name refers to pine woods.

12 *Myrmica punctiventris* Roger

Myrmica punctiventris Roger, 1863

Identification: TL 4.4-5.5 mm. Reddish-brown to brownish-black, alitrunk only very slightly paler and distinctly darker than coxae, mandibles, antennae, legs, and apex of gaster paler; head and alitrunk coarsely rugose, surface glossy between ridges. This larger species has longer propodeal spines and upwardly angled frontal lobes which distinguish it from *M. pinetorum*. Coxal characters not as reliable as others.

Taxonomy: Long recognized as distinct.

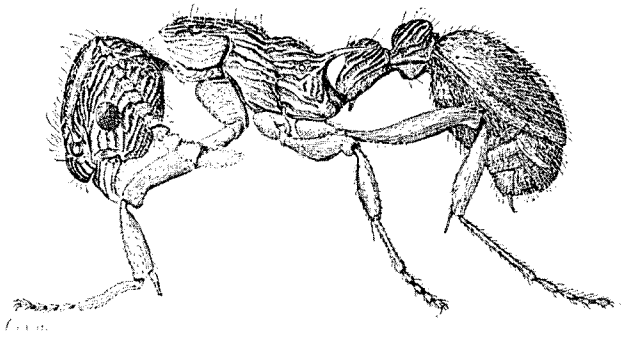
Ecology:

— Habitat: Found in dry to moist woodlands; Wesson & Wesson (1940) cite dry woods, but Headley (1943a) moist shady woods.

— Food Resources: Taken several times at fruit bait. Seeds are gathered from a number of myrmeco-

chorous plants for the nutritious elaiosomes (Culver & Beattie, 1978; Beattie & Culver, 1981). See also Fellers (1987).

— Associates: Further data lacking.



Myrmica punctiventris **Roger.** From Smith (1947a).

Behavior: Workers were found foraging on the ground, bark, and foliage in woods. "The workers sometimes become temporarily immobile when handled or disturbed" (Weber, 1948).

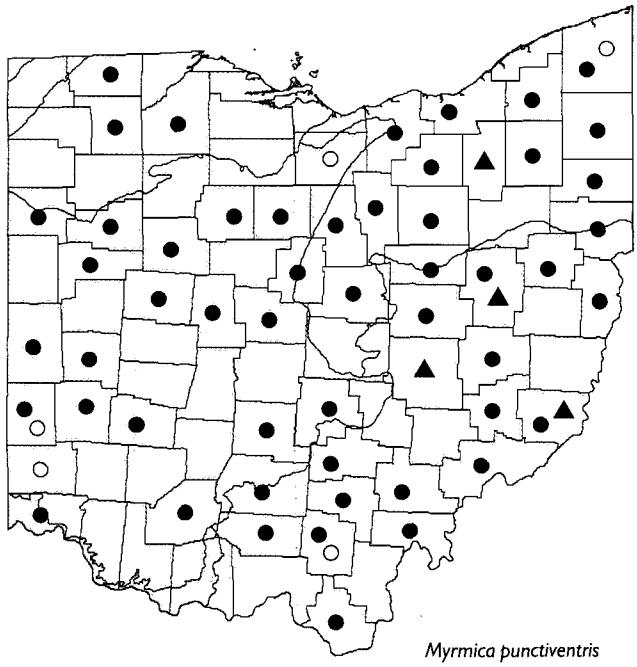
Nests: Under bark of rotten logs, bark of standing dead oaks, under small logs, in leaf litter & soil under rocks; several colonies in nut shells (hickory, acorns). Nests are moved frequently (every 5 to 26 days) (Hölldobler & Wilson, 1990).

— Colony Organization: Form very small colonies (Wesson & Wesson, 1940). Kannowski (1970) reported on colonies from Michigan with up to 68 workers and a single queen.

— Reproductives: Males - Aug. 21-Nov. 4. Females - Aug. 23-Oct. 21.

Range: Quebec, Massachusetts south to Georgia, west to Michigan, Iowa, Nebraska, Arkansas.

Ohio Distribution: Throughout Ohio. Recorded from 56 counties.



Myrmica punctiventris

Ohio References: Ashtabula (Headley, 1943a, 1943b; Weber, 1950), Butler (Gorham, 1956), Huron (Weber, 1950), Jackson (Wesson & Wesson, 1939), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940).

Comments: The more common of our two species, with a punctate gaster, and lacking a lamina at the bend of the antennal scape.

Myrmica spatulata Smith

Myrmica schencki var. *spatulata* Smith, 1930

Identification: TL 4.2-4.6 mm. Yellowish-brown to reddish-brown, alitrunk often somewhat paler, especially ventrally, darkest on gaster, mandibles and appendages paler; head and alitrunk coarsely rugose, surface glossy between ridges. This species is distinguished by the strongly projecting and over-hanging lamina at the bend of the scape.

Taxonomy: This could represent a species complex. Since it was recorded in southern Michigan (as sp. 2 - Wheeler, et al., 1994) and also in Illinois (D. R. Smith, 1979 - as *spatulata*), either form could conceivably be found in Ohio.

Ecology:

— Habitat: Found in dry woods in Michigan (Wheeler et al., 1994), and low heavily wooded area in Mississippi (Weber, 1948).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In soil (Wheeler et al., 1994).

— Colony Organization: The type series from a single nest in Mississippi consisted of 6 workers and 4 dealate females (Weber, 1948).

— Reproductives: Further data lacking.

Range: Michigan, Tennessee, Mississippi, Illinois, Indiana.

Comments: A more southerly species, the species name refers to the prominent, spatulate or spoon-like, lamina on the antennal scape.

Tribe Stenammini

Genus *Stenamma* Westwood

Stenamma Westwood, 1840

Identification: The structure of the clypeus, with a pair of fine longitudinal carinae which diverge anteriorly, is diagnostic for this genus. They have small eyes, distinct propodeal spines, and 12-segmented antennae with an indistinct 4-segmented club. Our species are small, being 4 mm in total length or less.

Immatures: Larvae aphaenogastroid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: Tribal placement follows Bolton (1994, 1995, 2003).

Revision(s): See Smith (1957) for the most recent revision (with a key to workers), although the revision and key of Snelling (1973b) for western species contains much useful information.

Key: The revised key presented below makes use of the eye height in relation to the gena height (the distance between the eye and mandibular insertion - the ocular/mandibular distance of other authors), and secondarily the number of facets in the eye height. The key does not include several species from the southeastern United States, including North Carolina, but is applicable for all of the northeastern United States and adjacent Canada.

Comments: These small, inconspicuous reddish-brown to brown ants are typically found in woodlands.

Key to *Stenamma* of Northeastern North America

1. Eye relatively large, gena height (distance between mandibular insertion and lower edge of eye) 2.1 X eye height or less; eye composed of 5 to 10 facets (ommatidia) in greatest diameter **2**

   Eye relatively small, gena height 2.3 X eye height or greater (usually nearly 3 X); eye composed of 3 to 6 facets in greatest diameter **4**

2. Eye large, gena height slightly greater than 1 X eye height; larger species, total length 3.6 to 4.3 mm .. .. (*S. meridionale*)

   Eye smaller, gena height 2.1 X eye height or less, but distinctly greater than 1 X; medium-sized species, total length 2.5 to 3.9 mm **3**

3. Smaller species, total length 2.5 to 3.0 mm; eye with 5 to 6 facets in greatest diameter; clypeus at most shallowly concave on front edge medially between longitudinal carinae; anterior angle of propodeum (just before suture) angulate but not raised above surface of propodeum ..... ***S. impar***

   Larger species, total length 3.0 to 3.9 mm; eye with 6 to 10 (usually 8 to 10) facets in greatest diameter; clypeus with distinct subtriangular notch on front edge medially between longitudinal carinae; anterior angle of propodeum (just before suture) usually raised as a transverse ridge or "welt" above surface of propodeum ..... ***S. brevicorne***

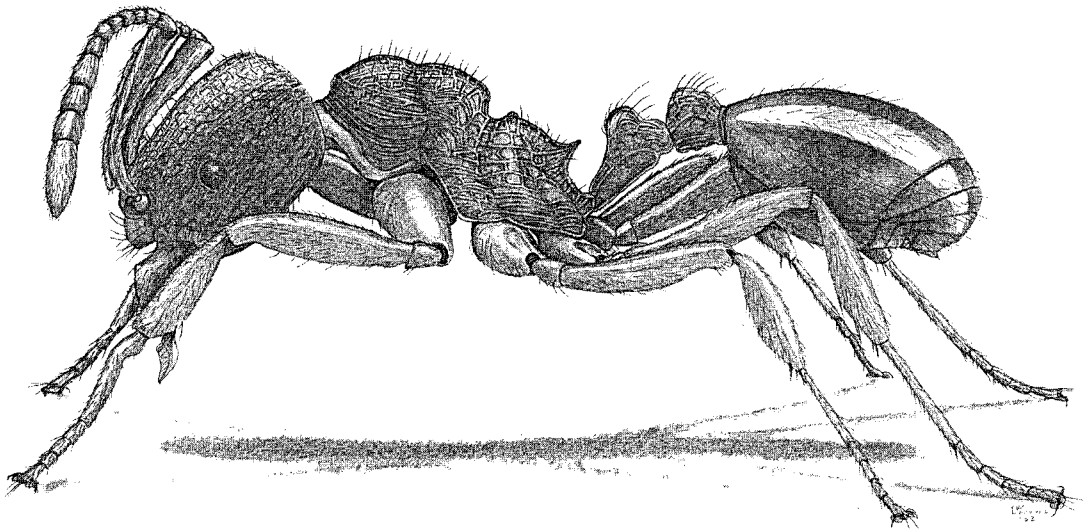
4. Surface of alitrunk (especially mesopleuron) dulled by micropunctures between rugae; postpetiole dorsally rugose, rarely smooth or noticeably glossy; facets of eye coarse and distinct ..... ***S. schmittii***

   Surface of alitrunk glossy between rugae, not dulled by micropunctures; postpetiole usually smooth and rather strongly glossy; facets of eye usually partially fused and thus smooth and glossy ..... (*S. diecki*)

13 *Stenamma brevicorne* (Mayr)

Aphaenogaster brevicornis Mayr, 1886

Identification: TL 3.0-3.9 mm. Reddish-brown to dark brown, gaster paler on base and apex (thus appears to be banded transversely), antennae and legs paler (yellowish-brown); head and alitrunk with rather finely rugose/reticulate sculpture, surface weakly glossy. Recognized by the relatively large size, larger eyes (gena height 2.1 X or less eye height), notched clypeus, and darker coloration. *S. impar* is smaller, lacks the distinctly notched clypeus, and usually has reduced sculpturing



***Stenamma brevicorne* (Mayr).** Drawing by Holly K. Coovert.

on the propleura; *S. meridionale* has larger eyes, while *S. schmittii* and *S. diecki* have much smaller eyes. Females of *S. brevicorne* are likewise larger, darker, and have the notched clypeus. Males are apparently unique in the punctate katepisternum (which is mostly smooth and glossy in the other species from our area), plus they have more prominent propodeal spines.

Taxonomy: Long recognized as distinct. See Smith (1957).

Ecology:

— Habitat: Found in moist woods, edge of old field, edge of grassland. Open woods (Wheeler et al., 1994).

— Food Resources: Smith (1957) notes "undoubtedly carnivorous, but may also be predaceous."

— Associates: Further data lacking.

Behavior: Workers found foraging on ground and under small stones in woods. Mostly subterranean or hypogaeic.

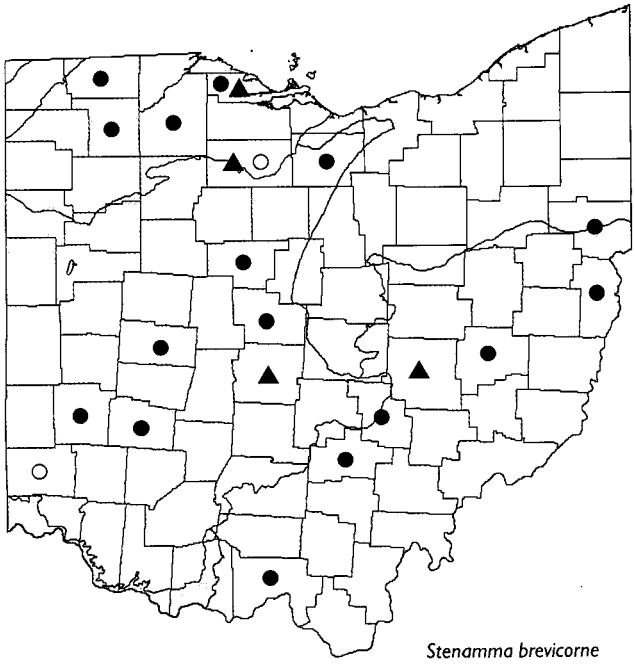
Nests: In soil under stones, in debris, rotting wood, etc. (D. R. Smith, 1979).

— Colony Organization: Colonies are small, a few dozen up to a hundred or so adults (Smith, 1957), with a single queen (Talbot, 1975).

— Reproductives: Males - June 5-12, Oct. 17. Kannowski (1958) described a swarm of males in southern Michigan, May 2. Females - May 18-27, Oct. 17. Stray dealate female - Sept. 2 (GAC 1930 #7) and Oct. 17. Talbot (1975) reports alates Aug. 10 to Sept. 10 in Michigan The above data seem to indicate that this species produces reproductives twice per year.

Range: Nova Scotia, Quebec south to Virginia, west to Ontario, Minnesota, Nebraska; Colorado (?).

Ohio Distribution: Widespread in Ohio. Recorded from 20 counties.



Stenamma brevicorne

Ohio References: Butler (Gorham, 1956), Seneca (Headley, 1949, 1952; Smith, 1957), southcentral Ohio (Wesson & Wesson, 1940).

Comments: Our most common *Stenamma*. The name "brevicorne" means short-horned, referring to the relatively short antennae.

Stenamma diecki Emery

Stenamma westwoodi diecki Emery, 1895
Stenamma westwoodi diecki var. *impressum* Emery, 1895

Identification: TL 3.0-3.7 mm. Brownish-yellow to reddish-brown, gaster paler on base and apex, mandibles, antennae, and legs paler (yellowish-brown); head and alitrunk with rather fine rugose/reticulate sculpture, surface weakly glossy, glossier on sides of pronotum. The small eyes (gena height 2.5 to 3 X eye height) with usually smooth, glossy facets, and overall glossy surface will distinguish this species. Also, the postpetiole in side view is more strongly swollen than the petiole and dorsally is usually mostly smooth and glossy, features also useful in identifying females. *S. impar* is superficially similar, but has larger eyes in relation to the gena, is smaller in size, and the postpetiole is less strongly swollen.

Taxonomy: Long confused with other species. Creighton (1950) recognized it as valid. See also Smith (1957).

Ecology:

— Habitat: Adapted to various habitats but usually in wooded areas (D. R. Smith, 1979). In moist woods in Michigan (Wheeler et al., 1994). Talbot (1975) reports swamps and their edges and low woods in Michigan.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: The timid workers will feign death on occasion when disturbed (Smith, 1957).

Nests: Colonies are in soil (usually under stones, logs, humus, moss, etc.) or in rotting wood (Smith, 1957; Talbot, 1975).

— Colony Organization: Usually a single queen (considered to be monogynous); colonies are small, up to 376 adults (Smith, 1957; Talbot, 1975).

— Reproductives: Males - July 19-Sept. 8 in Michigan (Talbot, 1975). Females - July 31-Aug. 26 (Michigan).

Range: Quebec, Maine west across southern Canada and the northern states to British Columbia, Washington, Oregon, California, south to North Carolina, Tennessee, Illinois, Iowa, North Dakota.

Comments: Further north (i.e. Michigan, see Talbot, 1975) this is the most common species of *Stenamma*. It has been recorded from Michigan (Wheeler et al., 1994), Pennsylvana (Smith, 1951), Indiana (Munsee et al., 1985), and Illinois (DuBois & LaBerge, 1988), so it should occur in at least northern Ohio. It seems to be associated with swamps and wet woods.

14 *Stenamma impar* Forel

Stenamma brevicorne impar Forel, 1901

Identification: TL 2.5-3.0 mm. Brownish-yellow to less commonly dark brown, gaster usually paler on base and apex (thus usually appearing transversely banded), mandibles, antennae, and legs paler (pale brownish-yellow); head and alitrunk with rather fine rugose/reticulate sculpture, surface weakly glossy, glossier on sides of pronotum, that could have greatly reduced sculpturing. The eyes are relatively large (gena height equal or less than 2 X eye height) and have relatively few facets (5 to 6 in greatest diameter); the postpetiole is not as strongly swollen in relation to petiole as in *S. diecki*; females are smaller than in other species (3.2 to 3.5 mm fide Smith, 1957). *S. brevicorne* is larger with more facets in the eyes and with an emarginate clypeus; *S. diecki* is larger, with very small eyes and a more swollen postpetiole.

Taxonomy: Originally described as a subspecies of *S. brevicorne*. Recognized as valid by Creighton (1950). See also Smith (1957).

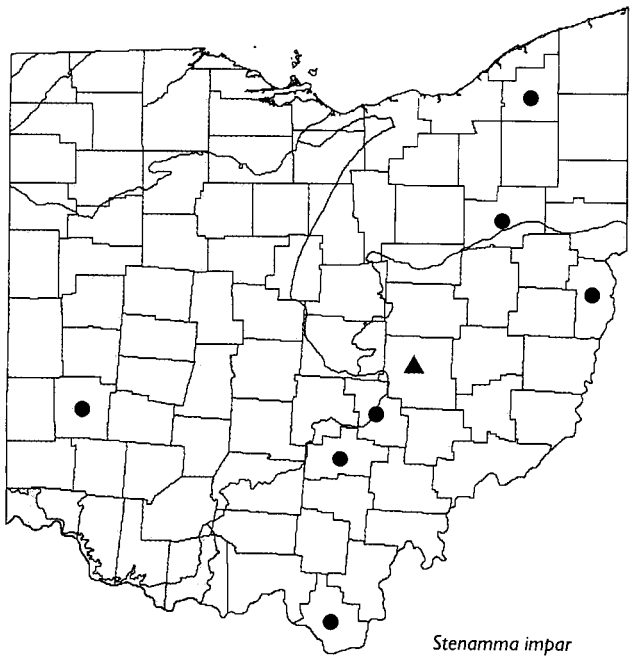
Ecology:

— Habitat: Found in woodland. In moist woods in Michigan (Wheeler et al., 1994).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Workers found foraging on ground in leaf litter in woods.



Stenamma impar

Nests: In soil or rotten wood (D. R. Smith, 1979).

— Colony Organization: Apparently with a single queen; colonies are small, up to 109 adults (Smith, 1957; Talbot, 1975).

— Reproductives: Males - Aug. 22 (GAC 2154 # 21) + Oct. 1-13. Stray dealate female, Aug. 9. Reproductives were found July 19 to Sept. 8 in Michigan, and Sept. and Oct. in Missouri (Talbot, 1975).

Range: Quebec, Massachusetts south to North Carolina, west to Michigan, Illinois, Missouri, North Dakota.

Ohio Distribution: Widespread in Ohio. Recorded from 8 counties.

Ohio References: None.

Comments: Our smallest species of *Stenamma*, this represents a new state record for Ohio.

Stenamma meridionale Smith

Stenamma meridionale Smith, 1957

Identification: TL 3.6-4.3 mm. Dark brown to brownish-black, head anteriorly and gaster apically paler, antennae and legs paler (yellowish-brown); head and alitrunk with rather fine rugose/reticulate sculpture, surface weakly glossy. The relatively large eyes of this large species should serve to distinguish it from all Ohio species.

Taxonomy: Described in the Smith (1957) revision.

Ecology:

— Habitat: Found in wooded areas (D. R. Smith, 1979); deciduous forest, usually near streams in Illinois (DuBois & LaBerge, 1988). See Carter (1962) for North Carolina habitats.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In soil (D. R. Smith, 1979). See Smith (1957).

— Colony Organization: Colonies are small (Smith, 1957).

— Reproductives: Further data lacking.

Range: Virginia south to South Carolina, Georgia, west to Illinois, Missouri, Arkansas.

Comments: This is typically a southern species, but has been recorded from Indiana (Munsee, 1968) and Illinois (DuBois & LaBerge, 1988), so I would certainly expect it in Ohio.

15 *Stenamma schmittii* Wheeler

Stenamma brevicorne schmittii Wheeler, 1903

Identification: TL 2.7-3.9 mm. Yellowish-brown to brown, rarely darker, head anteriorly and gaster at base and apex paler, alitrunk often paler ventrally, mandibles, antennae, and legs paler (brownish-yellow); head and alitrunk with moderately fine rugose/reticulate sculpture, surface dull to weakly glossy. This species is recognized by the small eyes and micropunctation which results in a relatively dull surface, plus a very broad, deep mesopropodeal suture. It is most similar to *S.*

diecki, but *S. schmittii* has a duller surface and coarser eye facets. The wing venation of the males and females is diagnostic and will distinguish them from all other eastern species (Smith, 1957:fig. 3).

Taxonomy: Known in earlier literature as *S. brevicorne schmittii*. Recognized as a valid species by Creighton (1950). See also Smith (1957).

Ecology:

— Habitat: Found in woods. In moist woods in Michigan (Wheeler et al., 1994).

— Food Resources: Carnivorous on various arthropods (Smith, 1957).

— Associates: Further data lacking.

Behavior: Primarily a leaf litter dweller. Smith (1957) reports activity primarily in the cooler months of March and Oct. to Dec.

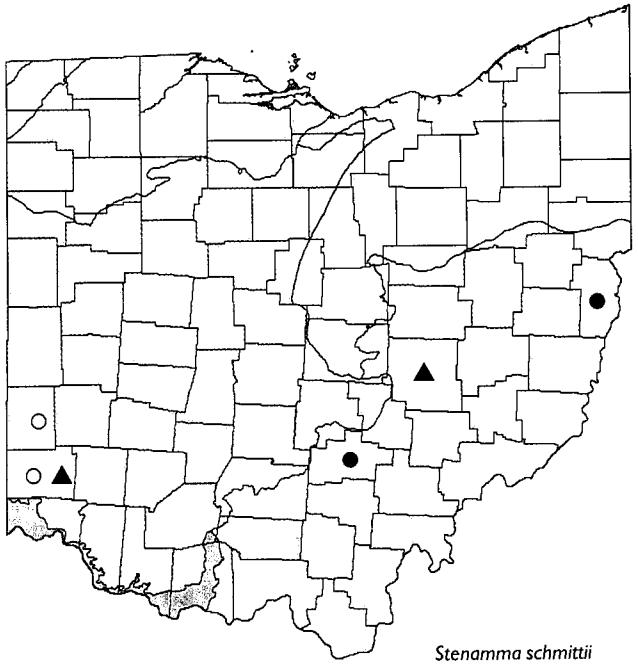
Nests: Colonies are typically in the soil under stones, logs, rotten wood, moss, leaf litter, and other debris and are difficult to find (Wesson & Wesson, 1940; Smith, 1957; D. R. Smith, 1979).

— Colony Organization: Apparently a single queen; colonies are small, at most 310 workers, and approx. 60 reproductives (Smith, 1957).

— Reproductives: Males - Oct. 15 (GAC 2369).

Range: Quebec, Maine south to North Carolina, west to Minnesota, Iowa, Missouri, Tennessee.

Ohio Distribution: Recorded from 5 counties in the southern half of Ohio.



Stenamma schmittii

Ohio References: Butler (Gorham, 1956), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950).

Comments: A small species recognized by sculpturing that has micropunctation between the rugae. Note that the spelling of "ii" at the end of the species name is the correct original spelling and is not to be changed to "i." Named for Rev. P. Jerome Schmitt (1857-1904), the designer of the well-known Schmitt box for storing insect specimens.

Tribe Pheidolini

Genus *Aphaenogaster* Mayr

Aphaenogaster Mayr, 1853
Aphaenogaster subg. *Attomyrma* Emery, 1915

Identification: Members of this genus are medium-sized to large (ca. 3.2 to 7.0 mm) and have a characteristically narrow, elongate body. They have a 12-segmented antennae with a long scape, but the club is at best weakly defined, the clypeus lacks the paired carinae of *Stenamma*, they have well-developed eyes, and they usually have distinct propodeal spines.

Immatures: Larvae aphaenogastroid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950) contains the most recent revision and key for all N. American species. Umphrey (1996) provides a complex worker key and detailed morphometric analysis of the *fulva-rudis-texana* complex.

Key: The key presented below is a complete revision of previous ones, resulting in a more useable and natural key. See additional comments under the *rudis / picea* complexes. Several species from the southeastern United States are not included. Particular care and latitude should be taken with unusually small individuals (minims) which often have reduced sculpturing and narrower heads; without association with normal-sized specimens they may prove to be misleading in some cases.

Comments: These slender ants are often a fairly dominant element of woodland faunas in our area.

Key to *Aphaenogaster* of Northeastern North America

1. Alitrunk and gaster completely lacking long, erect hairs dorsally; gena lacking erect hairs; postpetiole (viewed from above) broader than long; propodeal spines very long, as long or longer than distance between tips ..... ***A. tennesseensis***

   Alitrunk and gaster with abundant, conspicuous, long, erect hairs dorsally; gena with conspicuous erect hairs; postpetiole (viewed from above) longer than broad; propodeal spines usually shorter than distance between tips (long in only one species) **2**

2. First gastral tergite dorsally with long, distinct striae which radiate out from base (anterior end), striae as long as postpetiole; postpetiole (in side view) with

distinct, strongly produced, carinate ridge ventrally, lacking erect hairs ventrally; propodeal spines long, as long or longer than distance between tips; head and alitrunk with coarse rugose sculpturing ..... ***A. mariae***

First gastral tergite dorsally with basal striae greatly reduced or absent, if present, distinctly shorter than postpetiole length and weak; postpetiole (in side view) with smooth outline, lacking distinct, produced carinate ridge ventrally, and with at least a few erect hairs present ventrally; propodeal spines shorter than distance between tips; sculpturing finer **3**

3. Postpetiole very broad posteriorly, posterior end more than 1.5 X width of anterior end; base of antennal scape broadly flared at base (directly above condyle), usually slightly to very strongly lobate, flared base at least as wide as maximum width of distal end of scape (if approximately equal in width, then with prominent, dorsally pointed accessory scale just below outer edge of frontal lobe) **4**

Postpetiole relatively narrow posteriorly, posterior end at most 1.5 X width of anterior end; base of antennal scape only slightly flared at base (directly above condyle), never lobate, and flared base generally narrower than maximum width of distal end of scape (accessory scale, if present, very reduced and not pointed dorsally) **8**

4. Propodeum strongly rounded or angular at the junction of the dorsal and posterior (declivitous) faces, but lacking distinct spines; postpetiole (viewed from above) very long, over 1.5 X as long as wide ..... (*A. floridana*)

Propodeum with a pair of strong, distinct, sharply pointed spines; postpetiole shorter, less than 1.5 X as long as wide **5**

5. Base of antennal scape broadened into a distinct elongate lobe (with subparallel sides) which extends distally at least 1/6 length of scape, then abruptly narrows, the outer edge of lobe truncate, with a flattened face **6**

Base of antennal scape flared only at base, not broadened into elongate lobe, gradually or abruptly narrowing on distal end, the outer edge thin and carinate, lacking flattened face on edge **7**

6. Lobate base of antennal scape (viewed from side) strongly thickened, angular, this area as thick as broad, lobe extending ca. 1/4 length of scape; the outer edge of lobe with truncated face teardrop-shaped ..... ***A. treatae***

Lobate base of antennal scape (viewed from side) strongly flattened, this area much thinner than broad, lobe extending ca. 1/6 length of scape; the outer edge of lobe with truncated face narrowly linear ..... (*A. ashmeadi*)

7. Frontal lobe with prominent, distinct, dorsally pointed accessory scale just below outer edge which is subequal in size to upper half of frontal lobe and extends past antennal condyle when antenna in upright position; alitrunk distinctly sculptured, the surface relatively dull; base of antennal scape weakly flared and truncate basally above condyle, not lobate ..... ***A. lamellidens***

Frontal lobe with very weak, greatly reduced accessory scale which does not extend past antennal condyle; alitrunk with at least part of pronotum smooth and very glossy, most of alitrunk with very weak sculpturing and relatively glossy; base of antennal scape flared and weakly but distinctly lobate, the lobe extending somewhat basally toward condyle ..... (*A. flemingi*)

8. Antenna unicolorous (individual segments may be darkened apically but last 4 segments not noticeably lighter and contrasting with basal segments); legs and coxae pale, not infuscated, and distinctly contrasting in color with alitrunk; propodeal spines shorter, about half as long as propodeal declivity; mesonotal protuberances (pair of angularities posterior to front edge, best seen in side view) very low, rounded, scarcely or not concave between, and lacking transverse carina between them ..... ***A. rudis* Complex**

Antenna with apical 4 segments paler in color and contrasting with darker basal segments; legs and usually fore coxa lightly to distinctly infuscated, at least fore coxae barely or not at all contrasting in color with alitrunk; propodeal spines longer, more than half as long as propodeal declivity; mesonotal protuberances prominenet, sharply crested by transverse carina between them, concave in between **9**

9. Katepisternum (and usually anterolateral face of fore coxa) fully sculptured, the surface relatively dull, lacking smoother, glossy area; mesonotal protuberances very prominent, distinctly extended above level of pronotum, with sharply crested corners; pronotum dorsally with faint to distinct but crowded transverse rugae, surface not smooth and glossy; propodeal spines longer, at least as long as propodeal declivity and usually strongly directed upwards; alitrunk reddish-brown ..... ***A. fulva***

Katepisternum and anterolateral face of fore coxa usually with distinct, smooth, glossy area of reduced sculpturing; mesonotal protuberances moderately prominent, usually even with or only slightly extended above level of pronotum, the corners rounded; pronotum dorsally with transverse rugae faint and sparse to absent, surface punctate, often with smooth, glossy area of reduced sculpturing; propodeal spines shorter, about 2/3 as long as propodeal declivity and directed backward; alitrunk dark blackish-brown ..... ***A. picea* Complex**

Aphaenogaster ashmeadi (Emery)

Stenamma (Aphaenogaster) treatae var. *ashmeadi* Emery, 1895

Identification: TL 6.0-6.4 mm. Dark reddish-brown to brownish-black, gaster paler apically, mandibles and antennae paler, legs paler apically, basally, and on joints; head with fine rugose/reticulate sculpture, alitrunk finely punctate, dull to weakly glossy. The lobate base of the scape, similar to but smaller and thinner than in *A. treatae*, is diagnostic.

Taxonomy: Although originally described as a subspecies of *A. treatae*, Creighton (1950) recognized it as valid.

Ecology:

— Habitat: Found in a grassy slope in Tennessee (Cole, 1940b). Carter (1962) records open forests in North Carolina, especially pine/oak. See Van Pelt (1958) for Florida.

— Food Resources: Carnivorous, including other ants (Van Pelt, 1958).

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Under stone in Tennessee (Cole, 1940b). Carter (1962) records nests in soil in North Carolina.

— Colony Organization: Form moderately large colonies - Van Pelt (1958) records one with 326 workers, one queen, plus brood.

— Reproductives: Winged forms in nest in June in Florida (Van Pelt, 1958).

Range: North Carolina, Tennessee south to Florida, west to Missouri, Texas.

Comments: This is a southern species related to *A. treatae*. It is included because it just extends into the northeastern United States. All of the North Carolina records in Carter (1962) were from the coastal plain. I would not expect this species in Ohio.

Aphaenogaster flemingi Smith

Aphaenogaster texana flemingi Smith, 1928
Aphaenogaster texana macrospina Smith, 1934

Identification: TL 5.3-6.2 mm. Orangish- to reddish-brown, gaster usually darkened medially, paler at base and apex, mandibles, antennae, and legs somewhat paler; head with very fine rugose/punctate sculpturing, dull to weakly glossy, alitrunk smooth to weakly punctate, moderately to distinctly glossy, especially on pronotum. The characters presented in the key should readily identify this species. Diagnostic is the small lobate base of the scape and the smooth and glossy areas of the alitrunk. Obviously allied to *A. floridana* which is readily identified by its lack of propodeal spines.

Taxonomy: Originally described as a subspecies of *A. texana*. See Creighton (1950).

Ecology:

— Habitat: In open, grassy sites of dry, sandy soil in North Carolina (Carter, 1962).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In the soil (Carter, 1962).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: North Carolina south to Florida, west to Kentucky, Louisiana.

Comments: This is a fairly distinctive southern species included because it just extends into the northeastern United States. All of the North Carolina records in Carter (1962) were from the coastal plain. Because it occurs in Kentucky, it could be found in southern Ohio.

Aphaenogaster floridana Smith

Aphaenogaster (Attomyrma) floridana Smith, 1941

Identification: TL 6.5-6.8 mm. Pale to medium brownish-yellow, gaster mostly darker, mandibles and legs slightly paler; head with very fine rugose/punctate sculpturing, dull to weakly glossy, alitrunk smooth to weakly punctate, moderately to distinctly glossy, especially on pronotum; a very slender, elongate species. The complete lack of propodeal spines is diagnostic for this pale colored, largely smooth and glossy species. The weakly lobate base of the antennal scape clearly relates this species to *A. flemingi* which is likewise largely smooth and glossy.

Taxonomy: A distinctive species, recognized since it was described.

Ecology:

— Habitat: Found in grassy, open woodlands of sandhills and coastal areas in North Carolina (Carter, 1962). See Van Pelt (1958) for Florida habitats.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Fast moving; forages mostly at night (Van Pelt, 1958).

Nests: In sandy, dry soil (Carter, 1962).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: North Carolina south to Florida, Alabama.

Comments: A long, narrow southern species not likely to be found in Ohio.

16 *Aphaenogaster fulva* Roger

Aphaenogaster fulva Roger, 1863
Aphaenogaster fulva var. *rubida* Enzmann, 1947

Identification: TL 4.4-6.7 mm. Medium to very dark reddish-brown, mandibles slightly paler, antennae apically and legs apically and basally paler; head with rugose/reticulate sculpture, alitrunk rugose/punctate, both moderately dull to weakly glossy. This species is part of the *fulva-rudis-picea* complex but the characters in the key have worked consistently for Ohio material. The coarser sculpturing, more prominent mesonotal protuberance, bicolored antennae, and long propodeal spines are diagnostic characters. The female has a fully rugose mesopleura which is mostly smooth and glossy in *A. picea* and *A. rudis*.

Taxonomy: Both *A. rudis* and *A. picea* (q.v.) were long considered varieties or subspecies of *A. fulva*.

Ecology:

— Habitat: Found in moist to semi-open woods; "seem to be most abundant in dry oak woods where sometimes nearly every stone shelters a colony" (Wesson & Wesson, 1940).

— Food Resources: Mostly live and dead insects (D. R. Smith, 1979), but also gathers mymecochorous seeds of *Viola* sp. (Culver & Beattie, 1978).

— Associates: Host to the larvae of the myrmecophilous syrphid *Microdon coarctatus* (cf. Duffield, 1981).

— Ant Associates: Temporary host of *A. tennesseensis* and possibly of *A. mariae* (D. R. Smith, 1979).

Behavior: Workers found foraging on ground, logs, and under bark of logs.

Nests: Under bark of logs, in rotten logs and stumps, under logs. "Nests in rotting wood such as logs and stumps or in soil under stones or other objects" (D. R. Smith, 1979).

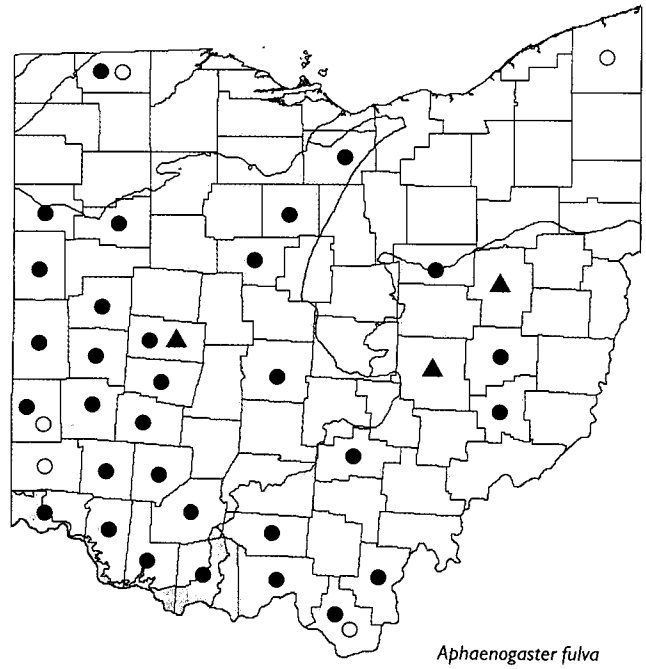
— Colony Organization: Further data lacking.

— Reproductives: Males - July 26-Aug. 28. Females - July 26-Aug. 26. Headley (1943a) notes July 15 to Sept. 25 for males and females.

Range: Vermont south to Florida, west to Michigan, Indiana, Nebraska, Missouri, Louisiana (composite of D. R. Smith, 1979 and Umphrey, 1996; Colorado record of Smith doubtful).

Ohio Distribution: Statewide in Ohio. Recorded from 35 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Lawrence (Umphrey, 1996), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Dennis, 1938).



Aphaenogaster fulva

Comments: The species name "fulva," meaning tawny or reddish-yellow, refers to the predominant color of this ant. This is a moderately common species with distinct sculpturing.

17 *Aphaenogaster lamellidens* Mayr

Aphaenogaster lamellidens Mayr, 1886
Aphaenogaster lamellidens var. *nigripes* Smith, 1923

Identification: TL 6.3-6.7 mm. Orangish- to reddish-brown, gaster somewhat paler (yellowish-brown), body darker overall in one variety, mandibles and antennal funiculus paler, legs paler basally and apically, especially coxae which contrast sharply with alitrunk; head with rugose/reticulate sculpture, alitrunk rugose/punctate, both moderately dull to weakly glossy. The accessory scale on the frontal lobe is diagnostic for this species. Once seen, this character is distinctive and much larger and more prominent than the tiny, reduced scale of other species. The flared base of the scale and broader postpetiole ally this species to *A. flemingi* and *A. floridana*.

Taxonomy: The Ohio record was listed as the var. *nigripes*, now a synonym. See Creighton (1950).

Ecology:

— Habitat: Found in deciduous forest in Illinois (DuBois & LaBerge, 1988). In moist, shaded woods in Tennessee (Cole, 1940b). See Carter (1962) for North Carolina habitats.

— Food Resources: Feeds on live and dead insects (D. R. Smith, 1979).

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Typically nests in stumps and logs with few of the passages running into the soil (Creighton, 1950).
— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.

Range: New York south to Florida, west to Illinois, Missouri, Texas.

Ohio Distribution: Only one unspecified record for southern Ohio (see below). A more typically southern species on the northern limit of its range in Ohio.

Aphaenogaster lamellidens

Ohio References: Southern Ohio (Dennis, 1938).

Comments: This is a predominantly southern species with a distinct accessory scale on the frontal lobe. It should be actively sought to determine if this is actually an Ohio species.

18 *Aphaenogaster mariae* Forel

Aphaenogaster mariae Forel, 1886

Identification: TL 5.0-5.6 mm. Medium to dark reddish-brown, base of gaster paler, mandibles, antennae apically, coxae, and tarsi slightly to distinctly paler; head and alitrunk with moderately coarse rugose/reticulate sculpture, surface moderately glossy between ridges. The very distinctive striae which radiate from the base of the gaster are diagnostic for this species. Additionally, the characters presented in the key and the coarse sculpturing make this species quite distinct.

Taxonomy: Being such a distinctive species, has had no major taxonomic problems.

Ecology:
— Habitat: Found in moist woods or woods' edges.
— Food Resources: Further data lacking.
— Associates: Further data lacking.
— Ant Associates: Probably a temporary social parasite on *A. fulva* (D. R. Smith, 1979). Buren (1944) found it in association 3 times in Iowa.

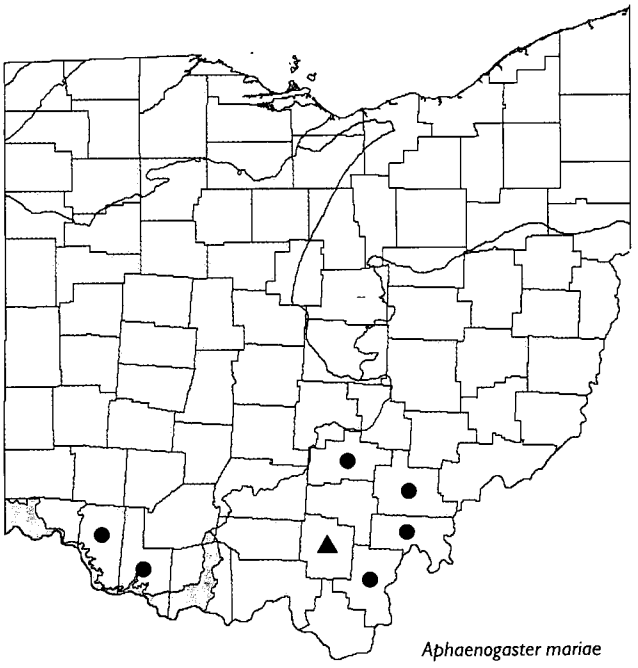
Behavior: Workers were found foraging on tree trunks in woods.

Nests: In rotten "stob" in white oak (GAC 1734) and boxelder (GAC 1919). Strays were taken on sycamore and red oak trunks. "A member of the tree crown fauna, this species was taken frequently in oak trees, often high above the ground. It nests in small stobs or in rotten cavities under the bark." (Wesson & Wesson, 1940).
— Colony Organization: Further data lacking.
— Reproductives: "Winged phases were taken in a nest in mid July." (Wesson & Wesson, 1940).

Range: New York south to Florida, west to Michigan, Iowa, Kansas.

Ohio Distribution: Recorded from 7 southern Ohio counties.

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940; Munsee, 1968), Ohio (Creighton, 1950; Gorham, 1956).



Aphaenogaster mariae

Comments: A very striking and distinctive species under the microscope, this ant appears to be strictly arboreal.

Aphaenogaster picea - rudis Complexes

Although *A. rudis* and *A. picea* were considered subspecies in D. R. Smith (1979), it was quickly obvious in this study that they are different species as both were frequently found at the same locality and always readily separable. A key was constructed early on, noting the

concolorous antennae of *A. rudis* as different from the bicolored antennae of *A. picea* in conjunction with other structural characters. Only later was a copy of Umphrey (1996) obtained. These taxa are part of a larger complex of sibling species, many only positively differentiated by chromosomal differences (karyotypes) and usually differing in chromosome number. Umphrey (1996) used complex morphometric analyses in an attempt to differentiate the different species but with limited success. After collecting material from both of his Ohio localities, I made an earnest effort to find additional characters within each complex but it quickly became obvious that this was a major task well beyond the scope of this work. The group is in desparate need of a formal revision, which still does not guarantee the ability to easily differentiate between species in each complex.

As used here, "*Aphaenogaster picea* Complex" refers to N17 and true *A. picea* (= N18), utilizing the terminology of Umphrey (1996), in which the N number refers to the number of chromosomes. Only N17 was recorded for Ohio by Umphrey. These two forms were indistinguishable by Umphrey and appear to be parapatric, with the range of true *picea* (N18) occurring east of N17. *A. picea* (N18) was recorded from Ontario, Connecticut, Pennsylvania (including a western county), West Virginia, and Georgia. It could therefore also be found in eastern Ohio.

As used here, "*Aphaenogaster rudis* Complex" includes true *A. rudis* (= N22a), N16, and N22b. Only the first two taxa were recorded from Ohio by Umphrey, but N22b was recorded from Ontario, Maryland, Indiana, and Missouri and is very likely found in Ohio. N16 has shorter antennal scapes than the other two in the *rudis* complex.

The key characters presented herein to separate the *rudis* and *picea* complexes from each other, especially antennal coloration, have held up remarkably well for several thousand Ohio specimens, but to differentiate sibling species within each complex will require a detailed formal revision.

In summary, the *A. picea* complex refers to one or possibly two species in Ohio, and the *A. rudis* complex refers to two or possibly three species in Ohio. Only karyotyping and in some cases very complex morphometric analyses can presently differentiate species within these complexes. It is felt that either method is impractical for general work and since a revision is still needed to formally name new taxa, the problem is left for future research.

One further set of names should be mentioned, and that is *A. texana / carolinensis*. Although neither has ever been mentioned for Ohio, *A. texana* was recorded for Illinois by DuBois & LaBerge (1988), and *A. texana carolinensis* for Indiana by Munsee et al. (1985) and Michigan by Gregg (1944) (although not in Wheeler et al., 1994). Umphrey (1996) recognizes both as distinct species, with material of *A. texana* from Texas and Arizona and *A. carolinensis* from the Atlantic coastal plain. In the past these two species were recognized by a narrower head with broadly rounded occipital corners, but often small individuals (minims) of other species which usually have broader heads were misidentified as one of these taxa. In all likelihood, the Illinois, Indiana, and Michigan records are small individuals of one of the members of the *rudis* or *picea* complex, and thus the species *A. texana* and *A. carolinensis* will not be further considered as potential Ohio species.

19 *Aphaenogaster picea* (Wheeler) Complex

Stenamma (Aphaenogaster) fulvum aquia var. *piceum* Emery, 1895
Stenamma (Aphaenogaster) fulvum var. *piceum* Wheeler, 1908
Aphaenogaster fulva aquia picea Emery

Identification: TL 4.0-6.2 mm. Dark reddish-brown to dark blackish-brown, mandibles and apical four segments of antennae slightly paler, legs often distinctly paler (light to dark yellowish-brown but often darkened, but fore coxae, at least, nearly concolorous with alitrunk); head with moderately fine rugose/reticulate sculpture plus very finely punctate, moderately glossy, alitrunk with some faint rugae but mostly with smooth punctate sculpture, largely glossy, katepisternum especially smoothed, with central glossy area. This species complex is another member of the *fulva-picea-rudis* complex. Ohio material studied by the present author has consistently been identified using the characters in the key. Note especially the bicolored antennae, usual darker coloration, and moderately reduced sculpturing, with the katepisternum normally having a smoothed, glossy area anteriorly. Most easily confused with *A. rudis*, which has unicolored antennae, and paler legs and coxae which contrast with the somewhat darker alitrunk.

Taxonomy: See above discussion. Since Emery proposed this name as a quadrinomial, which is "not available" taxonomically, the authorship is credited to W. M. Wheeler, 1908 because he was the first one to use the name in a trinomial, i.e. what we call in the trade "the first available use." See Bolton, 1995.

Ecology:

— Habitat: Found in moist woods and woods' edges.
— Food Resources: A feeding cluster of ca. 13 ants observed at a half eaten but fresh acorn (GAC 2175). Worker found carrying a *Camponotus* gaster (GAC 1778). Found on bait at night and on apple during the day. Probably also an active gatherer of myrmecochorous seeds.
— Associates: Further data lacking.
— Ant Associates: Temporary host of *A. tennesseensis* (D. R. Smith, 1979).

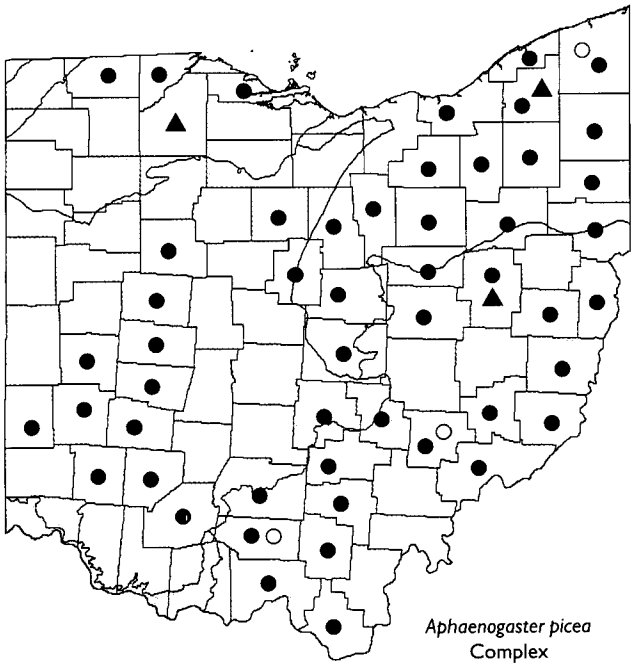
Behavior: Workers were found foraging on the ground and on tree trunks in woods.

Nests: Most commonly nests under rocks, logs, limbs, or bark, in rotten logs, under bark of logs, and bases of

trees, but occasionally in acorns and hickory nut shells.
— Colony Organization: Colonies often moderately large.
— Reproductives: Males - July 19-Aug. 23. Females - July 13-Aug. 30.

Range: Connecticut, Ontario south to North Carolina, Georgia, west to Ohio, West Virginia (Umphrey, 1996).

Ohio Distribution: Widespread in Ohio but appears to be gradually replaced by *rudis* westward. Recorded from 53 counties.



Aphaenogaster picea Complex

Ohio References: Ashtabula (Headley, 1943a), Morgan (Umphrey, 1996), Pike (Wesson & Wesson, 1939), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938).

Comments: The name "picea" means pitch-black or black with a slight red tinge. Indeed this species is usually darker in color than the related *A. rudis*. A complex of two sibling species differentiated by chromosome number; one or possibly both are found in Ohio. Very often a conspicuous element of Ohio woodlands.

20 *Aphaenogaster rudis* (Enzmann) Complex

Stenamma (Aphaenogaster) fulva aquia var. *rude* Emery, 1895
Aphaenogaster fulva aquia (Buckley) of authors
Aphaenogaster fulva var. *rudis* Enzmann, 1947

Identification: TL 4.1-6.2 mm. Medium brown, dark orangish-brown, to dark reddish-brown, alitrunk often slightly paler, mandibles, antennae, and legs slightly paler (medium orangish-brown), coxae at least slightly paler and usually distinctly contrasting with alitrunk; head with moderately fine rugose/reticulate sculpture plus very finely punctate, moderately dull to weakly glossy, alitrunk with smooth punctate sculpture, moderately dull to weakly glossy, katepisternum normally fully punctate. Part of the *fulva-picea-rudis* complex, this species complex is distinguished by the unicolorous antennae and paler legs and coxae which contrast with the somewhat darker alitrunk. Compared with *A. rudis*, *A. picea* has bicolored antennae, legs and fore coxae at least slightly infuscated, somewhat longer propodeal spines, and a more prominent mesonotal protuberance.

Taxonomy: See above discussion of *picea-rudis* complexes.

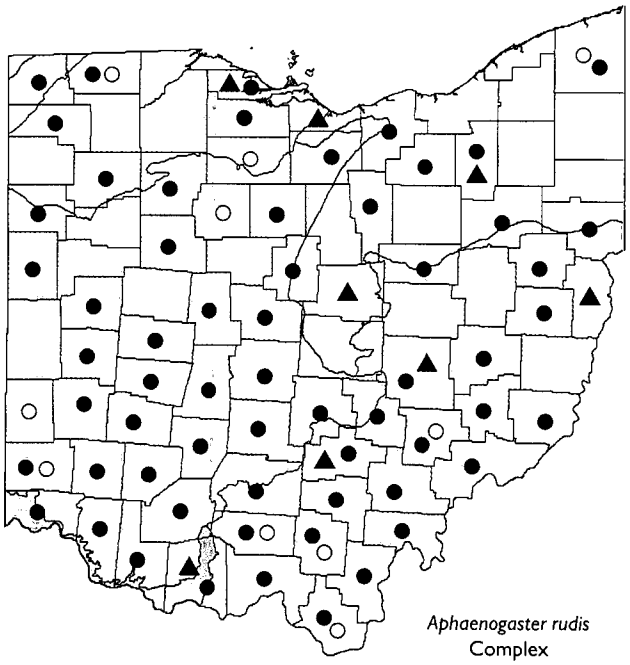
Ecology:
— Habitat: Found in woods, woods' edges, open areas near woods.
— Food Resources: Observed taking live termites (due to disturbance by collecting) (GAC 1778, 2120). Often taken at baits; GAC 2185 on decaying gilled fungus. "Food consists of insects, seeds, and pollen of ground nesting bees" (D. R. Smith, 1979). See Culver & Beattie (1978) and Beattie & Culver (1981) for list of myrmecochorous plants whose seeds are gathered for the nutritious elaiosomes. See also Fellers (1987). Predatory on Virginia-pine sawfly larvae (*Neodiprion p. pratti*) in Virginia (Bobb, 1965).
— Associates: GAC 1918 adjacent to *Camponotus castaneus* colony under same rock. The behavior of the myrmecophilous beetle *Limulodes parki* Seevers & Dybas, 1943 (q.v.) is described by Park (1933). These tiny beetles fed on skin exudations of the brood and adults.
— Ant Associates: Temporary host of *A. tennesseensis* (D. R. Smith, 1979).

Behavior: Workers were found foraging on ground in open and in woods and woods' edges. See Fellers & Fellers (1976) for description of "tool" use, in which bits of debris are used to gather soft or liquid food sources.

Nests: In leaf litter, under rocks, under bark or branches, under or in rotten wood; "colonies are occasionally found in the soil and under stones, but more often in moist, well rotted logs and stumps. On one occasion, a colony was found in a moist rotten portion of a large oak branch about 2 1/2 m. above the ground" (Wesson & Wesson, 1940). See also Headley (1949). Nest sites are frequently moved every 19 to 37 days (Hölldobler & Wilson, 1990).
— Colony Organization: Headley (1949), who did a population study, obtained an average colony size of 280 workers with a maximum of 950, and usually a single queen, but two colonies had two queens each. Talbot (1951) studied populations in Missouri, finding an average of 325 workers, a maximum of 2079, and up to 15 queens.
— Reproductives: Males - June 10-Aug. 26. Females - June 10-July 26.

Range: Ontario south to New Jersey, North Carolina, Alabama, west to Ohio, Indiana, Missouri (Umphrey, 1996).

Ohio Distribution: Widespread in Ohio but appears to be gradually replaced by *A. picea* eastward. Recorded from 67 counties.



Aphaenogaster rudis Complex

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Jackson (Wesson, 1940), Lawrence (Umphrey, 1996), Morgan (Umphrey, 1996), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938; Smith, 1951).

Comments: A complex of three sibling species differentiated by chromosome number. Two or possibly all three of these sibling species are found in Ohio. The name "rudis" means rough; compared with *A. picea*, it is more coarsely sculptured and usually paler in color.

21 *Aphaenogaster tennesseensis* (Mayr)

Atta Tenneseensis (!) Mayr, 1862
Atta laevis Mayr, 1862

Identification: TL 4.5-7.0 mm. Medium to dark reddish-brown, gaster slightly paler, orangish-brown, mandibles very slightly paler, apical four antennal segments, coxae, and tarsi usually slightly paler; head and alitrunk rugose/punctate, moderately dull to weakly glossy; alitrunk and gaster completely lacking long, erect hairs dorsally. This is our most distinctive *Aphaenogaster*. The total lack of erect hairs on the alitrunk and gaster is diagnostic, but ironically, this character has been virtually ignored. This feature is even discernable in the field with a hand lens.

Taxonomy: This species is apparently related to *A. mariae* since both have long propodeal spines, the postpetiole is produced below, both lack erect hairs ventrally on the postpetiole, and both have a similarly shaped postpetiole.

Ecology:

— Habitat: Found in woods, open woods, woods' edges, and semi-open areas.

— Food Resources: Taken several times at fruit bait; GAC 2309 on polypore fungus. Elaiosomes of the seeds of the myrmecochorous *Carex laxiculmis* (see Beattie & Culver, 1981).

— Associates: Further data lacking.

— Ant Associates: In early stages of colony formation, probably a temporary social parasite in ground nests of other *Aphaenogaster* species. Lives in ground nests only when females occur in nests of *rudis* and *picea*, otherwise it is exclusively a wood nesting ant. Host: *Aphaenogaster fulva, A. picea, A rudis*. (D. R. Smith, 1979). This conjecture is based on a few reported mixed nests and the small size and smooth, glossy surface of the females which are indicative of a social parasite, but nothing definitive is known in this regard.

Behavior: Workers were found foraging mainly on tree trunks in woods and woods' edges, but also on logs and on ground.

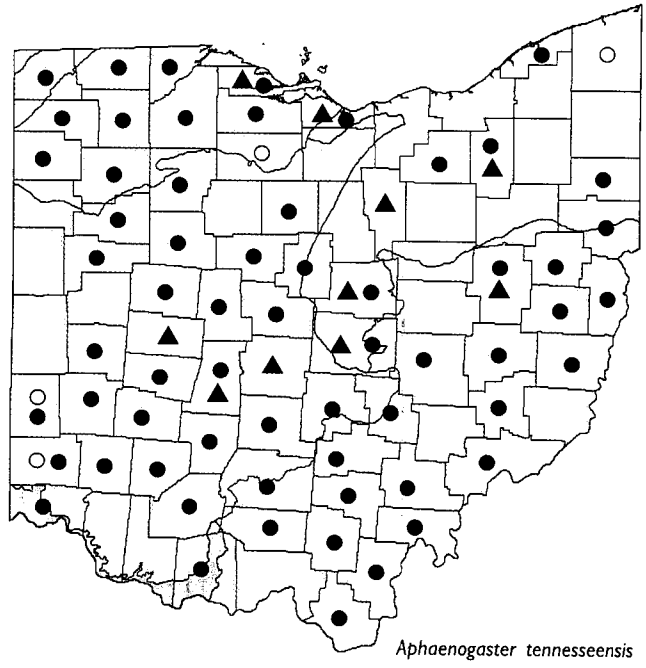
Nests: Most often in a variety of standing dead trees (in rotten cavities or under bark, but often in hard wood), stumps, or logs. I rather suspect that the colonies in logs are due to the dead tree having recently fallen.

— Colony Organization: Colonies are usually large.

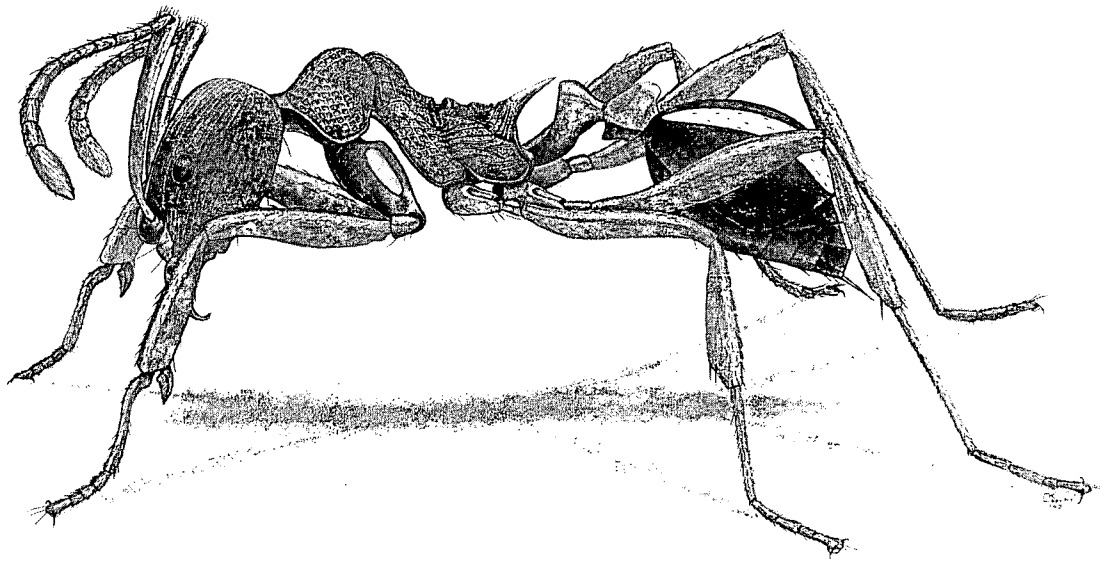
— Reproductives: Males - July 23-Aug. 21. Females - July 11-Aug. 21. The unusually small queens are distinctive, being smooth and having enlarged propodeal spines.

Range: Quebec, Ontario south to Florida, west to Minnesota, South Dakota, Nebraska, Kansas, Oklahoma.

Ohio Distribution: Found throughout Ohio. Recorded from 67 counties.



Aphaenogaster tennesseensis



***Aphaenogaster tennesseensis* (Mayr).** Drawing by Holly K. Coovert.

Ohio References: Ashtabula (Headley, 1943a, 1943b), Butler (Gorham, 1956), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938).

Comments: The bright chestnut red color in life makes this one of our most beautiful species of ants. This is predominantly a species of dead, standing trees. Dennis (1938) notes that this species is much more common in Ohio than in Tennessee, where it was originally found.

22 *Aphaenogaster treatae treatae* Forel

Aphaenogaster treatae Forel, 1886
Aphaenogaster treatae pluteicornis of some Ohio authors

Identification: TL 5.2-7.6 mm. Dark orangish-brown to dark reddish-brown or reddish-black, gaster usually dark yellowish-brown basally, darkening to nearly black apically, mandibles, antennae, and legs somewhat paler, medium orangish-brown; head with moderately fine rugose/reticulate sculpture plus very finely punctate, moderately dull to weakly glossy, alitrunk with smooth punctate sculpture, weakly glossy. The very distinctive, large lobe at the base of the scape is diagnostic for this species. Related to *A. ashmeadi*, which occurs further to the south, *A. treatae* has a much larger, thicker lobe at the base of the scape.

Taxonomy: Smith (1951), in the earlier Hymenoptera catalog, listed Ohio under *A. treatae pluteicornis*, also recorded by Wesson & Wesson (1940). The Ohio record was dropped in the recent catalog (D. R. Smith, 1979), the range for *A. treatae pluteicornis* being given as "Alabama west to Oklahoma, Texas." These early Ohio records of *A. treatae pluteicornis* are merely variants of *A. t. treatae*. See Creighton (1950).

Ecology:

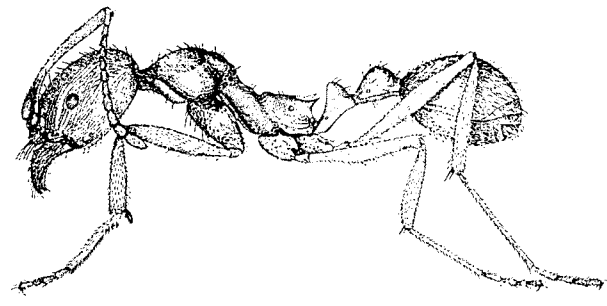
— Habitat: Found in semi-open to open grassy prairies and fields. Wesson & Wesson (1940) report that in southcentral Ohio they are "common everywhere in dry fields and open, well-drained woods." In North Carolina found in field and forest communities (see Carter, 1962 for detail). See also Talbot (1966).

— Food Resources: Primarily insects, including other ants; some collected grass seeds seasonally in Michigan (Talbot, 1954).

— Associates: Mites found in refuse chamber by Talbot (1954).

Behavior: Workers were found foraging on ground in fields and prairies. Talbot (1954) reports that most foraging activity occurs in the morning and late afternoon.

Nests: In soil, base of plants (GAC 1913). "Sometimes a small, irregular mound is piled outside the nest entrance." (Wesson & Wesson, 1940). Cole (1940b) found nests beneath stones in Tennessee, while Dennis (1938) describes nests in stumps as well as in the ground. See Talbot (1954) for more detail.



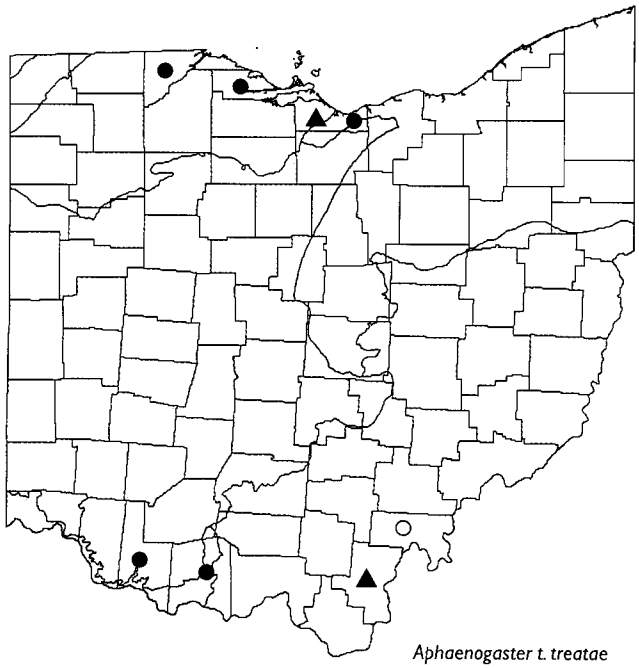
***Aphaenogaster treatae treatae* Forel.** From Smith (1947a).

— Colony Organization: Colonies are moderately large, averaging 682 workers in colonies studied by Talbot (1954) in Michigan, with a maximum of 1662 workers and a single queen.

— Reproductives: Males - July 16. "Winged females were taken from a nest in September" (Wesson & Wesson, 1940). Males and females, July 14 (Essex Co., Ontario). Talbot (1966) reports June 30-July 26 in Michigan for flights which are very brief and occur in warm temperatures when overcast skies develop.

Range: Ontario south to Florida, west to Michigan, Ohio, Illinois, Alabama.

Ohio Distribution: Only known from extreme northern and southern Ohio. Recorded from 7 counties.



Aphaenogaster t. treatae

Ohio References: Meigs (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Dennis, 1938; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This uncommon, but beautiful species of ant with a distinctive antennal lobe should be looked for in prairies and fields. Named for Mrs. Mary Treat, collector of the original type material, and author (1882) of *Injurious Insects of the Farm and Garden*.

Genus *Pheidole* Westwood

Pheidole Westwood, 1841

Identification: Members of this genus are most readily identified when accompanied by the huge-headed majors. Unassociated minors (which are generally very small) are more difficult to identify, but the features in the key should serve to identify them.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Helpful recent revisions include Gregg (1958) for the United States, with keys to major and minor workers, and Naves (1985) for Florida species, the latter containing useful keys and SEMs. The huge monograph of Wilson (2003) is now the definitive work. The extensive list of generic synonyms in D. R. Smith (1979) will not be repeated here.

Key: The key below should work for all regions of the northeastern United States and adjacent Canada.

Comments: This is a genus of harvesting ants, so named for their habit of gathering and storing seeds. The group is known for the workers being separated into two distinct castes or size classes (dimorphism): minors and majors. The huge heads of the major workers are apparently used to husk gathered seeds. This is a large genus with numerous species in the southeastern and southwestern United States.

Key to *Pheidole* of Northeastern North America

1. Majors, head grossly enlarged and strongly, sharply concave dorsally; size larger overall **2**

   Minors, head not enlarged; size distinctly smaller **10**

Majors:

2. Antennal scape with strong, compound bend near base (strongly bent both toward head and laterally), the scape distinctly flattened and flared (broadened) at the bend, nearly as wide at bend as at apical end; head with reduced sculpturing and very glossy dorsally ..... (*P. crassicornis*)

   Antennal scape with simple (not compound) bend near base (only bent toward head), the scape not notably flared (broadened) and usually not flattened at the bend, normally distinctly narrower at bend than at apical end; head variable dorsally, often fully sculptured **3**

3. Head fully and strongly sculptured and dull or weakly glossy dorsally, occipital lobes with strong reticulate sculpturing, not smooth and glossy **4**

   Head with at least the tops (and usually the front faces) of the occipital lobes very weakly sculptured or completely smooth, with only fine punctures, and very glossy (if head only smooth posterodorsally, then 1st tergite dull in contrast to remainder of gaster) **5**

4. Larger species, head 1.4 mm in length or longer; crest of petiole strongly and sharply emarginate dorsally;

eye larger, wider than width of distal antennal segment; color a medium to dark brown; ventral margin (lower rim) of head (behind mouth parts) lacking pair of prominent spines ..... ***P. pilifera***

Smaller species, head 0.85 mm in length, or less; crest of petiole convex or very slightly concave, eye smaller, width equal to width of distal antennal segment; color yellow to brownish-yellow; ventral margin (lower rim) of head (behind mouth parts) with a pair of strong, prominent teeth or spines ..... (*P. dentigula*)

5. Propleuron largely or entirely sculptured, surface dull or semiglossy, not largely smooth and glossy **6**

   Propleuron largely unsculptured, surface mostly smooth and glossy **7**

6. First gastral tergite minutely and densely granulose dorsally, the surface thus opalescent and dull (shagreened) in contrast to remainder of gaster ... . ***P. bilimeki***

   First gastral tergite smooth and very glossy dorsally ..... (*P. davisi*)

7. Anterior (lower) clypeal margin bluntly bidentate, with deep median notch in between; ventral margin (lower rim) of head (behind mouth parts) without teeth (although a pair present above and in front of the rim) ..... ***P. bicarinata***

   Anterior clypeal margin not bidentate and without median notch (may have wide, shallow median concavity); ventral margin of head with 2 or 3 distinct (often sharp) teeth or spines (besides the pair above and in front of the rim) **8**

8. Mesonotum without transverse, angular impression, the profile (side view) forming a continuous, smooth curve with the pronotum; antennal scape short, barely reaching half way to occipital corner; compound eye smaller, about as wide as width of apical antennal segment; head elongate with nearly parallel sides ..... ***P. tysoni***

   Mesonotum with well-developed, sharp, angular transverse impression, the profile (side view) forming an angular, stepped outline with the pronotum; antennal scape long, reaching 3/4 or more to occipital corner; compound eye larger, distinctly wider than width of apical antennal segment; head broad with convex sides **9**

9. Propodeum angular at the junction of the dorsal and posterior (declivitous) faces, but the angles not produced into distinct teeth or spines; color yellow or pale brownish-yellow, the gaster rarely slightly infuscated ..... (*P. morrisii*)

   Propodeum armed with distinct teeth or spines; color darker, yellowish-brown to brown, the gaster usually infuscated ..... (*P. dentata*)

Minors:

10. Head sculptured (punctate or striate) and mostly dull over nearly entire surface (rarely with limited area of reduced sculpturing medially); propleuron fully sculptured, to same degree as remainder of side of alitrunk **11**

    Head mostly devoid of sculpturing (except around antennal insertion and below eye, rarely very weakly sculptured medially), almost entirely smooth and very glossy; propleuron fully sculptured in only one species, others with propleuron smooth and glossy **14**

11. Antennal scape long, surpassing the occipital border by length distinctly greater than length of first funicular segment; front of head with longitudinal median area of reduced sculpturing .... (*P. crassicornis*)

    Antennal scape shorter, at most surpassing the occipital border by length less than length of first funicular segment; front of head almost entirely covered with sculpturing **12**

12. Larger species, total length 2.3 mm or longer; eye larger, width at least as great as width of apical antennal segment; scale of petiole (seen from behind) with crest broad, flat to weakly concave .... ***P. pilifera***

    Smaller species, total length ca. 2.1 mm or less; eye smaller, width less than width of apical antennal segment; scale of petiole (seen from behind) with crest narrow, usually rounded **13**

13. First gastral tergite and postpetiole minutely and densely granulose dorsally, the surface thus opalescent and dull; head finely and uniformly punctate. ..... ***P. bilimeki***

    First gastral tergite and postpetiole smooth and very glossy dorsally; head with at least some reticulate sculpturing ..... (*P. dentigula*)

14. Antennal scape shorter, at most surpassing the occipital border by length less than length of 1st funicular segment; eye small to medium-sized, width equal to or less than width of apical antennal segment **15**

    Antennal scape very long, surpassing the occipital border by length much greater than length of 1st funicular segment; eye large, width greater than width of apical antennal segment **17**

15. Propleuron fully sculptured, to same degree as remainder of side of alitrunk ..... (*P. davisi*)

    Propleuron mostly or entirely devoid of sculpturing, smooth and glossy **16**

16. Alitrunk almost entirely smooth and very glossy, almost completely devoid of sculpturing; color pale yellow; eyes small, width less than width of apical antennal segment ..... ***P. tysoni***

    Alitrunk with at least mesopleuron and side of propodeum distinctly sculptured and dull, contrasting with smooth, glossy propleuron; color medium to dark brown; eyes larger, width equal to width of apical antennal segment ..... ***P. bicarinata***

17. Propodeum angular at the junction of the dorsal and posterior (declivitous) faces, but the angles not produced into distinct teeth or spines; color yellow or pale brownish-yellow, the gaster rarely slightly infuscated ..... (*P. morrisii*)

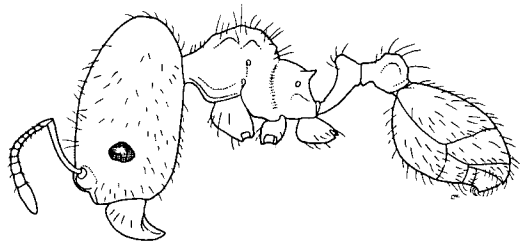
    Propodeum armed with distinct teeth or spines; color darker, yellowish-brown to brown, the gaster usually infuscated ..... (*P. dentata*)

23 *Pheidole bicarinata* Mayr

Pheidole bicarinata Mayr, 1870
Pheidole vinelandica of some Ohio authors

Identification: MAJOR: TL 3.2-3.3 mm. Pale brownish-yellow to usually dark orangish-brown, gaster darkened apically, mandibles with edges black, legs slightly paler than alitrunk; front and sides of head with fine rugae, top mostly smooth and glossy with scattered punctures, alitrunk mostly smooth and glossy anteriorly, finely punctate posteriorly. MINOR: TL 1.9 mm. Head and gaster medium to dark brown, gaster darker apically, alitrunk orangish-brown, head with sculpturing greatly reduced, mostly smooth and glossy, otherwise as in major.

The bidentate clypeal margin of the majors, along with the smooth and glossy propleuron and top of the head, are diagnostic. Minors have the head and propleuron smooth and glossy, have shorter antennal scapes, and medium-sized eyes.



***Pheidole bicarinata* Mayr.** Drawing of major by Holly K. Coovert.

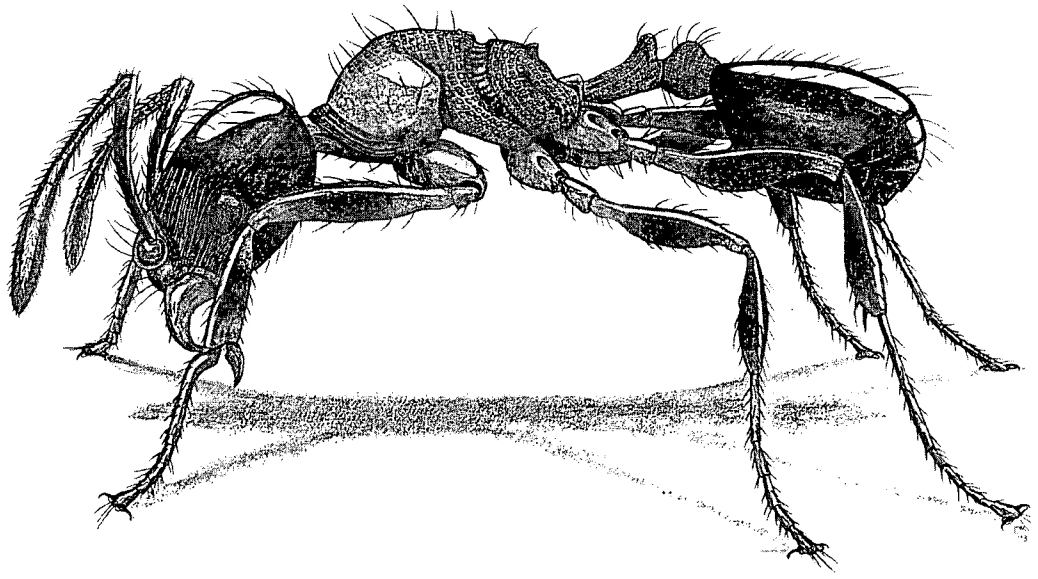
Taxonomy: Under this species heading fall three names associated with the northeastern United States and usually treated as subspecies: *P. b. bicarinata* (type locality: Illinois), *P. b. longula* (type locality: Colorado), and *P. b. vinelandica* (type locality: New Jersey). Creighton (1950), followed by Gregg (1958), provided a key to separate these three forms. All three of these were subsequently recorded from North Dakota by Wheeler & Wheeler (1963), with *P. b. bicarinata* and *P. b. vinelandica* being recorded in one of two records each from the same locality! In the Hymenoptera catalog (D. R. Smith, 1979), the following ranges are given: *b. bicarinata*, Michigan to Tennessee, west to North Dakota, Wyoming, Colorado; *b. longula*, New York, North Dakota, west Texas, Colorado, New Mexico; and *b. vinelandica*, New York to Florida, west to North Dakota, Utah, Arizona. Naves (1985) separated *bicarinata* and *vinelandica* as distinct species, recording *vinelandica* from New Jersey, North Carolina, South Carolina, Georgia, Florida, Alabama, and Texas, with *bicarinata* from Illinois, Iowa, Minnesota, Colorado, Wyoming, Utah. He described (op. cit., p. 66) *vinelandica* as "differing from *P. bicarinata* by having the basal face of propodeum in the major largely punctate and having a longitudinal striation on the frontal area" but not giving the obverse characters for *bicarinata*. He further stated that "It was evident that the two forms are not conspecific and have constant morphological differences, emphasizing that *P. vinelandica* deserves full species rank." Interestingly, Deyrup et al. (1980) list *P. vinelandica* in their "list of species excluded from or doubtfully included in our preliminary list" from Florida. DuBois (1985:151) found that the characters used to separate *bicarinata* and *vinelandica* in Kansas intergraded, even within the same nest, and listed all under *bicarinata*. This treatment was followed by DuBois & LaBerge (1988) for Illinois. Wheeler et al. (1994) record *P. bicarinata* from Michigan, although both species are listed by Gregg (1944) for the Chicago area. Bolton (1995) treated *bicarinata* and *vinelandica* as subspecies, with *P. longula* as a distinct species. Finally, Wilson (2003) lumps all three forms together, but admits that they could possibly represent a "...complex of closely related species."

Ohio material that I have collected (including the same locality as in Wesson & Wesson, 1940 - GAC 1920) would key to *vinelandica* based on the punctate rather than transversely striate dorsal face of the propodeum and the weakly rugose dorsum of the pronotum.

Obviously this situation requires much further study, given the disparate opinions. On one hand *bicarinata* and *vinelandica* were accorded separate species status by Naves (1985) but were lumped together by Bolton (1995) and Wilson (2003). I will consider all of these forms under *bicarinata* sensu latu, and thus including *vinelandica*.

Ecology:

— Habitat: Semi-open sandy areas; GAC 1920 from cemetery with scattered red cedars and *Opuntia*



***Pheidole bicarinata* Mayr.** Drawing of minor by Holly K. Coovert.

cacti (same Adams Co. locality as in Wesson & Wesson, 1940); GAC 2083 sand dune area under scattered pines. Grasslands (D. R. Smith, 1979). In Michigan limited to sand dunes and ridges (Wheeler et al., 1994). See Wilson (2003) for further detail.

— Food Resources: Active seed gatherer, but less granivorous than *P. pilifera* fide Buren (1944). Omnivorous, but regularly harvests seeds (Wilson, 2003).

— Associates: Further data lacking.

Behavior: The tiny, slow-moving workers are found foraging on the ground in open areas.

Nests: In sandy soil. "... nests are usually under objects" (D. R. Smith, 1979). Under stones and rotten logs in Illinois (DuBois & LaBerge, 1988). See Wilson (2003) for further detail.

— Colony Organization: Colonies are small, up to 200 adults (Cole, 1940b).

— Reproductives: "Winged phases were taken in the middle of July." (Wesson & Wesson, 1940). Cole (1940b) records reproductives in a nest June 17 in Tennessee

Range: New Jersey to Florida, Michigan, Tennessee, west to North Dakota, Wyoming, Colorado, and Texas, to Utah and Nevada.

Ohio Distribution: Recorded from 3 counties in the southernmost portion of unglaciated Ohio.

Ohio References: Adams (Wesson & Wesson, 1940), Jackson (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956).

Comments: A locally abundant *Pheidole*, or harvester ant. The name "bicarinata," or two-keeled, refers to the distinctive clypeus of the major, while *vinelandica* refers to the type locality of Vineland, New Jersey.

Pheidole bicarinata

24 *Pheidole bilimeki* Mayr

Pheidole bilimeki Mayr, 1870
Pheidole anastasii Emery, 1896

Identification: MAJOR: TL 3.0-3.2 mm. Medium to dark brownish-orange, gaster darker on apical half, mandibles black on edges, antennae and legs usually slightly paler (orangish-yellow); head finely rugose anteriorly, coarser on genae, finely punctate on occiput, dull, alitrunk minutely punctate, dull, first segment of gaster minutely and densely granulose dorsally, the surface opalescent and dull (shagreened) in contrast to smooth and glossy

posterior segments. MINOR: TL 1.6-1.7 mm. Structure and color as in major except the much smaller head minutely punctate and dull, largely lacking rugae, mandibles paler.

The dull, finely granulose first gastral tergite is diagnostic. Minors have a fully sculptured head and alitrunk, being densely and uniformly punctate.

Taxonomy: Originally described from Costa Rica. Naves (1985, as *P. anastasii*) differentiates this species from *Pheidole floridana* Emery, 1895, which is followed here. Synonymy after Wilson (2003); curiously, he does not mention the Naves (1985) material from Florida.

Ecology:

— Habitat: Found in greenhouses and other heated buildings in the north. See Wilson (2003) for tropical habitats.

— Food Resources: Naves (1985) notes "seeds, fruits, and scavenges on small dead arthropods and is predaceous on small live arthropods."

— Associates: Parasitized by a mermithid and eucharitid (*Orasema* sp.) (Naves, 1985).

Behavior: "The workers forage over 4 m from the colony and once food is located majors are recruited to help transport it back to the colony." (Naves, 1985).

Nests: Usually only found in greenhouses in northern states. In Florida it nests in the bases of pine trees and only rarely in the soil (Naves, 1985). See Wilson (2003) for tropical nests.

— Colony Organization: Colonies can be relatively large with more than 100 majors and 500 minor workers plus a single queen (Naves, 1985).

— Reproductives: See Wilson (2003) for data from the tropics.

Range: Southern Florida; Mexico, Central America to montane Colombia and Venezuela; Greater Antilles north to the Bahamas.

Pheidole bilimeki

Ohio Distribution: Only record is from a greenhouse in Franklin Co.

Ohio References: None.

Comments: This is a small tropical species. Thought to be an introduced species by D. R. Smith (1979) and others; Naves (1985) argues for its native status in Florida. In the northeast, it is occasionally found in greenhouses (e.g. Francoeur, 1990 for Quebec) and other heated buildings, but this is the first record of this species for Ohio.

Pheidole crassicornis Emery

Pheidole crassicornis Emery, 1895

Identification: MAJOR: TL 4.2 mm. Medium to dark orangish-brown, gaster dark yellowish-brown, very dark brown to blackish-brown apically, mandibles black on edges; front of head rugose, sides rugose/reticulate, top smooth and glossy with scattered punctures, alitrunk weakly sculptured anteriorly, weakly glossy, with dense punctation and duller posteriorly. MINOR: TL 3.2 mm. Medium to dark brown, alitrunk reddish-brown, gaster nearly black, mandibles paler (brownish-yellow); head with reduced rugose/reticulate sculpturing, but moderately dense, finely punctate, glossy medially, alitrunk as in major.

The majors have a very distinctive bend on the antennal scape near the base and a glossy head above, while the minors have the head sculptured but have long antennal scapes. These features make this species distinctive.

Taxonomy: A rather distinctive species. See Wilson (2003).

Ecology:

— Habitat: Found in open areas, usually among trees in Florida (Naves, 1985); dry, unshaded grassy areas in Tennessee (Cole, 1940b); and mainly open forests in North Carolina (Carter, 1962).

— Food Resources: Live termites and small dead arthropods (Naves, 1985).

— Associates: Further data lacking.

Behavior: Will forage 4 m or more from nest opening (Naves, 1985).

Nests: Deep in the soil, entrance apparently not marked by craters (Naves, 1985); in ground beneath a stone in Tennessee (Cole, 1940b); and mostly under rocks or logs in Tennessee (Dennis, 1938).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: North Carolina, Tennessee, Georgia and northern Florida, west to Texas.

Comments: This is a southern species with a distinctive antenna in the major. It is not expected from Ohio, but included for completeness.

Pheidole davisi Wheeler

Pheidole davisi Wheeler, 1905

Identification: MAJOR: TL 3.0 mm. Head dark brown with reddish-yellow band across anterior portion, alitrunk dark brown, sutures reddish-yellow, petiole, postpetiole, and gaster black; legs and antennae reddish-yellow; head mostly smooth and glossy above, alitrunk sculptured and mostly dull. MINOR: TL 1.5-1.8 mm. Head and gaster black, alitrunk and pedicel black or very dark brown; antennae and legs yellow; antennal club more or less infuscated, middle portions of femora and tibiae black.

Characters presented in the key should serve to identify this species. The combination of smooth and glossy head (only above in majors) plus fully sculptured alitrunk and short antennal scapes is diagnostic.

Taxonomy: Originally described from the pine barrens of coastal New Jersey. See Wilson (2003).

Ecology:

— Habitat: Found in open grassy areas with sandy soil in North Carolina (Carter, 1962); sandy pine barrens in New Jersey (Wheeler, 1905).

— Food Resources: Seed harvesters (Wilson, 2003).

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In sandy soil marked with small crater (Wheeler, 1905). See also Wilson (2003).

— Colony Organization: Colonies are small.

— Reproductives: Further data lacking.

Range: New York, New Jersey south to North Carolina, northern Alabama, with disjunct population in northeastern Mexico.

Comments: This is an Atlantic coastal species included for completeness. Named after William T. Davis, "the well-known naturalist of Staten Island" who introduced Wheeler to the pine barrens and later studied ants himself.

Pheidole dentata Mayr

Pheidole Morrisi var. *dentata* Mayr, 1886
Leptothorax tennesseensis Cole, 1938

Identification: MAJOR: TL 3.7 mm. Yellowish-brown to dark orangish-brown, gaster darker, dark brown to nearly black, mandibles with edges black; front and sides of head rugose, top mostly smooth and glossy with scattered punctures, alitrunk mostly smooth and glossy on pronotum, otherwise finely, densely punctate and dull. MINOR: TL 2.6-2.7 mm. As in major but head mostly smooth and glossy with reduced sculpturing, and color tends to be slightly paler.

The majors are identified by the smooth and glossy propleuron and top of head, non-bidentate clypeus, angular mesonotum, and presence of propodeal spines. Minors can be identified by the smooth and glossy head and propleuron, long antennal scapes, and presence of propodeal spines. A rather variable species. (see Naves, 1985).

Taxonomy: See Wilson (2003) for details. A close relative of *morrisii* (q.v.).

Ecology:

— Habitat: Cole (1940b) records fields of broomsedge grass in Tennessee, while Dennis (1938) found that they prefer the shade of woods but are also found in fields in Tennessee. They are rather variable in Florida, including wooded areas, sandy beaches, open areas, and marshland (Naves, 1985; Van Pelt, 1958). See Carter (1962) for North Carolina habitats. See also Wilson (2003).

— Food Resources: Highly carnivorous, but also using sugar sources. See Van Pelt (1958), Naves (1985), and Wilson (2003).

— Associates: Seevers & Dybas (1943) list the myrmecophilous beetle *Limulodes parki* (Limulodidae). Majors parasitized in the head by a phorid fly *Apocephalus* sp. in Texas (see Feener, 1981), while Kistner (1981) mentions *Apocephalus aridas* and *A. tenuipes*. Van Pelt (1950) describes parasitism by the chalcid *Orasema robertsoni* in Florida Host to the larvae of the myrmecophilous syrphid *Microdon rufipes* (cf. Duffield, 1981). See also Van Pelt (1958).

Behavior: See Wilson (1975b) who discusses odor trails and pheromone recruitment of the majors. See also Van Pelt (1958). For defensive strategies against fire ants in the south, see Hölldobler & Wilson (1994).

Nests: "Nests of small to large colonies are in exposed soil with a mound of excavated earth above it, under the cover of objects, or in rotting wood. Occasionally a house-infesting ant." (D. R. Smith, 1979). The flexibility to nest in rotten logs is unusual in this genus. Cole (1940b) found all his colonies in Tennessee beneath stones.

— Colony Organization: Colonies are rather large, with single queen (Van Pelt, 1958).

— Reproductives: In Florida winged forms in flight May and June (Van Pelt, 1958).

Range: Maryland and Virginia to Florida, west to Illinois, Tennessee, Kansas, Texas, and New Mexico.

Comments: A southern species possibly occurring in Ohio. Since this species is recorded from Illinois (but not found by DuBois & LaBerge, 1988) and Tennessee, it could possibly be found in southern Ohio.

Pheidole dentigula Smith

Pheidole dentigula Smith, 1927

Identification: MAJOR: TL 2.9 mm. Head and alitrunk orangish-brown, gaster brownish-yellow, mandibles black on margins, legs slightly paler than alitrunk; head

rugose/reticulate and punctate, dull or at most weakly glossy, alitrunk rugose/tuberculate, weakly glossy. MINOR: TL 1.7-2.1 mm. Brownish-yellow, head with sculpturing reduced but punctation more abundant, otherwise similar to major.

The key should serve to distinguish this species; diagnostic are the fully sculptured head and alitrunk, plus the pair of teeth on the lower edge of the head behind the mouthparts. The smaller eyes, paler color, and smaller size will readily distinguish this species from *P. pilifera*.

Taxonomy: Originally described from Mississippi. See Wilson (2003).

Ecology:

— Habitat: Found in wooded areas. In Tennessee, on grassy slope (Cole, 1940b). In North Carolina in moist, shaded forest communities (Carter, 1962). See Van Pelt (1958) for Florida habitats. Apparently a forest ant (Wilson, 2003).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: *Solenopsis molesta* fide Van Pelt (1958).

Behavior: Further data lacking.

Nests: In soil or in well-rotted stumps (Naves, 1985). Cole (1940b) reports on a nest in the ground under a stone in Tennessee. See also Wilson (2003).

— Colony Organization: Colonies are small, averaging 85 workers, 17 majors, brood, and a queen (Van Pelt, 1958).

— Reproductives: In Florida, males - Aug. in nest, females - July on the wing, Sept. in nests (Van Pelt, 1958). In South Carolina - June 9 (Wilson, 2003).

Range: North Carolina, Tennessee south to Florida, west to Louisiana and eastern Texas.

Comments: This is a southeastern species that just extends into the northeastern United States. In North Carolina this species was only found in the coastal plain (Carter, 1962).

Pheidole morrisii Forel

Pheidole Morrisii Forel, 1886

Identification: MAJOR: TL 4.1-4.4 mm. Yellow to pale brownish-yellow, mandibles with edges black, legs slightly paler than alitrunk; front and sides of head rugose, top mostly smooth and glossy with scattered punctures, alitrunk mostly smooth and glossy on pronotum, otherwise finely, densely punctate and dull. MINOR: TL 2.4-2.9 mm. As in major but head mostly smooth and glossy, with reduced sculpturing.

The greatly reduced propodeal spines are diagnostic for this species in both castes. The characters in the key will serve to identify it.

Taxonomy: A close relative of *P. dentata* (q.v.). See Wilson (2003). Note the "ii" ending to the specific epithet. This is the correct original spelling according to the ICZN (and as utilized by Bolton, 1995).

Ecology:

— Habitat: Found in dunelands, especially black oak dunes in Indiana and Illinois (Gregg, 1944). Dry grassy fields and slopes in Tennessee (Cole, 1940b). See also Carter (1962) for details of North Carolina habitats, and Van Pelt (1958) for Florida.

— Food Resources: Primarily a scavenger, but will also gather seeds (Naves, 1985). Barton (1986) records visiting extrafloral nectaries of partridge pea (*Cassia fasciculata*) in Florida.

— Associates: Further data lacking.

Behavior: Workers can forage over 8 m from the nesting site; majors can help bring back food once it is located (Naves, 1985). Gregg (1944) reports "the ants swarm out in large numbers to defend themselves" when disturbed. See also Cole (1940b).

Nests: In the ground, usually among the roots of a grass hummock in Indiana and Illinois (Gregg, 1944). Cole (1940b) notes that most nests are in the soil beneath large stones, but some construct mounds. See also Van Pelt (1958) for Florida.

— Colony Organization: Colonies are quite large with single queen (monogynous) (Naves, 1985; Van Pelt, 1958), although Hölldobler & Wilson (1990) report multiple queens. Gregg (1942) reports up to four queens per nest.

— Reproductives: Winged males collected in Aug. and females present as early as June in Indiana and Illinois (Gregg, 1944). Alates present in nests during mid-June in Tennessee (Cole, 1940b).

Range: New York to Florida, west to Illinois, Louisiana, Missouri, Oklahoma, and Texas.

Comments: A species recognized by the reduced propodeal spines. Since this species is recorded from Illinois (but not found by DuBois & LaBerge, 1988) and Indiana (Gregg, 1944, but not listed in Munsee et al., 1985), it should be sought in Ohio.

25 *Pheidole pilifera pilifera* (Roger)

Leptothorax pilifer Roger, 1863
Pheidole pennsylvanica Roger, 1863

Identification: MAJOR: TL 4.2-5.1 mm. Yellowish-brown to usually dark reddish-brown, petiole and postpetiole darkened, gaster nearly black, mandibles with margins black, legs paler than alitrunk; head fully sculptured, rugose on front and sides, reticulate above, dull or weakly glossy; alitrunk with rugose/punctate sculpturing, dull to weakly glossy. MINOR: TL 2.4-2.8 mm. As in major, except head usually darker, mandibles paler than head; head fully covered with rugose/punctate sculpturing, alitrunk with fine punctate sculpturing.

This species should readily key out; the larger size, fully sculptured head and alitrunk, darker color, and larger eyes are diagnostic.

Taxonomy: See Creighton (1950) for extensive discussion. Wilson (2003) synonymizes all the forms, but delineates geographic variation and even keys separately eastern and western populations. For this reason, I follow Bolton (1995) in recognizing subspecies.

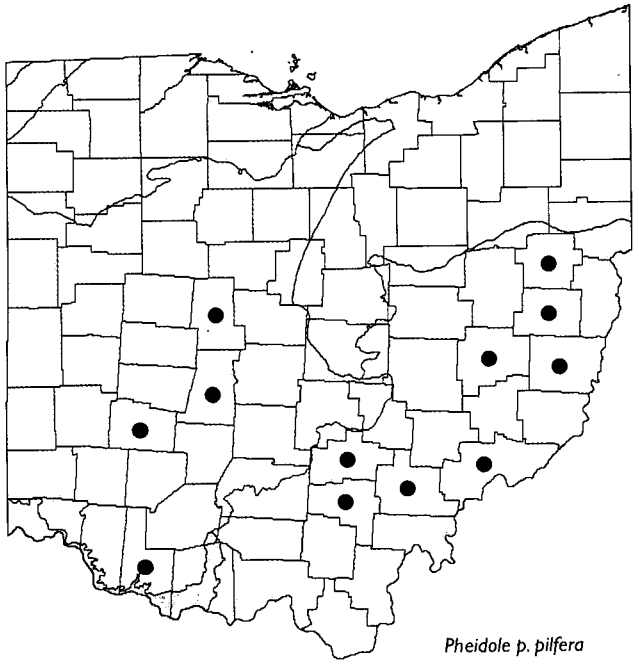
Ecology:

— Habitat: Found in open fields and meadows in areas with sparser vegetation;"fairly common in both dry and moist fields and meadows where the sun reaches the soil. One colony was taken in a small opening on a moist slope in the woods." (Wesson & Wesson, 1940).

— Food Resources: Taken at bait in open (GAC 1815). A harvester of seeds (grass seeds collected with GAC 1772). Buren (1944) states that it will take dead insects if offered, but is largely granivorous. Wheeler & Wheeler (1963) lists seeds utilized in North Dakota

— Associates: Wheeler & Wheeler (1986) report on finding pupae of the parastic eucharitid wasp *Orasema occidentalis* in Nevada.

Behavior: The tiny workers found foraging on ground in open. Stefan Cover (in Wilson, 2003) reports that the majors seldom leave the nest except when recruited. Their primary function is to block nest passages, which they do effectively.



Pheidole p. pilfera

Nests: In soil, often at base of grasses; columnar soil piles (GAC 1917); conspicuous conical fine soil pile ca. 12-13 cm dia. x 3.8-5 cm high (GAC 2036); sand piled to one side of entrance (GAC 2198).

— Colony Organization: Monogynous, with newly mated queens starting their own colonies singly (Wilson, 2003).

— Reproductives: Males - Sept 9 (GAC 2347 # 10). Wheeler (1905) notes a mating flight July 27 in Illinois. Stefan Cover (in Wilson, 2003) lists early to mid-July for mating flights in the east.

Range: New York, Massachusetts south to Georgia, west to North Dakota, Nebraska, Kansas.

Ohio Distribution: Widespread in the southern half of Ohio. Recorded from 12 counties. This is the regional northern range limit for this species.

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Cole, 1952; Gorham, 1956).

Comments: Our largest and most common species of harvester ant or *Pheidole*. The species name means "to bear hairs," not exactly a unique character. Named by Julius Roger, a European myrmecologist.

26 *Pheidole tysoni* Forel

Pheidole tysoni Forel, 1901

Identification: MAJOR: TL 3.5-3.7 mm. Brownish-yellow to yellowish-brown, mandibles darker and edged with black; lower front and sides of head rugose, top mostly smooth and glossy with scattered punctures, alitrunk mostly smooth and glossy. MINOR: TL 1.8-2.0 mm. As in major but mandibles paler and head mostly smooth and glossy.

The smooth and glossy propleuron and top of head, elongate and nearly parallel-sided head, plus the smooth outline of the mesonotum are diagnostic for the majors, while the minors have the entire head and alitrunk smooth and glossy. All other species have at least the posterior part of the alitrunk sculptured.

Taxonomy: A distinctive species with no major taxonomic problems. See Wilson (2003).

Ecology:

— Habitat: "Very common in dry fields and meadows and grazed hillside pastures; found occasionally in openings in the woods." (Wesson & Wesson, 1940). See Carter (1962) for details of similar habitats in North Carolina. See also Wilson (2003).

— Food Resources: A seed gatherer, but workers also tend aphids and collect floral nectar on low, herbaceous plants (Wilson, 2003).

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Deep in the ground. In Tennessee in soil beneath stones (Cole, 1940b).

— Colony Organization: Colonies are small (Cole, 1940b).

— Reproductives: "Winged females were taken in the middle of July." (Wesson & Wesson, 1940). Cole (1940b) found alates in nests during late June and July in Tennessee.

Range: New York, Virginia, North Carolina, northwestern Georgia, Ohio, Tennessee, and Kentucky; disjunct populations in Louisiana, west Texas, the mountains of southern Arizona, and Mexico.

Ohio Distribution: Recorded from 2 counties in southern unglaciated Ohio. At the northern range limit for this species.

Pheidole tysoni

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), southern Ohio (Dennis, 1938), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: The smooth and glossy areas of the body help to identify this species. This species of harvester ant was considered very common by Wesson & Wesson (1940). Further collecting will hopefully reveal more material. The species was named for the type locality, Tyson's farm at the foot of Mt. Mitchell, North Carolina.

Tribe Crematogastrini

Genus *Crematogaster* Lund

Crematogaster Lund, 1831
Acrocoelia Mayr, 1852
Orthocrema Santschi, 1918

Identification: The distinctive shape of this genus is unmistakable. Look for the subcordate gaster which is flatter dorsally than ventrally, and the postpetiole attachment at the base of the gaster dorsally, not in the usual ventral position. In life these ants will often flex their gasters upward or even forward over the alitrunk.

Immatures: Larvae crematogastroid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): The taxonomy of this group has seen an evolutionary change – the earlier papers of Buren (1958, 1968b) are superseded by Johnson (1988). Keys to workers are provided.

Key: The key below will work satisfactorily for most of northeastern North America, but does not include *C. ashmeadi* which occurs from Virginia to Florida and west to Texas. See Johnson (1988) for a key to all species east of the Mississippi River.

Comments: These ants, with their distinctively-shaped gasters, often form sizeable colonies. These ants are able to bring their gaster up over their back and exude a defensive droplet from the sting.

Key to *Crematogaster* of Ohio

1. Head (especially front) with pubescence (shorter hairs) mostly erect or suberect, not appressed; pleura (side) of pronotum largely unsculptured, with a large, smooth, glossy area; dorsum of 1st gastral tergite with pubescence often largely erect or suberect .. .. ***C. pilosa***

   Head with pubescence always closely appressed to surface; pleura of pronotum weakly to strongly sculptured over most of the surface, resulting in a roughened, often largely dull surface; dorsum of 1st gastral tergite with pubescence always closely appressed **2**

2. Pronotum with continuous transverse band of moderately long erect hairs; mesonotum with rather abundant, scattered erect hairs; 1st gastral tergite with a number of scattered long, erect hairs dorsally (besides those near posterior border) .... ***C. lineolata***

   Pronotum with very long erect hairs confined to humeral angles, usually not more than 1 to 3 on each side and always lacking in middle; mesonotum usually lacking erect hairs, at most a few (3 to 4) very short hairs present posteriorly; 1st gastral tergite with only 1 or 2 scattered long, erect hairs dorsally (besides those near posterior border) ..... ***C. cerasi***

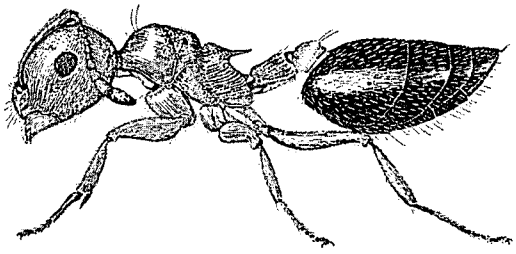
27 *Crematogaster cerasi* (Fitch)

Myrmica cerasi Fitch, 1855
Crematogaster (Acrocoelia) kennedyi Wheeler, 1930
Crematogaster lineolata var. *cerasi* (Fitch)

Identification: TL 2.7-4.0 mm. Dark yellowish-brown to very dark reddish-brown, gaster nearly black; head minutely striate on lower face and sides, with a few scattered punctures above, mostly smooth and glossy, alitrunk rugose dorsally, finely punctate on sides, mostly dull or weakly glossy; minute pubescence on head ap-

pressed, pronotum with only a few longer hairs on each corner. The combination of appressed pubescence on the head plus erect hairs restricted to the humeral angles and usually completely lacking on the mesonotum will differentiate this species.

Taxonomy: Now our most distinct species but with a long, tangled taxonomic history. Earlier references list it as a subspecies of *C. lineolata*, or failed to recognize it altogether. See Johnson (1988).



***Crematogaster cerasi* (Fitch).** From Smith (1947a).

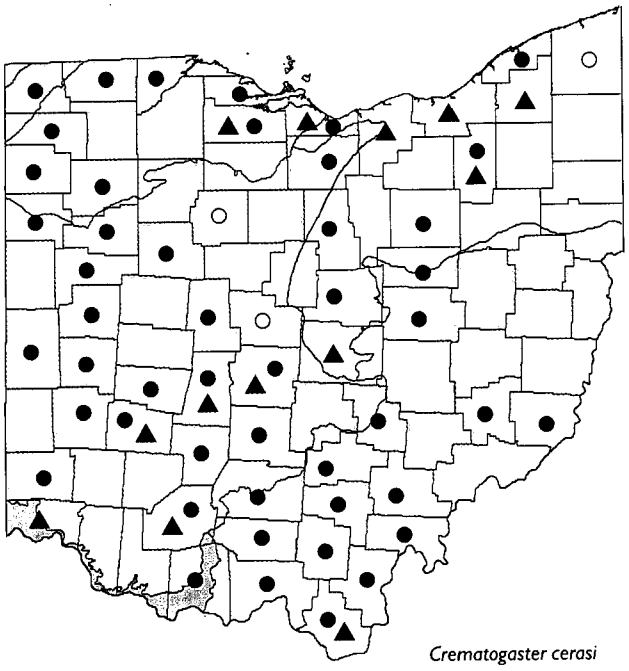
Ecology:

— Habitat: Found in woods, woods' edges, semi-open, and open areas; occasionally in buildings.

— Food Resources: Found on bloom of *Viburnum acerifolium* probably tending aphids (GAC 1738); on *Solidago* sp. (GAC 1952), and on dead insects (GAC 1795). Seeds of myrmecochore *Uvularia perfoliata* (see Beattie & Culver, 1981).

— Associates: Burns (1964) reports tending tuliptree scale (*Toumeyella liriodendri*). Parasitized by the phorid fly *Pseudacteon onyx* Steyskal, 1944 (q.v.) in Michigan.

Behavior: Workers were found foraging on ground, tree trunks, logs, and foliage in woods.



Crematogaster cerasi

Nests: Variety of situations: under rocks, logs, bark, and man-made objects, in hollow *Eupatorium* stem, in and under rotten log, base of tree, in kitchen.

— Colony Organization: Further data lacking.

— Reproductives: Males - July 21-Oct. 10. Females - July 28-Sept. 15.

Range: Quebec south to Georgia and Florida, west to Michigan, South Dakota, Arkansas, New Mexico.

Ohio Distribution: Statewide. Recorded from 56 counties.

Ohio References: Ashtabula (Headley, 1943a), Delaware (Burns, 1964), Wyandot (Amstutz, 1943).

Comments: Our most common species of *Crematogaster*. They sometimes do minor damage when nesting in woodwork and timbers in houses (D. R. Smith, 1979). Described by Asa Fitch (1809-1879), one of the more important early American entomologists.

28 *Crematogaster lineolata* (Say)

Lined Acrobatic Ant

Myrmica lineolata Say, 1836

Crematogaster punctulata Emery, 1895 [fide Johnson (1988), at least in eastern United States]

Identification: TL 2.8-4.2 mm. Medium orangish-brown to dark reddish-brown, head often slightly darker, gaster nearly black; head minutely striate or rugose on lower face and sides, with a few scattered punctures above, mostly smooth and glossy, alitrunk rugose dorsally, finely punctate or minutely striate on sides, mostly dull or weakly glossy; minute pubescence on head appressed, pronotum with band of longer hairs across anterior margin. The combination of appressed pubescence on the head plus numerous erect hairs on the pronotum and mesonotum will readily identify this species.

Taxonomy: See Johnson (1988).

Ecology:

— Habitat: Found in woods, semi-open areas, open fields, and meadows.

— Food Resources: A scavenger and honeydew (below).

— Associates: Burns (1964) reports tending tuliptree scale (*Toumeyella liriodendri*) in Kentucky. Bristow (1983) reports tending of membracid *Publilia reticulata* on ironweed in New Jersey. Predatory on Virginia-pine sawfly larvae (*Neodiprion p. pratti*) in Virginia (Bobb, 1965).

— Ant Associates: GAC 1800 colony under board in moist meadow adjacent to *Lasius alienus* colony.

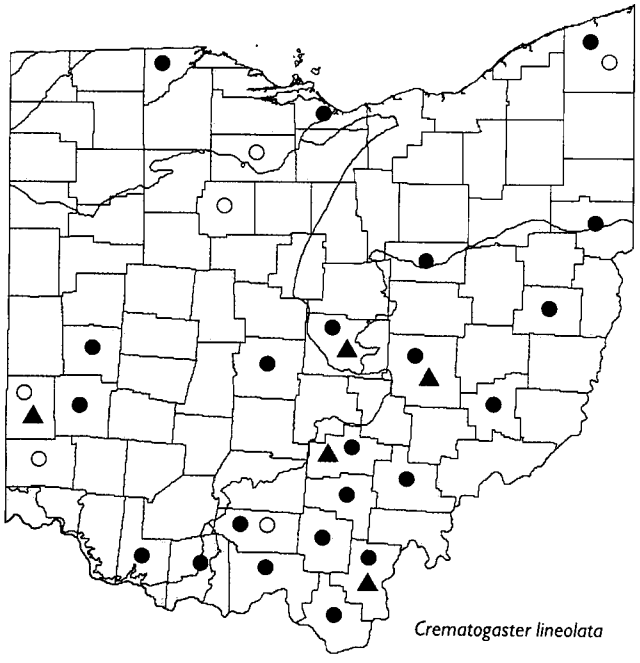
Behavior: Workers were found foraging on ground in meadows and on base of tree and foliage in woods. Disturbance will cause numerous workers to issue forth from nest.

Nests: In ground under rocks, boards, or small logs; numerous colonies under shale rock in open at base of bluff, carton used to wall off nest (GAC 2201). Wesson & Wesson, 1940 describe a nest built almost entirely of carton in a clump of beard grass in an open meadow. "...infests houses and often nests within buildings" (D. R. Smith, 1979).

— Colony Organization: "They appear strongly polydomous." (Wesson & Wesson, 1940). The colonies are usually moderately large.
— Reproductives: Males - July 10-Aug. 23. Females - Aug. 23-Oct. 31. "Winged males and females were taken in July." (Amstutz, 1943). Headley (1943a) notes early Aug. to late Sept.

Range: Quebec, Ontario south to Florida, west to Michigan, North Dakota, Colorado, Texas.

Ohio Distribution: Widespread in Ohio. Recorded from 26 counties.



Crematogaster lineolata

Ohio References: Ashtabula (Headley, 1943a, 1943b), Butler (Gorham, 1956), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: Another rather abundant species of *Crematogaster*. The name means "with small lines" referring to the striate sculpturing. This species was posthumously described by Thomas Say (1787-1834), the father of American entomology, in the first American publication on ants.

29 *Crematogaster pilosa* Emery

Crematogaster lineolata pilosa Emery, 1895
Crematogaster clara Mayr, 1870
Crematogaster (Acrocoelia) creightoni Wheeler, 1933

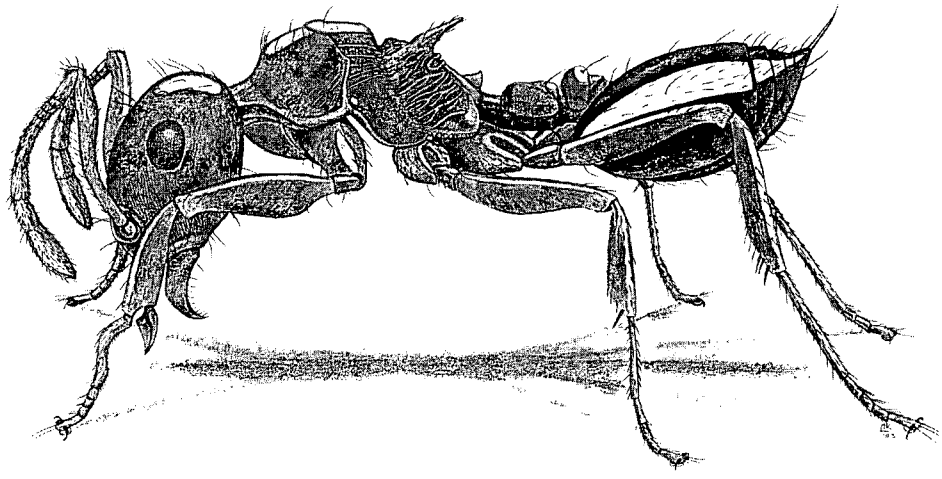
Identification: TL 2.7-3.7 mm. Dark reddish-brown, gaster nearly black; head minutely striate/punctate on lower face and sides, with a few scattered punctures above, mostly smooth and glossy, alitrunk with reduced, usually punctate sculpturing dorsally, sides of pronotum mostly smooth and glossy, sides of mesonotum (katepisternum) fully punctate and dull. The presence of erect or suberect pubescence on the head is diagnostic for this species, with the other key characters serving to confirm the identify. In *C. cerasi* and *C. lineolata* the minute pubescence on the head is distinctly appressed.

Taxonomy: Seldom correctly recognized until Johnson (1988), q.v.

Ecology:
— Habitat: Found in semi-open and open areas as well as moist woods.
— Food Resources: On bloom of *Oxypolis rigidior* (GAC 319); and on dead cicada (GAC 2083 #15).
— Associates: Further data lacking.

Behavior: Workers were found foraging on ground, under bark, and on tree trunks.

Nests: Under bark of small elm stump (GAC 2309 #18). Mainly arboreal according to Johnson (1988), nesting in trees, grasses, reeds, etc.

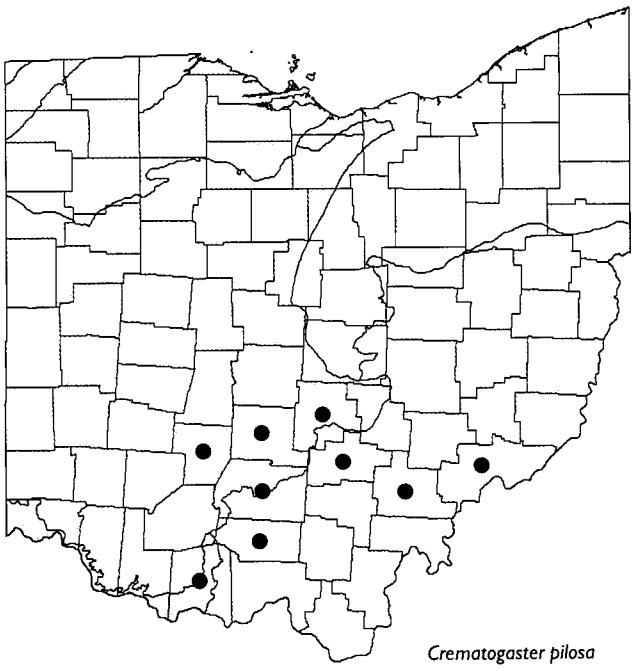


Crematogaster pilosa Emery. Drawing by Holly K. Coovert.

— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.

Range: New Jersey south to Georgia, Florida, west to Indiana, Kansas, Missouri, Texas.

Ohio Distribution: Recorded from 9 counties in southcentral Ohio. Apparently at the northern range limit regionally.



Crematogaster pilosa

Ohio References: None.

Comments: This represents a new state record for Ohio, now readily identified by new diagnostic characters. Named for the characteristic hairs or pilosity.

Tribe Solenopsidini

Genus *Monomorium* Mayr

Monomorium Mayr, 1855
Epoecus Emery, 1892

Identification: These very small to minute ants have a 12-segmented antenna with a 3-segmented club and an unarmed propodeum. The shape of the clypeus, with a pair of longitudinal carinae extended anteriorly as sharply produced teeth, are diagnostic.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950) is the most recent revision of the entire genus in North America, but is largely replaced by the excellent revision of DuBois (1986), which has keys to workers and females.

Key: The key that follows does not include *M. pergandei* and *M. talbotae*, both of which lack a worker caste. See DuBois (1986) for more detail.

Comments: These are very small to minute ants, one of which can become a serious pest in buildings.

Key to *Monomorium* of Northeastern North America

1. Color yellow to brownish- or orangish-yellow; surface of head and alitrunk densely punctate, dull to very feebly glossy ..... ***M. pharaonis***

   Color brownish-black to black; surface of head and alitrunk mostly to entirely smooth and very glossy **2**

2. Propodeum (in profile) with dorsal face distinctly shorter than posterior face (declivity) ..... (*M. emarginatum*)

   Propodeum (in profile) with dorsal face distinctly longer than posterior face (declivity) **3**

3. Mesopleuron not punctate (or very few punctations, usually only on extreme margins); antennal scape shorter, usually not reaching occipital margin in repose ..... ***M. minimum***

   Mesopleuron extensively punctate; antennal scapes longer, reaching or usually surpassing occipital margin in repose ..... (*M. viride*)

Monomorium emarginatum DuBois

Monomorium emarginatum DuBois, 1986

Identification: TL 2.0-2.2 mm. Dark brown to brownish-black, mandibles paler (brownish-yellow), legs paler apically; body mostly smooth and very glossy. This species is differentiated by the shorter dorsal face of the propodeum, which is about two-thirds the length of the posterior face.

Taxonomy: See DuBois (1986). Most easily recognized from the queens.

Ecology:
— Habitat: Presumably found in open, sandy or gravelly areas.
— Food Resources: Dead insects and other material.
— Associates: Further data lacking.

Behavior: Able to recruit fellow workers at higher temperatures than competitors and thus appropriate a substantial portion of available food (Hölldobler & Wilson, 1990).

Nests: In sandy or gravelly soil (DuBois, 1986).
— Colony Organization: Usually with multiple queens (1-11) (DuBois, 2000).
— Reproductives: Further data lacking.

Range: Massachusetts, eastern New York, eastern Virginia (DuBois, 1986).

Comments: This is a species of the central and northcentral Atlantic coastal region, replacing *M. minimum* in this area. It is not expected in Ohio, but included for completeness. The species is named for the furrow (emargination) on the mesonotum of the queens.

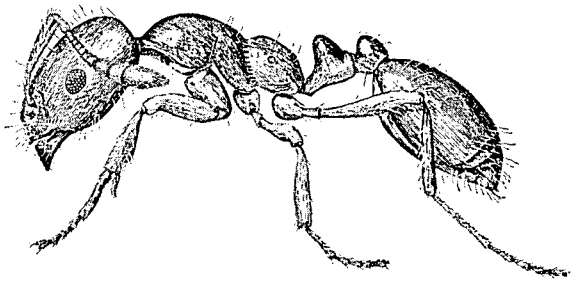
30 *Monomorium minimum* (Buckley)

Little Black Ant

Myrmica (Monomarium (!)) minima Buckley, 1867

Identification: TL 1.7-1.8 mm. Dark brown to nearly black, gaster blackish-brown to black, mandibles paler, brownish-yellow to orangish-brown, legs paler apically; body mostly smooth and very glossy. This species is recognized by the glossy surface and shorter antennal scapes.

Taxonomy: See DuBois (1986).



***Monomorium minimum* (Buckley).** From Smith (1947a).

Ecology:

— Habitat: In open and semi-open areas, usually with exposed soil.

— Food Resources: On bloom of *Pycnanthemum* sp. (GAC 1802), *Daucus carota* (GAC 2345), and *Asclepias hirtella* (GAC 2457); on dead earthworm 2.3 m from nest (GAC 1768); on dead cicada (GAC 2083); frequently taken at various baits. As a house pest it will eat meat, butter, greasy foods, and sweets. Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York.

— Associates: Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*) in Kentucky. Host to the larvae of the myrmecophilous syrphids *Microdon coarctatus*, *M. baliopterus*, and *M. painteri* (cf. Duffield, 1981).

— Ant Associates: Host of workerless parasites *Monomorium pergandei* and *M. talbotae*.

Behavior: Workers were found foraging on ground and rocks in open. A single-file line of workers observed on poison ivy stem (GAC 2103).

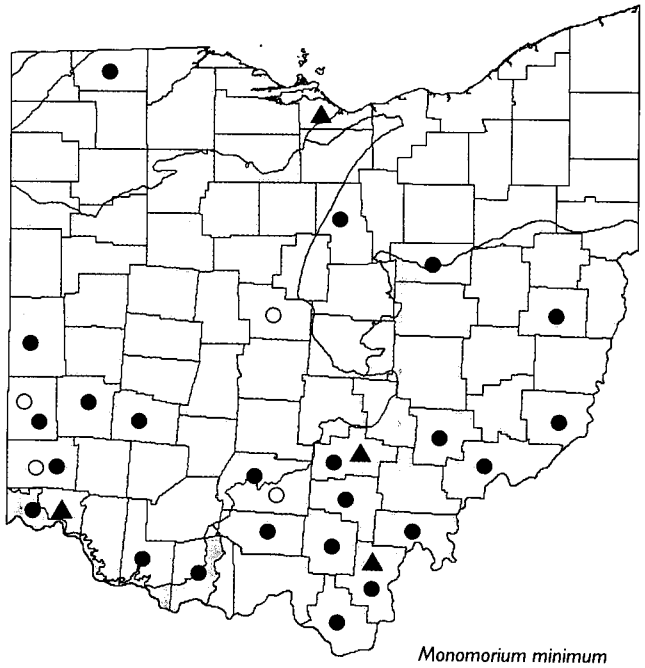
Nests: In soil, under stones and rocks; GAC 1732 fine granular sand mounds about multiple entrance holes. "Sometimes invades houses from outdoors or nests in woodwork." (D. R. Smith, 1979). See DuBois (1986) for more detail.

— Colony Organization: Multiple queens (usually 12-14), with colonies having 2000 to 3000 individuals (Gregg, 1944). Cole (1940b) found a colony with 76 queens in Tennessee See also DuBois (2000).

— Reproductives: Males - June 28-Aug. 8. Females - June 19-July 26.

Range: Pennsylvania and District of Columbia, south to Georgia and Texas, west to Michigan, North Dakota, Idaho, Colorado, New Mexico (DuBois, 1986).

Ohio Distribution: Widespread in Ohio. Recorded from 25 counties.



Monomorium minimum

Ohio References: Butler (Gorham, 1956), Delaware (DuBois, 1985), Preble (Gorham, 1956), Ross (DuBois, 1986), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This common, glossy black species, named for its diminutive size, is often abundant in open areas with some exposed soil. One of the few species described by Samuel B. Buckley (1809-1883) that is actually recognizable.

Monomorium pergandei (Emery)

Epoecus pergandei Emery, 1892

Identification: FEMALE: TL 2.2-2.5 mm. The queens are distinctly smaller than in *M. minimum*, have three teeth on each mandible, longer scapes which surpass the occipital border, reduced sculpturing, and the head is broadest at the occiput. Diagnostic is the large depression on the dorsum of the first gastral tergite. See DuBois (1986) for further description.

Taxonomy: See DuBois (1986).

Ecology:

— Habitat: See host species.

— Food Resources: Further data lacking.

— Ant Associates: "Supposedly workerless and parasitic. The host colony contained only winged males and winged females. Host: *Monmorium minimum*." (D. R. Smith, 1979).

Behavior: Further data lacking.

Nests: See host species.

— Colony Organization: One colony noted by DuBois (2000) had 7 queens.

— Reproductives: Further data lacking.

Range: District of Columbia.

Comments: This is a workerless social parasitic species only known from its type locality in the District of Columbia. It is an inquiline in nests of *Monomorium minimum*. See Dubois (1986) for further details. Since it was collected only once over 100 years ago, this species may be extinct.

31 *Monomorium pharaonis* (Linnaeus)

Pharaoh Ant

Formica Pharaonis Linnaeus, 1758

Identification: TL 2.0-2.2 mm. Yellow to brownish- or orangish-yellow, gaster darkened dark brown apically; head and alitrunk entirely and finely punctate, surface dull to very weakly glossy. Readily distinguished by the yellow color and punctate, dull surface.

Taxonomy: An easily recognized species with no major taxonomic problems.

Ecology:

— Habitat: In heated buildings in Ohio.

— Food Resources: Various household foods; may damage fabrics, rubber goods, and even insect collections! (D. R. Smith, 1979).

— Associates: Further data lacking.

Behavior: Workers were found foraging at drinking fountain in building (GKM 6). Workers forage in files.

Nests: In heated buildings (in wall spaces, debris, etc.) in northeast United States. Frequently moves nest site.

— Colony Organization: Form populous colonies with short-lived multiple queens (up to 110) which can be replaced as they die, leading to extremely long-lived colonies (Hölldobler & Wilson, 1990; DuBois, 2000). Thompson (1990) reports colonies up to 350,000 workers and over 800 females and males.

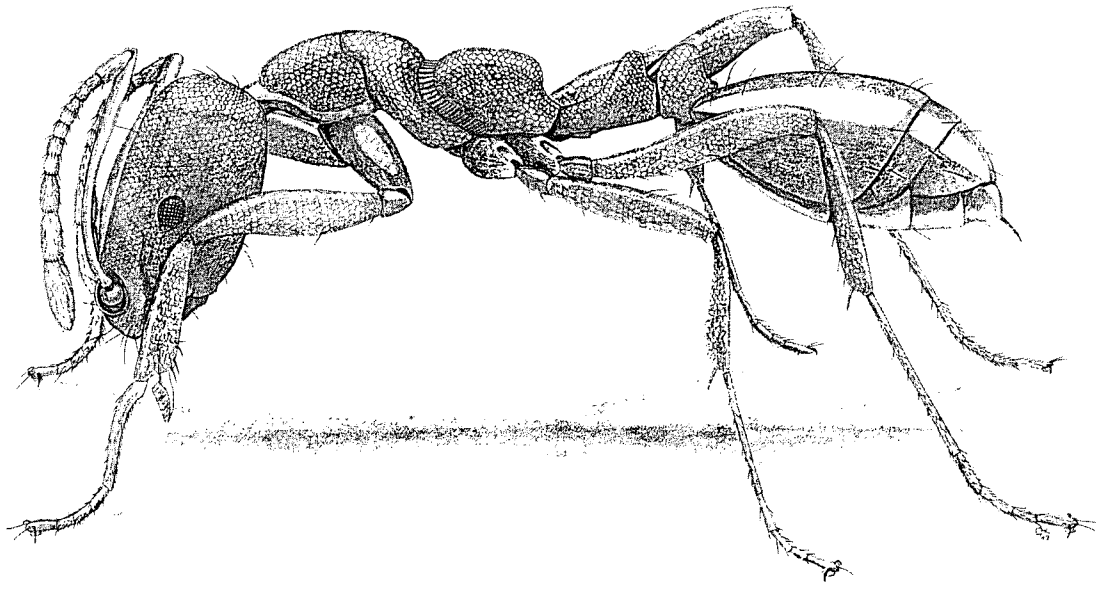
— Reproductives: Queens produced steadily; mating occurs in the nest; colonies spread by budding, in which groups of workers depart with one or more mated queens (Hölldobler & Wilson, 1990).

Range: Florida, throughout United States and Canada in larger cities; cosmopolitan.

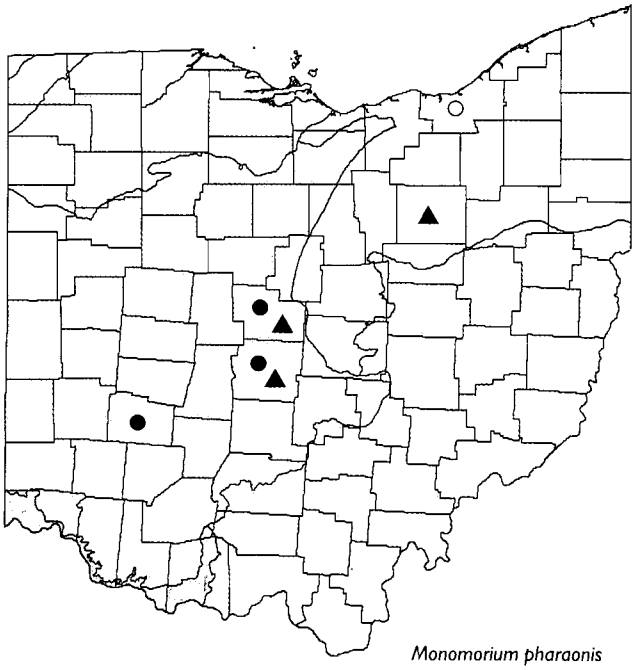
Ohio Distribution: Widespread in Ohio in buildings. Recorded from 5 counties.

Ohio References: Cuyahoga (Headley, 1943a), Ohio (Gorham, 1956).

Comments: This tiny, often troublesome, introduced species is now cosmopolitan, probably originally coming from Africa or tropical Asia. Concerning this "most persistent and difficult of all our house-infesting ants to control or eradicate," D. R. Smith (1979:1383) states: "...probably found in every town or city of commercial importance especially in hotels, large apartment buildings, groceries, or other places where food is commercially handled." Described by the father of taxonomy, Carl von Linné in 1758 from Egypt, land of the Pharaohs.



***Monomorium pharaonis* (Linnaeus).** Drawing by Holly K. Coovert.



Monomorium pharaonis

Monomorium talbotae DuBois

Monomorium talbotae DuBois, 1986

Identification: FEMALE: TL 2.3 mm. The queens are distinctly smaller than in *M. minimum*, have only two teeth on each mandible (four in *minimum*), longer scapes which reach or surpass the occipital border, reduced sculpturing, and the head is broadest at the occiput. See DuBois (1986) for further description.

Taxonomy: See DuBois (1986).

Ecology:

— Habitat: See host species.

— Food Resources: Further data lacking.

— Ant Associates: Permanent social parasite in nests of *Monomorium minimum*.

Behavior: Further data lacking.

Nests: See host species.

— Colony Organization: One colony noted by DuBois (2000) had 8 queens.

— Reproductives: Type series of 8 females and 2 males coll. June 30 in Michigan.

Range: Livingston Co., Michigan.

Comments: This is a workerless social parasitic species only known from the type locality (Livingston Co., Michigan). It is an inquiline in nests of *Monomorium minimum*. See Dubois (1986) for further details. Named for Mary Talbot who discovered this ant and did extensive work on ants in Michigan and Ohio.

Monomorium viride Brown

Monomorium viridum Brown, 1943

Identification: TL 1.8-2.1 mm. Blackish brown to nearly black, alitrunk paler in some (reddish-brown), mandibles and legs apically somewhat paler; body mostly smooth and glossy. This species is separated from *M. minimum* by the punctate mesopleura and longer antennal scapes.

Taxonomy: See DuBois (1986). Note the correct ending of the species name.

Ecology:

— Habitat: Found in open sandy habitats (DuBois, 1986).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Most commonly found in soil under objects (D. R. Smith, 1979), apparently restricted to pure sand (DuBois, 1986).

— Colony Organization: Usually with multiple queens (1-5, but up to 64; DuBois 1986, 2000).

— Reproductives: Sexual forms produced in July (DuBois, 1986).

Range: Coastal New Jersey and North Carolina to Florida (DuBois, 1986).

Comments: This is an Atlantic coastal species, and thus not likely to occur further inland. The species name refers to the green tint on fresh specimens.

Genus *Solenopsis* Westwood

Solenopsis Westwood, 1841
Diplorhoptrum Mayr, 1855
Euophthalma Creighton, 1930

Identification: The 10-segmented antennae with a 2-segmented club and the unarmed propodeum are diagnostic. The species in our area are minute ants with very reduced eyes.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: *Solenopsis laeviceps* Mayr, described from Colombia, was recorded by Wesson & Wesson (1940) from Gallia Co., Ohio and based on material identified by W. S. Creighton, but the species was not mentioned in Creighton, 1950. The Ohio record was repeated (plus Florida and Louisiana) in the 1951 Hymenoptera catalog (Smith, 1951) but not in the D. R. Smith (1979) catalog, and the species is not mentioned in the revisions of Florida thief ants (Thompson, 1989 and Thompson & Johnson, 1989). The Ohio record was apparently based on a misidentification of one of the small *Solenopsis* other than *molesta*, probably either *S. carolinensis* or *S. texana*. The name *S. laeviceps* should therefore be dropped from the Ohio list.

Revision(s): The revision in Creighton (1950) has been largely replaced by Thompson (1989) and Thompson & Johnson (1989) for thief ants from the southeastern United States, and Trager (1991) for the fire ants. Keys to workers are provided in these papers.

Key: Several largely southeastern United States species, extending as far north as Virginia, North Carolina, or

Tennessee, are not included in the key below. For specimens from these areas and the southeastern United States, especially the Atlantic coastal plain, consult Thompson (1989) and Thompson & Johnson (1989). The trick to identifying these tiny ants, and especially discerning the fine details on the head, are higher magnification, a dark background, and holding the specimen at just the right angle for light to reflect off of the hairs. Although listed as an Ohio key, it will work for a majority of the northeastern United States.

Comments: The species of this genus in our area are minute yellow ants known as "thief ants."

Key to *Solenopsis* of Ohio

1. Coxae a different color than alitrunk (greenish-tinged yellow coxae vs. clear yellow alitrunk); funicular segments 3, 4, and 5 notably broader than long; color pale yellow; head relatively narrow, without conspicuous punctures on head and without distinct non-punctate central stripe; [gaster pinkish-orange in living specimens of female] ..... ***S. texana***

   Coxae concolorous with alitrunk; color golden honey yellow, often with darker infuscation; funicular segments 3, 4, and 5 only slightly broader than long; otherwise variable; [gaster lacking pinkish-orange color in living specimens of female] **2**

2. Head with distinct, bare, non-punctate, central longitudinal stripe bordered on each side by a row of distinct punctures each bearing a hair (best viewed against a dark background); these bordering hairs are symmetrically angled in towards the mid-line; propodeum somewhat concave dorsally between posterior angles; larger species, total length 1.5 to 1.8 mm; [female with smaller eyes which do not cover half the side of the head] ..... ***S. molesta***

   Head lacking distinct bare, non-punctate central longitudinal stripe, rather the very fine punctures are more evenly distributed and the hairs toward the mid-line not notably symmetrically angled inwards; propodeum rather evenly rounded, lacking posterior angles and slight concavity; smaller species, total length 1.3 to 1.5 mm or less; [female with very large eyes which cover more than half the side of the head] ..... ***S. carolinensis***

32 *Solenopsis carolinensis* Forel

Solenopsis texana race *carolinensis* Forel, 1901

Identification: TL 1.3-1.5 mm. Yellow to orangish-yellow, head dorsally and gaster dorsomedially often slightly darkened; body mostly smooth and very glossy. The features given in the key should serve to identify this species, especially the lack of the bare central stripe present on the head of *molesta*. The females have very large eyes which cover more than half of the side of the head.

Taxonomy: Ohio literature treats this species as *S. texana carolinensis*. See Creighton (1950).

Ecology:

— Habitat: "Less abundant than *molesta* but found over a similar range of habitat." (Wesson & Wesson, 1940).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Probably lestobiotic (D. R. Smith, 1979).

Nests: Apparently in soil.

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Massachusetts south to North Carolina and Florida, west to Ohio, Tennessee.

Ohio Distribution: Single unspecified southcentral Ohio record (see below).

Solenopsis carolinensis

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: A minute, uncommon species in which careful identification is needed. Described in 1901 by Auguste Forel (1848-1931), a Swiss myrmecologist and one of the most prolific describers of ant species.

33 *Solenopsis molesta molesta* (Say)

Thief Ant

Myrmica molesta Say, 1836

Solenopsis molesta var. *validiuscula* Emery, 1895

Identification: TL 1.5-1.8 mm. Yellow to yellowish-brown, head dorsally and gaster dorsomedially often slightly darkened; body mostly smooth and very glossy. The presence of the bare, non-punctate central longitudinal stripe on the head with the bordering hairs angling in towards each other, once seen, is diagnostic. This species is larger than *S. carolinensis* and tends to be darker in color than either it or *S. texana*.

Taxonomy: See Creighton (1950) and Thompson (1989).

Ecology:

— Habitat: Found in open woods, fields, and meadows; occasionally a pest in buildings. Wesson & Wesson(1940) report it "in rotten logs and stumps and under stones in woods and fields."

— Food Resources: Frequently taken at various baits; inside relatively fresh acorn (probably feeding - GAC 2124). Thompson (1990) reports they are highly predacious, and nearly omnivorous.

— Associates: See Wheeler & Wheeler (1986) for Nevada data.

— Ant Associates: On bread bait atop *Formica subsericea* mound (GAC 1785); stray with *Lasius umbratus* colony (associated ?) (GAC 1910); probable association with *Acanthomyops claviger* (GAC 1937). "Colonies of this species are often exposed while excavating the nests of other ants." (Wesson & Wesson, 1940). "...in association with *Myrmica* and *Formica*, particularly on the tops and sides of the mounds they build." (Amstutz, 1943). See also Headley (1943a). Gregg (1944) lists an association with *Formica exsectoides* and *F. ulkei*. For Florida data see Van Pelt (1958). Wheeler & Wheeler (1986) list *Pheidole pilifera* in Nevada. See Wheeler & Wheeler (1963) for North Dakota list. See Appendix II for more detail.

Behavior: Workers were found foraging on ground in open, especially abundant at night on bait. A foraging column at base of linden (GAC 2133) was observed. "Lestobiotic, usually nests in or near nests of other ants from which they rob food and brood." (D. R. Smith, 1979).

Nests: Under rocks or in ground. Wesson & Wesson (1940) note "Colonies of this species are often exposed while excavating the nests of other ants." "A house-infesting ant and of great annoyance because of their small size; sometimes nests in woodwork and masonry of houses." (D. R. Smith, 1979).

— Colony Organization: Colonies contain up to a few thousand workers (Thompson, 1990). Van Pelt (1958) counted colony sizes in Florida, ranging from 60 to 100 workers. With multiple queens (Wheeler & Wheeler (1986) reported a colony in Nevada with 23 queens).

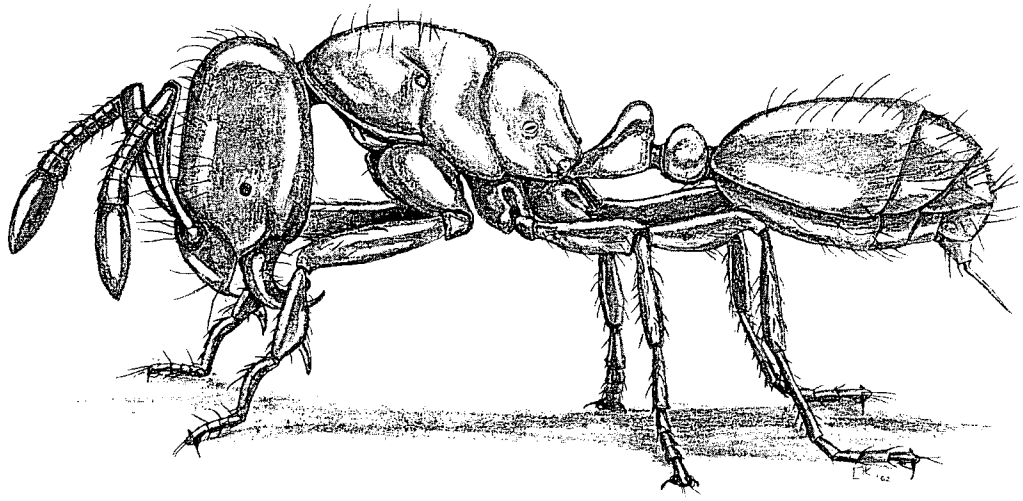
— Reproductives: Males - July 28. Females - July 30-Sept. 8. "Winged males and females were taken during July and August." (Amstutz, 1943). Queens can apparently carry workers on their nuptial flights, possibly to help found new nests (Thompson, 1990).

Range: Quebec, Ontario south to Florida, west to Washington, California.

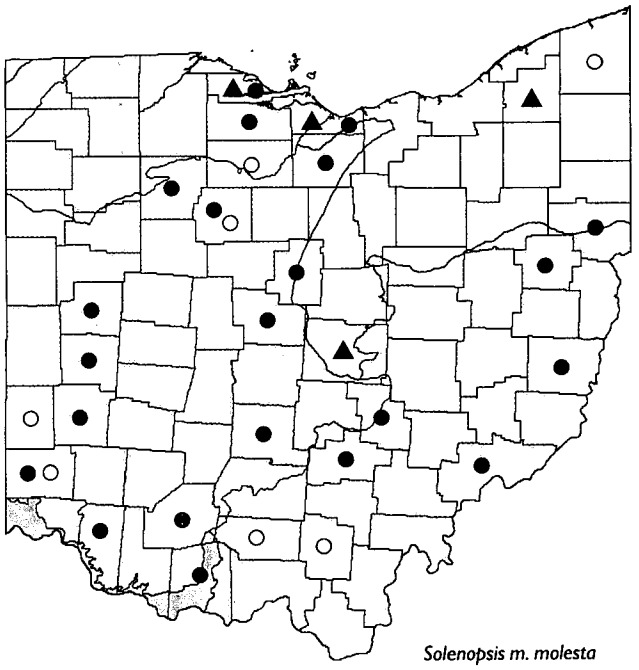
Ohio Distribution: Widespread in Ohio. Recorded from 29 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Jackson (Wesson & Wesson, 1940), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1949), Wyandot (Amstutz, 1943).

Comments: This is one of our smallest species of ants, and our most commonly encountered *Solenopsis*. Named the Thief Ant because this diminutive ant often lives in close proximity to larger ant species and steals their food, a behavior known as lestobiosis. Because of their tiny size, they are usually ignored by larger ants. Described posthumously by Thomas Say (1787-1834), the father of American entomology, in 1836, who named them *molesta* because of their nuisance in houses and the sting which was described "like the puncture of a very fine needle."



***Solenopsis molesta molesta* (Say).** Drawing by Holly K. Coovert.



Solenopsis m. molesta

34 *Solenopsis texana texana* Emery

Solenopsis pollux var. *texana* Emery, 1895
Solenopsis rosella Kennedy, 1938

Identification: TL 1.5 mm. Pale to medium yellow, head and gaster very slightly darker, coxae greenish-tinged yellow, slightly paler than alitrunk; body mostly smooth and very glossy. The differently colored coxae and lack of the bare non-punctate longitudinal stripe on the head should distinguish this species. The females have a pinkish-orange gaster in living specimens.

Taxonomy: See Creighton (1950) and Thompson (1989).

Solenopsis t. texana

Ecology:
— Habitat: Found in deciduous forest in Illinois (DuBois & LaBerge, 1988).
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Logs, stumps, and under bark (D. R. Smith, 1979).
— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.

Range: Ontario south to Florida, west to Illinois, Oklahoma, Texas.

Ohio Distribution: Only known from Adams Co.

Ohio References: None.

Comments: This represents a new state record for Ohio. Described in 1895 by Carlo Emery (1848-1925), an Italian whose careful work had a profound effect on myrmecology.

Tribe Formicoxenini (= Leptothoracini)

Nomenclature: Tribal nomenclature follows Bolton (1994, 1995, 2003); = Leptothoracini.

Genus *Leptothorax* Mayr

Leptothorax Mayr, 1855

Identification: Members of this genus have either 11- or 12-segmented antennae. The key will serve to identify both groups of species. They are generally small and usually have distinct propodeal spines.

Immatures: See under each subgenus.

Taxonomy: Our subgenera (*Myrafant and Dichothorax*) were synonymized under *Leptothorax* by Bolton (1995) based on a worldwide perspective, then synonymized under *Temnothorax* in Bolton (2003). However, *Myrafant* is considered a distinct genus in Francoeur (1990) (see also Loiselle et al., 1990). *Dichothorax*, with the single species *L. pergandei*, is quite distinct. But given the disparity in the above two views between full recognition as genera and sinking them into synonymy, recognition as subgenera as treated in D. R. Smith (1979) still seems the most logical route for the present. See also Creighton (1950).

The argument that smaller groups "fail to function on a whole-world basis" (Bolton, 2003:271) is tenuous at best. Many smaller groups are endemic to smaller areas and simply don't occur on a "whole-world basis." Creating a large, hyper-diverse group such as *Temnothorax* only serves to confuse the situation.

The constancy of the number of antennal segments within a genus is nearly a given in ants, thus the presence of 11- and 12-segmented species within *Leptothorax* is quite unusual (but the number is still constant within a species).

Revision(s): Creighton (1950) is the only recent revision and key of the whole group for N. America. Smith (1952) treated the *L. tricarinatus-texanus* complex, with a key to workers, and Mackay (2000) revised *Myrafant*.

Key: The key presented below combines the three regional subgenera. The key does not include *L. minutissimus* Smith, a workerless species associated with *L. curvispinosus*. The key also does not included several recently described species that are essentially boreal (*L. retractus* Francoeur, *L. sphagnicolus* Francoeur, and *L. wilsoni* Heinze). Although listed as an Ohio key, it will work for a majority of the northeastern United States.

Comments: The ants of this genus are generally very small and usually have sharp propodeal spines.

Key to *Leptothorax* of Ohio

1. Antenna composed of 11 segments (including scape) **2**

   Antenna composed of 12 segments (including scape) **8**

2. Clypeus with a broad, glossy longitudinal trough medially, lacking median carinulae; metanotal groove (mesopropodeal suture) present dorsally and usually noticeably impressed; crest of petiole (in side view) situated at middle of petiole ..... ***L. (L.) muscorum* Complex**

   Clypeus with 1 or more longitudinal carinulae, lacking a broad, shallow medial trough; metanotal groove rarely present dorsally and never impressed (or if so, broadly, and otherwise not as above); crest of petiole (in side view) situated slightly to distinctly posterior to middle of petiole **3**

3. Propodeal spines greatly reduced, short and dentiform, their length less than half the distance which separates their bases ..... ***L. (L.) schaumii***

   Propodeal spines normally developed, long and spinose, their length greater than half the distance which separates their bases **4**

4. Head with coarse, conspicuous, longitudinal rugae which are notably heavier than the intervening sculpture; top of petiolar scale blunt, usually somewhat flat-topped; distinctly larger species, total length 3.4 to 4.4 mm; color rather uniformly orangish-yellow ..... ***L. (M.) smithi***

   Head finely punctate or with fine longitudinal rugae, the intervening sculpture nearly as heavy; top of petiolar scale angulate or sharply crested; distinctly smaller species, total length less than 3.0 mm; color variable, uniformly black, if yellow, usually with darker markings on gaster **5**

5. Uniformly dark colored, nearly black species; head mostly smooth and glossy dorsally, the sculpturing sparse and reduced, consisting mostly of fine, scattered punctures ..... ***L. (M.) longispinosus***

   Yellowish species, often with darker infuscation, gaster often bicolored **6**

6. Gaster with abundant, scattered, short appressed pubescence dorsally in addition to erect hairs; head with very fine reticulate or punctate sculpturing, the surface dull; postpetiole very broad (viewed from above), at least 2 X as wide as long ..... ***L. (L.) duloticus***

   Gaster usually completely lacking scattered, short appressed pubescence dorsally (if present, very sparse); head with very fine longitudinal rugae and semiglossy to glossy dorsally; postpetiole variable **7**

7. Postpetiole (viewed from above) subquadrate or only slightly broader than long; gaster with 1st tergite normally with a pair of distinct, darker infuscated spots present; propodeal spines set close together at the base ..... ***L. (M.) curvispinosus***

   Postpetiole (viewed from above) distinctly broader than long; gaster lacking a pair of darker spots; propodeal spines well-separated at the base ..... ***L. (M.) ambiguus***

8. Promesonotum strongly convex in profile (side view), the metanotal groove (mesopropodeal suture) distinctly and strongly impressed; antennal scape long, surpassing the occipital border, with abundant, long, distinctly suberect to erect hairs; petiole (in side view) very long, 2 X as long as high, with long, slender anterior stalk (peduncle) ..... ***L. (Dichothorax) pergandei***

   Alitrunk flat or very slightly convex in profile, metanotal groove at most very shallowly impressed dorsally; antennal scape short, at most reaching the occipital border, with only fine, appressed pubescence, lacking longer, erect or suberect hairs (except at extreme apex); petiole (in side view) short, nearly as high as long **9**

9. Postpetiole dorsally relatively smooth, finely granulate or punctulate, surface semiglossy ..... (*L. (M.) davisi*)

   Postpetiole dorsally with strongly rugose / reticulate sculpturing, surface essentially dull ..... ***L. (M.) texanus***

Genus *Leptothorax*
Subgenus *Myrafant* Smith

Leptothorax subgenus *Myrafant* Smith, 1950

Identification: This subgenus contains species with either 11- or 12-segmented antennae. The alitrunk usually lacks a distinct metanotal groove (mesopropodeal suture).

Immatures: Larvae crematogastroid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950), MacKay (2000) treating *Myrafant*, and Smith (1952) treating the *tricarinatus-texana* complex. Keys are provided.

Comments: Most of the species in our area nest in preformed cavities. They are typically very small ants.

35 *Leptothorax (M.) ambiguus* Emery

Leptothorax (Leptothorax) curvispinosus ambiguus Emery, 1895
Leptothorax foveata Smith, 1934
Leptothorax ambiguus var. *pinetorum* Wesson and Wesson, 1940

Identification: TL 2.2-2.6 mm. Pale brownish-yellow to dark orangish-brown, legs and gaster slightly paler, lacking distinct spots; head and alitrunk minutely punctate, head with genae very weakly rugose, alitrunk weakly rugose dorsally, surface moderately dull to weakly glossy. The characters presented in the key should serve to distinguish this species. It is closest to *L. curvispinosus* but *L. ambiguus* consistently has a broader postpetiole and lacks the dark spots on the gaster.

Taxonomy: Creighton (1950) discussed *foveatus* Smith, 1934 (described from Illinois) and *pinetorum* Wesson & Wesson, 1940 (described from Jackson Co., Ohio as a variety) and although provisionally treated as subspecies, he felt that it was "very unlikely that both will prove to be valid subspecies and perhaps both may prove to be inconsequential variations which lack any distributional significance" (op. cit., p. 262). M. R. Smith (cf. Creighton, 1950:261) apparently felt that his *foveatus* may simply be a synonym of *ambiguus*, and is so treated here. All of the Ohio material studied seems to be conspecific, regardless of habitat. More work needs to be done to clarify this situation (especially in light of other cryptic sibling species turning up), but for now *pinetorum* will be considered as a minor variant of *ambiguus* and not differentiated further. I have studied one lot (GAC 1986 #9) which has the propodeal spines as in *L. curvispinosus* but is otherwise typical *L. ambiguus*.

Ecology:

— Habitat: Found in open woods or usually open fields and meadows. Wesson & Wesson (1940) report that they are "found in nearly every growth of beard grass that we have examined" in southcentral Ohio.

— Food Resources: Honeydew (below) and other nectar sources.

— Associates: Bristow (1983) reports tending of membracid *Publilia reticulata* on ironweed in New Jersey.

— Ant Associates: "A few were found in the mounds of *F. [montana]*" (Amstutz, 1943). Occasionally host to *Leptothorax duloticus*.

Behavior: Workers were found foraging on foliage and on ground in open.

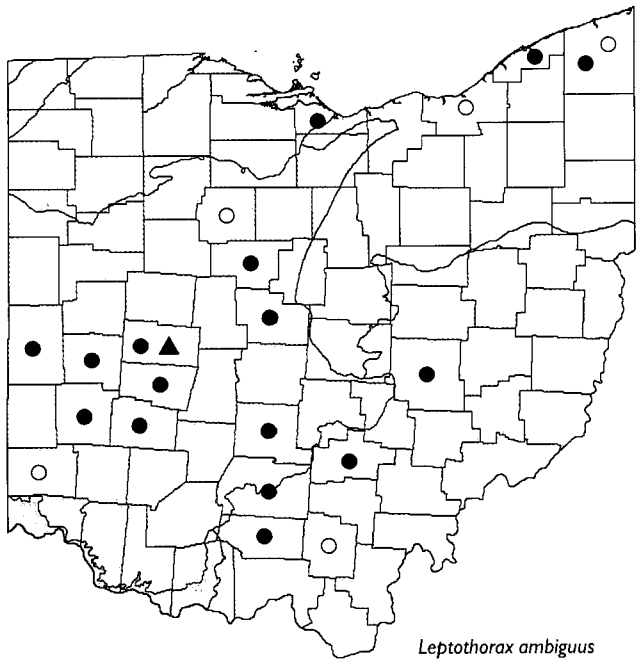
Nests: In goldenrod stem galls, under bark of trees, or in ground (entrance marked by granular soil pile, GAC 1893). "The colonies usually nest in hollow dead stems at the base of grass tufts" (Wesson & Wesson, 1940). Headley (1943a) reports this species from acorns and among the roots of plants.

— Colony Organization: Colonies are small, often occupying multiple nest sites (polydomous); multiple queens (polygynous); workers can reproduce in queenless nests (Hölldobler & Wilson, 1990).

— Reproductives: Males - June 25-July 11. Females - June 25-July 10. Females attracted to blacklight at night (GAC 2277).

Range: Quebec to Virginia, west to Michigan, North Dakota, South Dakota, Iowa, Nebraska.

Ohio Distribution: Widespread in Ohio. Recorded from 20 counties.



Leptothorax ambiguus

Ohio References: Ashtabula (Headley, 1943a; Alloway, 1980), Butler (Gorham 1956), Cuyahoga (Wheeler, 1903), Jackson (**Type locality**—as *L. ambiguus pinetorum* - Wesson & Wesson, 1940; Creighton, 1950; D. R. Smith, 1979), Wyandot (Amstutz, 1943), Ohio (Smith, 1951).

Comments: This tiny ant is a common inhabitant of goldenrod galls in open fields. Described in 1895 by Carlo Emery (1848-1925), an Italian whose careful work had a profound effect on myrmecology.

36 *Leptothorax (M.) curvispinosus* Mayr

Leptothorax curvispinosus Mayr, 1866

Identification: TL 2.0-3.0 mm. Orangish- or brownish-yellow to dark orangish-brown, legs slightly paler but with femora usually infuscated, first segment of gaster with a large, subtriangular dark brown spot on each side which may be fused medially to form a posterior band; head and alitrunk minutely punctate, genae rugose, alitrunk dorsally rugose, moderately dull to weakly glossy. This species is readily identified using the key. It consistently has a subquadrate postpetiole and a pair of dark spots on the first segment of the gaster.

Taxonomy: See *L. ambiguus* which was long considered a subspecies of *curvispinosus*. Wesson & Wesson (1940) discuss a tree-dwelling variety with short epinotal spines of which I have also found examples.

Ecology:

— Habitat: Found in woods or woods' edges.

— Food Resources: Workers forage for honeydew droplets on leaf surfaces, etc. Davis & Bequart (1922) list attending extrafloral nectaries of bigtooth aspen in New York. See also Fellers (1987).

— Associates: Seevers & Dybas (1943) list the myrmecophilous beetle *Limulodes parki* (Limulodidae).

— Ant Associates: Found as slaves in mixed colonies with *Leptothorax duloticus* (GAC 1727 #4, BSR 35 #2, BSR 43 #18) and *Protomognathus americanus* (GAC 2079 #8). See Alloway (1980), Stuart & Alloway (1988), and Hölldobler & Wilson (1990) for more detail.

Behavior: Workers were found foraging on ground, logs, tree trunks, and foliage in woods.

Nests: In hollow acorns, hickory nuts, branches, and a goldenrod stem gall.

— Colony Organization: Most single acorn colonies have a single queen, but one (GAC 2191 #21) had 8 dealate females present. Headley (1943b) recorded an average population of nearly 83 workers per acorn with a maximum of 367 and a single queen (or none). It is now known that this species occupies multiple nest sites (polydomous) each often with its own queen, thus the whole colony has multiple queens (polygynous). Workers are also able to reproduce. (Hölldobler & Wilson, 1990). See also Talbot (1957; Wilson, 1975a).

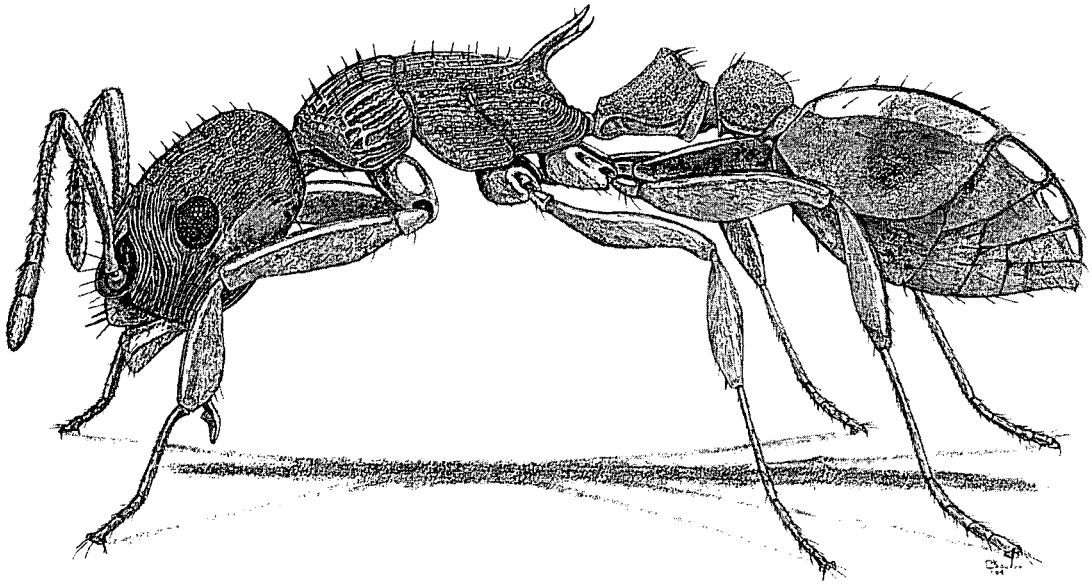
— Reproductives: Males - June 18-Aug. 3. Females - June 18-Aug. 3. Both taken at blacklight (GAC 1793 - July 19; GAC 1816 - Aug. 3). Ergatogyne: GAC 2158. In Michigan, flights occurred mainly between July 7 and 18 (Talbot, 1957).

Range: Maine south to Florida, west to Michigan, Iowa, Kansas, Oklahoma, Texas, Arizona.

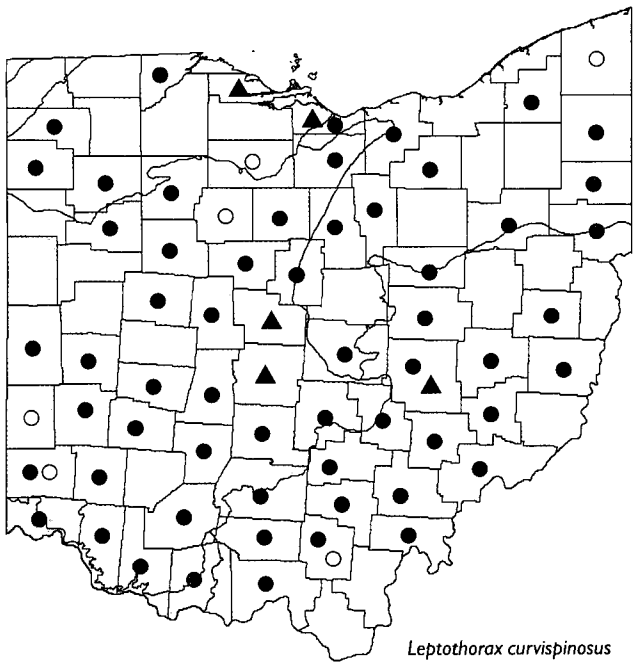
Ohio Distribution: Statewide. Recorded from 65 counties.

Ohio References: Ashtabula (Headley, 1943a, 1943b; Alloway, 1980; Stuart & Alloway, 1988), Butler (Gorham, 1956), Jackson (Wesson, 1940), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This tiny species is the common "acorn ant" of this region. One or both propodeal spines are occasionally malformed. The species name refers to the curved propodeal spines.



***Leptothorax (M.) curvispinosus* Mayr.** Drawing by Holly K. Coovert.



Leptothorax curvispinosus

Leptothorax (M.) davisi Wheeler

Leptothorax texanus davisi Wheeler, 1905

Identification: TL 2.5-2.7 mm. Medium to dark brown, alitrunk, petiole, and postpetiole slightly paler, especially ventrally, mandibles pale brownish-yellow, legs paler on bases and tips of each segment, tibiae brownish-yellow; head minutely punctate, surface weakly glossy, alitrunk weakly rugose dorsally, sides finely punctate, surface weakly glossy, postpetiole very finely granulate or punctulate dorsally, surface weakly glossy. Separated by the characters in the key. Especially important are the 12-segmented antennae and relatively smooth dorsal surface of the postpetiole.

Taxonomy: See *L. texanus* below, Smith (1952), and MacKay (2000).

Ecology:

— Habitat: Found in open, sandy habitats with a few scattered trees in Florida (Smith, 1952). In North Carolina, dry, open woodlands (Carter, 1962). See also Van Pelt (1988) for Florida.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: It is "shy, and moves only moderately fast over the sand" (Van Pelt, 1958).

Nests: In pure white sand (Smith, 1952) or sandy soil (Carter, 1962), sometimes under litter (Van Pelt, 1958).

— Colony Organization: Van Pelt (1958) records a Florida nest containing 18 workers and a queen.

— Reproductives: Further data lacking.

Range: New York, New Jersey, Florida.

Comments: An Atlantic coastal species closely related to *L. texanus*. It is not found in Ohio, but included for completeness.

37 *Leptothorax (M.) longispinosus* Roger

Leptothorax longispinosus Roger, 1863

Identification: TL 2.4-3.0 mm. Blackish-brown to nearly black, mandibles very slightly paler, antennae and legs pale (usually medium brown), tarsi brownish-yellow; head with genae rugose, sides of front minutely striate, dorsally and medially smooth and glossy with scattered punctures, alitrunk rugose and weakly glossy. This distinct black species has long propodeal spines and a mostly smooth and glossy head.

Taxonomy: A distinctive species with no major taxonomic problems.

Ecology:

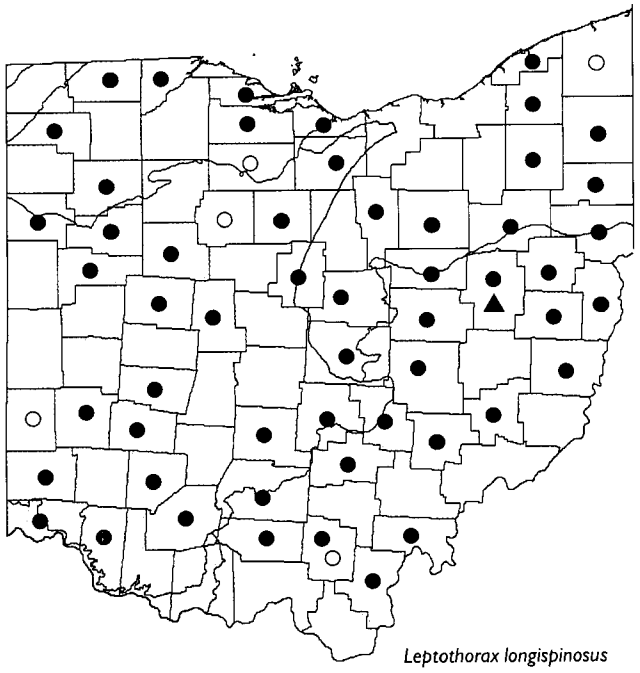
— Habitat: Found in open woods or woods' edges.

— Food Resources: Workers forage for honeydew droplets on leaf surfaces, etc. Davis & Bequart (1922) list attending extrafloral nectaries of bigtooth aspen in N.Y

— Associates: Further data lacking.

— Ant Associates: Enslaved by *Leptothorax duloticus* and *Protomognathus americanus*.

Behavior: Workers were found foraging on ground, on tree trunks, bark, foliage, and logs in woods and woods' edges. See Herbers & Cunningham (1983) for details.



Leptothorax longispinosus

Nests: In acorns or on trees. Wesson & Wesson (1940) record it "in crevices and under moss and lichen on dry boulders or rock outcrops. We have also found colonies nesting in hollow nuts and acorns on dry wooded hilltops, and in the bark at the base of trees." Wheeler et al. (1994) list logs or stumps.

— Colony Organization: Normally with a single queen and 40 to 50 workers in each acorn, but up to 141

(Headley, 1943b). It is now known that this species occupies multiple nest sites (polydomous) each often with its own queen (or up to 29), thus the whole colony has multiple queens (polygynous), with workers also able to reproduce (Hölldobler & Wilson, 1990).

— Reproductives: Males - July 18-21. Females - July 18-26. "Winged phases were taken in early July." (Wesson & Wesson, 1940). "Winged females were found in August in the scaly bark of elm." (Amstutz, 1943).

Range: Quebec, Ontario south to Georgia, Alabama, west to Michigan, Iowa.

Ohio Distribution: Recorded from 58 counties statewide.

Ohio References: Ashtabula (Headley, 1943a, 1943b; Alloway, 1980), Jackson (Wesson, 1940), Preble (Gorham, 1956), Seneca (Headley, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: A fairly common black *Leptothorax* with long propodeal spines, hence the species name.

38 *Leptothorax (M.) minutissimus Smith*

Leptothorax minutissimus Smith, 1942

Identification: Female: TL 2.3 – 2.5 mm. Light brown or yellowish-brown, edge of mandibles, head, dorsal sutures of alitrunk, and gaster much darker; head minutely punctate, sculpturing on dorsal surface of alitrunk more indistinct than on head; propodeal spines well-separated at bases, blunt-tipped and digitiform (i.e. not distinctly tapering apically); postpetiole (viewed from above) distinctly broader than long; eye small, round, maximum diameter 0.12 mm.

This small, workerless species is only known from females collected in colonies of *L. curvispinosus*. These social parasite females are 77% the size of the larger *L. curvispinosus* queens. They not only are distinctly smaller, but differ in the broader postpetiole and have propodeal spines which are blunt-tipped and well-separated at bases. They most resemble *L. ambiguus* females, but the *L. minutissimus* females have digitiform, blunt-tipped propodeal spines and distinctly smaller eyes (compared to 0.25 mm maximum diameter in *L. ambiguus*). Females of *L. duloticus* are larger, have an emarginate anterior clypeal margin, shorter propodeal spines, and larger eyes.

Taxonomy: See Smith (1942a) for original description and MacKay (2000) for key. Until very recently, it was only known from the type series from Washington, D.C.

Ecology:

— Habitat: Found in colonies of *L. curvispinosus* in woods and along woods' edges.

— Food Resources: Apparently totally dependent upon their hosts.

— Associates: See host species.

— Ant Associates: An inquilinous workerless social parasite of *L. curvispinosus*.

Behavior: The smaller parasitic females ride or closely flank the larger host queen, often several per host. Currently being studied by Joan Herbers at Ohio State University.

Nests: See host, *L. curvispinosus*.

— Colony Organization: Multiple queens (14 and 32 from Ohio); apparently only the dominant queen lays eggs (Herbers, 2004).

— Reproductives: One of the four females from the type series (Washington, D.C., Jan. 6, 1921) is alate. No confirmed reports of males.

Range: Washington, D.C. (type loc.), Long Island (N.Y.), West Virginia, Ohio, Indiana, Michigan.

Ohio Distribution: Only recorded from Delaware and Franklin counties in central Ohio (Herbers, 2004).

Leptothorax minutissimus

Ohio References: Delaware (Herbers, 2004), Franklin (Herbers, 2004) (determination confirmed by Stefan Cover).

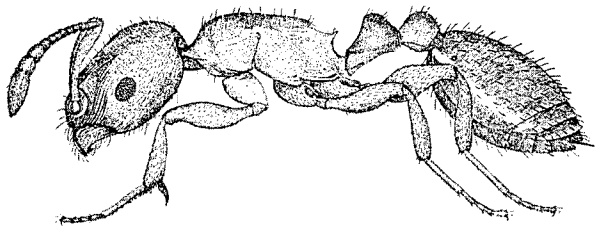
Comments: This is an exciting new addition to Ohio's ant fauna, discovered by Joan Herbers, who is studying these interesting ants at Ohio State University. More information about this species can be found on the internet.

39 *Leptothorax (M.) schaumii* Roger

Leptothorax schaumii Roger, 1863
Leptothorax fortinodis Mayr, 1886
Leptothorax fortinodis var. *gilvus* Wheeler, 1903
Leptothorax fortinodis var. *melanoticus* Wheeler, 1903

Identification: TL 2.2-3.2 mm. Two color forms: 1) yellow to orangish-brown, legs slightly paler, or 2) dark reddish-brown to brownish-black; mandibles slightly paler; head with genae rugose/punctate, sides of front minutely striate, dorsally and medially smooth and glossy with scattered punctures, alitrunk punctate and moderately dull to weakly glossy. The reduced propodeal spines are diagnostic for this species which occurs as either a dark brownish-black or entirely yellow form, some colonies containing both.

Taxonomy: See Wesson & Wesson (1940) for more details on the two color forms. Note the various names above that have been used for this species.



***Leptothorax* (*M.*) *schaumii* Roger.** From Smith (1947a).

Ecology:

— Habitat: Found in open woods or woods' edges.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Workers were found foraging on logs, bases of trees (rather wide range of species), and foliage in woods.

Nests: Under bark of dead oak branch (GAC 1718). "...all collected from living or recently felled trees, especially oak. We have yet to find a large oak tree which does not have colonies of at least one of these forms on it. The nests are located in cavities in the bark or dead stobs." (Wesson & Wesson, 1940).

— Colony Organization: Colonies are small, apparently with a single queen (Headley, 1943a), and usually a hundred or fewer workers (Cole, 1940b).

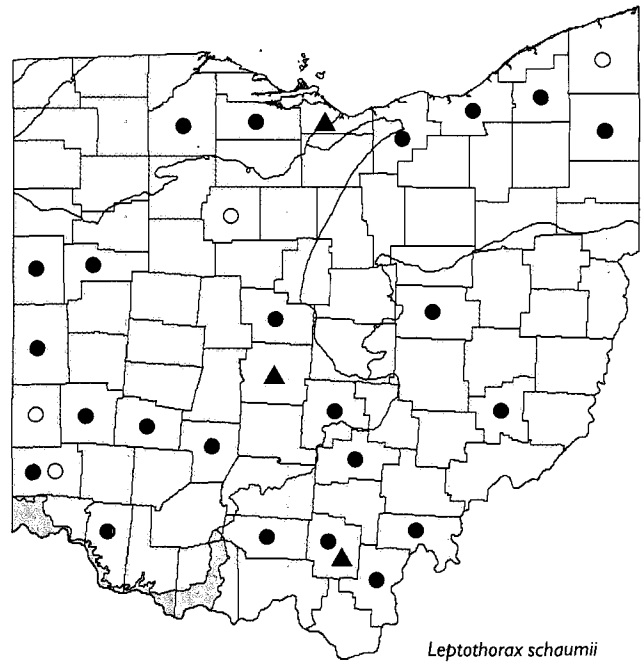
— Reproductives: Stray dealate females, June 22 (GAC 1763).

Range: Maine to Georgia, west to Michigan, Iowa, Kansas, Texas.

Ohio Distribution: Widespread in Ohio. Recorded from 28 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Preble (Gorham, 1956), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Smith, 1951).

Comments: This little species appears to be essentially arboreal and occurs as either a dark or pale form. It was described in 1863 by the European Julius Roger, one of the pioneers in myrmecology.



Leptothorax schaumii

40 *Leptothorax (M.) smithi* Baroni Urbani

Leptothorax wheeleri Smith, 1929 [preoccupied]
Leptothorax smithi Baroni Urbani, 1978 [replacement name]

Identification: TL 3.4-4.4 mm. Orangish-yellow to brownish-orange, gaster and legs slightly paler; head and alitrunk finely but distinctly rugose/striate, surface weakly glossy. The larger size and coarser sculpturing on the head are diagnostic for this species.

Taxonomy: Known in the literature as *L. wheeleri*, a name which is preoccupied and thus replaced.

Ecology:

— Habitat: Apparently woods or open woods.

— Food Resources: "on one occasion, workers were observed feeding on the exuviae of wood-boring beetles." (Wesson & Wesson, 1940).

— Associates: Further data lacking.

Behavior: Smith (1929b) noted that workers "made frantic efforts to conceal themselves" when a nest was disturbed.

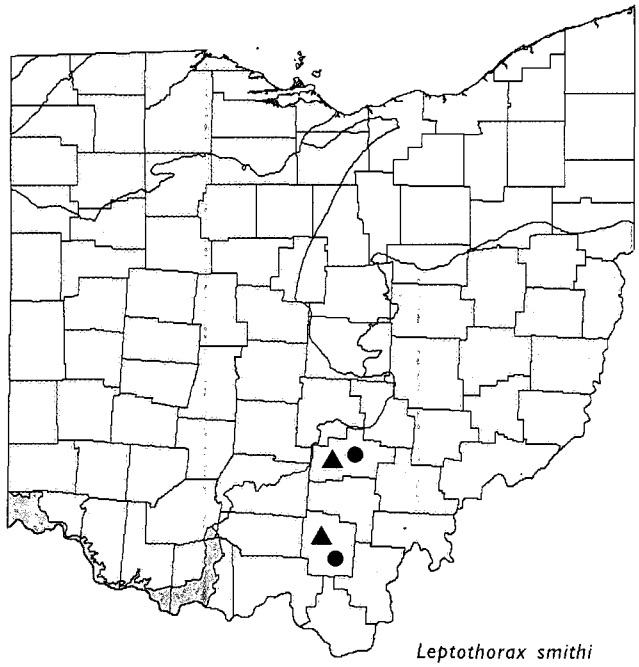
Nests: "We have found many colonies of this species in galleries in the hardened, weathered logs on old deserted and tumble-down log cabins exposed to the sun. Two other colonies were found on large oak trees where they were nesting in dead stobs." (Wesson & Wesson, 1940). Colonies found in cavities in trees and under bark. (Smith, 1929b).

— Colony Organization: Smith (1929b) reports colonies with 2 to 3 dealate females and 31 to 40 workers.

— Reproductives: Males - June 30. "Winged phases were taken in the early part of August." (Wesson & Wesson, 1940).

Range: North Carolina, Georgia, Florida, Ohio, Tennessee, Alabama, Mississippi.

Ohio Distribution: Recorded from 2 counties in southcentral, unglaciated Ohio. At the northern limit of its range in Ohio.



Leptothorax smithi

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940; Wilson, 1952), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This is our largest species in the genus and is more coarsely sculptured than other species. A southeastern species, its range just extends north into southeastern Ohio. Named after Marion R. Smith (1894-1981), one of America's most important myrmecologists.

41 *Leptothorax (M.) texanus* Wheeler

Leptothorax texanus Wheeler, 1903

Identification: TL 2.5-2.7 mm. Medium to dark brown, alitrunk, petiole, and postpetiole slightly paler, especially ventrally, mandibles pale (brownish-yellow), legs paler on bases and tips of each segment, tibiae brownish-yellow; head minutely striate/punctate, surface weakly glossy, alitrunk rugose dorsally, sides rugose/punctate, surface weakly glossy, postpetiole rugose dorsally, surface moderately dull. The only *Myrafant* in our area with 12-segmented antennae, it is abundantly distinct from *L. pergandei*, the sole representative of the subgenus *Dichothorax*. *L. texanus* is separated from *L. davisi*, which occurs on the Atlantic coastal plain, by the coarser sculpturing overall, This is especially evident on the postpetiole and sides of propodeum, although the front of the head is also more coarsely sculptured.

Taxonomy: Material that I've studied from Ohio and Indiana is clearly of *L. texana* and quite distinct from Florida material of *L. davisi*. See Smith (1952) and MacKay (2000).

Ecology:

— Habitat: "Oak Openings" area in Ohio in area of sandy soil or ridges with small black oaks (Smith, 1952). Black oak dunes in Indiana and Illinois (Gregg, 1944). Reported from sandy areas in Michigan (Wheeler et al., 1994). Open areas or open woods, sand dunes (Smith, 1952).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: "The workers ran about very rapidly in the sun over the pine needles." (Wesson & Wesson, 1940)

Nests: Found "...in sandy soil under pine needles on the edge of dry, open sandstone bluffs..." (Wesson & Wesson, 1940).

— Colony Organization: Colonies are small (Smith, 1952).

— Reproductives: "Winged phases were taken from a nest in early July." (Wesson & Wesson, 1940).

Range: Michigan, Ohio, south to North Carolina, Georgia, west to Oklahoma, Texas.

Leptothorax texanus

Ohio Distribution: Recorded from 2 widely separated counties.

Ohio References: Jackson (Wesson & Wesson, 1940), Lucas (Smith, 1952), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This species is easily identified by the 12-segmented antennae. Described by William Morton Wheeler (1865-1937), the father of American myrmecology.

Genus *Leptothorax*
Subgenus *Dichothorax* Emery

Leptothorax subg. *Dichothorax* Emery, 1895

Identification: This subgenus, represented by a single species in our area, is very distinctive. They have a conspicuous metanotal groove or suture, very long antennal scapes, and the dorsal surface of the head and pronotum are smooth and glossy black.

Immatures: Larvae crematogastroid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950).

Comments: The single species in our area is a very small, glossy black species.

42 *Leptothorax (D.) pergandei* Emery

Leptothorax (Dichothorax) pergandei Emery, 1895
Leptothorax (Dichothorax) manni Wesson, 1935

Identification: TL 2.8-3.3 mm. Dark blackish-brown to nearly black, mandibles and antennal scape slightly paler, legs somewhat paler on bases and tips of segments, tibiae brownish-yellow; head with genae and sides of front rugose, dorsally and medially smooth and glossy with scattered punctures; alitrunk weakly sculptured and moderately glossy, sides of mesothorax and propodeum rugose/punctate and less glossy. Immediately recognized by the 12-segmented antennae, strongly convex promesonotum, deeply impressed metanotal groove, long antennal scapes bearing suberect to erect hairs, and unusually long petiole. This all-black species is further characterized by the mostly smooth and glossy head and promesonotum.

Taxonomy: See Creighton (1950). Various subspecies and forms are now synonyms.

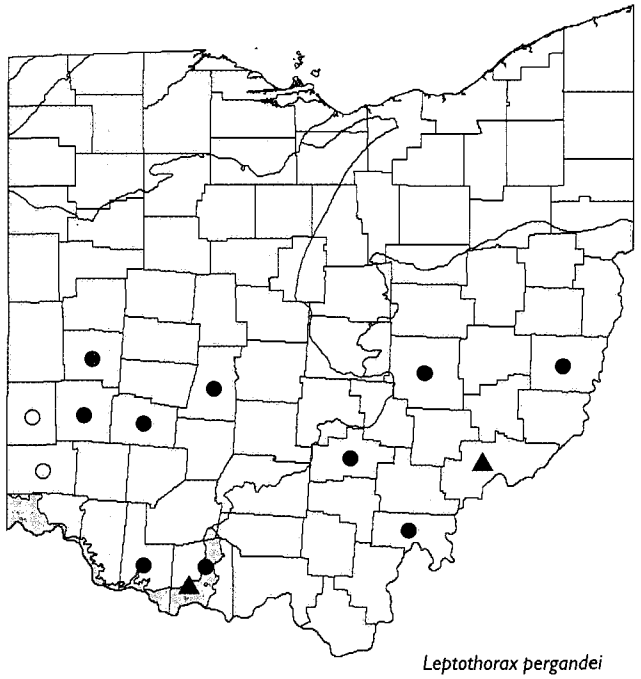
Ecology:

— Habitat: Found in semi-open or usually open, exposed or usually dry, barren areas. "Seen everywhere in dry, sunny fields and meadows, sometimes in dry open woods." (Wesson & Wesson, 1940).

— Food Resources: Occasionally taken at bait.

— Associates: Further data lacking.

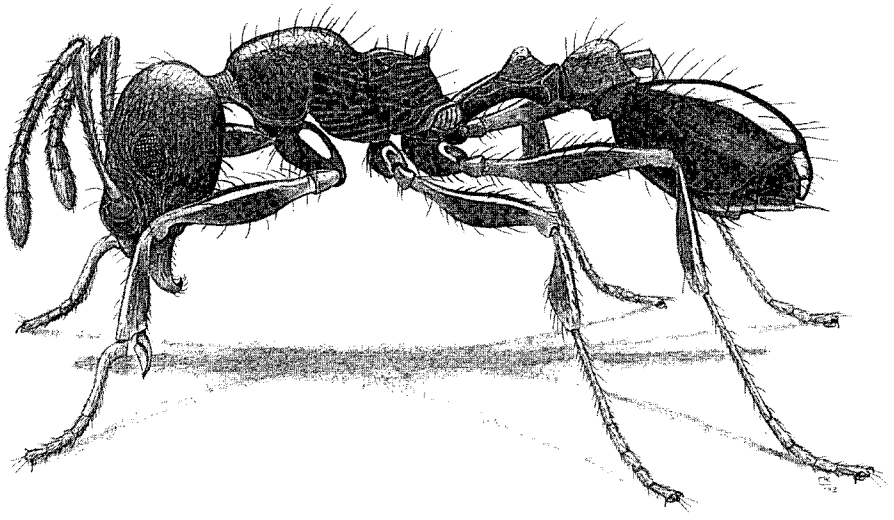
Behavior: Workers were found foraging on ground in open, mostly on exposed ground.



Leptothorax pergandei

Nests: Apparently a ground nesting species (D. R. Smith, 1979).

— Colony Organization: Colonies are apparently small (Wheeler, 1903). Cole (1940b) reports a colony of



***Leptothorax (D.) pergandei* Emery.** Drawing by Holly K. Coovert.

less than 25 workers. Van Pelt (1958), in Florida, counted colonies ranging from 21 to 111, with a single queen, while Wesson (1935) reports 75 to 250 workers in Tennessee.

— Reproductives: Females - June 19 (GAC 2093). "Winged phases were taken from nests in early July." (Wesson & Wesson, 1940).

Range: District of Columbia south to Georgia, Tennessee, west to Illinois, Nebraska, Texas.

Ohio Distribution: Recorded from 13 counties in the southern half of Ohio. At the northern limit of its range in Ohio.

Ohio References: Butler (Gorham, 1956), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This atypical black *Leptothorax* is an inhabitant of open, dry ground. Named after Theodore Pergande, American entomologist (1840-1916), who sent much of the North American ant material to Carlo Emery.

Genus *Leptothorax*
Subgenus *Leptothorax* Mayr

Leptothorax Mayr, 1855
Mychothorax Ruzsky, 1904

Identification: Species in our area have 11-segmented antennae.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950).

Comments: The tiny ants of this subgenus are in need of revision.

43 *Leptothorax (L.) duloticus* Wesson

Leptothorax (Mychothorax) duloticus Wesson, 1937

Identification: TL 2.4-2.8 mm. Brownish-yellow to yellowish-brown, head darkened dorsally, first gastral segment darkened on apical three-fourths, mandibles, clypeus, and antennal scapes paler, legs uniformly pale (brownish-yellow); head very finely reticulate or punctate, surface dull, alitrunk weakly rugose or punctate, surface dull to weakly glossy. One of the most distinctive features of this species, the presence of abundant, scattered, short appressed pubescence on the gaster in addition to erect hairs, has previously been unrecognized. Combined with the other features in the key, plus the longer antennal scapes usually characteristic of *duloticus* (normally reaching the occipital border but not in the other species), identification should be assured. Wilson (1975a) gives an illuminating discussion of the other features.

Taxonomy: See Wilson (1975a).

Ecology:

— Habitat: Found in open woods and woods' edges. The type locality is a steep, dry oak woods. See Talbot (1957) for more detail.

— Food Resources: See host species.

— Associates: See host species.

— Ant Associates: Found as slave-maker in mixed colonies with *Leptothorax curvispinosus* (GAC 1727 #4, BSR 35 #2, BSR 43 #18). Also enslaves *Leptothorax longispinosus* and less commonly *L. ambiguus*. See Talbot (1957; Wilson, 1975a).

Behavior: Workers were found foraging on ground (GAC 1775 #28) and on log (GAC 2083 #12) in woods. For slave-raiding and other behavior see Wesson (1937, 1940a); Alloway, 1979; and Wilson, 1975a. Especially notable is the fact that *L. duloticus* raiders kill many of the opposing workers during a raid, unlike *Protomognathus americanus* (see Alloway, 1979).

Nests: In acorn with *L. curvispinosus* (GAC 1727 #4). The type colony (Wesson, 1937) was in a large oak gall with *L. curvispinosus* and *L. longispinosus*, while additional colonies were in cavities of dead sticks on the ground (Wesson, 1940a). Mainly found in acorns (Talbot, 1957).

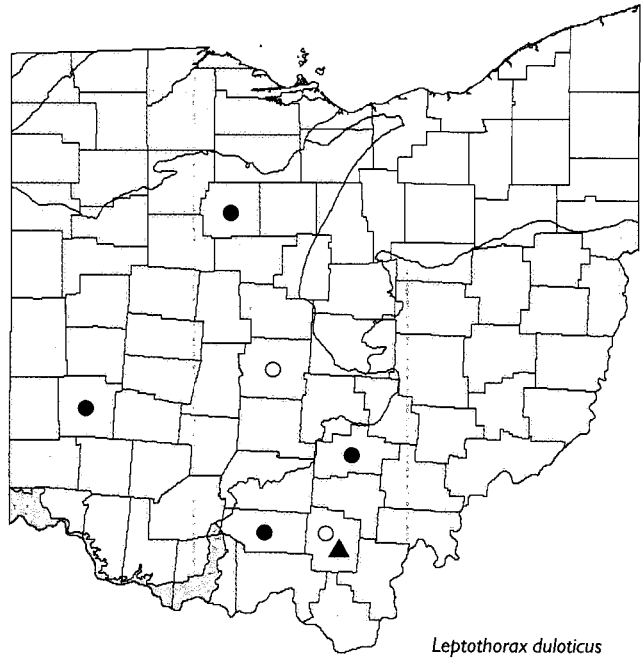
— Colony Organization: Colonies are small, up to 70 workers plus three times as many slaves (Talbot, 1957).

— Reproductives: Stray dealate female, Oct. 17 (ex. litter sample). Talbot (1957) records Aug. 1-10 in Michigan as a peak period for alates.

Range: Michigan, Ohio (see comments).

Ohio Distribution: Recorded from 6 widely distributed counties.

Ohio References: Franklin (Herbers, 2004), Jackson (**Type locality**—Wesson, 1937, 1940; Wesson & Wesson, 1940; Creighton, 1950; Smith, 1951; Talbot, 1957; Wilson, 1975a), Ohio (Gorham, 1956; D. R. Smith, 1979).



Leptothorax duloticus

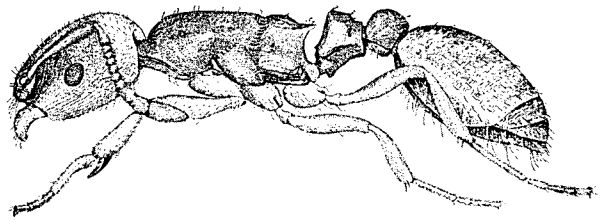
Comments: This interesting, slave-raiding species is most often found in mixed colonies inside old acorns. It was originally described from Ohio. This uncommon species is apparently only known from Ohio and Michigan (D. R. Smith, 1979; Wilson, 1975a). In Michigan it is recorded from only two counties (Wheeler et al., 1994).The questionable record from Illinois was discussed by Talbot (1957:449) who could find no substantiation for it and the species was not found by DuBois & LaBerge (1988) in their Illinois study. As it superficially resembles *Leptothorax curvispinosus* with which it is most often found, material in this group should be carefully examined. The term "dulotic" refers to the slave-raiding behavior, which in this case is obligatory.

44 *Leptothorax (L.) muscorum* (Nylander) Complex

Myrmica muscorum Nylander, 1846
Leptothorax canadensis Provancher, 1887
Leptothorax (Leptothorax) canadensis var. *yankee* Emery, 1895
Leptothorax acervorum canadensis var. *convivialis* Wheeler, 1903

Identification: TL 3.0-3.7 mm. Head and gaster medium brown with alitrunk brownish-yellow to orangish-brown, or completely dark reddish-brown, mandibles, antennae (except tips), and legs paler (brownish-yellow); head and alitrunk finely rugose/punctate, surface moderately dull. The distinctive median trough on the clypeus is diagnostic for this species. In addition, the presence of a weak but usually distinct metanotal groove and the median position of the petiolar scale will help in identification. Like *L. duloticus*, which is also in the nominate subgenus, *L. muscorum* has abundant, scattered, short appressed pubescence on the gaster in addition to erect hairs.

Taxonomy: See Creighton (1950). Brown (1955) synonymized all of the forms, but this is apparently a complex of more than one species based on chromosome data (see Loiselle et al., 1990) and is in need of revision.



***Leptothorax (L.) muscorum* (Nylander) Complex.** From Smith (1947a).

Ecology:

— Habitat: Mostly found in woodlands (D. R. Smith, 1979). In swamps and bogs in Michigan (Wheeler et al., 1994). See also Brown (1955).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Enslaved by *Harpagoxenus canadensis*.

Behavior: Further data lacking.

Nests: Headley (1943a) found a colony under bark and in the wood of a fallen sugar maple. In decaying stumps, logs, under bark of fallen trees, or under rocks (D. R. Smith, 1979). Under bark and in twigs (Wheeler et al., 1994).

— Colony Organization: With multiple queens (Hölldobler & Wilson, 1990).

— Reproductives: Males and females, July 19 in N.H. (Brown, 1955).

Range: Throughout Canada and Alaska, south to Connecticut, Michigan, Wisconsin, and south in the Rocky Mountains to Nevada, New Mexico, Arizona, California; northern Eurasia.

Ohio Distribution: Only recorded from the Lake Plain Region of Ashtabula Co. in extreme northeastern Ohio. This northern species is at its southern range limit in Ohio.

Ohio References: Ashtabula (Headley, 1943a), Ohio (Gorham, 1956).

Leptothorax muscorum

Comments: This is a northern form considered to be a true alpine/boreal species. It is probably a complex of more than one species. The species name refers to muscus (moss). This species occurs further north than any other New World ant.

Genus *Formicoxenus* Mayr

Formicoxenus Mayr, 1855

Identification: The minute hairs on the eyes are diagnostic for this genus. Species in our area have erect or suberect hairs on the scapes.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: Raised to valid genus by Francoeur, Loiselle & Bushinger (1985) and followed by Hölldobler & Wilson (1990) and Bolton (1994, 1995).

Revision(s): Consult Francoeur, Loiselle & Buschinger (1985), with keys to females and males.

Key: The two species treated in the key below can be found in the lower peninsula of Michigan and are thus included in this paper. Other species are more northern or western in distribution. Consult the revision listed above for a more complete treatment.

Comments: This is a group of more northerly distribution. They are inquilines, or guests, of larger, unrelated ants.

Key to *Formicoxenus* of Northeastern North America

1. Postpetiole smooth and glossy dorsally, weakly sculptured with widely spaced, small punctures; head with rugose sculpturing distinctly predominating ..... (*F. provancheri*)

   Postpetiole densely punctate, often with granulations, the surface dull or nearly so, not smooth and glossy; head with punctate sculpturing predominating ..... (*F. hirticornis*)

Formicoxenus hirticornis (Emery)

Leptothorax (Leptothorax) hirticornis Emery, 1895

Identification: TL 2.6-2.9 mm. Orangish-brown, head with middle of front and gaster darkened; head and alitrunk reticulate/punctate, surface dull, in some, parts of the pro- and mesonotum are smoother and glossy; antennal scapes with short, erect clavate hairs. The characters given in the key will separate this species.

Taxonomy: See Francoeur, Loiselle & Buschinger (1985).

Ecology:

— Habitat: See host species.

— Food Resources: Further data lacking.

— Ant Associates: Xenobiotic in nests of *Formica obscuripes* and possibly *F. integroides* (D. R. Smith, 1979).

Behavior: Further data lacking.

Nests: See host species.

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Michigan, North Dakota, South Dakota, Colorado, Utah, California.

Comments: A fairly rare inquiline in nests of *Formica obscuripes*. This northern and western species is xenobiotic in nests of *Formica obscuripes*. Neither species has been recorded from Ohio, but both occur in southern Michigan (Wheeler et al., 1994) and should be looked for in northern Ohio.

Formicoxenus provancheri (Emery)

Leptothorax (Leptothorax) provancheri Emery, 1895
Leptothorax emersoni Wheeler, 1901

Identification: TL 2.6-3.6 mm. Yellowish-brown to brown, head and gaster dorsally darkened, mandibles, antennal scapes, and legs paler; head rugose/reticulate, alitrunk rugose dorsally, punctate on sides, surface moderately dull; antennal scapes with abundant, short, nearly erect hairs. The characters given in the key will separate this species.

Taxonomy: See Francoeur, Loiselle & Buschinger (1985).

Ecology:

— Habitat: See host species.

— Food Resources: "It obtains its food by licking the surfaces and mouth-parts of the *Myrmica* workers," (Wheeler, 1916).

— Ant Associates: Xenobiotic in nests of *Myrmica incompleta* and *M. fracticornis* (D. R. Smith, 1979). Reported as xenobiotic in nests of *Myrmica lobifrons* (Wheeler et al., 1994).

Behavior: See Wheeler & Wheeler (1963) for details.

Nests: See host species. See also Wheeler (1916), and Wheeler & Wheeler (1963).

— Colony Organization: Further data lacking.

— Reproductives: Alates appear during Aug. in Connecticut (Wheeler, 1916).

Range: Quebec, Maine west to Michigan, Alberta, North Dakota, Colorado, New Mexico.

Comments: A somewhat rare inquiline in nests of *Myrmica*, this northern and western species was recorded from Cheboygan Co., Michigan (northern lower peninsula - Wheeler et al., 1994) as xenobiotic in nests of *Myrmica lobifrons*. Neither species is known from Ohio but *M. lobifrons* is widely distributed throughout Michigan in bogs and swamps, so both should be looked for in northern Ohio.

Genus *Harpagoxenus* Forel

Tomognathus Mayr, 1861 [preoccupied]
Harpagoxenus Forel, 1893 [replacement name]

Identification: The distinct scrobe or groove for reception of the antenna is diagnostic, and characters of the mandibles will serve to differentiate it from *Protomognathus*.

Immatures: Unknown.

Revision(s): Smith (1939b) and Creighton (1950).

Key: A single species is found in our area.

Comments: This is a dulotic, or slave-raiding genus of ants. The tiny ants enslave certain species of the related genus *Leptothorax*.

Harpagoxenus canadensis Smith

Harpagoxenus canadensis Smith, 1939

Identification: TL 4.0-4.3 mm. Head and gaster dark brownish-black, alitrunk lighter brown, mandibles dark-edged, appendages lighter brown; front of head with delicate longitudinal rugae, otherwise largely reticulate/punctate, head and alitrunk moderately dull to weakly glossy. This is the only species found in North America and is easily recognized by the characters given for the genus. The distinctive antennal scrobe is especially diagnostic.

Taxonomy: See Smith (1939b) and Creighton (1950).

Ecology:

— Habitat: A woodland species. See host species for more detail.

— Food Resources: Further data lacking.

— Ant Associates: Enslaves *Leptothorax muscorum*.

Behavior: See Stuart & Alloway (1982, 1985).

Nests: See host species.

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Nova Scotia, Quebec, Maine west to Michigan, Minnesota.

Comments: This northern species enslaves *Leptothorax muscorum*, and although rare, should be sought in northern Ohio.

Genus *Protomognathus* Wheeler

Protomognathus Wheeler, 1905

Identification: The very distinctive scrobe or groove for reception of the antenna is diagnostic along with the 4-toothed mandible and the broad, shallow median notch of the clypeus.

Immatures: Wheeler & Wheeler (1955) describe and illustrate an immature larvae but do not summarize it by type; presumably crematogastroid larvae and naked pupae.

Taxonomy: This genus was separated from *Harpagoxenus* by Hölldobler & Wilson (1990) and likewise considered valid in Bolton (1994, 1995).

Revision(s): Smith (1939b) and Creighton (1950).

Key: A single species is found in our area.

Comments: The single North American species in this genus is a dulotic, or slave-raiding ant.

45 *Protomognathus americanus* (Emery)

Tomognathus americanus Emery, 1895
Harpagoxenus americanus (Emery)

Identification: TL 2.8-3.4 mm. Dark yellowish-brown to very dark brown, mandibles slightly paler with teeth black-tipped, antennae paler, especially scapes and distal segment of funiculus, legs paler basally and apically, tibiae and middle and hind coxae especially pale (brownish-yellow); head with genae minutely striate, otherwise smooth and moderately glossy with scattered punctation, alitrunk weakly striate and moderately glossy. This is the only species in the genus and is easily recognized by the generic characters, especially the distinctive scrobe or groove for the reception of the antenna.

Taxonomy: In the genus *Harpagoxenus* in the Ohio literature (see above).

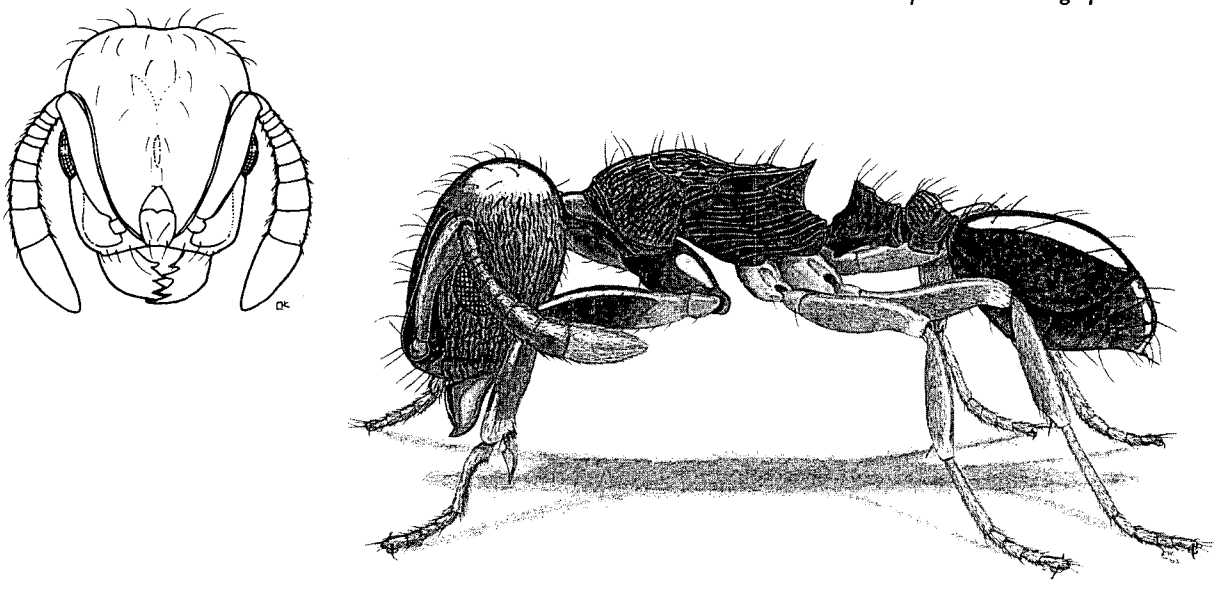
Ecology:

— Habitat: Found in woods and semi-open woods.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Found as slave-maker in mixed colonies with *Leptothorax curvispinosus* (GAC 2079 #8). Also enslaves *Leptothorax longispinosus*. Wesson



***Protomognathus americanus* (Emery)**, full face view of head and habitus. Drawing by Holly K. Coovert.

(1939) found 1 out of 15 colonies of *L. curvispinosus* enslaved by *P. americanus*. Hölldobler & Wilson (1990) also list *L. ambiguus*.

Behavior: Workers were found foraging on ground in woods (GAC 1795 #6) and on cherry trunk in open woods (GAC 2102 #12). See Wesson (1939), Alloway (1979), and Stuart & Alloway (1985) for more details.

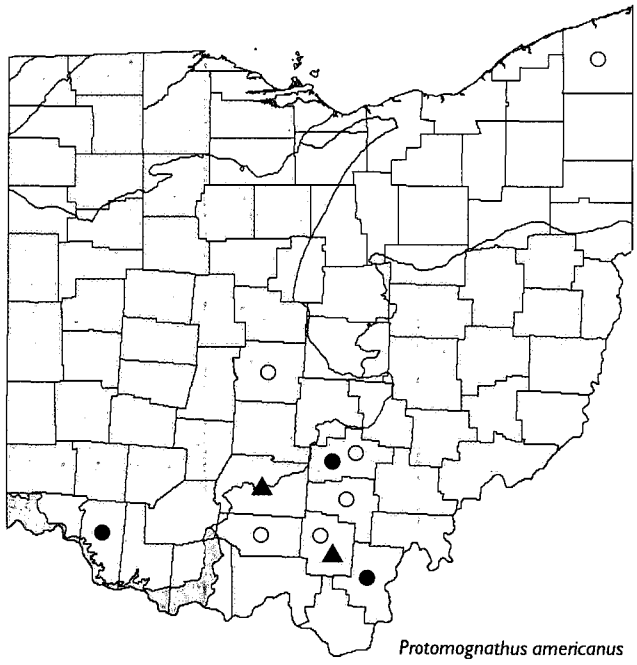
Nests: In hickory nut colony with *Leptothorax curvispinosus* (GAC 2079 #8). Usually in acorn colonies with its host.

— Colony Organization: A host colony is enslaved by the queen entering the nest and killing or driving away the host ants, then appropriating the brood. Later a mixed colony results after the host and her own brood develop. The *P. americanus* workers then occasionally raid other host colonies to bolster their work force (Smith, 1939b; Wesson, 1939; Creighton, 1950). Colonies are small, usually about 6 *Protomognathus* and 30 slaves but up to 50 *Protomognathus* workers and 300 worker slaves.

— Reproductives: Females - June 19 (GAC 2094). Stray dealate female - July 20 (GAC 1795 #6). Wesson (1939) found winged females July 11 (s. Ohio) and June 23 (Baltimore, Maryland).

Range: Massachusetts, Ontario, Michigan, south to North Carolina, Ohio, Indiana, Illinois, Missouri.

Ohio Distribution: Recorded from 9 counties in Ohio, most in southcentral, unglaciated Ohio.



Protomognathus americanus

Ohio References: Ashtabula (Headley, 1943a, 1943b), Franklin (Herbers, 2004), Hocking (Wesson, 1939), Jackson (Wesson, 1939; Smith, 1939b; Creighton, 1950), Pike (Wesson, 1939), Vinton (Wesson, 1939), southcentral Ohio (Wesson & Wesson, 1940), northeastern Ohio (Stuart & Alloway, 1985), Ohio (Gorham, 1956).

Comments: These uncommon tiny black ants enslave certain species of the related genus *Leptothorax*. This is an exciting species to find in the field, especially when a mixed colony of the slave-maker and its slaves are found together. The antennal scrobes serve to protect the vulnerable antennae of this ant when invading an alien colony, but ironically, raiders succeed more by causing panic than actual fighting.

Tribe Myrmecinini

Genus *Myrmecina* Curtis

Mymecina Curtis, 1829

Identification: The characteristic shape of the petiole and the double pair of propodeal spines are diagnostic for this genus.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Brown (1967) revised the North American fauna, considering all taxa a single species.

Key: A single species is found in our area.

Comments: The single North American species in this genus is a small black woodland ant.

46 *Myrmecina americana* Emery

Myrmecina latreillei americana Emery, 1895
Myrmecina latreillei americana var. *brevispinosa* Emery, 1895
Myrmecina graminicola quadrispina Enzmann, 1946
Myrmecina graminicola americana Emery
Myrmecina graminicola americana var. *brevispinosa* Emery

Identification: TL 3.0-3.7 mm. Very dark reddish-brown to blackish-brown, mandibles, antennae, and legs a paler brownish-orange, apex of gaster paler; head and alitrunk distinctly rugose/reticulate, surface weakly glossy; antennal scapes with abundant, long, nearly erect hairs. This is the only North American species and is easily recognized by the characters given for the genus.

Taxonomy: See Brown (1967). The earlier named varieties (see above) have all been synonymized.

Ecology:

— Habitat: Found in moist to dry woodlands. Ohio literature records include "in dry or open woods" (Wesson & Wesson, 1940), while Amstutz (1943) found that it "prefers shady, rather moist habitats." (Amstutz, 1943).

— Food Resources: Occasionally taken at bait. Predaceous and carnivorous; not known to attend honeydew-secreting insects (Smith, 1947a).

— Associates: Further data lacking.

Behavior: The slow-moving workers were found foraging on ground and in leaf litter and on log in woods. Dennis (1938) notes that they have "the interesting habit of feigning death when disturbed."

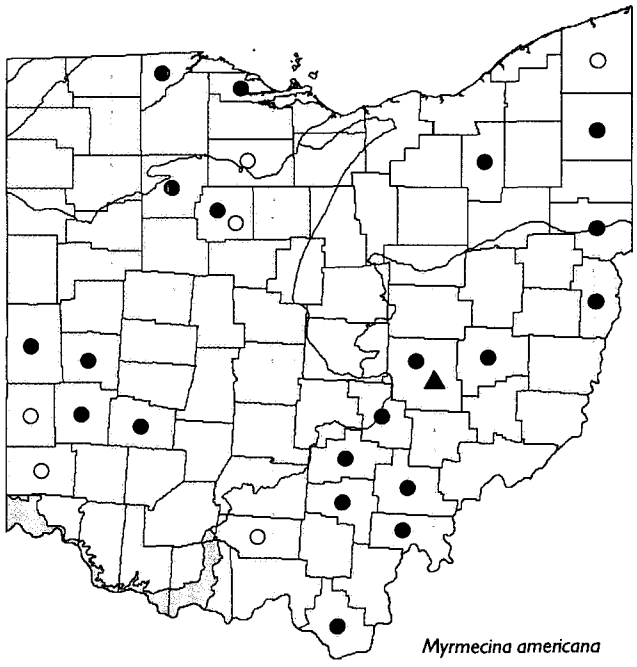
Nests: In rotten logs, hickory nut (GAC 2123), under rocks. Amstutz (1943) notes it "in a crevice under the bark of elm," while D. R. Smith (1979) states that the nests are "usually built in moist shady areas often under small stones." Headley (1943a) found a colony in an acorn.

— Colony Organization: Colonies are small, rarely more than 100 individuals, apparently with a single queen (Headley, 1943a, Creighton, 1950; Brown, 1967).

— Reproductives: Males - Aug. 23-Sept. 28. Stray dealate females - Aug. 28-Oct. 17.

Range: Quebec, Michigan, south to Georgia, west to Iowa, Colorado, New Mexico, Arizona, California.

Ohio Distribution: Widespread in Ohio. Recorded from 25 counties.



Myrmecina americana

Ohio References: Ashtabula (Headley, 1943a, 1943b), Butler (Gorham, 1956), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: The double propodeal spines are diagnostic for this species. Another species described by Carlo Emery (1848-1925), an Italian whose careful work had a profound effect on myrmecology.

Tribe Tetramoriini

Genus *Tetramorium* Mayr

Tetramorium Mayr, 1855

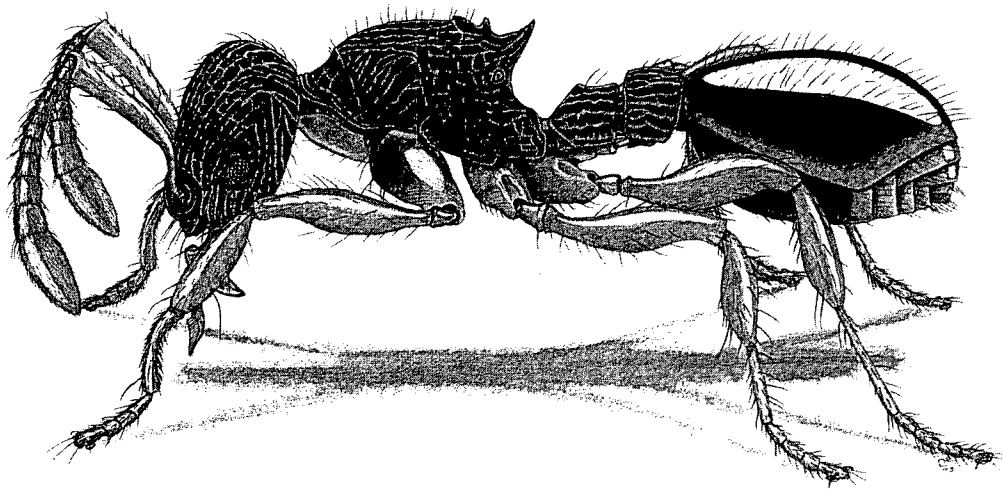
Identification: The appendage on the sting is transparent and difficult to see, but once discerned, is diagnostic. Besides the characters given in the key, our single species has a 3-segmented antennal club, and the sculpturing consists of strong, straight longitudinal striae or ridges over the head and dorsal surface of the alitrunk which are usually not connected by cross-striae.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Smith (1943a) published an earlier revision. Bolton (1979) revised the genus, and includes a worker key to the species found in the New World.

Key: A single introduced species is found in our area.

Comments: The single introduced species of this genus in our area is a small dark ant of disturbed areas, often being quite abundant.



***Myrmecina americana* Emery.** Drawing by Holly K. Coovert.

47 *Tetramorium caespitum* (Linnaeus)

Pavement Ant

Formica caespitum Linnaeus, 1758

Identification: TL 2.6-4.5 mm. Medium brown to dark reddish- or blackish-brown, mandibles, antennae, and legs paler (orangish-brown), femora usually infuscated; head distinctly and uniformly finely rugose, alitrunk rugose, katepisternum punctate, surface weakly glossy. This is the only species found in our area and is easily recognized by the characters given for the genus.

Taxonomy: See revisions above.

Ecology:

— Habitat: Found in open or partially shaded situations. Seems to invariably be associated with human disturbed sites.

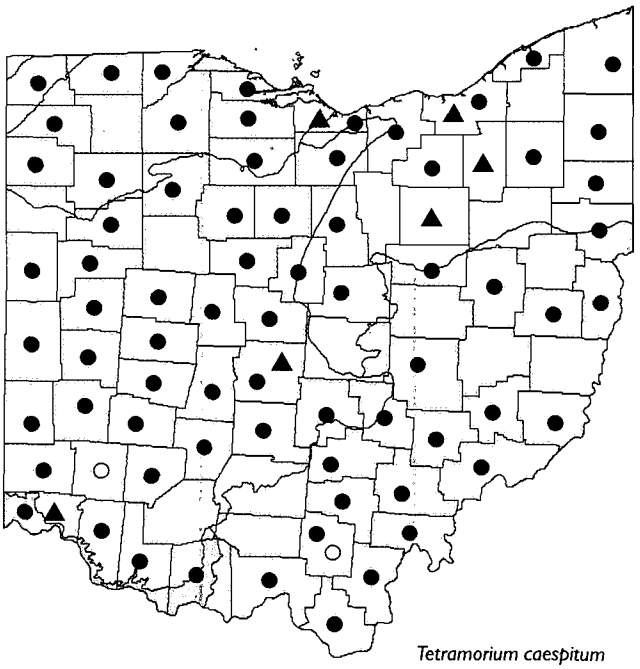
— Food Resources: Frequently taken at various fruit baits. D. R. Smith (1979) reports that they "steal seeds from seedbeds, gnaw into tubers, roots, and stalks of various plants, [and] attend honeydew excreting insects."

— Associates: See Bruder & Gupta (1972) for New Jersey myrmecophiles.

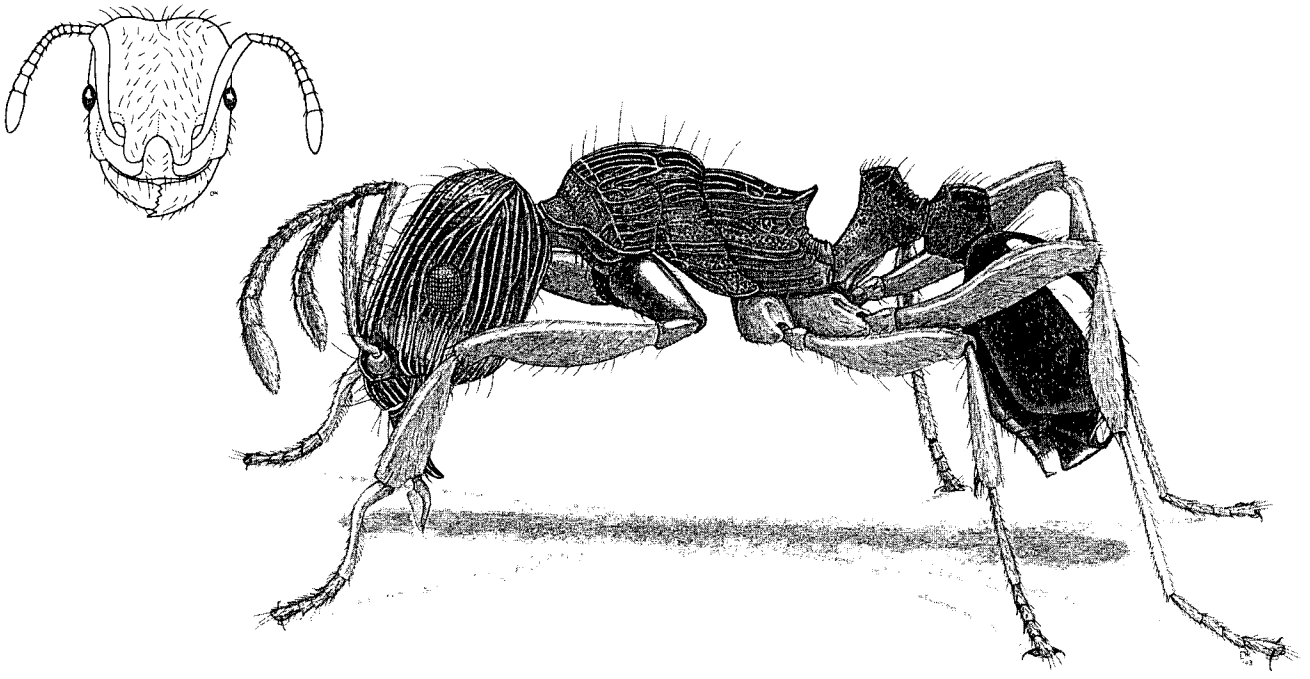
— Ant Associates: One colony (GAC 1925) in ground with two alate female *Anergates atratulus* at nest entrance, semi-open area by lake. Serves as host of this workerless parastic species. Bruder & Gupta (1972) note *Monomorium minimum* and *Solenopsis molesta* in New Jersey at least in close proximity.

Behavior: Workers were found foraging on pavement and ground, and under debris and at bases of trees in open. A very large aggregation (ca. 18 x 25 cm) was observed on open ground beside paved path (perhaps moving nest site? GAC 2025). See Hölldobler & Wilson (1990) for description of battles between colonies.

Nests: In soil in open or in cracks or under objects (cracks in pavement, under bark, hubcap, log, RR tie, rocks, etc.), under bark of trees; occasionally in buildings. Seems to be especially common on or adjacent to paved areas. One extensive nest (GAC 1892) in crack in pavement ca. 4-5 m long with at least 18 mounded entrances. "One of the most common house-infesting ants in the large cities of the Atlantic coast." (D. R. Smith, 1979).



Tetramorium caespitum



***Tetramorium caespitum* (Linnaeus)**, full face view of head and habitus. Drawing by Holly K. Coovert.

— Colony Organization: Colonies are populous, with up to 31,000 individuals (averaging 7,000 to 14,000) (Hölldobler & Wilson, 1990). Bruder & Gupta (1972) record a single queen.

— Reproductives: Males - May 16-June 22. Females - March 14, June 11-22. Swarming time in New Jersey is recorded as the end of May until the last week of July (Bruder & Gupta, 1972).

Range: Quebec, Ontario, Michigan, Atlantic coastal region of northeastern United States, west to Tennessee, Nebraska, Missouri, Washington, Nevada, California; Eurasia, Africa.

Ohio Distribution: Recorded from 74 counties statewide in Ohio. It undoubtedly occurs in every county.

Ohio References: Jackson (Wesson & Wesson, 1940), Warren (Gorham, 1956).

Comments: A common ant of human disturbed, usually urban, areas. There has been a long-standing disagreement whether this species, and the workerless parasite *Anergates atratulus*, are native or introduced. See especially Creighton (1950:286-90), who championed for native status largely based on the unlikely prospect of *Anergates* having also been introduced. Wheeler (1905) only found it at Ft. Lee in his New Jersey study, stating "it is evidently imported from Europe and seems to be making but slow progress over the country." Seventeen years later Davis & Bequaert (1922) stated "this ant has been introduced from Europe, but is now well established in the eastern United States." Smith (1943a) believed that it was introduced by the early colonists. Brown (1957a) thoroughly discussed the situation and considered both species as being introduced. I would have to agree with this assessment based on my observations throughout Ohio, namely that *T. caespitum* is only ever collected in human-disturbed situations, which is clearly indicative of an introduced species. Also note the paucity of published Ohio records for this now commonly encountered ant, indicating a more recent spread into the state. Wesson & Wesson (1940), for instance, only found it "in alleyways and along sidewalks near the business district of Jackson," while Gorham (1956) only found it in one site. I would consider this an indicator species for disturbed areas.

Described by the father of taxonomy, Carl von Linné in 1758 from Europe. The species name refers to turf or sod, referring to grassy fields.

Genus *Anergates* Forel

Anergates Forel, 1874

Identification: The very distinctive females have a longitudinally furrowed gaster which is diagnostic. Workers are lacking.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950).

Key: A single introduced species is found in our area.

Comments: The single species of this genus is a rarely collected workerless parasite of *Tetramorium caespitum*.

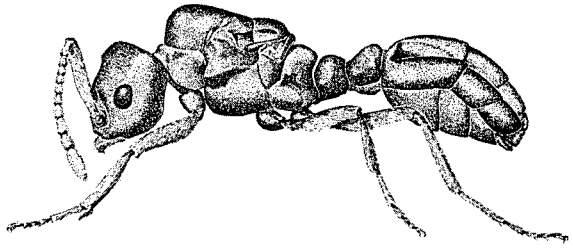
48 *Anergates atratulus* (Schenck)

Myrmica atratula Schenck, 1852

Identification: FEMALES: TL 3.0 mm. Dark blackish-brown, mandibles paler, antennae and legs paler, especially apically (brownish-yellow); body fully micropunctate, surface thus dull; gaster with deep, wide, longitudinal furrow.

Taxonomy: See Creighton (1950).

Ecology:



***Anergates atratulus* (Schenck) female.** From Smith (1947a).

— Habitat: Same as that of its host *Tetramorium caespitum* (q.v.).

— Food Resources: Further data lacking.

— Ant Associates: Workerless parasite of *Tetramorium caespitum*. "A parasitized nest of the host consists of a single fertile female of *atratulus*, a large number of host workers, and a large number of pupoidal males and virgin females of *atratulus*." (D. R. Smith, 1979).

Behavior: A fertilized female *Anergates* enters a host colony either unobserved or by grabbing a worker *Tetramorium* by the antenna. Her presence apparently induces the host workers to kill their own queen, a feat the *Anergates* queen is probably not capable of accomplishing. See Wheeler (1910b) and Creighton (1950) for more detail.

Nests: Same as that of its host *Tetramorium caespitum* (q.v.); two alate females at mouth of entrance to colony of *Tetramorium caespitum* in ground, semi-open sparsely grassy area by lake (GAC 1925).

— Colony Organization: Creighton (1950) reports a single queen of *Anergates* in the colony of the host, but we now know that this is a polygynous species with multiple queens (Hölldobler & Wilson, 1990).

— Reproductives: Females - Aug. 28 (GAC 1925). Males are wingless and pupoidal and never leave the nest.

Range: Connecticut, New York, New Jersey, Pennsylvania, Ohio, Delaware, Maryland, District of Columbia, Virginia; Europe.

Anergates atratulus

Ohio Distribution: Known only from Shelby Co. in Ohio.
Ohio References: None.
Comments: This is the only species found in North America and is easily recognized by the characters given for the genus. The longitudinal furrow on the gaster of the females is distinctive and diagnostic.

This rare workerless parastic species represents a new state record for Ohio and is a considerable westward range extension. See comments under *Tetramorium caespitum* where the introduced status of both of these species is discussed. Although recorded from a number of states along the Atlantic seaboard, most are represented by a single record.

Tribe Blepharidattini

Genus *Wasmannia* Forel

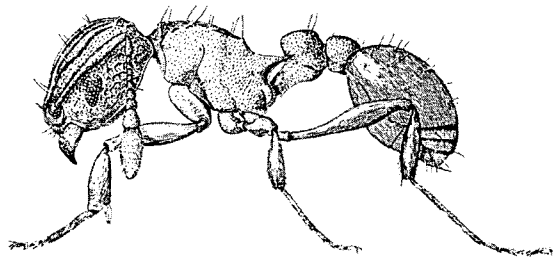
Wasmannia Forel, 1893

Identification: These minute yellow ants have sharply angular humeri ("shoulders" of the pronotum) and a delicate but distinct scrobe for the reception of each antenna.
Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).
Taxonomy: This genus and species were included in *Ochetomyrmex* in D. R. Smith (1979), but *Wasmannia* has been considered valid by Hölldobler & Wilson (1990) and Bolton (1994, 1995), the latter placing it in the tribe Blepharidattini.
Revision(s): Creighton (1950).
Key: A single introduced species is found in our area.
Comments: The single species of this genus found in our area is a minute yellow ant introduced from the tropics.

Wasmannia auropunctata (Roger)
Little Fire Ant

Tetramorium ? auropunctatum Roger, 1863
Ochetomyrmex auropunctata (Roger)

Identification: TL 1.5-2.0 mm. Pale yellowish- to medium orangish-brown, head and gaster slightly infuscated dorsally, antennae and legs concolorous; head and alitrunk finely rugose and micropunctate, the surface dull. This is the only species found in North America and is easily recognized by the characters given for the genus.
Taxonomy: See above.



Wasmannia auropunctata (Roger). From Smith (1947a).

Ecology:
— Habitat: Highly adaptable in tropical and subtropical regions (Nickerson, 1983).
— Food Resources: Attends honeydew excreting insects and is predaceous (Thompson, 1990). In homes, attracted to fatty or oily substances (Nickerson, 1983).
— Associates: Tends aphids for honeydew.
Behavior: Noted for its painful and long-lasting sting.
Nests: In exposed soil under cover of objects, or in wood (D. R. Smith, 1979).
— Colony Organization: "Nests" may contain several dealate queens connected with other "nests" (Nickerson, 1983). Colonies are usually very populous (Smith, 1947a). Colonies spread by budding off groups of workers accompanied by queens, thus multiple queens are implied (Hölldobler & Wilson, 1990).
— Reproductives: Further data lacking.
Range: Florida, California, Illinois; West Indies, Mexico, Central and South America.
Comments: Named the Little Fire Ant because of the severe sting which is completely out of proportion to its diminutive size. This is an introduced tropical species which only survives in heated buildings in the northeast. Not known from Ohio, but recorded from Illinois by Ross et al. (1971).

Tribe Dacetini

Genus *Strumigenys* F. Smith

Strumigenys F. Smith, 1860
Pyramica Roger, 1862

Identification: These minute but very distinctive ants have 6-segmented antennae and very long, linear mandibles each ending as a 2-pronged fork.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Brown (1953), with a key to workers.

Key: A single species is found in our area.

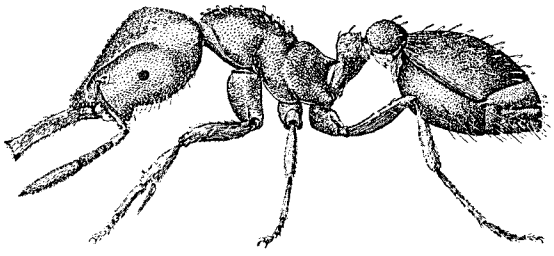
Comments: This is typically a tropical genus of minute "trap-jawed" ants.

Strumigenys louisianae Roger

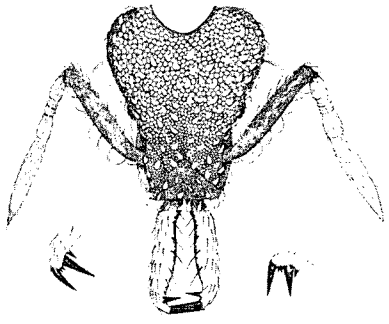
Strumigenys louisianae Roger, 1863

Identification: TL 2.1-2.5 mm. Yellowish- to orangish-brown, head and gaster darker dorsally, appendages pale (brownish-yellow); surface of head and alitrunk dull. This is the only species found in our area and is easily recognized by the characters given for the genus.

Taxonomy: See Brown (1953).



Strumigenys louisianae Roger. From Smith (1947a).



Strumigenys louisianae Roger, cephalic view. From Smith (1932).

Ecology:

— Habitat: Found in sunny, open forests to shaded, closed canopy stands in North Carolina (Carter, 1962).

— Food Resources: Small arthropods, especially Collembola (D. R. Smith, 1979). See Wilson (1953) for details.

— Associates: Further data lacking.

Behavior: They "move with a slow, deliberate gait" (Van Pelt, 1958).

Nests: In soil beneath objects, in rotting wood, plant cavities (D. R. Smith, 1979).

— Colony Organization: Colonies are small, up to 120 workers and several queens (Smith, 1931; Wilson, 1953).

— Reproductives: Females - July 4, present in a nest in Mississippi (Smith, 1931). Alates in Gulf states produced in the last half of June and first half of July (Wilson, 1953).

Range: North Carolina to Florida, west to Illinois, Oklahoma, Arizona; Mexico south to Bolivia, Argentina.

Comments: A typically southern species of "trap-jawed" ant, their mandibles can open at least 180°. The Illinois record (Ross et al., 1971, but not found by DuBois & LaBerge, 1988) indicates its possible occurrence in Ohio, and is thus included.

Genus *Smithistruma* Brown

Smithistruma Brown, 1948

Identification: These minute but very distinctive ants have a 6-segmented antenna and, in our species, a well-developed spongiform process on the ventral surface of the petiole and postpetiole. The mandibles are shorter and have more and finer teeth than in *Strumigenys*.

Immatures: Larvae pheidoloid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: The recent generic revision of Bolton (1999) synonymizes this and a large number of other taxa under the genus *Pyramica*. This is largely a question of a preference for a single large genus or a large number of smaller genera. I follow the philosophy of Ernst Mayr and others in which it is deemed advisable to break up large groups where appropriate. Thus I continue to recognize the genus *Smithistruma* for our species. Named in honor of Marion R. Smith (1894-1981), "an outstanding myrmecologist and the first reviser of the North American *Strumigenys*."

Revision(s): The earlier works of Smith (1931), Wesson & Wesson (1939), and Creighton (1950) should be consulted but are largely replaced by the revision of Brown (1953, 1964); the 1953 revision contains a key to workers.

Key: Like all of the keys in this paper, the key below has been revised and rearranged to facilitate ease of use.

Comments: This is a very large genus in our area. These minute ants are specialist predators and use their "trap jaws" (which open to about 60°) to capture tiny springtails (Collembola).

Key to *Smithistruma* of Northeastern North America

1. Mandibles long, (portion beyond clypeus) nearly as long to longer than the clypeus, with a basal toothless area (diastema) as long or longer than length occupied by the apical series of teeth; basal tooth of mandible fully exposed when the mandibles are closed; scapes strongly bent at base **2**

   Mandibles short, distinctly shorter than the clypeus; basal toothless area absent or much smaller; basal tooth of mandible partially or completely covered by the clypeus when the mandibles are closed; scapes not strongly bent at the base **3**

2. Clypeus subrectangular, the ventral margin broad and truncate, the anterior corners sharp; antennal scape relatively short, strongly angled near base at angle of nearly 90°; petiole and postpetiole without reclinate spatulate hairs dorsally ..... (*S. angulata*)

   Clypeus semicircular, the ventral margin narrowly truncate, the anterior corners broadly rounded; antennal scape relatively long, less strongly angled near base at angle of approx. 45°; petiole and postpetiole with reclinate spatulate hairs dorsally ..... ***S. pergandei***

3. Clypeus (viewed from both top and side) distinctly pointed anteriorly, this point blunt, raised, and bearing a concentrated group of 8 to 10 slender, outwardly radiating hairs ..... ***S. dietrichi***

   Clypeus rounded or truncate anteriorly, not pointed, and clypeal hairs not concentrated as above, or if so, with strongly bulbous apices **4**

4. Clypeus with a group of 8 to 10 relatively long hairs with strongly bulbous apices radiating from a small anteromedial area plus a pair of 2 very long, curved, narrow erect hairs near the middle; remainder of clypeal surface bare and glossy posteromedially .... ***S. ornata***

   Clypeal hairs generally more evenly distributed, or otherwise not as above, usually a rather even covering of short, either fine or spatulate hairs **5**

5. Clypeus weakly concave, glossy, with outer border sharply bimarginate (viewed from the side with marginal groove, thus appearing as double margin); clypeal pilosity rather sparse, extremely so in the center; mandible with well-developed basal toothless area (diastema) distinct at full closure ..... ***S. bimarginata***

   Clypeus with outer border single (if indistinctly bimarginate, then the clypeal surface mostly weakly convex, pilosity more dense and uniformly distributed, and the mandibular disastema very weak and indistinct at full closure) **6**

6. Clypeus with marginal hairs (those that extend over outer edges) mostly distinctly J-shaped, curved posterolaterally; surface of clypeus minutely tuberculate, dull; mandibles relatively large, diastema very weakly developed and indistinct ..... ***S. ohioensis***

   Clypeus with marginal hairs either distinctly enlarged apically or if fine, then not J-shaped; mandibles smaller or with a well-developed, distinct diastema **7**

7. Head wedge-shaped (cuneiform) in full-face view, the preocular laminae (sides below the occipital lobes above clypeus) straight and distinctly convergent anteriorly, their outline even with the closed mandibles and nearly so with occipital lobes; clypeus approximately as wide as long and about half as wide as the width across the occipital lobes; mandibles somewhat convex dorsally, diastema very small and indistinct, especially at full closure **8**

   Head not wedge-shaped in full-face view, the occipital lobes broader and extended, and the preocular laminae parallel or very weakly convergent, their outline distinctly uneven with the closed mandibles and occipital lobes; clypeus distinctly broader than long and more than half as wide as the width across the occipital lobes (if width of clypeus ambiguous, then the mandibles depressed and with a distinct diastema) **10**

8. Hairs on clypeus short, appressed, scale-like, densely covering glossy surface; outer edges of clypeus fringed with border of anteriorly-directed, narrowly spatulate hairs ..... ***S. clypeata***

   Hairs on clypeus erect or suberect, fine or indistinctly broadened at apex, not appressed nor scale-like, the surface semiglossy to glossy; outer edges of clypeus fringed with fine or narrow hairs, not narrowly spatulate **9**

9. Clypeal hairs, including those in the center, very fine, with finely tapered apices, curving gently and obliquely away from the midline; clypeus distinctly glossy, yellowish ..... (*S. laevinasis*)

   Clypeal hairs slender, but with apices feebly broadened or at least not finely tapered, those in the center shorter and with distinctly enlarged apices ..... ***S. pilinasis***

10. Mandibles coarsely and continuously toothed, lacking a toothless diastema; anterior border of clypeus broadly truncate and often shallowly concave medially; hairs on clypeus, front, and occiput of head mostly spatulate and reclinate ..... ***S. rostrata***

Mandibles with a distinct toothless diastema; anterior border of clypeus narrower, rounded apically, at most weakly truncate, not emarginate; hairs on clypeus, front, and occiput of head often partially to mostly thin and erect 11

11. With 5 to 10 marginal clypeal hairs on each side (side of clypeus to base of mandible when closed); disc of clypeus rather evenly covered with spatulate hairs 12

With 2 to 4 marginal clypeal hairs on each side; disc of clypeus largely devoid of hairs posteromedially (or with a few, scattered, greatly reduced hairs) 15

12. Marginal clypeal hairs thin and fine, not noticeably broadened at apices ..... (*S. filitalpa*)

Marginal clypeal hairs spatulate (spoon-shaped), although sometimes narrowly so 13

13. Hairs on front and dorsal surface of head with weakly enlarged tips, not strongly and distinctly spatulate, many hairs long, fine; marginal clypeal hairs narrowly spatulate ..... ***S. talpa***

Hairs on front and dorsal surface of head mostly or entirely spatulate, reclinate (bent forward with spoon-shaped apices lying parallel to surface), very uniform in height, forming a virtual secondary surface; marginal clypeal hairs broadly spatulate 14

14. Hairs on front and dorsal surface of head entirely spatulate, lacking taller, thinner hairs; clypeus not or barely broader than long; usually with 6 to 7 marginal clypeal hairs ..... (*S. creightoni*)

Hairs on front and dorsal surface of head not uniformly spatulate, at least a few slender erect or suberect hairs present on occiput, lateral borders of occipital lobes often each with 1 or 2 very long, weak hairs; usually with 7 to 10 marginal clypeal hairs ..... ***S. abdita***

15. Marginal clypeal hairs mostly or entirely curved posteriorly 16

Marginal clypeal hairs curved anteriorly or anteromedially (at most 1 hair per side curved posteriorly) 17

16. Clypeus rounded, the outer margins convex and uneven; mandibles (seen in side view) thick (usually thicker than height of eye), the tip abruptly tapered and distinctly and abruptly decurved at tip; normally 3 marginal clypeal hairs on each side (excluding smaller ones above mandibles) ..... ***S. reflexa***

Clypeus wedge-shaped, the outer margins straight and even; mandibles (seen in side view) thin (thickness at most equal to height of eye), the tip gradually tapered and only very slightly decurved at tip; normally 2 marginal clypeal hairs on each side (excluding smaller ones above mandibles) .. (*S. cloydi*)

17. Mandibles (seen in side view) thin (thickness at most equal to height of eye), the tip gradually tapered and only very slightly decurved at tip; occipital lobe normally with an unusually long, fine curved hair near end of antennal scrobe ..... ***S. pulchella***

Mandibles (seen in side view) thick (usually thicker than height of eye), the tip abruptly tapered and distinctly and abruptly decurved at tip; each occipital lobe lacking unusually long, curved hair 18

18. Many hairs on dorsal surface of head distinctly spatulate; alitrunk and gaster with few, scattered, long erect hairs; femora with hairs appressed or nearly so .... ***S. missouriensis***

Hairs on dorsal surface of head thin or at most with weakly enlarged tips, not distinctly spatulate; alitrunk and gaster covered with crowded, short erect hairs; femora with hairs suberect ..... (*S. memorialis*)

49 *Smithistruma abdita* (Wesson and Wesson)

Strumigenys (Cephaloxys) abdita Wesson & Wesson, 1939

Identification: TL 2.05-2.35 mm. Yellowish-, orangish-, or reddish-brown, gaster darker; head and alitrunk reticulate/punctate, dull, sides of mesothorax and propodeum very smooth and glossy. It shares the general head shape (not evenly wedge-shaped) and more numerous marginal clypeal hairs of the *talpa* group. The characters given in the key should serve to identify it; especially note the uniform covering of spatulate, reclinate hairs on the clypeus.

Taxonomy: This species keys out with the *talpa* group (incl. *creightoni* and *filitalpa*) but is unplaced in Brown (1953).

Ecology:

— Habitat: Shaded to somewhat open situations (Brown, 1953).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Soil dweller under stones or other objects (Brown, 1953). Wesson & Wesson (1939) found the type series under boards and pieces of slate in a back yard.

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Pennsylvania, Virginia, North Carolina, Ohio, Indiana, Illinois, Iowa.

Ohio Distribution: Recorded from 2 widely separated counties in Ohio.

Smithistruma abdita

Ohio References: Jackson (**Type locality**—Wesson & Wesson, 1939; Creighton, 1950; Brown, 1953), Ottawa (Brown, 1953, 1964), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This uncommon species was originally described from Ohio. The species name means "hidden, concealed" which could adequately describe any *Smithistruma*.

Smithistruma angulata (Smith)

Strumigenys (Cephaloxys) angulata Smith, 1931

Identification: TL 2.25-2.40 mm. Light to medium reddish-brown, gaster slightly darker, head and alitrunk dull, reticulate/punctate, sides of alitrunk mostly very smooth and glossy. The unusually long mandibles and the long, toothless area at base (diastema) are diagnostic for this species group. The key characters given will readily separate the two species.

Taxonomy: Formerly segregated as the subgenus *Wessonistruma* along with *pergandei* based on the structure of the mandibles.

Ecology:

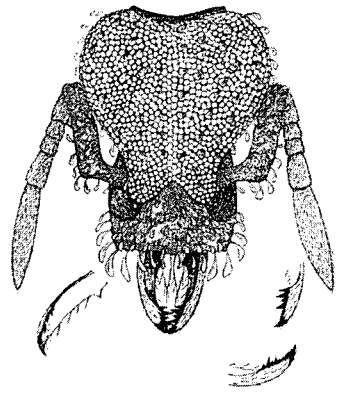
— Habitat: Found in woodland thickets and swamps (Brown, 1953); deciduous forest in Illinois (DuBois & LaBerge, 1988).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Some specimens found in nest of *Strumigenys louisianae*." (D. R. Smith, 1979).

Behavior: Further data lacking.



Smithistruma angulata (Smith), full face view. From Smith (1931).

Nests: D. R. Smith (1979) notes "colonies found in a rotten pine stump."

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Illinois, Alabama, Mississippi.

Comments: A rare, typically southern species with distinctive, long mandibles. The occurrence of this species in Illinois indicates that it could be found in Ohio. The species name is in reference to the angular shape of the clypeus.

50 *Smithistruma bimarginata* (Wesson and Wesson)

Strumigenys (Cephaloxys) bimarginata Wesson & Wesson, 1939

Identification: TL 2.20-2.40 mm. Reddish-brown, gaster darker, legs slightly paler; head and alitrunk densely reticulate/punctate, dull, clypeus smooth and glossy, sides of mesothorax and propodeum very smooth and glossy. The double clypeal margin and concave surface of the clypeus in this species are distinctive and diagnostic. The narrow, wedge-shaped head is similar to that in the *clypeata* group.

Taxonomy: In its own species group.

Ecology:

— Habitat: Found in open grassy spot in brushy woods (Brown, 1953); deciduous forest in Illinois (DuBois & LaBerge, 1988).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In thin soil cover (Brown, 1953); *Andropogon* (bluestem grass) sod (Brown, 1964).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Ohio, Illinois.

Ohio Distribution: Only known from Adams Co. in southern Ohio.

Smithistruma bimarginata

Ohio References: Adams (**Type locality**—Wesson & Wessson, 1939; Creighton, 1950; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This rare species was originally described from a single worker from Ohio. The species name refers to the double clypeal margin, a diagnostic character.

Smithistruma cloydi Pfitzer

Smithistruma cloydi Pfitzer, 1951

Identification: TL ca. 2.0 mm. Reddish-brown; head and alitrunk dull dorsally, sides of mesothorax and propodeum very smooth and glossy. This species is recognized by the uneven head outline and few marginal clypeal hairs on each side. This species is unusual in that these hairs curve posteriorly. The clypeal shape and thinner mandibles will separate it from *reflexa*.

Taxonomy: This species is a member of the *pulchella* group (fide Deyrup, 1998).

Ecology: Further data lacking.

Behavior: Further data lacking.

Nests: Further data lacking.

Range: Tennessee (Knoxville).

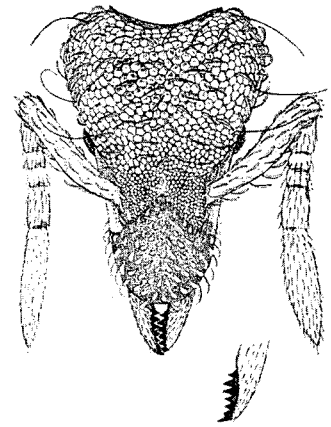
Comments: A rare species only known from Tennessee. This species has not been found since the types were collected (Brown, 1964).

51 *Smithistruma clypeata* (Roger)

Strumigenys clipeata (!) Roger, 1863

Identification: TL 2.15-2.50 mm. Brownish-yellow to dark reddish-brown, gaster darker (dark brown), paler apically, head and alitrunk infuscated dorsally; antennae and legs paler (pale brownish-yellow); head and alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. The wedge-shaped head with the outline nearly even to the tips of the mandibles are diagnostic for this species group. The appressed scale-like clypeal hairs will then distinguish this species.

Taxonomy: In the *clypeata* species group along with *laevinasis* and *pilinasis*.



***Smithistruma clypeata* (Roger)**, full face view. From Smith (1931).

Ecology:

— Habitat: Usually found in forested areas (D. R. Smith, 1979). For North Carolina habitats, see Carter (1962).

— Food Resources: Springtails (Collembola) and diplurans (Wilson, 1953).

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In the soil cover, beneath stones, or in rotten logs (Brown, 1953).

— Colony Organization: Colonies are small, up to 62 workers recorded in Alabama (Wilson, 1953).

— Reproductives: Further data lacking.

Range: New Jersey, Pennsylvania south to Florida, west to Illinois, Arkansas, Louisiana.

Ohio Distribution: Only known from Jackson Co. in Ohio.

Ohio References: Jackson (Wesson & Wesson, 1939; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

Comments: A rare species with a wedge-shaped head. The species name refers to the clypeus which is diagnostic.

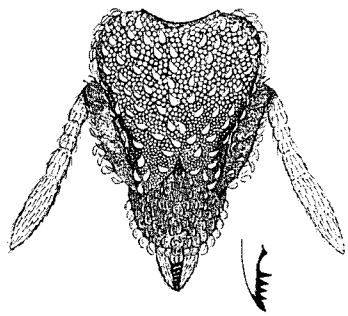
Smithistruma clypeata

Smithistruma creightoni (Smith)

Strumigenys (Cephaloxys) creightoni Smith, 1931

Identification: TL 2.15-2.45 mm. Medium to dark brownish-yellow, antennae and legs slightly paler; head and alitrunk dull, sides of mesothorax and propodeum smooth and glossy. Recognized by the uneven outline to the head (i.e. not wedge-shaped) and more numerous marginal clypeal hairs, which in this species are broadly spatulate. These spatulate, reclinate hairs are very uniform in height on the clypeus and head and form a virtual secondary surface when seen in side view.

Taxonomy: A member of the *talpa* group, along with *creightoni*.



Smithistruma creightoni (Smith), full face view. From Smith (1931).

Ecology:

— Habitat: Oak pine forest in Tennessee (Cole, 1940b). Various forests in North Carolina (Carter, 1962).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Collections made from leaf litter (D. R. Smith, 1979). In well-rotted pine log covered with moss in Tennessee (Cole, 1940b). Dennis (1938) notes strays taken under bark of stumps and under a rock.

— Colony Organization: Colonies are small, 75 to 123 workers, 1 to 6 dealate females, plus a few alates in Tennessee (Cole, 1940b).

— Reproductives: Further data lacking.

Range: District of Columbia, North Carolina, Georgia, Florida, Tennessee, Alabama.

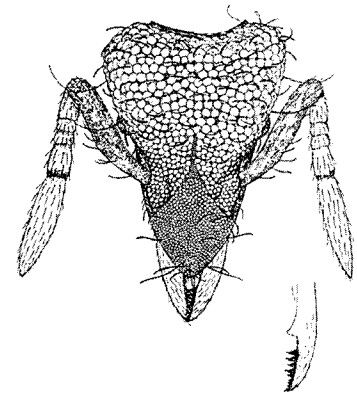
Comments: Although southeastern in distribution, this rare species is included for completeness. Named for William Steel Creighton (1902-1973), foremost American myrmecologist.

52 *Smithistruma dietrichi* (Smith)

Strumigenys (Cephaloxys) dietrichi Smith, 1931

Identification: TL 2.10-2.40 mm. Medium to dark reddish-brown, gaster darker, nearly black, paler apically, antennae and legs slightly paler; head and alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. The distinctly pointed clypeus bearing a concentrated group of relatively long hairs is diagnostic for this species. It is best to view this from both the side and the top, then the blunt, apically raised point will be clearly visible.

Taxonomy: Our only other member of the *ornata* species group.



***Smithistruma dietrichi* (Smith)**, full face view. From Smith (1931).

Ecology:

— Habitat: Found in woodland. DuBois & LaBerge (1988) note deciduous forest in Illinois. See Carter (1962) for details of habitat in North Carolina.

— Food Resources: Collembolans, diplurans, and symphylans (Wilson, 1953).

— Ant Associates: Sometimes occurs in or near nests of other ants (D. R. Smith, 1979).

Behavior: Further data lacking.

Nests: Usually under the bark of logs, stumps, or standing trees but may be in rotten wood (Brown, 1953) or leaf litter (Brown, 1964).
— Colony Organization: Colonies are small, one recorded by Kennedy & Schramm (1933) contained over 80 workers.
— Reproductives: Further data lacking.

Range: Maryland south to Florida, west to Ohio, Illinois, Arkansas, Louisiana.

Ohio Distribution: Recorded from 5 widely distributed Ohio counties.

Smithistruma dietrichi

Ohio References: Adams (Wesson & Wesson, 1939), Lawrence (Wesson & Wesson, 1939), Pike (Wesson & Wesson, 1939), "n. of Columbus" (Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956; D. R. Smith, 1979).

Comments: A moderately common species with distinct clypeal hairs. Named for Henry Dietrich, American entomologist, who collected the original material from Mississippi.

Smithistruma filitalpa Brown

Smithistruma (Smithistruma) filitalpa Brown, 1950

Identification: TL 2.00-2.10 mm. Pale orangish- or reddish-brown, head including clypeus dull, alitrunk with sculpture weak dorsally, moderately glossy, sides of mesothorax and propodeum very smooth and glossy. Recognized by the uneven outline to the head (i.e. not wedge-shaped) and more numerous marginal clypeal hairs, this species has fine clypeal hairs not broadened at their apices.

Taxonomy: A member of the *talpa* group, along with *creightoni*.

Ecology:
— Habitat: Found in open grassy areas.
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Probably a grass-sod dweller (Brown, 1953); under stone in lawn (Brown, 1964).
— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.

Range: Indiana, Arkansas.

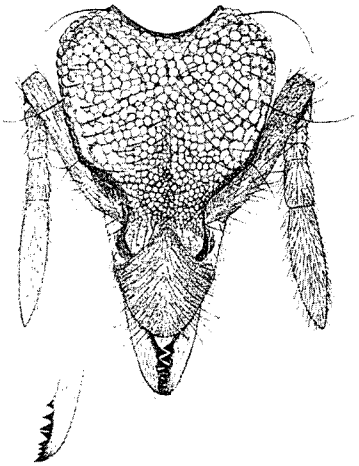
Comments: This is a rare species, possibly a grass-sod dweller best collected with the Berlese funnel (Brown, 1953:80). Recorded from Brown Co., Indiana (Brown, 1953) and rather abundantly from Vermillion Co., Indiana (Munsee, 1968), so it certainly could be found in Ohio.

Smithistruma laevinasis (Smith)

Strumigenys (Cephaloxys) clypeata var. *laevinasis* Smith, 1931

Identification: TL 2.15-2.50 mm. Dark reddish-brown; head with front and clypeus rather smooth and moderately glossy, sides of mesothorax and propodeum very smooth and glossy. Recognized by the wedge-shaped head and the fine clypeal hairs which lack broadened tips.

Taxonomy: In the *clypeata* species group along with *pilinasis*.



Smithistruma laevinasis (Smith), full face view. From Smith (1931).

Ecology:
— Habitat: Found in dense woods (Brown, 1953); deciduous forest in Illinois (DuBois & LaBerge, 1988); and various forest types in North Carolina (Carter, 1962).
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.
Nests: Rotten logs (D. R. Smith, 1979). Most commonly collected in litter samples.
— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.
Range: Virginia, North Carolina, Tennessee, Alabama, Mississippi, Illinois.
Comments: Found in the southeast and Illinois, so should be looked for in Ohio.

Smithistruma memorialis Deyrup

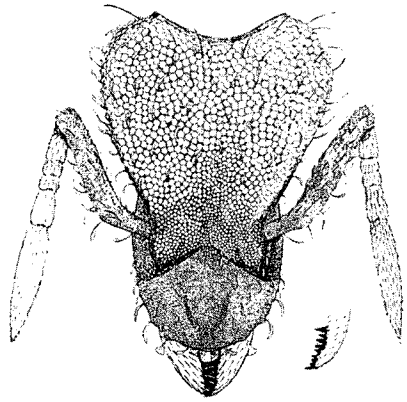
Smithistruma memorialis Deyrup, 1998

Identification: TL 1.95-2.00 mm. Reddish-brown; head and alitrunk finely reticulate, dull, sides of mesothorax and propodeum very smooth and glossy. Recognized by the uneven head outline and few marginal clypeal hairs on each side. These hairs curve forward in this species and the mandibles are relatively thick and it lacks the specialized long, thin hair on each side of the head on the occiput found in *pulchella*. It can be separated from *missouriensis* by the much more numerous hairs on the alitrunk and gaster.
Taxonomy: A member of the *pulchella* group.
Ecology:
— Habitat: Found in open, grassy area with scattered large pine at the top of a ridge (Deyrup, 1998).
— Food Resources: Further data lacking.
— Associates: Further data lacking.
Behavior: Further data lacking.
Nests: In soil near the base of a pine tree (Deyrup, 1998).
— Colony Organization: Type colony consisted of 54 workers and one queen.
Range: Laurel Co., Kentucky.
Comments: This recently described species from Kentucky could possibly occur in Ohio. Named in memory of William L. Brown, Jr., noted myrmecologist.

53 *Smithistruma missouriensis* (Smith)

Strumigenys (Cephaloxys) missouriensis Smith, 1931
Strumigenys (Cephaloxys) sculpturata Smith, 1931

Identification: TL 1.95-2.10 mm. Reddish-brown, gaster darker, appendages paler; head dorsally and alitrunk reticulate/punctate, dull, front of head fairly smooth and moderately glossy, sides of mesothorax and propodeum very smooth and glossy. Characterized by an uneven head outline and few marginal clypeal hairs on each side. This species has these hairs curving anteriorly but has relatively thick mandibles and lacks the specialized long, thin hair on each side of the head on the occiput, found in *pulchella*. The hairs on the head are spatulate and those on the alitrunk fewer and sparser than in *memorialis*.
Taxonomy: A member of the *pulchella* species group. See above synonymy.



***Smithistruma missouriensis* (Smith)**, full face view. From Smith (1931).

Ecology:
— Habitat: Humus of a cedar thicket (Wesson & Wesson, 1939). Various forest types in North Carolina (Carter, 1962).
— Food Resources: Collembolans (see Wilson, 1953).
— Associates: Further data lacking.
— Ant Associates: Types collected in a nest of *Aphaenogaster fulva* under a stone in clay soil (Smith, 1931).
Behavior: Further data lacking.
Nests: Primarily a soil and soil cover inhabitant (Brown, 1953) but also found in the nests of other ants (above) and under bark of logs and stumps.
— Colony Organization: Further data lacking.
— Reproductives: Females - Aug. 20 (Missouri).
Range: New York, Virginia, North Carolina, Ohio, Mississippi, Illinois, Iowa, Missouri.
Ohio Distribution: Known only from Pike Co. in Ohio.

Smithstruma missouriensis

Ohio References: Pike (Wesson & Wesson, 1939; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: A rare species in the *pulchella* group. Described by Marion R. Smith (1894-1981), a major figure in American myrmecology.

54 *Smithistruma ohioensis* (Kennedy and Schramm)

Strumigenys ohioensis Kennedy and Schramm, 1933
Strumigenys (Cephaloxys) manni Wesson & Wesson, 1939

Identification: TL 2.25-2.50 mm. Yellowish-brown to usually dark reddish-brown, gaster darker (sometimes nearly black), paler apically, head and alitrunk darkened dorsally, antennae and legs slightly paler; head and alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. The J-shaped marginal clypeal hairs and the relatively large mandibles with a very small diastema are diagnostic.

Taxonomy: Not in any particular species group. See above synonymy. See Brown (1953).

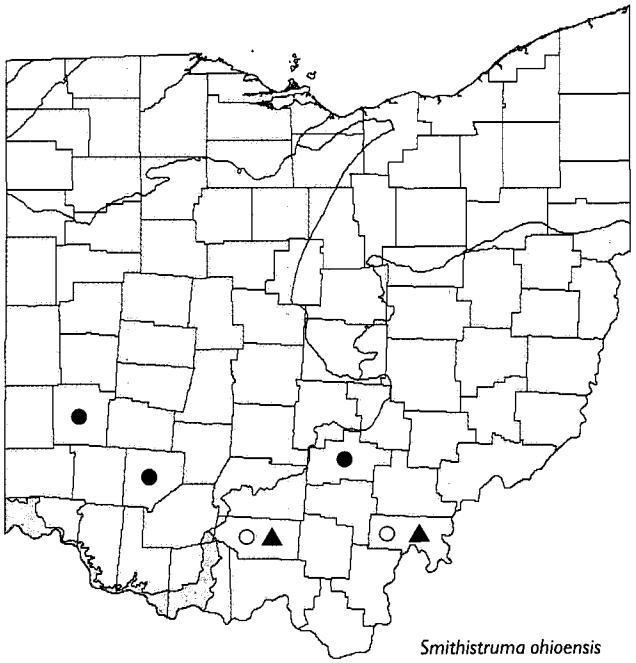
Ecology:

— Habitat: Found in woodland.

— Food Resources: Deciduous forest in Illinois (DuBois & LaBerge, 1988). Various forest types in North Carolina (Carter, 1962).

— Associates: Further data lacking.

Behavior: Further data lacking.



Smithistruma ohioensis

Nests: In acorn (BSR 37 #1) in woods. Brown (1953) reports that "it is definitely a dweller in the soil cover and upper soil layers, often utilizing such shelters as are afforded by small chips and twigs lying on, or wood partly buried in, the soil." No records from wood well above the soil surface. But DuBois & LaBerge (1988) list "in soil, under stones, in rotten logs" for Illinois.

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: New Jersey south to Georgia, west to Illinois, Arkansas, Louisiana.

Ohio Distribution: Recorded from 5 southern Ohio counties. At its regional northern range limit in Ohio.

Ohio References: Meigs (**Type locality**—Kennedy & Schramm, 1933; Creighton, 1950; Brown, 1953), Pike (**Type locality**—as *S. manni* - Wesson & Wesson, 1939; Creighton, 1950; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951).

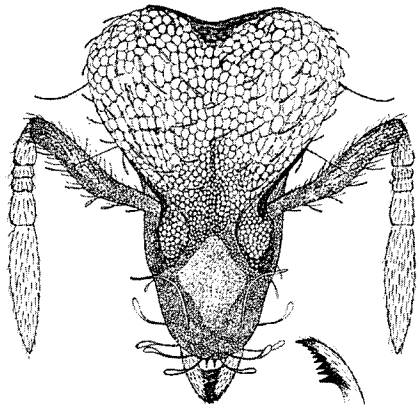
Comments: As its name implies, this species was originally described from Ohio, along with *S. manni*, a synonym. Our only species named for Ohio, described by Clarence H. Kennedy and Mabel M. Schramm in 1933.

55 *Smithistruma ornata* (Mayr)

Strumigenys ornata Mayr, 1887

Identification: TL 1.95-2.25 mm. Medium orangish-brown, gaster slightly to distinctly darker medially, antennae and legs very slightly paler; head dull, pronotum moderately glossy, sides of mesothorax and propodeum very smooth and glossy. This species has a group of 8 to 10 relatively long hairs radiating out from the anteriomedial portion (near the front above the jaws) of the clypeus. This character relates *ornata* to *dietrichi* which has the clypeus ending in a blunt, raised point.

Taxonomy: In the *ornata* species group along with *dietrichi*.



***Smithistruma ornata* (Mayr)**, full face view. From Smith (1931).

Ecology:

— Habitat: Found in moist woodland. Deciduous forest in Illinois (DuBois & LaBerge, 1988). Various forest types in North Carolina (Carter, 1962).

— Food Resources: Further data lacking.
— Associates: Further data lacking.
— Ant Associates: Specimens are frequently found in the nests of other, larger species of ants (Wesson & Wesson, 1939; Brown, 1953).

Behavior: Further data lacking.

Nests: Most commonly found in leaf litter or forest debris or under or at bases of rotten stumps (Brown, 1953), but also under stones.
— Colony Organization: Further data lacking.
— Reproductives: Further data lacking.

Range: Delaware, Maryland south to Florida, west to Michigan, Ohio, Illinois, Missouri, Oklahoma, Texas.

Ohio Distribution: Known only from Pike Co. in Ohio.

Smithistruma ornata

Ohio References: Pike (Wesson & Wesson, 1939; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956).

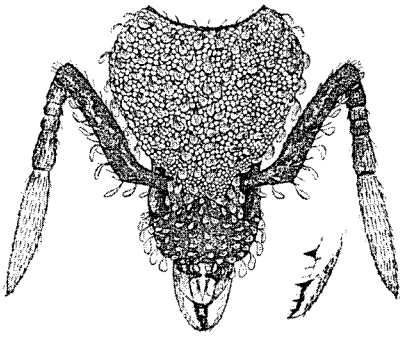
Comments: A rare species with distinct clypeal hairs. The species name means "decorated or adorned," undoubtedly referring to the radiating hairs of the clypeus.

56 *Smithistruma pergandei* (Emery)

Strumigenys pergandei Emery, 1895

Identification: TL 2.60-2.90 mm. Brownish-orange to dark reddish-brown, gaster at most slightly darker, antennae and legs very slightly paler; head and alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. The unusually long mandibles with a long, toothless area at base (diastema) are diagnostic. The characters given in the key will further differentiate this species.

Taxonomy: Formerly segregated in the subgenus *Wessonistruma* along with *angulata* based on the structure of the mandibles.



***Smithistruma pergandei* (Emery)**, full face view. From Smith (1931).

Ecology:
— Habitat: Found in open woods. Wesson (1936) describes a typical habitat as atop sandstone bluffs with scattered pines.
— Food Resources: A specialized predator on myrmecophilous springtails (collembolans) (Wesson, 1936).
— Associates: Further data lacking.
— Ant Associates: Almost always found in or near nests of other ants (Wesson, 1936; Wesson & Wesson, 1939).

Behavior: See Wesson (1936) for full discussion.

Nests: In large, rotten log. Brown (1953) notes "...in rotten logs, in the soil, or under stones in the soil." Under reindeer moss among pine needles (Wesson, 1936).
— Colony Organization: Small to moderate, up to 300 adults (Brown, 1953). Brown (1964) reports on a colony from Massachusetts of over 700 workers. See also Wilson (1953) who reports a single queen and up to 146 workers.
— Reproductives: Males - Aug. 11. Female - Aug. 7. Both Illinois (Smith, 1931).

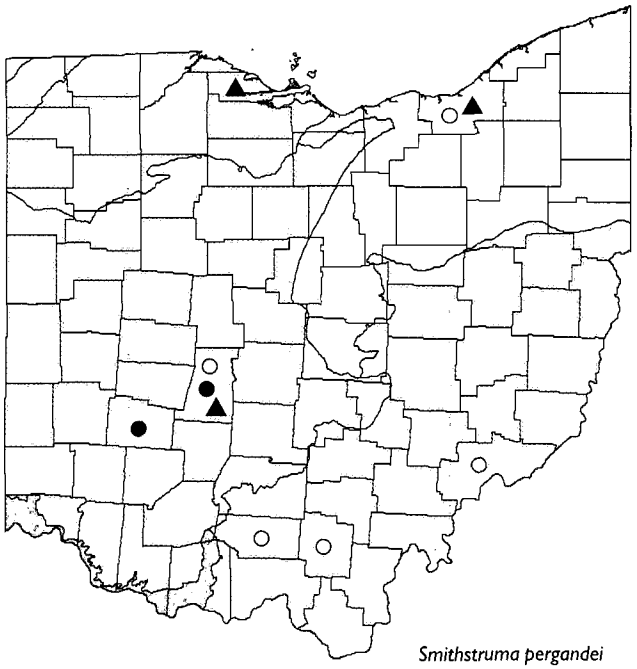
Range: Massachusetts, New York, Ontario south to North Carolina, Tennessee, west to Michigan, Iowa, Missouri, Kansas.

Ohio Distribution: Recorded from 7 widely distributed counties in Ohio.

Ohio References: Cuyahoga (Kennedy & Schramm, 1933), Jackson (Wesson, 1936; Wesson & Wesson, 1939), Madison (Smith, 1931; Kennedy & Schramm, 1933), Pike (Wesson & Wesson, 1939), Washington (Kennedy & Schramm, 1933), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Brown, 1953; Gorham, 1956).

Comments: Our largest and most common species of *Smithistruma*, recognized by the distinctive, long mandibles. Another species named after Theodore Pergande, American entomologist (1840-1916), who sent a large amount of North American ant material to

Carlo Emery in Europe. It is thought that this species lives in association with larger ants due to the concentration of ant-loving (mymecophilous) springtails which are the specialized food source of this interesting ant.



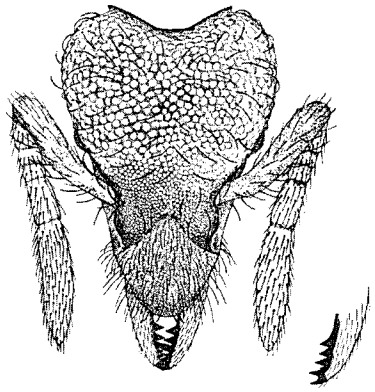
Smithstruma pergandei

57 *Smithistruma pilinasis* (Forel)

Strumigenys clypeata var. *pilinasis* Forel, 1901
Strumigenys (Cephaloxys) clypeata var. *brevisetosa* Smith, 1935
Strumigenys (Cephaloxys) medialis Wesson & Wesson, 1939

Identification: TL 2.20-2.50 mm. Dark reddish-brown, gaster darker, paler apically, antennae and legs slightly paler; head and alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. Recognized by the wedge-shaped head and the feebly broadened tips of the clypeal hairs.

Taxonomy: In the *clypeata* group along with *laevinasis*. See above synonymy.



***Smithistruma pilinasis* (Forel)**, full face view. From Smith (1931).

Ecology:
— Habitat: Found in deciduous forest in Illinois (DuBois & LaBerge, 1988).
— Food Resources: Springtails (Wesson & Wesson, 1939; Brown, 1953).
— Associates: Further data lacking.

Behavior: Described as a sluggish hunter by Brown (1953).

Nests: Under stones, in the soil cover, or in logs (Brown, 1953) or forest debris (Brown, 1964).
— Colony Organization: Colonies are small. Wesson & Wesson (1939) report about 30 workers and several dealate females.
— Reproductives: Further data lacking.

Range: Pennsylvania south to North Carolina, Alabama, west to Ohio, Illinois, Missouri, Arkansas, Louisiana.

Ohio Distribution: Recorded only from Pike Co. in Ohio.

Smithistruma pilinasis

Ohio References: Pike (**Type locality**—as *S. medialis* - Wesson & Wesson, 1939; Creighton, 1950; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940; Brown, 1953), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979)

Comments: A synonym of this rare species, *S. medialis*, was originally described from Ohio. The species name means "nose hairs" in reference to the clypeal hairs.

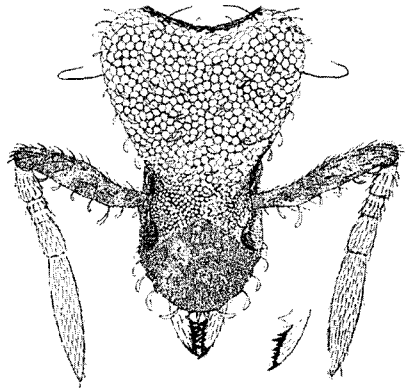
58 *Smithistruma pulchella* (Emery)

Strumigenys pulchella Emery, 1895

Identification: TL 1.95-2.10 mm. Yellowish- to orangish-brown, gaster somewhat darkened medially, antennae and legs slightly paler; head dull, alitrunk weakly glossy, sides of mesothorax and propodeum very smooth and

glossy. The typical species of the *pulchella* group which all have an uneven head outline and few marginal clypeal hairs on each side. This species has those hairs curving anteriorly but has relatively thin mandibles and an unusually long, curved hair on each side of the head on the occiput. The head is also relatively narrower than in *missouriensis* and *memorialis*.

Taxonomy: In the *pulchella* species group.



***Smithistruma pulchella* (Emery)**, full face view. From Smith (1931).

Ecology:

— Habitat: Found in woodland (Kennedy & Schramm, 1933). Found in deciduous forest in Illinois (DuBois & LaBerge, 1988).

— Food Resources: Springtails (Wesson & Wesson, 1939; Brown, 1953).

— Associates: Further data lacking.

— Ant Associates: Colonies are often in close proximity to nests of other ants (Smith, 1931; Wesson & Wesson, 1939).

Behavior: See Wesson & Wesson (1939).

Smithistruma pulchella

Nests: In large masses of rotten wood (Brown, 1953), or moist frass beneath well-rotted pine stumps and logs, or in soil beneath stones and other objects (Smith, 1931).

— Colony Organization: Colonies are small, ranging from 6 to 60 (Smith, 1931).

— Reproductives: Winged phases in nests in mid-Aug. (Wesson & Wesson, 1939).

Range: New York, Pennsylvania south to Florida, west to Michigan, Ohio, Illinois, Louisiana.

Ohio Distribution: Recorded from 6 widespread Ohio counties.

Ohio References: Cuyahoga (Kennedy & Schramm, 1933), Huron (Smith, 1931; Kennedy & Schramm, 1933), Jackson (Brown, 1953), Pike (Wesson & Wesson, 1939), Washington (Smith, 1931; Kennedy & Schramm, 1933), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938; Gorham, 1956).

Comments: A fairly common species in the *pulchella* group. The species name *pulchella* means beautiful, an apt name given to it by the Italian Carlo Emery (1848-1925), a major figure in myrmecology.

59 *Smithistruma reflexa* (Wesson and Wesson)

Strumigenys (Cephaloxys) reflexa Wesson & Wesson, 1939

Identification: TL 1.95-2.40 mm. Medium to dark orangish-brown, gaster slightly infuscated medially, paler apically, antennae and legs very slightly paler; head dull, alitrunk dull dorsally, sides of pronotum weakly glossy, sides of mesothorax and propodeum very smooth and glossy. Recognized by the uneven head outline and only three marginal clypeal hairs on each side. This species is unusual in that these hairs curve posteriorly. Separated from *cloydi* by the characters given in the key.

Taxonomy: A member of the *pulchella* species group.

Ecology:

— Habitat: Found in wet woods. The type series came from a shaded backyard.

— Food Resources: Springtails (collembolans) (Wesson & Wesson, 1939).

— Associates: Further data lacking.

Behavior: See Wesson & Wesson (1939).

Nests: Nests in soil or under or in objects lying on soil (Brown, 1953).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Maryland south to North Carolina, Tennessee, Alabama, west to Ohio, Illinois.

Ohio Distribution: Recorded from 3 widespread Ohio counties.

Ohio References: Jackson (**Type locality**—Wesson & Wesson, 1939; Creighton, 1950; Brown, 1953), Ottawa (Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: Another species originally described from Ohio. The species name *reflexa* refers to the clypeal hairs which are curved back.

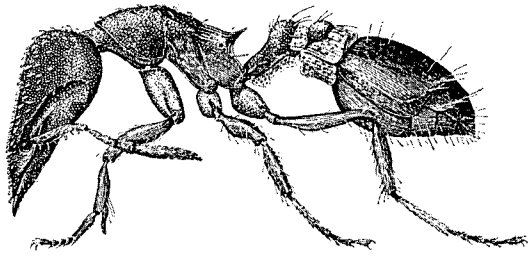
Smithistruma reflexa

60 *Smithistruma rostrata* (Emery)

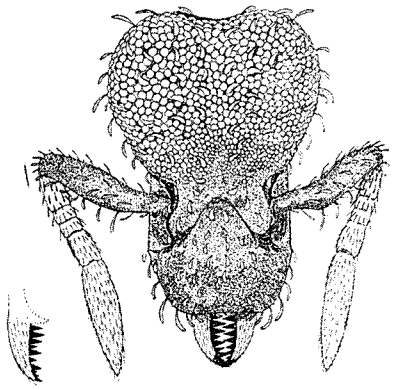
Strumigenys rostrata Emery, 1895

Identification: TL 2.40-2.75 mm. Dark reddish-brown, gaster darker except apically, head and alitrunk distinctly darkened dorsally, antennae and legs paler (yellowish-brown); head dull, alitrunk dull, sides of mesothorax and propodeum very smooth and glossy. This species is identified by the fully toothed mandibles and broad, truncate, or shallowly concave anterior border of the clypeus. Also distinctive is the spatulate, reclinate hairs found on the clypeus and head which are bent forward with the spoon-shaped apices lying parallel to the surface.

Taxonomy: In its own species group.



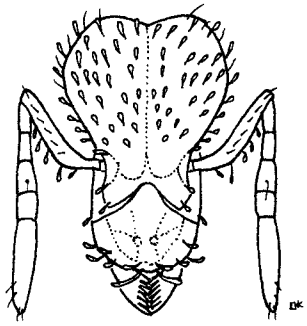
***Smithistruma rostrata* (Emery),** habitus. From Smith (1947a).

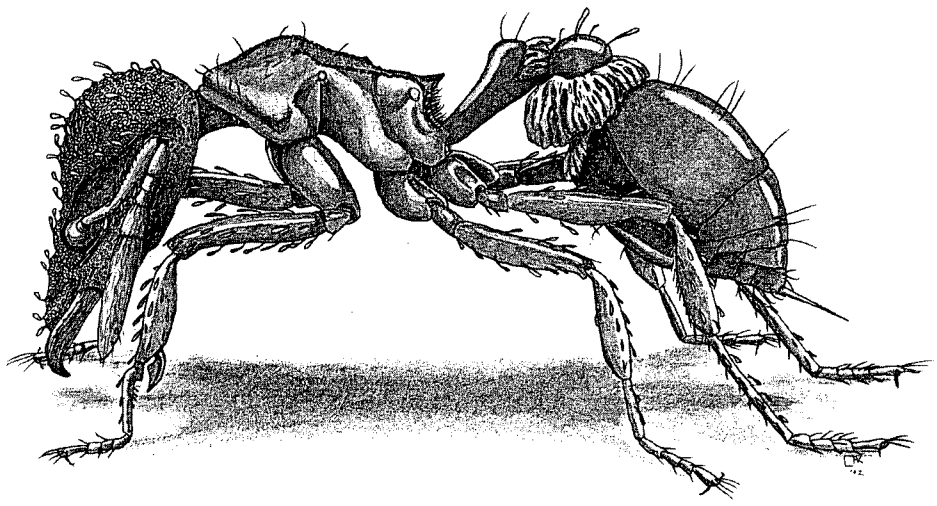


***Smithistruma rostrata* (Emery),** full face view. From Smith (1931).

Ecology:

— Habitat: Found in moist to dry woods and woods' edges (Wesson & Wesson, 1939). See Carter (1962) for North Carolina woodland habitats.





***Smithistruma reflexa* (Wesson and Wesson),** full face view of head and habitus. Drawing by Holly K. Coovert.

— Food Resources: Collembola of the families Entomobryidae and Isotomidae (Brown, 1953), plus Sminthuridae (see Wilson, 1953).
— Associates: Further data lacking.
— Ant Associates: Occasionally in proximity to other ant nests but not as close a relationship as with other *Smithistruma* (Wesson & Wesson, 1939).

Behavior: See Wesson & Wesson (1939).

Nests: In humus, rotten wood, and in one case a rotten hickory nut (Wesson & Wesson, 1939). See also Wilson (1953).
— Colony Organization: Moderate in size with over 200 workers and 3 to 5 queens (Brown, 1953).
— Reproductives: Further data lacking.

Range: New Jersey, Pennsylvania south to Florida, west to Ohio, Illinois, Missouri, Louisiana.

Ohio Distribution: Recorded from 4 counties in southcentral, unglaciated Ohio.

Smithstruma rostrata

Ohio References: Jackson (Wesson & Wesson, 1939), Pike (Wesson & Wesson, 1939), Ross (Wesson & Wesson, 1939), Scioto (Wesson & Wesson, 1939), southcentral Ohio (Wesson & Wesson, 1940; Brown, 1953), Ohio (Creighton, 1950; Gorham, 1956).

Comments: A relatively large, distinctive, rather common species in its own species group. The species name *rostrata* means snout or beak in reference to the clypeus, so important in the classification of *Smithistruma* species.

61 *Smithistruma talpa* (Weber)

Strumigenys (Cephaloxys) talpa Weber, 1934
Strumigenys (Cephaloxys) venatrix Wesson & Wesson, 1939

Identification: TL 2.00-2.40 mm. Medium orangish-brown, gaster faintly darker medially, paler apically, legs and antennae slightly paler; head and alitrunk dorsally dull, sides of pronotum weakly glossy, sides of mesothorax and propodeum very smooth and glossy. Characterized by the head shape (not evenly wedge-shaped) plus the more numerous marginal clypeal hairs. These hairs, plus the ones on the head, have only weakly broadened tips, unlike the broader ones of *creightoni*.

Taxonomy: This species, along with *creightoni* and *filitalpa*, form the *talpa* group. See above synonymy.

Ecology:
— Habitat: Found in dry, open woods, openings in woods, and in thickets in fields (Wesson & Wesson, 1939).
— Food Resources: Collembolans and diplurans (Wesson & Wesson, 1939; Wilson, 1953).
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In soil or humus (Wesson & Wesson, 1939).
— Colony Organization: The type colony of *S. venatrix* contained about 60 workers (Wesson & Wesson, 1939).
— Reproductives: Further data lacking.

Range: North Carolina, Florida, Ohio, Tennessee, Alabama, Illinois, Louisiana.

Ohio Distribution: Recorded from 4 counties in southcentral, unglaciated Ohio.

Ohio References: Adams (Wesson & Wesson, 1939; Brown, 1953), Lawrence (**Type locality**—as *S. venatrix* - Wesson & Wesson, 1939; Brown, 1953), Pike (Wesson & Wesson, 1939; Brown, 1953), Scioto (Wesson & Wesson, 1939; Brown, 1953), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Smithstruma talpa

Comments: A snynonym of this common species, *S. venatrix*, was originally described from Ohio. The species name is in reference to the mole, whose digging behavior is characteristic of all *Smithistruma*.

Tribe Attini

Genus *Trachymyrmex* Forel

Atta subgenus *Trachymyrmex* Forel

Identification: The sharply pointed spines and tubercles on the dorsal surface of the head and alitrunk and smaller ones on the legs and antennal scapes are diagnostic for this genus.

Immatures: Larvae attoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Wheeler (1907) and Creighton (1950).

Key: A single species is found in our area.

Comments: This is a genus of fungus-gardening ants. Our single species occurs farther north than any other leaf-cutting or fungus-growing ant.

62 *Trachymyrmex septentrionalis* (McCook)

Atta septentrionalis McCook, 1880
Atta (Trachymyrmex) septentrionalis var. *obscurior* Wheeler, 1907

Identification: TL 3.7-6.8 mm. Yellowish-brown, medium brown, to dark reddish-brown, head and gaster somewhat darkened dorsally, mandibles slightly paler, edges black, legs slightly paler; entire body surface microscopically roughened and dull with scattered sharp spines and tubercles of varying sizes, largest dorsally on head and alitrunk, smaller on antennal scapes and legs. One of our most distinctive species, easily recognized by the characters given for the genus, especially the conspicuously spinose and tuberculate body.

Taxonomy: Formerly with a number of named varieties. See Creighton (1950).

Ecology:

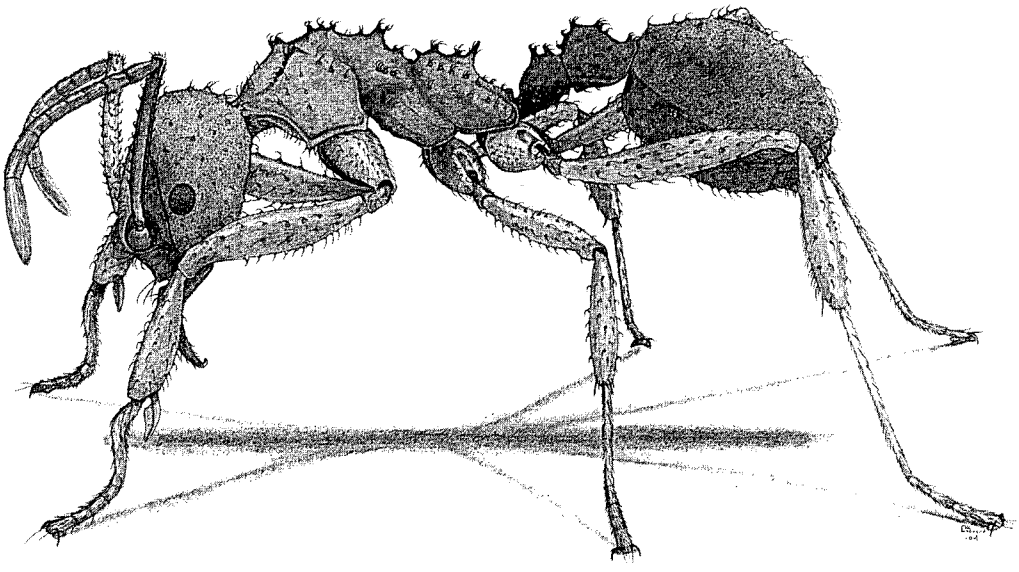
— Habitat: Found in semi-open to open area of scattered red cedars and *Opuntia* cacti (GAC 1920, BSR 80) (same Adams Co. locality in Wesson & Wesson, 1940). "Colonies have usually been found on dry, shaly clay hillsides in open woods, often under stones. Workers were found a few times in scattered woods on limestone soil.... on the sandy loam slides, bearing scattered pitchpines, beardgrass and huckleberry at the base of a sandstone bluff" (Wesson & Wesson, 1940). Open woods throughout its range (Wheeler, 1907). See Carter (1962) for details on North Carolina habitats.

— Food Resources: This species feeds solely on the fungus grown in their gardens. This fungus is maintained primarily on caterpillar excrement and bits of fallen oak-catkins, but also on other bits of plant material (Wheeler, 1907). Older, well-established colonies will cut and carry leaf fragments like the tropical leaf-cutters (Hutchins, 1967).

— Associates: See Weber (1972) for complete list.

Behavior: Workers were found foraging on ground in partial shade. Slow-moving; will feign death (play 'possum) if disturbed (see Wheeler, 1907 and Van Pelt, 1958).

Nests: In sandy soil or pure sand, with a small semicircular crater marking the nest entrance in certain seasons (Wheeler, 1907; Weber, 1972).



***Trachymyrmex septentrionalis* (McCook).** Drawing by Holly K. Coovert.

— Colony Organization: Colonies are small, of 200 to 300 adults (Wheeler, 1907). A nest in Tennessee contained 284 workers, 29 alate females, and 8 dealate females, while a second consisted of 324 workers, 57 alate females, and 18 dealate females (Cole, 1950). A nest in Florida contained 382 workers and one queen (Van Pelt, 1958), while Hölldobler & Wilson (1990) report colony size from 200 to 1,400 with one to several dealate queens.

— Reproductives: Females - Aug. 16 (GAC 1920, BSR 80 #1). "Winged phases were taken from a nest in late August." (Wesson & Wesson, 1940). See Weber (1972) for further detail in other states.

Range: New York (Long Island, Staten Island) south to Florida, west to Louisiana, Texas, with northern extension up Mississippi R. valley to Illinois, Indiana, and Ohio.

Ohio Distribution: Only known from 2 southcentral Ohio counties. At the regional northern range limit for this species in Ohio.

Trachymyrmex septentrionalis

Ohio References: Adams (Wesson & Wesson, 1940), Jackson (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956).

Comments: The most northerly occurring fungus-growing ant, Ohio is on the northern fringe of its range. This is a fungus-growing ant related to the famous leaf cutter ants (*Atta*) of the American tropics. Unlike *Atta*, colonies of *Trachymyrmex* are very small and inconspicuous. They are slow-moving ants and this habit plus their dull, earth-color and tuberculate sculpturing makes them well-camouflaged. The species name *septentrionalis* means northern or belonging to the north, an unusual feature for the typically tropical fungus-growing ants.

Subfamily Dolichoderinae

Taxonomy: Tribes were recognized in D. R. Smith (1979) and Hölldobler & Wilson (1990). Shattuck (1992b), who presented a thorough generic revision of the entire subfamily, presented convincing evidence for not recognizing tribes in this particular subfamily. This approach was followed by Bolton (1995) and is likewise followed here. Bolton (2003) unnecessarily recognizes a single tribe, which is not followed herein. Shattuck (1992b) also provided keys to genera of all three castes.

Genus *Dolichoderus* Lund

Dolichoderus Lund, 1831
Hypoclinea Mayr, 1855

Identification: This genus is characterized by the very distinctive shape of the propodeum, which forms a posterior overhang and a distinct concavity posteriorly. The exoskeleton is very thick and hard and often distinctly sculptured with small to large punctures (foveae). This serves as an effective armor, providing defense against predators.

Immatures: Larvae dolichoderoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: This group in North America has been variously treated as *Dolichoderus* or *Hypoclinea* – as subgenus *Hypoclinea* in D. R. Smith (1979) or a valid genus in Hölldobler & Wilson (1990), but modern revisions synonymize *Hypoclinea* under *Dolichoderus* [Shattuck (1992), MacKay (1993), Bolton (1994, 1995)]. This latter approach is followed here.

Revision(s): Johnson (1989a) and MacKay (1993) both revised the North American species, both providing keys to workers, with MacKay additionally keying females.

Key: The key below treats all four of the North American species found north of Mexico.

Comments: These distinctively shaped ants form small to moderately large colonies.

Key to *Dolichoderus* of America North of Mexico

1. Pronotum with dorsal sculpturing coarse and equal to that of propodeum, dull; antennal scape usually with at least 10 erect hairs (often 20 or more); head with coarse, distinct, closely-spaced foveolae (bordered pits) that form a reticulate pattern, this sculpturing equal to that of propodeum; pronotum usually with at least 10 erect hairs dorsally ..... ***D. plagiatus***

Pronotum with dorsal sculpturing distinctly weaker than that of propodeum, usually glossy; antennal scape usually lacking erect hairs (always less than 9 excluding

a few at apex); head smooth and glossy to heavily punctate, but usually completely lacking coarse foveolae, this sculpturing normally finer than that of propodeum; pronotum usually lacking erect hairs, if present, less than 9 ..... **2**

2. Propodeum with dorsal face subquadrate (less than 1.2 X longer than broad) and usually wider posteriorly; propodeal concavity with fine vertical striae present; body usually colored uniformly black..... ..... ***D. taschenbergi***

Propodeum with dorsal face distinctly longer than broad (more than 1.4 X longer than broad) and not wider posteriorly; propodeal concavity with vertical ridges present or absent **3**

3. Propodeum with posterodorsal carinate edge rounded in outline, the concavity below with fine vertical striae present; dorsum of propodeum and mesonotum at most weakly foveolate, usually only granulose or shagreened; mesopleuron in large part or entirely shagreened, semiglossy or dull; propodeal spiracle on prominent tubercle; body usually distinctly bicolored, with head and alitrunk reddish, gaster dark brown (at least apically) .... (*D. mariae*)

Propodeum with posterodorsal carinate edge distinctly emarginate (shallow, rounded concavity), the concavity below smooth and glossy, lacking vertical striae; dorsum of propodeum and mesonotum with coarse, deep set foveolae forming a reticulate pattern; mesopleuron very smooth and glossy (except at extreme edges); propodeal spiracle little more prominent than adjacent fovea; body usually uniformly dark brown, gaster dark brown..... ..... ***D. pustulatus***

Dolichoderus mariae Forel

Dolichoderus Mariae Forel, 1884

Identification: TL 4.0-5.1 mm. Pale brownish-orange to reddish-brown, gaster concolorous (pale) on extreme base, remainder very dark blackish-brown to nearly black (rarely with pale basal markings on 2nd segment), mandibles paler with blackened margins, legs concolorous basally and apically, darkened medially; head and alitrunk dorsally moderately smooth and weakly glossy, mesopleuron moderately dull, propodeum rugose and dull. The distinctly bicolored body plus the features in the key should serve to distinguish this species. This species comes closest to *pustulatus* which is consistently darker in color, and usually not bicolored, but if so, *mariae* can be differentiated by the convex, non-emarginate propodeal edge and the vertically striate propodeal concavity.

Taxonomy: See Creighton (1950) and MacKay (1993).

Ecology:

— Habitat: Generally found in open grassy areas and old fields (MacKay, 1993); in marshes and swamps in Michigan (Wheeler et al., 1994); a grassy opening in a pine forest in Tennessee (Cole, 1940b). See Carter (1962) for North Carolina habitats.

— Food Resources: Tends Homoptera and scavenges dead arthropods (MacKay, 1993).

— Associates: Further data lacking.

Behavior: "The workers ascend trees in files and attend aphids and coccids" (Wheeler, 1916).

Nests: Nests are "found in the soil, preferably sand, beneath tufts of grass or small bushes" (D. R. Smith, 1979). "In domes of plant fragments and soil" (Wheeler et al., 1994). Gregg (1944) describes nests in cattails (*Typha*) from a tamarack bog in Illinois. Occasionally under stones or logs (MacKay, 1993).

— Colony Organization: Forms rather large colonies.

— Reproductives: Mating flights occur in early July to mid-Sept. throughout its range (MacKay, 1993).

Range: Massachusetts to Georgia, west to Michigan, Minnesota, Indiana, Illinois, Oklahoma, Louisiana.

Comments: A bicolored species that should be found in Ohio. MacKay (1993) shows a Pennsylvania record very close to northeast Ohio; and there are recent records for adjoining states: Michigan (Wheeler et al., 1994) and Indiana (Munsee et al., 1985). Cole (1940b) describes this species as a "gorgeous red and black ant."

63 *Dolichoderus plagiatus* (Mayr)

Hypoclinea plagiata Mayr, 1870

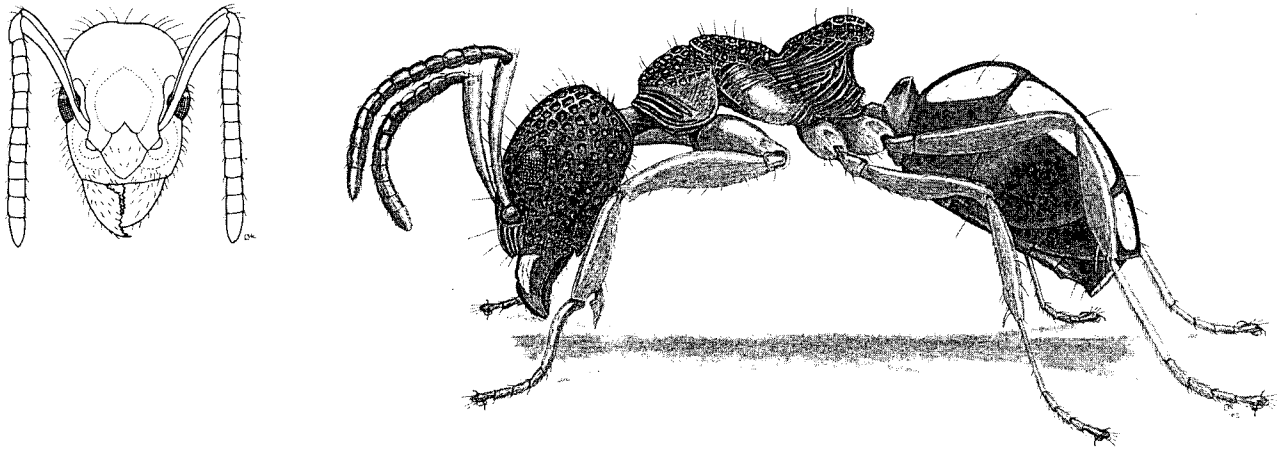
Identification: TL 3.5-3.9 mm. Head very dark reddish-brown, alitrunk medium reddish-brown, gaster yellowish-brown basally, nearly black on apical two-thirds, legs and antennae slightly paler basally; head and alitrunk dorsally with closely packed foveolae (bordered pits), surface dull, sides of alitrunk with sculpturing somewhat reduced, surface weakly glossy. The presence of tiny erect hairs on the scapes is the usual diagnostic character, but they are rarely reduced; if so, the other features in the key should consistently identify this species.

Taxonomy: See Creighton (1950) and MacKay (1993).

Ecology:

— Habitat: Found in woods' edges. Reported "in open woods" by Wesson & Wesson (1940). MacKay (1993) lists a range from open areas to woods and bogs.

— Food Resources: Collected on bloom of *Solidago* (GAC 2174). Utilizes honeydew (below). MacKay (1993) notes that they tend Homoptera and scavenge dead arthropods. Davis & Bequaert (1922)



***Dolichoderus plagiatus* (Mayr)**, full face view of head and habitus. Drawing by Holly K. Coovert.

mention attending extrafloral nectaries of bigtooth aspen in New York.

— Associates: Tending membracid *Publilia reticulata* on plant stem (GAC 1894 #2).

Behavior: Workers found foraging on ground and foliage in woods' edges.

Nests: *In* leaf litter (GAC 1894). "The nests found have consisted of a curled-over dead leaf or a hollow weed stem, the gaps sealed with carton." (Wesson & Wesson, 1940). "...nests are found in inconspicuous places such as under forest debris in the soil, in hollow stems, and in curled-up leaves." (D. R. Smith, 1979).

— Colony Organization: Colonies are small (MacKay, 1993). Kannowski (1967) reports on colonies from Michigan with up to 378 workers and a single queen (2 queens in one case).

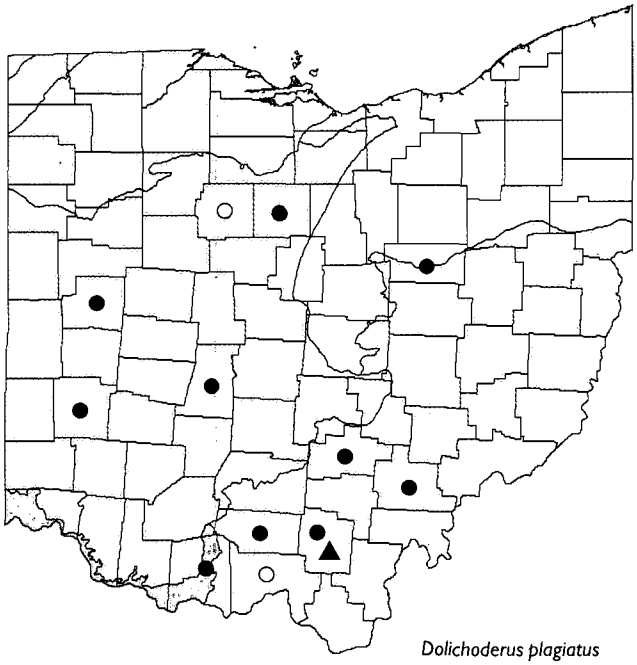
— Reproductives: Females - Aug. 15 (GAC 2146 #23). "Males were found in the nest in the middle of August." (Wesson & Wesson, 1940). Alates rangewide mid-Aug. (MacKay, 1993).

Range: New Brunswick, Quebec, Ontario, south to Georgia, Tennessee, west to Michigan, North Dakota, Illinois, Indiana, Ohio.

Ohio Distribution: Widespread in Ohio. Recorded from 12 counties.

Ohio References: Scioto (Wesson & Wesson, 1940), Wyandot (Amstutz, 1943), Ohio (Gorham, 1956).

Comments: Our most common *Dolichoderus*, recognized by the tiny erect hairs on the scapes. The species name means oblique or slanting, apparently in reference to the characteristic shape of the propodeum.



Dolichoderus plagiatus

64 *Dolichoderus pustulatus* Mayr

Dolichoderus pustulatus Mayr, 1886
Dolichoderus plagiatus var. *beutenmuelleri* Wheeler, 1904
Dolichoderus (H.) plagiatus pustulatus beutenmuelleri Wheeler

Identification: : TL 3.1-3.8 mm. Very dark reddish-brown to black, head and especially gaster darkest, alitrunk usually dark reddish-brown but may be entirely black, mandibles very slightly paler than head, base of antennae, trochanters, and tibiae slightly to distinctly paler; head and alitrunk with closely-spaced foveolae and minute punctation, coarser on propodeum, surface moderately glossy, propleuron somewhat and especially mesopleuron smooth and very glossy. This species has a longer propodeum than *taschenbergi*, a distinctly emarginate posterodorsal edge of the propodeum, and lacks a vertically striate propodeal concavity. These features, plus others in the key, should easily differentiate this species. Most similar is *mariae*, which is distinctly bicolored and has a rounded, non-emarginate posterodorsal edge of the propodeum.

Taxonomy: See synonymy above which was used by earlier authors. See Creighton (1950) and MacKay (1993).

Ecology:

— Habitat: Found in woods, open fields, fens, and bogs. Also from "dry upland meadows" (Wesson & Wesson, 1940). In Michigan in bogs and swamps (Wheeler et al., 1994).

— Food Resources: Bloom of *Daucus carota* (GAC 2155, 2316); honeydew (below).

— Associates: Tending aphids on jewelweed (GAC 2160). Bristow (1983) reports tending of the membracid *Publilia reticulata* on ironweed in New Jersey.

Behavior: Workers found foraging on foliage in woods and boardwalk in bog.

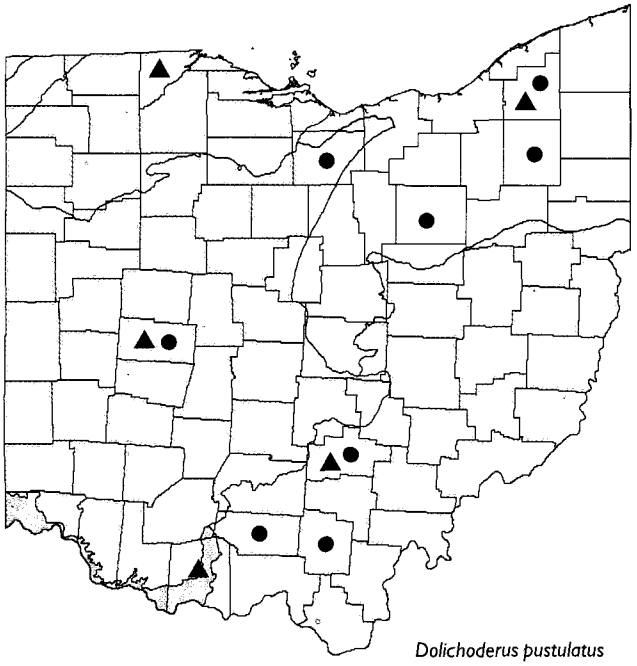
Nests: Wesson & Wesson (1940) report "among dead pine needles ... or in the detritus at the base of a clump of grass." The Wessons also describe the teakettle-like carton nest sometimes constructed. Nests "are found under piles of detritus or in a hard, thin carton shell above ground about blades of a tuft of grass" (D. R. Smith, 1979). Found in hollow stems and curled leaves in Michigan (Wheeler et al., 1994). See also MacKay (1993).

— Colony Organization: Colonies are small, probably in the range of a few hundred individuals (MacKay, 1993). Kannowski (1967) reports on colonies from Michigan with up to 794 workers and usually one or two dealate females but in one case 9.

— Reproductives: Males - Aug. 4-Sept. 19. Stray dealate females - June 5 (GAC 2564). "Winged forms are found in the nest in late August." Mating flights rangewide late July to Sept. (MacKay, 1993).

Range: Nova Scotia, Quebec, south to Florida, west to Michigan, Illinois, Oklahoma, Texas.

Ohio Distribution: Recorded from 10 widespread Ohio counties.



Dolichoderus pustulatus

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

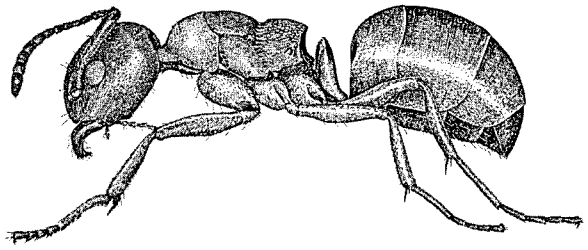
Comments: A fairly common species with a distinctly emarginate posterodorsal edge of the propodeum. The species name means blistered, in reference to the sculpturing.

65 *Dolichoderus taschenbergi* (Mayr)

Hypoclinea Tashenbergi Mayr, 1866
Dolichoderus tashenbergi var. *gagates* Wheeler, 1905

Identification: TL 3.9-4.1 mm. Dark reddish-brown to black, usually essentially concolorous, but areas of paler reddish-brown may be present on alitrunk and gastral tergites laterally, mandibles slightly to distinctly paler, antennae and legs slightly paler to nearly concolorous; head and alitrunk with closely-spaced foveolae and minute punctation (or shagreened), slightly coarser on mesonotum and propodeum, surface moderately dull to weakly glossy, duller on mesothorax and propodeum, glossier on propleuron. The subquadrate propodeum (dorsal face viewed from above) is diagnostic for this species. The uniform black coloration and vertically striate propodeal concavity will further distinguish it.

Taxonomy: Earlier literature often used the synonymous var. *gagates*. See Creighton (1950) and MacKay (1993).



***Dolichoderus taschenbergi* (Mayr).** From Smith (1947a).

Ecology:

— Habitat: Found "along the edge of woods or in dry, brushy fields where it usually seems to be associated with the sandy soil on which pine is the predominating tree" (Wesson & Wesson, 1940). MacKay (1993) lists a range of habitats from grassy fields to shaded forests or bogs.

— Food Resources: Workers commonly attend honeydew-excreting insects. They also scavenge dead arthropods (MacKay, 1993).

— Associates: Further data lacking.

Behavior: When foraging, will often travel in files (Burrill & Smith, 1919). See Wheeler & Wheeler (1963) for summary.

Nests: Nests found as "irregular funnels filled with vegetable detritus, often in and under a clump of grass" (Wesson & Wesson, 1940). D. R. Smith (1979) notes "in the soil...and usually have a low mound of thatch

(grass, twigs, needles) over the entrance hole." In Michigan reported from domes of plant fragments and soil (Wheeler et al., 1994). Also in soil under litter and in hollow stems (MacKay, 1993).

— Colony Organization: Form rather large colonies, up to 50,000 individuals and multiple queens (polygynous) (MacKay, 1993).

— Reproductives: Males - June 6. Females - June 17 (Kennedy 1193). Mating flights rangewide mid-June to end of July (MacKay, 1993), with up to 15,000 alates being released from the nest. Flights in Michigan occurred June 17 through July 28 in the morning (20 min. before sunrise to 4 hrs. after) (Kannowski, 1959b).

Range: Nova Scotia, Quebec, Ontario, south to South Carolina, west to Manitoba, Michigan, North Dakota, South Dakota, Louisiana.

Ohio Distribution: Recorded from only 2 Ohio counties.

Dolichoderus taschenbergi

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), southern Ohio (Dennis, 1938), Ohio (Gorham, 1956).

Comments: A uniformly black species with the propodeal concavity vertically striate. All three of our species of *Dolichoderus* were described by Gustav Mayr (1830-1908), an important Austrian myrmecologist.

Genus *Linepithema* Mayr

Linepithema Mayr, 1866

Identification: The characters given in the key will serve to distinguish this genus. Unlike *Forelius*, this genus has a gaster which is normally inflated.

Immatures: Larvae dolichoderoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: Placement of this group, formerly included in *Iridomyrmex*, follows Shattuck (1992a, b) and subsequently Bolton (1995).

Revision(s): Shattuck (1992a).

Key: The key below differentiates both species found in North America north of Mexico.

Comments: Both species found in our area are introduced, including the Argentine ant.

Key to *Linepithema* of America North of Mexico

1. Mesonotum with the dorsum bearing a flattened, irregular impression; mesopropodeal suture deeply impressed, the propodeum thus sharply set off from the rest of the alitrunk and appearing somewhat inflated (gibbose); a small (ca. 2.4 mm) glossy species with very sparse appressed pubescence ..... (*L. iniquum nigellum*)

   Mesonotum with the dorsum lacking flattened impression, evenly convex; mesopropodeal suture only moderately impressed, the propodeum not as sharply set off from the rest of the alitrunk; larger (2.4 to 2.6 mm) species with the surface feebly glossy due to abundant appressed pubescence ..... ***L. humile***

66 *Linepithema humile* (Mayr)

Argentine Ant

Hypoclinea (Iridomyrmex) humilis Mayr, 1868
Iridomyrmex humilis (Mayr)

Identification: TL 2.4-2.9 mm. Head and alitrunk yellowish- to reddish-brown, gaster darker, medium to dark brown, mandibles and appendages slightly paler; head, alitrunk, and gaster micropunctate with thin covering of micropubescence, the surface thus weakly glossy. Distinguished from *L. iniquum nigellum* by the larger size, more abundant pubescence, and evenly convex mesonotum.

Taxonomy: Formerly placed in *Iridomyrmex*.

Ecology:

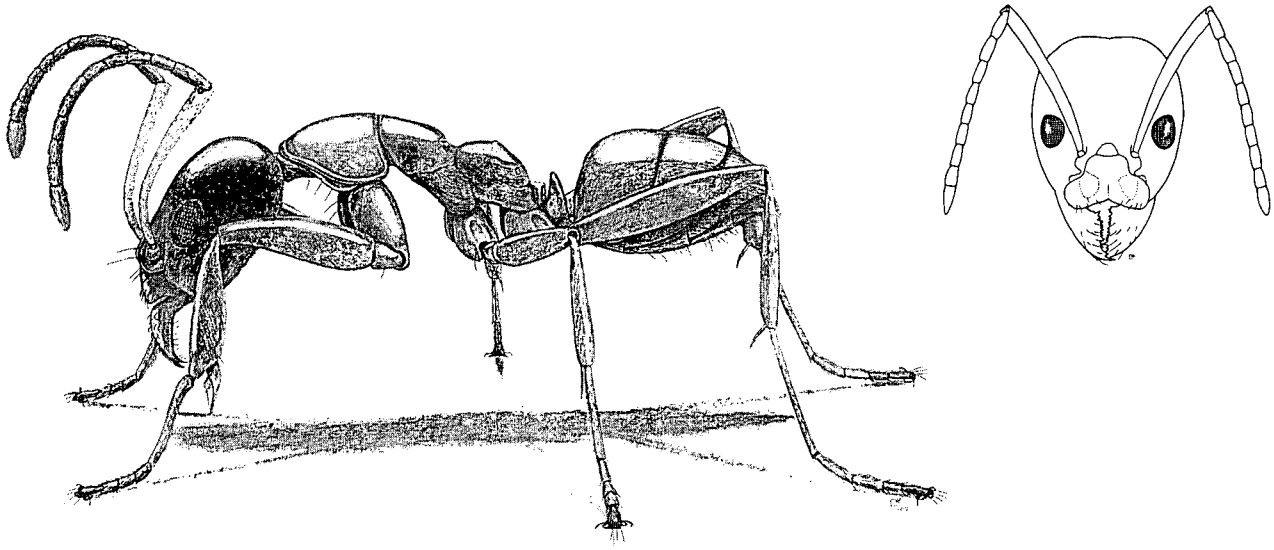
— Habitat: Found in open areas in the south and in heated buildings in the north.

— Food Resources: Tend honeydew-excreting insects though they also feed on other sweet substances, and will eat other insects (Creighton, 1950).

— Associates: Will tend aphids which they transport from one plant to another (Thompson, 1990).

Behavior: Workers forage in files and are very active insects (Creighton, 1950).

Nests: Constructed "in soil, rotting wood or debris" (D. R. Smith, 1979).



Linepithema humile **(Mayr)**, habitus and full face view of head. Drawing by Holly K. Coovert.

— Colony Organization: Forms large multi-nest colonies with multiple queens which can spread by budding off groups of workers and queens (Shattuck, 1992b; Hölldobler & Wilson, 1990).

— Reproductives: Alates mate in the nest and are seldom seen (Thompson, 1990).

Range: Maryland to Florida, west to Illinois, Texas, southern Nevada, Arizona, California; Mexico, South America; southern Europe; South Africa; Hawaii; Australia. Native to Brazil and Argentina.

Ohio Distribution: A single, unspecified Ohio record (below).

Linepithema humile

Ohio References: Ohio (Arnett, 1993).

Comments: The Argentine Ant is a wide-spread, persistent house-infesting ant originally introduced from Brazil and Argentina. It is established in the warmer, southern U.S. where very large colonies may develop. This species can exterminate many other kinds of ants in warmer climates where they become well-established (Wheeler & Wheeler, 1986). See D. R. Smith (1979) for an extensive bibliography to this "persistent and troublesome house-infesting ant." See also Van Pelt (1958). The species name *humile* means "on the ground."

Linepithema iniquum nigellum (Emery)

Iridomyrmex iniquus var. *nigellus* Emery, 1890

Identification: TL ca. 2.4 mm. The head, alitrunk, and gaster with appressed pubescence very sparse, the surface smooth and glossy. Distinguished from *L. humile* by the smaller size, glossier surface, and features of the alitrunk.

Taxonomy: Formerly placed in *Iridomyrmex*.

Ecology:

— Habitat: Found in greenhouses and other heated buildings in the northeast.

— Food Resources: Feeds on honeydew and is also carnivorous (Smith, 1929a).

— Associates: Attends honeydew-secreting insects.

Behavior: Further data lacking.

Nests: In soil, inconspicuous (Smith, 1929a).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Massachusetts, Illinois, other scattered localities mostly in northeastern U.S.; Central America.

Comments: An introduced tropical species that only survives in heated buildings (e.g., greenhouses) in the northeastern U.S. Not yet recorded from Ohio.

Genus *Forelius* Emery

Forelius Emery, 1888

Identification: The characters in the key will distinguish this genus. Note the somewhat flattened (dorsoventrally compressed) gaster.

Immatures: Larvae dolichoderoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: Placement of this group, formerly included in *Iridomyrmex*, follows Hölldobler & Wilson (1990) and Shattuck (1992b), and subsequently Bolton (1995).

Revision(s): Snelling & George (1979), Wheeler & Wheeler (1986).

Key: A single species is found in our area.

Comments: These ants form a craterlike mound when nesting in exposed soil. This is predominantly a southern or western group. Named in honor of Auguste Forel (1848-1931), a Swiss psychiatrist and prominent myrmecologist who named twelve of our Ohio species and two genera.

67 *Forelius pruinosus* (Roger)

Tapinoma pruinosum Roger, 1863
Tapinoma anale André, 1893
Iridomyrmex analis (André)
Iridomyrmex pruinosus (Roger)

Identification: TL 2.0-2.6 mm. Variable in color, yellowish-brown to dark blackish-brown, gaster may be paler, mandibles may be paler, antennae basally and legs apically often paler; head, alitrunk, and gaster micropunctate with very thin to distinct covering of micropubescence, the surface weakly to moderately glossy. Identified by the characters given for the genus.

Taxonomy: Subspecies were not recognized in Wheeler & Wheeler (1986) and likewise followed by Bolton (1995). Formerly placed in *Iridomyrmex*. Note synonymy above.

Ecology:

— Habitat: Found on "dry hilltop in Adams Co. on which the limestone and clay soil is sparsely covered by beard grass and cedars" (Wesson & Wesson, 1940). Found in black oak and Jack pine dunes in Indiana and Illinois (Gregg, 1944). In open grassy fields in Tennessee (Cole, 1940b) and North Carolina (Carter, 1962).

— Food Resources: Honeydew is a major source of food. Barton (1986) records visiting extrafloral nectaries of partidge pea (*Cassia fasciculata*) in Florida.

— Associates: Workers tend plant lice and scale insects (Dennis, 1938). Host to the larvae of the myrmecophilous syrphid *Microdon fuscipennis* (cf. Duffield, 1981).

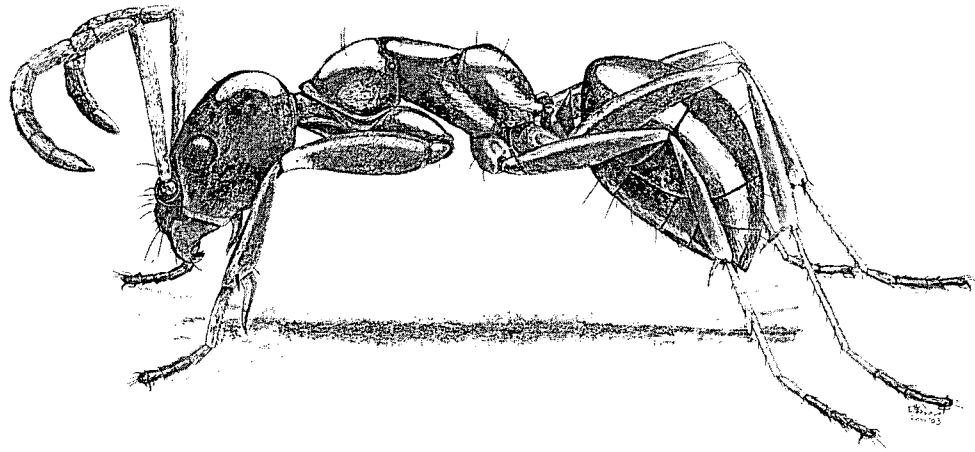
Behavior: An extremely active species (Cole, 1940b) which "run about over the hot soil at a remarkable speed." Workers can withstand a very high soil temperature (Wheeler & Wheeler, 1986). See also Van Pelt (1958) for description of trailing behavior.

Nests: In soil either under objects or in exposed situations surmounted by a craterlike mound (D. R. Smith, 1979). See Wheeler & Wheeler (1986) for Nevada nest descriptions.

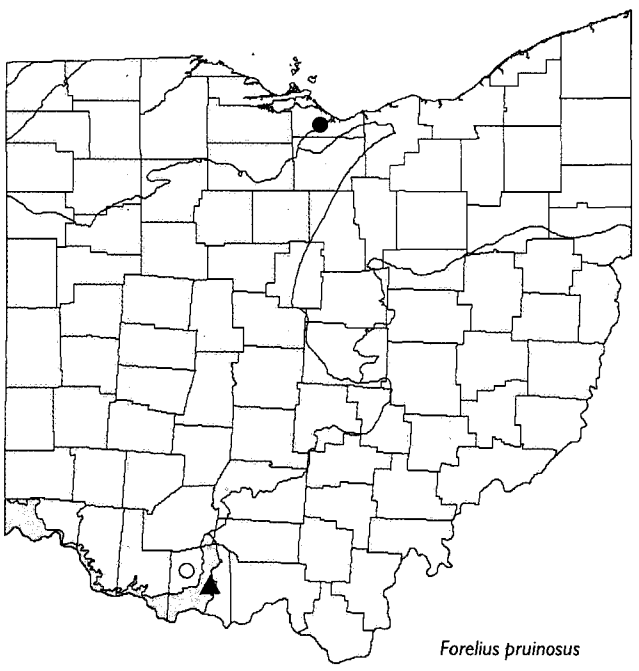
— Colony Organization: Colonies are populous and form aggregations (Cole, 1940b); has multiple queens (up to 15) (Wheeler & Wheeler, 1986).

— Reproductives: Further data lacking.

Range: New York to Florida, west to Ohio, Wisconsin, North Dakota, southern Idaho, Oregon, Kansas, Oklahoma, Texas, New Mexico, California; West Indies, Mexico, Guatemala.



***Forelius pruinosus* (Roger).** Drawing by Holly K. Coovert.



Forelius pruinosus

Ohio Distribution: Known only from Adams Co. in southern Ohio and Erie Co. in northern Ohio. Probably at its regional northern range limit in Ohio.

Ohio References: Adams (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: Ohio's only species of *Forelius*. This species of ant can become a house pest in the southern states. The name *pruinosus* means frosted, in reference to the fine micropubescence on the body.

Genus *Dorymyrmex* Mayr

Dorymyrmex Mayr, 1866
Conomyrma Forel, 1913

Identification: The sharp, conical protuberance on the propodeum is diagnostic for this genus, along with the laterally compressed gaster (flattened from the sides).

Immatures: Larvae dolichoderoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: The classification of members of this group have undergone a long and tangled history. Creighton (1950) utilized the genus *Dorymyrmex*, but later authors used *Conomyrma*. Shattuck (1992b) finally synonymized *Conomyrma* under *Dorymyrmex*, followed by Snelling (1995) and Bolton (1995).

Revision(s): Snelling (1973a), Trager (1988), Johnson (1989b), and Snelling (1995). The earlier authors struggled back-and-forth in an attempt to make sense of this group. I consider the last revision, which contains keys to workers of all U.S. species, to be the definitive word so far.

Key: There are a number of species found in the southeastern and southwestern U.S. and Snelling (1995) should be consulted for identification. All of the species likely to be found in the northeastern U.S. and adjacent Canada have been included in the following key. Note that Shattuck (1992:83) shows no *Dorymyrmex* from the Great Lakes region.

Comments: These rapidly moving ants nest in exposed sunny, usually sandy, areas; the group has many more species in the southern and southwestern U.S.

Key to *Dorymyrmex* of Northeastern North America

1. Color predominantly yellow, varying from pale orangish-yellow to somewhat infuscated; mesonotal profile (side view) evenly convex to nearly flat ..... (*D. bureni*)

   Color predominantly dark, varying from dusky yellowish-brown to usually dark brown or brownish-black; mesonotal profile (side view) distinctly angular **2**

2. Pronotal dorsum without erect hairs; front of head with extremely fine, minute appressed pubescence, the individual hairs so small they are difficult to discern ..... ***D. grandulus***

   Pronotal dorsum with pair of short erect hairs usually present; front of head with longer appressed pubescence (the individual hairs readily discerned); propodeal tubercle relatively prominent ..... (*D. insanus*)

Dorymyrmex bureni (Trager)

Conomyrma bureni Trager, 1988

Identification: TL 3.0-3.7 mm. Pale orangish-yellow to orangish-brown, gaster usually darkened with black apically and ventrally, head may be darker dorsally, mandibles edged with black, antennal funiculus and apical tarsal segments dark brown to nearly black; head, alitrunk, and gaster with sparse microscopic appressed pubescence which imparts a weak whitish sheen, surface otherwise moderately glossy. The non-angulate mesonotum and pale coloration readily differentiates this species from any others found in northeastern North America.

Taxonomy: See Trager (1988) and Snelling (1995).

Ecology:

— Habitat: Found in open areas such as roadsides, fields, pastures, lawns, and dunes, especially in areas with sandy soils (Trager, 1988).

— Food Resources: Avid predator of small arthropods (Trager, 1988).

— Associates: Further data lacking.

Behavior: Foragers can move very rapidly.

Nests: In sand and sandy soil.

— Colony Organization: Further data lacking.

— Reproductives: See Trager (1988).

Range: Maryland to Virginia, Florida, west to Mississippi, Louisiana, eastern Texas (Snelling, 1995).

Comments: A species that is predominantly yellow in color. This is an abundant species of the Atlantic coastal plain and southeastern United States, and is not at all likely to occur in Ohio, but included here as it does extend up into Virginia and Maryland. Being described in 1988, earlier works obviously did not recognize this species. Named after William F. Buren, who has produced several recent revisions.

68 *Dorymyrmex grandulus* (Forel)

Prenolepis (Mylanderia) parvula var. *grandula* Forel, 1922

Identification: TL 2.6-2.8 mm. Medium brown to blackish-brown, head and alitrunk paler ventrally (yellowish-brown), gaster nearly black, mandibles and lower genae orangish- or brownish-yellow, mandibles edged with black, antennal scapes and tibiae basally pale (brownish-yellow); head, alitrunk, and gaster with microscopic appressed pubescence which imparts a whitish sheen, surface otherwise moderately glossy. The dark coloration, angulate mesonotum, and extremely fine pubescence on the head distinguish this species. See notes under *insanus*.

Taxonomy: Interestingly, this species was named as a minor variant of *Paratrechina parvula* by August Forel in 1922, then subsequently synonymized and thus "lost." The two species have nothing in common, being in different subfamilies. It was only by an odd circumstance that James Trager (see Trager, 1988) discovered the type while studying *Paratrechina*, otherwise *Dorymyrmex grandulus* would have been named as a new species.

Ecology:

— Habitat: Found near edge of sand dune area in open (GAC 1935). In Michigan reported from sandy ridges (Wheeler et al., 1994).

— Food Resources: Predaceous and also utilizes honeydew as is typical for genus.

— Associates: Further data lacking.

Behavior: Active species.

Nests: In sand marked by a large conical sand pile beneath very small oak sapling (GAC 1935).

— Colony Organization: Further data lacking.

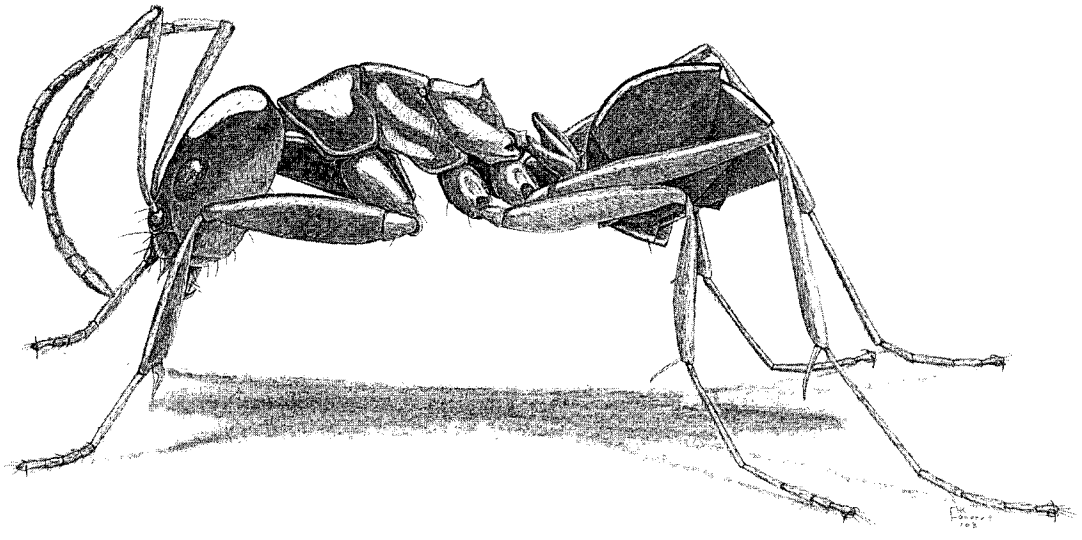
— Reproductives: Further data lacking.

Range: New Jersey south to Florida, Alabama, west to Michigan, Ohio; questionable for Illinois (Snelling, 1995) and Indiana (see comments for *D. insanus* below).

Ohio Distribution: Only known from the Oak Openings area in Lucas Co.

Ohio References: A possible record from Ohio (Arnett, 1993 - as *insanus*, q. v.).

Comments: This species represents a new state record, and the only *Dorymyrmex* positively recorded for Ohio. Trager (1988:25) comments that "the true range of this ant may be much more extensive than that indicated ... I have seen similar [*Dorymyrmex*] specimens collected in Michigan and New York, but have not had the opportunity to study them carefuly. Buren (personal communication) felt that Michigan specimens he saw were 'probably different,' but sensing his caution, I prefer to leave open the question of their conspecificity with *C. grandula*." Wheeler et al. (1994) record *D. grandulus* from Michigan (Livingston Co., in soil in sandy ridges), and I likewise consider our Ohio material to be *D. grandulus*. See comments below for *D. insanus*.



***Dorymyrmex grandulus* (Forel).** Drawing by Holly K. Coovert.

Dorymyrmex grandulus

Dorymyrmex insanus (Buckley)
Pyramid Ant

Formica insana Buckley, 1866
Dorymyrmex pyramicus of some authors

Identification: TL 2.7-3.4 mm. Yellowish-brown to blackish-brown, head and alitrunk usually somewhat paler ventrally, gaster nearly black, mandibles and lower genae orangish- or brownish-yellow, mandibles edged with black, antennal scapes and legs apically pale, apical tarsal segments dark; head, alitrunk, and gaster with minute appressed pubescence which imparts a whitish sheen, surface otherwise moderately glossy. The dark coloration, angulate mesonotum, relatively narrow head, and character of the pubescence on the front of the head serve to distinguish this species.

Taxonomy: Most of the earlier literature records refer to this species as *Dorymyrmex pyramicus* (Roger) which is a different, valid species only found in South America. See Snelling (1995).

Ecology:

— Habitat: Found in open sunny places.

— Food Resources: Predaceous as well as utilizing honeydew (Wheeler & Wheeler, 1986).

— Associates: Further data lacking.

Behavior: Workers are active and aggressive and emit a fluid with a disagreeable odor (D. R. Smith, 1979). They forage in files and move with extreme rapidity, especially in hot sunshine (Wheeler & Wheeler, 1986).

Nests: In soil surmounted by an irregular or craterlike mound. (D. R. Smith, 1979).

— Colony Organization: Colonies are small to moderate, with up to 1000 workers (Wheeler & Wheeler, 1986).

— Reproductives: Further data lacking

Range: Kansas to central Texas, west to southern California (Snelling, 1995).

Comments: The common name of Pyramid Ant refers to their distinctive nest mound. This is a western species not currently known from Ohio. This species is included here because of possible records from Illinois (Gregg, 1944; DuBois & LaBerge, 1988) and Indiana (Munsee et al., 1985). Because these records are based on a much earlier revision, their identity is uncertain (but they could be *D. grandulus*; cf. Snelling, 1995). Since *D. insanus* occurs as far east as Kansas, it could occur east of the Mississippi River and is thus included in the keys for completeness. Arnett (1993:449) gives an unsubstantiated record of *D. insanus* from Ohio, which is very likely *D. grandulus* (he was obviously unaware of the Trager, 1988 revision). Buckley's name 'insana' apparently refers to the erratic, rapid movements of foraging workers in hot, open habitats.

Genus *Tapinoma* Foerster

Tapinoma Foerster, 1850

Identification: The reduced petiolar scale which is strongly inclined forward is diagnostic for this genus.

Immatures: Larvae dolichoderoid; naked pupae (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950).

Key: A single species is found in our area, although the introduced tropical species *T. melanocephalum* has been reported from Quebec, Ontario, and Iowa and could be found in greenhouses or heated buildings. It is recognized by its very pale gaster which contrasts with the rest of the darker body.

Comments: Our single species is a small, relatively common brown ant.

69 *Tapinoma sessile* (Say)
Odorous House Ant

Formica sessilis Say, 1836

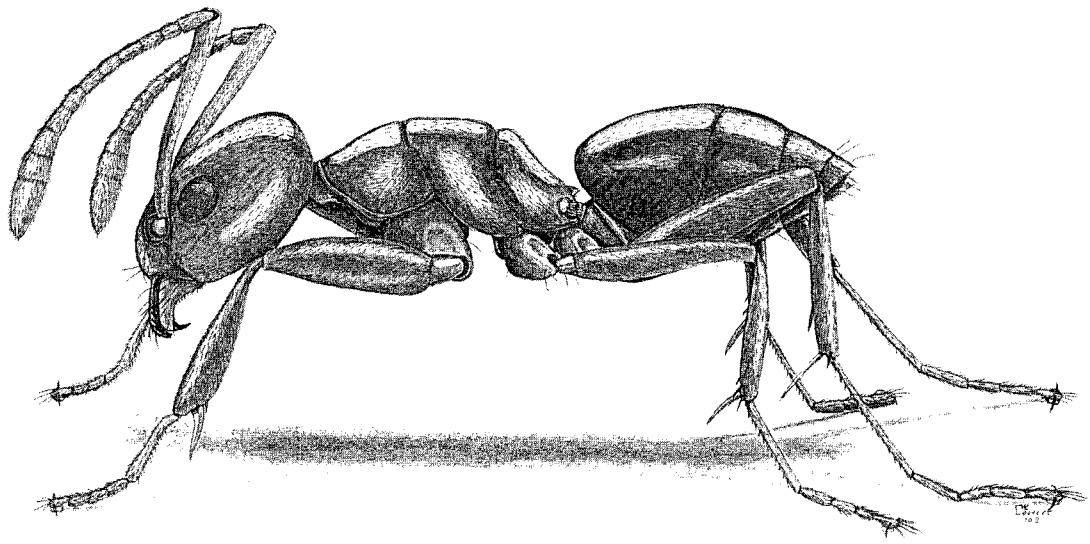
Identification: TL 2.1-3.5 mm. Medium yellowish-brown to blackish-brown, alitrunk paler ventrally in some, legs paler, especially apically; head, alitrunk, and gaster with microscopic appressed pubescence which imparts a whitish sheen, surface otherwise moderately glossy. Easily recognized by the characters given in the key to genera, especially the greatly reduced petiolar scale.

Taxonomy: See Smith (1929).

Ecology:

— Habitat: Found in woods, woods' edges, and open fields and meadows.

— Food Resources: On bloom of *Solidago caesia* (GAC 1964); occasionally taken at bait. "Food consists



***Tapinoma sessile* (Say).** Drawing by Holly K. Coovert.

mainly of honeydew and workers attend honeydew-excreting insects" (D. R. Smith, 1979). Diet supplemented with the flesh of other organisms. Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York. Seeds of *Viola* taken for nutritious elaiosomes (Culver & Beattie, 1978). Predatory on Virginia-pine sawfly larvae (*Neodiprion p. pratti*) in Virginia (Bobb, 1965). See also Fellers (1987).

— Associates: Bristow (1983, 1984) reports tending of the aphid *Aphis vernoniae* and the membracid *Publilia reticulata* on ironweed in New Jersey. See Smith (1928) for detailed list of species attended for honeydew and lists of other associates. Kistner (1982) mentions the myrmecophilous staphylinid beetle *Myrmoecia lauta*. Host to the larvae of the myrmecophilous syrphid *Microdon globosus* (cf. Duffield, 1981).

Behavior: Workers mostly found foraging on ground, bases of trees, and foliage in woods, but also in leaf litter and under bark. Workers forage in files. This species emits a substance with an odor similar to that of rancid butter (butyric acid). See also Smith (1928).

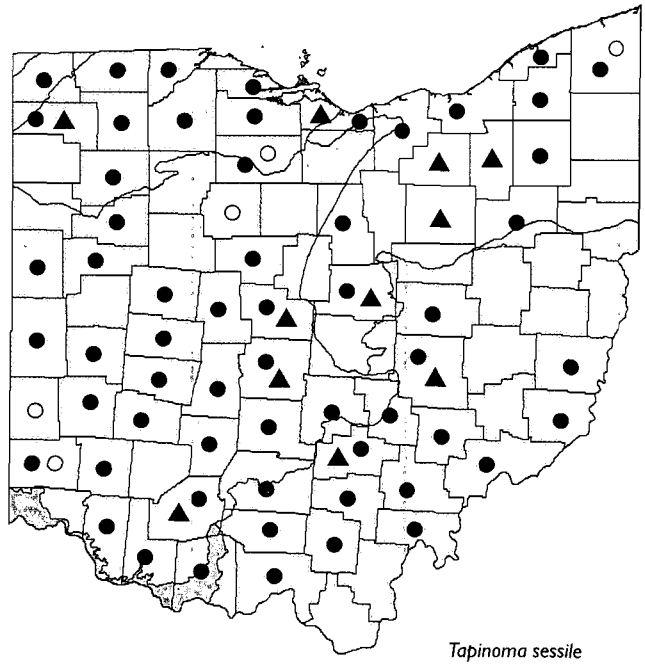
Nests: In leaf litter, under bark of stumps and trees, under rocks, in hollow plant stems, and in nut shells. "...nests in about every available, but preferably dry situation throughout the area" (Wesson & Wesson, 1940). "Most nests are in the soil beneath objects but also under bark, in stumps, plant cavities, insect galls, refuse piles, and bird and mammal nests" (D. R. Smith, 1979). Nest sites are moved frequently. See Smith (1928) for further details on nesting.

— Colony Organization: An acorn colony found with 2 queens (GAC 1971); and a colony under rock with 4 queens (GAC 2358). "Colonies may contain thousands of individuals and numerous reproductive females" (D. R. Smith, 1979). Smith (1928) reports as many as 200 dealated females in a colony. Colonies range in size from 100 to 10,000 individuals. Larvae and pupae are dull orange in color (Amstutz, 1943). Colonies can be established by a single queen or by budding (Thompson, 1990).

— Reproductives: Males - May 28 (GAC 2560)-June 5 (GAC 2564), Oct. 27. Females - June 23, Oct. 27-31. Smith (1928) reports males June 10 to July 9, and females June 17 to early July rangewide. Thompson (1990) reports that mating generally occurs in the nest.

Range: Transcontinental - Nova Scotia, Quebec south to Florida, west to Washington, California; Mexico.

Ohio Distribution: Recorded statewide from 64 Ohio counties.



Tapinoma sessile

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: A common and adaptable ant with a distinctive odor described by some as "rancid butter." May become a troublesome house-infesting ant. This common species was posthumously described by Thomas Say (1787-1834), the father of American entomology, in 1836.

Subfamily Formicinae

Taxonomy: There is a fair amount of disagreement on tribal arrangement in this subfamily. Both Hölldobler & Wilson (1990) and Wheeler & Wheeler (1970), the latter based on larvae, recognize different arrangements from each other and from that of D. R. Smith (1979). The last arrangement is followed by Bolton (1994, 1995) and, with the modifications incorporated by Bolton (2003), is the one used here, although the sequence is altered somewhat, placing Camponotini at the end, following Hölldobler & Wilson (1990).

Tribe Plagiolepidini

Genus *Brachymyrmex* Mayr

Brachymyrmex Mayr, 1868

Identification: The minute size of these ants and the 9-segmented antennae will readily distinguish this genus.

Immatures: Larvae pheidoloid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Taxonomy: Tribal placement follows Bolton (2003). Hölldobler & Wilson (1990) combined this group with the Myrmelachistini. Creighton (1950) refers to this group (taxonomically speaking) as "this miserable little genus."

Revision(s): Wheeler & Wheeler (1978) report on *B. musculus*, introduced into Louisiana, and present a key to workers of these two species, but do not include *B. obscurior* which is also found in the southeastern U.S.

Key: A single species is found in our area.

Comments: Our single species is a minute ant found in the soil or under rocks.

70 *Brachymyrmex depilis* Emery

Brachymyrmex heeri depilis Emery, 1893

Identification: TL 1.2-1.4 mm. Brownish-yellow to yellowish-brown, alitrunk paler ventrally, gaster usually darker apically, antennae and legs paler; head and alitrunk moderately glossy, gaster less glossy due to thin covering of microscopic pubescence. Easily recognized by the generic characters, especially the small size and 9-segmented antennae.

Taxonomy: See Creighton (1950). Formerly considered a subspecies of the European *B. heeri*.

Ecology:

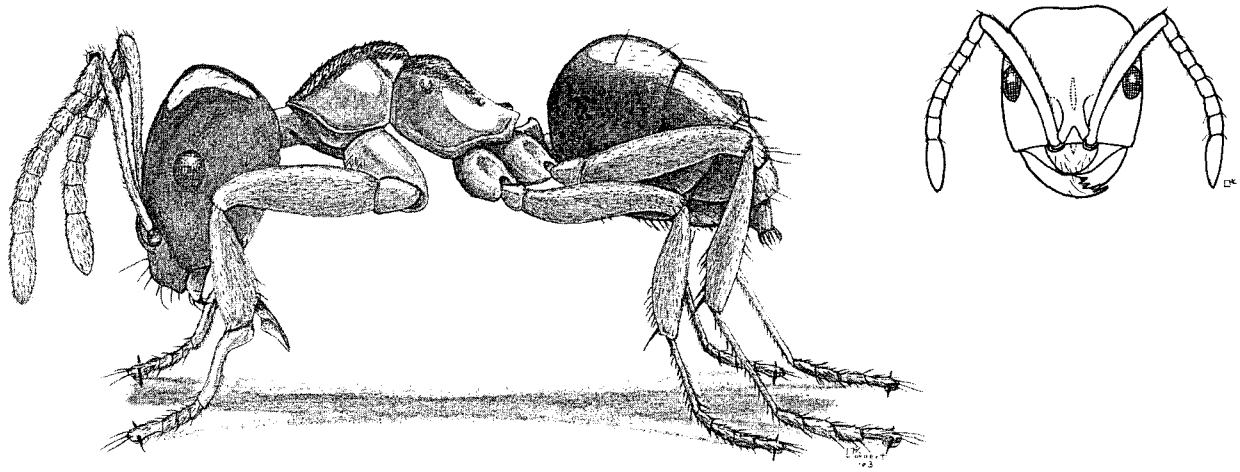
— Habitat: Found in woods and woods' edges. Wesson & Wesson found that it "seems to be most abundant in open woods, but we have also taken it in rotten logs in dense moist woods, and in meadows and dry fields."

— Food Resources: Taken at bread bait; food mostly honeydew (below).

— Associates: Colony under rock with root aphids (BSR 12 # 12).

Behavior: Workers found foraging on foliage and at bait, demonstrating that they are not completely subterranean.

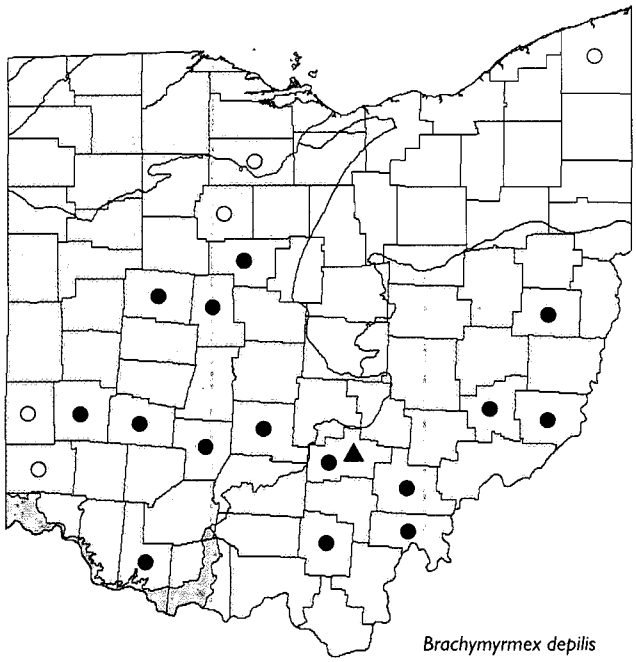
Nests: In soil under rocks, in rotten wood, hickory nut (GAC 1795). The nests "do not go more than one or two inches down into the ground under the stones" (Headley, 1943a). See Headley (1952) for further description of ground nests.



***Brachymyrmex depilis* Emery**, habitus and full face view of head. Drawing by Holly K. Coovert.

— Colony Organization: Colonies are always small (Headley, 1943a).
— Reproductives: Males - Aug. 26-Sept. 26. Female - Aug. 30. Stray dealate female - Aug. 30 (GAC 2171 #4).

Range: Nova Scotia south to Florida, west to British Columbia, California; central Mexico.



Brachymyrmex depilis

Ohio Distribution: Widespread in Ohio. Recorded from 20 counties.

Ohio References: Ashtabula (Headley, 1943a, 1943b), Butler (Gorham, 1956), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938).

Comments: The species name *depilis* means without hair. These tiny, mostly subterranean ants apparently receive most of their nutrition from honeydew-producing insects on the roots of plants and are only infrequently found above ground. It is one of the smallest ants found in Ohio.

Genus *Paratrechina* Motschulsky

Paratrechina Motschulsky, 1863
Nylanderia Emery, 1906

Identification: The coarse, dark, bristle-like hairs, eyes situated low on the head, and low petiolar node will serve to distinguish this genus.

Immatures: Larvae dolichoderoid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Taxonomy: The subgenus *Nylanderia* was synonymized by Trager (1984) and followed by later authors, including Bolton (1994, 1995).

Revision(s): Trager (1984) provides a revision for the Continental U.S. with keys to workers and males.

Key: The key below covers all species found in the northeastern U.S. and adjacent Canada. *Paratrechina pubens* (Forel) (*P. fulva* (Mayr) in D. R. Smith, 1979) is occasionally found in greenhouses as far north as New Jersey.

Comments: These small ants are recognized by the dark, bristle-like hairs.

Key to *Paratrechina* of Northeastern North America

1. Antennal scape extremely long, ca. 2X length of head; lacking erect hairs; legs unusually long; eyes very large, in full-face view extending beyond sides of head; body with bluish reflections ..... (*P. longicornis*)

   Antennal scape much shorter, distinctly less than 2X length of head, often with erect hairs; legs not unusually long; eyes smaller, in full-face view not extending beyond sides of head; body lacking bluish reflections **2**

2. Body yellow with gaster infuscated posteriorly ..... (*P. arenivaga*)

   Body predominantly dark brown to brownish-black (or rarely bicolored with head and gaster dark) .. **3**

3. Antennal scape completely lacking erect hairs ..... ***P. parvula***

   Antennal scape with at least 4 and usually 7 or more erect hairs **4**

4. Minute, appressed pubescence of head sparse, mostly absent on lower half of head, the hairs above are spaced a hair's length or usually more apart ..... (*P. terricola*)

   Minute, appressed pubescence of head denser, most hairs spaced a hair's length or usually less apart .. **5**

5. Alitrunk, legs, and antennae yellow; head averaging broader and with rounded sides; [introduced species] ..... (*P. flavipes*)

   Uniform brown to brownish-black (or with slightly paler head and alitrunk); head narrower and less convex-sided; middle and hind coxae usually distinctly lighter than fore coxa; [native species] ..... ***P. faisonensis***

Paratrechina arenivaga (Wheeler)

Prenolepis arenivaga Wheeler, 1905

Identification: TL 2.0-2.7 mm. Yellow to brownish-yellow, head slightly darker, alitrunk and gaster basally paler

(yellow); head densely micropubescent, alitrunk usually lacking pubescence. The only species in this area that is predominant pale colored.

Taxonomy: See Trager (1984).

Ecology:

— Habitat: Found in open, well-drained, sandy areas (Trager, 1984).

— Food Resources: Feeds mostly on dead insects (Trager, 1984) and honeydew.

— Associates: The planthopper *Oecleus borealis* and a cricket *Myrmecophila* are known associates (Thompson, 1988). See also Trager (1984) for details.

Behavior: This species is largely noctural (Thompson, 1988).

Nests: Forms crater nests in the sand (Trager, 1984), usually with multiple nest sites (polydomous) (Trager, 1984; Thompson, 1988).

— Colony Organization: Thompson (1988) considers this species "almost certainly monogynous."

— Reproductives: Reproductives fly in Dec. and Jan. in Florida, and in May further north (Trager, 1984).

Range: New Jersey south to Florida, west to Arkansas and Texas, then north to Illinois, Iowa, Nebraska. Apparently absent in the Appalachian and adjacent regions (Trager, 1984).

Comments: This species has a predominantly yellow body. The range of this species lies along the Atlantic and Gulf coasts, thence north to Illinois, Iowa, and Nebraska. It could possibly occur in Ohio in areas of sandy soil. The Indiana record in Munsee et al. (1985) could possibly be *P. faisonensis*. The name means "to wander in sandy areas."

71 *Paratrechina faisonensis* (Forel)

Prenolepis (Nylanderia) arenivaga var. *faisonensis* Forel, 1922

Identification: TL 1.9-2.5 mm. Dark yellowish-brown to usually dark brown or brownish-black, alitrunk often slightly paler, gaster slightly darker, mandibles paler with slight black margins, basal funicular segment, trochanters, and legs apically especially pale, middle and hind coxae usually paler than fore coxae; body generally smooth and very glossy. The presence of erect hairs on the antennal scapes plus the dark colored body and moderately dense appressed pubescence of the head should differentiate this species.

Taxonomy: Although the density of the appressed pubescence of the head varied somewhat in the material studied, it is felt that these were all within the range of *P. faisonensis*. See Trager (1984).

Ecology:

— Habitat: Found in woods, woods' edges, and semi-open areas; occasionally in buildings. Wesson & Wesson (1940) report "dry or exposed situations."

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Workers found foraging on ground and foliage in meadows.

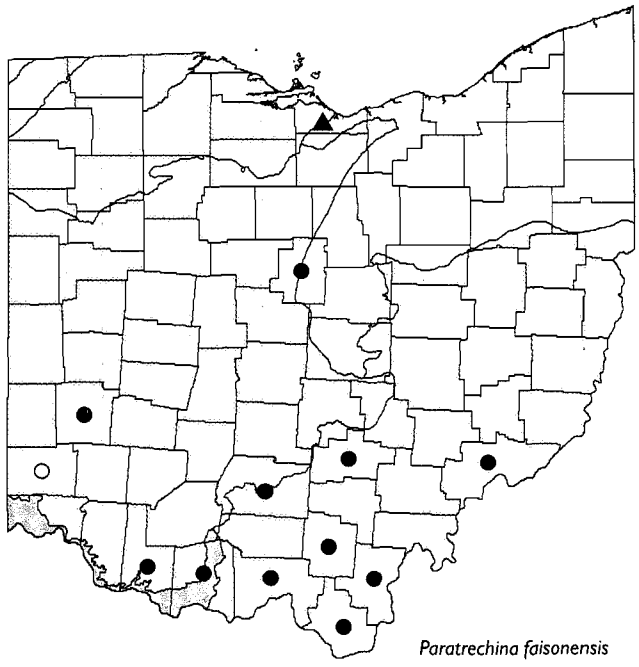
Nests: Located under rocks, in acorns and hickory nuts, under bark and branches.

— Colony Organization: Further data lacking.

— Reproductives: Males - May 18-19. Females - May 5-19. Trager (1984) reports alates from the end of April through May for the northern part of the range.

Range: New Jersey south to Florida, west to Ohio, Arkansas, Mississippi (Trager, 1984).

Ohio Distribution: Widespread in Ohio. Recorded from 13 counties, mostly in southern Ohio. At its regional northern limit in Ohio.



Paratrechina faisonensis

Ohio References: Butler (Gorham, 1956 - probable unpublished record as *melanderi arenivaga*); part of the Wesson & Wesson (1940) material from southcentral Ohio of *P. parvula* is actually *P. faisonensis*.

Comments: Ohio's most common species of *Paratrechina*. This represents a new state record for Ohio and extends the range in the northeast as shown in Trager (1984:103) northward and westward. The species name is in reference to the type locality of Faison, N. C.

Paratrechina flavipes (F. Smith)

Tapinoma flavipes F. Smith, 1874

Identification: TL 1.8-2.3 mm. Brown with alitrunk, legs, and antennae yellow; body generally smooth and very glossy. Erect hairs on the antennal scapes and bicolored body should serve to differentiate this species.

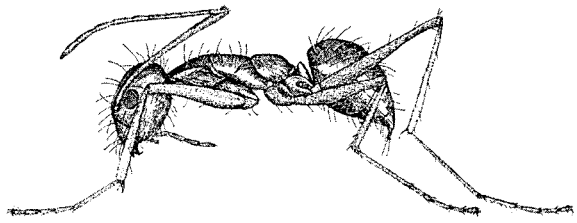
Taxonomy: See Trager (1984).

Ecology:
— Habitat: Found in woodlands.
— Food Resources: Further data lacking.
— Associates: Further data lacking.
Behavior: Further data lacking.
Nests: Presumably in soil.
— Colony Organization: Further data lacking.
— Reproductives: Alates found in May in Pennsylvania (Trager, 1984).
Range: Pennsylvania (Pittsburgh, Philadelphia), New York (Long Is.); Japan, China (Trager, 1984).
Comments: Trager (1984) records this introduced species from urban wooded areas of the northeastern U.S. Apparently these populations are established and the species could possibly be found in Ohio.

Paratrechina longicornis (Latreille)
Crazy Ant

Formica longicornis Latreille, 1802

Identification: TL 2.1-2.8 mm. Medium brown to blackish-brown, with bluish reflections, mandibles, antennae, and legs slightly paler, legs especially paler apically; body generally smooth and weakly glossy. Readily recognized by the unusually long legs and antennae and larger eyes.
Taxonomy: Long separated from the rest of the genus, the subgenera have now been synonymized. See Trager (1984).



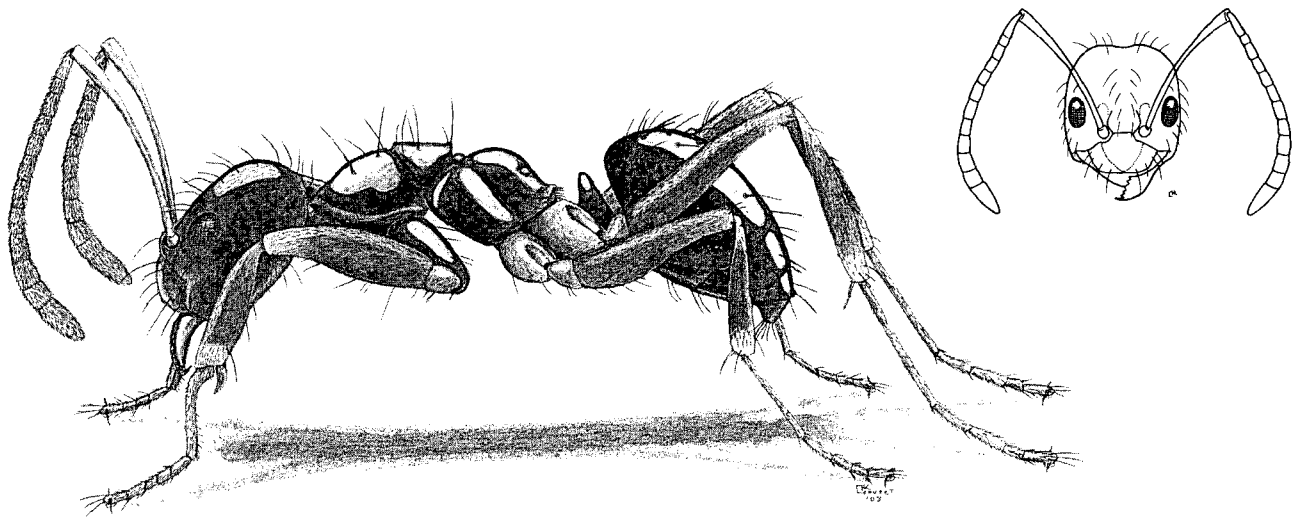
Paratrechina longicornis (Latreille). From Smith (1947a).

Ecology:
— Habitat: This species only survives in heated buildings in northern states. It seems to be found largely in buildings in Florida as well (Van Pelt, 1958).
— Food Resources: D. R. Smith (1979) notes "workers are omnivorous and feed on live and dead insects, seeds, honeydew and household foods."
— Associates: Tends honeydew secreting insects.
Behavior: Workers are very adept at finding food and are often the first to arrive at newly placed baits (Hölldobler & Wilson, 1990).
Nests: In warmer climates "may nest in many situations such as trash, refuse, plant cavities, rotting wood, and in soil under stones. ... Sometimes found in northern states in greenhouses or other buildings." (D. R. Smith, 1979).
— Colony Organization: Multiple queens (polygyny) implied (Hölldobler & Wilson, 1990). Thompson (1990) reports colonies up to 2,000 workers and 40 queens.
— Reproductives: Further data lacking.
Range: South Carolina south to Florida, west to Texas; California; Pantropical. In heated buildings further north (Illinois - DuBois & LaBerge, 1988; Indiana - Munsee et al., 1985; Quebec - Francoeur, 1990).
Comments: The Crazy Ant (hormigas locas) is an introduced species only found in heated buildings in the north but often abundant in the south, especially southern Florida. Named for the very quick and erratic pace of the workers. Creighton (1950) reported that it was "surprisingly abundant in New York City, where it infests warehouses and apartments." The species name refers to the unusually long antennae.

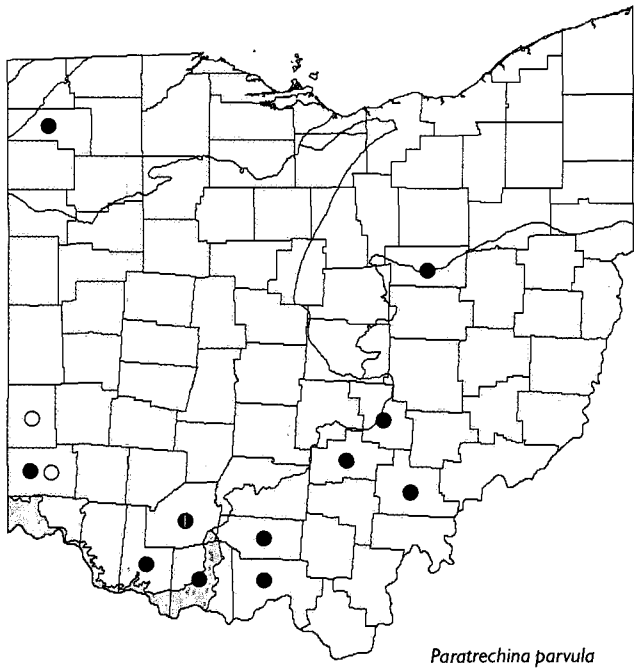
72 *Paratrechina parvula* (Mayr)

Prenolepis parvula Mayr, 1870

Identification: TL 1.9-2.5 mm. Medium brown to brownish-black, gaster usually slightly darker, mandibles paler with slight black margins, antennal scapes and basal segment, trochanters, and legs apically and especially on knees pale, middle and hind coxae usually paler than fore coxae; body generally smooth and very glossy. Readily recognized by the lack of erect hairs on the antennal scapes.
Taxonomy: See Trager (1984).
Ecology:
— Habitat: Found in woods, open woods, and open areas near woods. Wesson & Wesson (1940) found it "common nearly everywhere except in very cool, moist woods" in southcentral Ohio. Seems to prefer more open habitats than *P. faisonensis* (Trager, 1984).
— Food Resources: Seeds of myrmecochorous plant *Trillium erectum* collected for nutritious elaiosomes (Beattie & Culver, 1981). Barton (1986) records visiting extrafloral nectaries of partidge pea (*Cassia fasciculata*) in Florida.
— Associates: Further data lacking.
Behavior: Workers found foraging on ground in open woods and on foliage.
Nests: "Nests under moss, in logs and stumps, beneath stones, or in open grassy areas where the nest may be surmounted by a small crater." (D. R. Smith, 1979).
— Colony Organization: In Tennessee "most of the colonies contained a large number of individuals" (Cole, 1940b). See Van Pelt (1958) for Florida data.
— Reproductives: Stray dealate female - June 9. In Michigan, alates are reared in July and Aug. (Trager, 1984).
Range: Massachusetts south to northern Florida, west to Michigan, Illinois, North Dakota, Nebraska, Kansas, eastern Oklahoma, eastern Texas (Trager, 1984).



***Paratrechina parvula* (Mayr),** habitus and full face view of head. Drawing by Holly K. Coovert.



Paratrechina parvula

Ohio Distribution: Widespread in Ohio. Recorded from 12 counties, mostly in southern Ohio.

Ohio References: Butler (Gorham, 1956), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940, in part).

Comments: A moderately common species recognized by the lack of erect hairs on the antennal scapes. The species name means "very small," a characteristic certainly not unique to this species.

Paratrechina terricola (Buckley)

Formica (Tapinoma) terricola Buckley, 1866

Identification: TL 2.0-2.4 mm. Yellowish-brown to dark brown, gaster darker, especially apically, mandibles, antennae basally, and legs paler; body generally smooth and very glossy. The minute appressed pubescence of the head is sparser than related species; readily differentiated from *parvula* by the presence of erect hairs on the antennal scapes.

Taxonomy: See Trager (1984).

Ecology:

— Habitat: Found in forest openings and other open or disturbed areas (Trager, 1984).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Normally under stones, logs, moss clumps, bark, or other objects (Trager, 1984).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Illinois south to Tennessee, west to Arkansas, Texas, lower elevations in southwestern mountains (Trager, 1984).

Comments: This southern and western species is not known from Ohio. It is not likely for the state, but has been included for completeness.

Genus *Prenolepis* Mayr

Prenolepis Mayr, 1861

Identification: The shape of the alitrunk, the low petiolar node and long, erect body hairs will serve to distinguish this genus.

Immatures: Larvae aphaenogastroid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950), with a key to workers.

Key: A single species is found in our area.

Comments: The single species in our area is found foraging earlier in the spring than any other species; workers can store food by distending their gasters like the

honeypot ants of the west but to a lesser degree. These workers are referred to as repletes.

73 *Prenolepis imparis imparis* (Say)

Formica imparis Say, 1836

Identification: TL 2.8-4.4 mm. Head and alitrunk orangish-brown to dark brown, gaster darker, dark brown to blackish-brown, mandibles slightly paler, edged with black, antennae and legs distinctly paler; body smooth and very glossy. Readily recognized by the characters given in the key to genera.

Taxonomy: See Wheeler (1930) and Creighton (1950).

Ecology:

— Habitat: Found in open woods, edges of fields, occasionally in buildings. Wheeler et al. (1994) report it from a "wide variety of habitats from grasslands to deep woods."

— Food Resources: On bloom of *Solidago* sp. (GAC 1962), *Solidago caesia* (GAC 1964, 1965), and *Daucus carota* (BSR 67). Collected feeding on dead phalangid (GAC 2142); on fruit and other baits; and obtaining honeydew (below). "Workers feed on honeydew, secretions of floral and extrafloral nectaries, exudates from galls, earthworms, arthropods, and ripened or decaying fruits." (D. R. Smith, 1979). Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York. Gelderloos (1977) observed feeding on flowers of *Rhus typhina* in Michigan, and suggested that this ant species might be the primary pollinator. See also Fellers (1987).

— Associates: Tending membracids (mostly nymphs) - *Entylia bactriana* on thistle (GAC 2174 #8); and on *Solidago* with membracid (*Publilia concava*) (BSR 62 #4). Wood (1982) reports tending the membracid *Enchenopa binotata*.

Behavior: Workers were found foraging on ground, tree trunks, and on foliage in woods. They were often seen in feeding trails. Repletes (workers with extended gasters from "tanking up" on fluids) were seen fairly commonly. See Wheeler (1930) for illustration. Burrill & Smith (1919) describe the gait of these repletes as having "the appearance of swaggering like a drunken man."

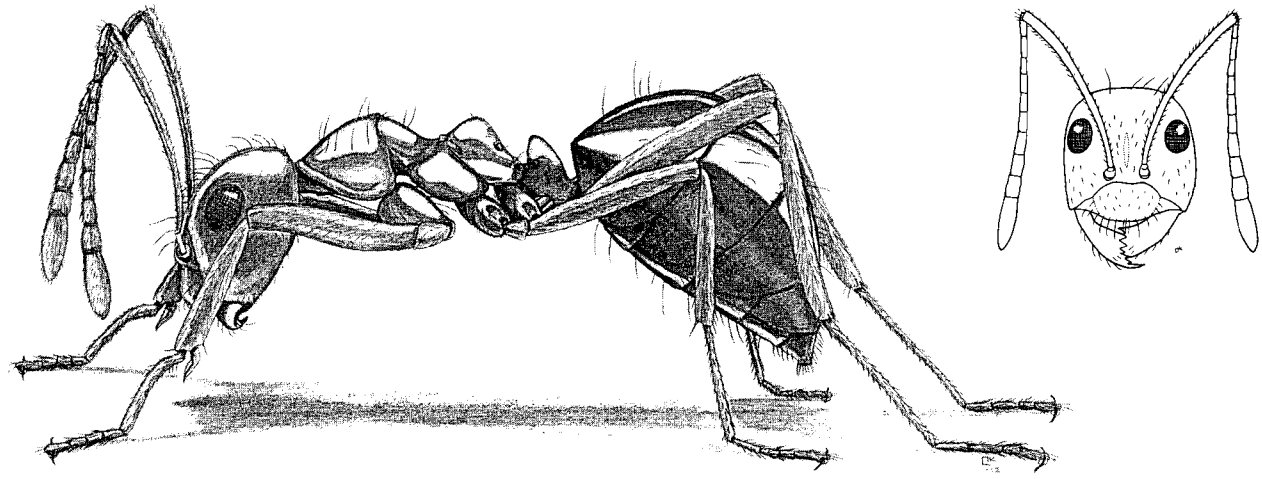
"This ant is predominantly nocturnal but is often seen through the day during cool or cloudy weather or in damp shaded situations." (Wesson & Wesson, 1940). This species is noted for its preference for cool temperatures and tolerance of temperatures near freezing (Wheeler, 1930), often being active above ground in the winter. There is a lull in activity during the summer (Talbot, 1943a, b).

Nests: Usually in soil, marked by soil pile, but may be under or in logs. The typical nest in soil has a single entrance and proceeds straight down, often over 1 m, with chambers off to the side. During flight season additional entrances (up to 6 more) are added. See Dennis (1941) and Talbot (1943a) for more details.

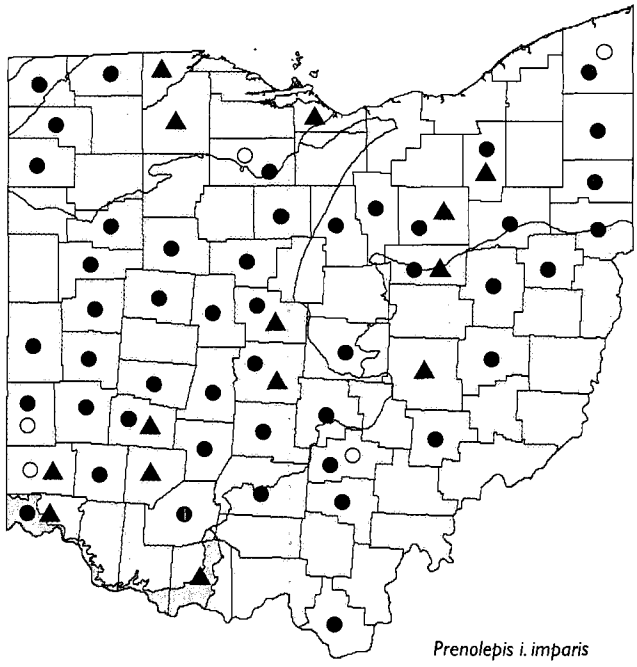
— Colony Organization: Colonies are moderately large, normally with 1,000 to 2,000 adults and usually a single queen (see Talbot, 1943a for details), although Hölldobler & Wilson (1990) report multiple queens and a maximum colony size of 10,300.

— Reproductives: Males - March 25-Apr. 26. Females - March 6-May 9, mating pair April 7. A large number of males were observed flying above a bush in the open March 30 (GAC 2075). This is one of the earliest ants to conduct their nuptial flights in the spring. These reproductives matured the previous year and overwintered in the nest (see Wheeler, 1930 and Talbot, 1943a and 1945a for more detail).

Range: Connecticut, Ontario south to Florida, west to Wisconsin, Iowa, Missouri, Oklahoma, Texas, New Mexico, Arizona.



***Prenolepis imparis imparis* (Say),** habitus and full face view of head. Drawing by Holly K. Coovert.



Prenolepis i. imparis

Ohio Distribution: Found statewide. Recorded from 54 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Hocking (Wheeler, 1930), Preble (Gorham, 1956), Seneca (Talbot, 1943a, 1943b; Headley, 1944, 1952), Ohio (Wheeler & Wheeler, 1953), southcentral Ohio (Wesson & Wesson, 1940),

Comments: One of the earliest ants to appear in the spring, it prefers cooler temperatures for foraging than most of our ants. This common species was posthumously described by Thomas Say (1787-1834), the father of American entomology, in 1836. The species name refers to "the great disparity in color and magnitude between the male and female," which could be said of nearly all ants.

Tribe Lasiini

Genus *Lasius* Fabricius

Lasius Fabricius, 1805

Identification: The characters presented in the key will serve to identify this genus. *Acanthomyops*, a related genus, has a short 3-segmented maxillary palp, small eyes, and is generally more coarsely pilose.

Immatures: Larvae pogonomyrmecoid; pupae generally in cocoons (Wheeler & Wheeler, 1976). Certain species may have cocoons and naked pupae together in the same nest.

Revision(s): Wilson (1955) monographed the genus worldwide and provided keys to workers, males, and queens. This major work was Edward O. Wilson's doctoral thesis.

Key: Because Wilson (1955) was dealing with *Lasius* worldwide, many of the characters he used were rather obscure. For our local (northeastern North America) fauna, much more useable characters have been found, but these may not all hold up out of our area. See subgenus *Lasius* for more discussion.

Eye size is a very important taxonomic character in *Lasius*. Wilson (1955) used the eye length (or width in some cases) as compared to the head width but discerning the difference between the fraction 0.17 and 0.20 under the microscope is simply not practical for the first couplet in a key to the most common ants of North America. Diagnostic characters should be as easy to use as possible. The key presented below compares the eye length to the directly adjoining gena ("cheek") height (mandibular insertion to the lower edge of the eye). Someone utilizing the key can, in most cases, visually compare the eye length to the gena height without actually having to critically measure the specimen.

Comments: These are small yellow to brown ants.

Key to Subgenera of *Lasius* of America North of Mexico

1. Eyes relatively large, height of gena (mandibular insertion to lower margin of eye) 1.5 to 1.8 X eye height ..... ***Lasius (Lasius)***

   Eyes relatively small, height of gena 2 X eye height or more **2**

2. Eyes very small, with fewer than 35 facets (ommatidia) in total, and not more than 6 facets in greatest diameter; gena height 2.9 to 4.8 X eye height ..... ***Lasius (Cautolasius)***

   Eyes larger, with 35 or more facets (ommatidia) in total, and 10 to 12 facets in greatest diameter; gena height 2.0 to 2.7 X eye height (3.0 to 3.2 X only in *subumbratus*) ..... ***Lasius (Chthonolasius)***

Genus *Lasius*, Subgenus *Lasius* Fabricius

Lasius Fabricius, 1805

Identification: The larger size of the eyes will distinguish this subgenus from the other two.

Revision(s): Wilson (1955).

Key: Our two most common ants, *Lasius alienus* and *L. neoniger*, have long been confused. Most published Ohio records confused or lumped the two species. Early keys differentiated the two species based on the presence of erect hairs on the scapes and tibiae in *L. neoniger*. E. O. Wilson's (1955) thorough study used details of the teeth of the mandibles to initially separate the two,

but still attributed standing hairs to the scapes and tibiae of workers of *L. neoniger*. This was the basis that I used to separate the two initially. It was only later that I studied them in more detail and discovered the much more stable characters used in the present key, finding that the presence of erect hairs on scapes and tibiae is not reliable by itself. This resulted in correctly identifying many *neoniger* (from open areas nesting in soil) which, using previous keys, incl. Wilson (1955), were misidentified as *alienus*.

Comments: This subgenus contains our two most common ants, one of which dominates open areas, the other woodlands. They have larger eyes than other members of the genus, and are commonly seen foraging in the open.

Key to *Lasius* (*Lasius*) of Northeastern North America

1. Hind femur with at most only 1 or 2 ventrally-directed erect hairs, these found at base; sides of propodeum above propodeal spiracle largely devoid of erect hairs (1 or at most 2 or 3 present just below spiracle plus a few at upper posterior angle but well-separated from spiracle), usually only fine appressed pubescence present; tibiae, gula, antennal scapes, and gena posteriorly usually without erect hairs or very few in number ..... ***L. (L.) alienus***

   Hind femur with more than 2 ventrally-directed erect hairs, usually numerous; sides of propodeum immediately above and below propodeal spiracle with numerous, obviously erect hairs which are usually contiguous with upper patch; tibiae, gula, antennal scapes, and gena often with numerous erect hairs **2**

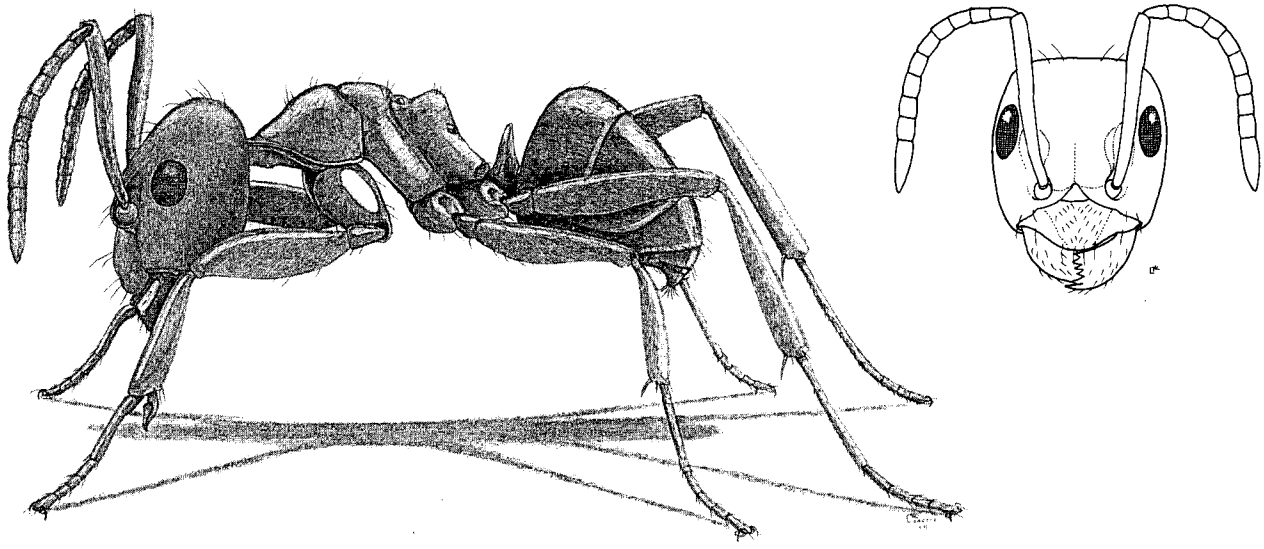
2. Mandible with 1 or more offset teeth at basal angle of masticatory border in larger workers and most smaller workers, this offset tooth set at a different angle and smaller than adjacent tooth and often succeeded by 1 or 2 even smaller teeth on the basal border, this arrangement resulting in the basal angle being somewhat rounded ..... (*L. (L.) pallitarsis*)

   Mandible with the posterior basal tooth aligned with the adjacent teeth of the masticatory border, the basal angle being sharply angular, not rounded ..... ***L. (L.) neoniger***

74 *Lasius* (*L.*) *alienus* (Foerster)

Formica aliena Foerster, 1850
Lasius niger var. americanus Emery, 1893
Lasius niger subsp. *alienus* var. *americanus* Emery

Identification: TL 2.2-4.1 mm. Medium to dark brown, often orange tinged in areas, mandibles dark orangish-brown, antennae and legs brownish-yellow, femora broadly infuscated medially; head, alitrunk, and gaster micropunctate with covering of micropubescence giving a grayish or silvery sheen, surface moderately dull to weakly glossy. The features presented in the key will reliably separate *L. alienus* from *neoniger* in our area. The diagnostic feature of the mandibles given in Wilson (1955) doesn't always apply, is difficult to see, and then only if the mandibles are opened. *Lasius alienus* is distinctly less pilose, darker in color, and the gaster has a sparser covering of appressed pubescence as compared to *neoniger*. Furthermore, the angle between the posterior face and sides of the propodeum is sharper in *alienus*. *Lasius alienus* consistently nests in woods or woods' borders in logs or under stones, never in the ground in the open like *neoniger*.



***Lasius* (*L.*) *alienus* (Foerster)**, habitus and full face view of head. Drawing by Holly K. Coovert.

Taxonomy: There has been a major problem differentiating *L. alienus* from *neoniger* in the past, largely based on the strict reliance on presence or absence of erect hairs on the scapes and tibiae. If this and the obscure mandibular tooth character are bypassed, and pilosity in other areas as presented in the key is utilized, the two species are found to be consistently different, at least in our area. [I make no claims that these characters will hold up outside of our region, especially in western U.S. and Europe, but this question should be investigated further. Note that Wheeler & Wheeler (1986) included *L. niger* (sensu Wilson (1955) for western U.S. populations) under *L. alienus*.]

Creighton (1950) describes a difference in head shape, with the sides more nearly parallel in *neoniger*. A further character, utilized in Creighton (1950), compares the virtually unimpressed promesonotal suture and even profile of *alienus* with the distinctly impressed suture and interrupted outline of *neoniger*. I find this character to be too subtle and unreliable to have any diagnostic utility. Based on this feature, Creighton (1950) considered the often used figure of *alienus* from Smith (1947) to actually represent *neoniger*, underscoring the problems of identification that have plagued these two common species.

In summary, the characters outlined in the present key, once compared and appreciated, will reliably and consistently separate these two species at least in Ohio, and very likely throughout northeastern North America. Most of the Ohio literature confused these two common species, and used outdated nomenclature (see synonymy above).

Ecology:

— Habitat: Found in woods or woods' edges, rarely in open fields and meadows (if so, under objects, in logs, or in nest constructed of carton).

— Food Resources: On bloom of *Pastinaca sativa* (GAC 1893), and fruit bait; also utilizes honeydew (below). Food also includes living and dead insects. Seeds of *Luzula echinata* and *Uvularia perfoliata* are gathered for the nutritious elaiosomes (Beattie & Culver, 1981), plus *Viola* spp. (Culver & Beattie, 1978). See also Fellers (1987).

— Associates: Found tending scale in carton structure surrounding tuliptree sapling (GAC 1745); with aphids on poison ivy vine enclosed with soil (GAC 1763); and tending membracids (*Entylia bactriana*) on thistle (Dayton, O.). Burns (1964) reports tending tuliptree scale (*Toumeyella liriodendri*). Wheeler & Wheeler (1963) record tending aphids (*Chaitophorus populicola*) on cottonwood (*Populus deltoides*) in North Dakota. Wood (1982) reports tending the membracid *Enchenopa binotata*. Host to the larvae of the myrmecophilous syrphid *Microdon ruficrus* (cf. Duffield, 1981).

— Ant Associates: Host of temporary social parasite *Lasius minutus* and *L. umbratus* (Wheeler et al., 1994). Colony under board with adjacent colony of *Crematogaster lineolata* (GAC 1800 #23).

Behavior: Workers found foraging on ground, in leaf litter, under bark, on tree trunks, and on foliage in woods.

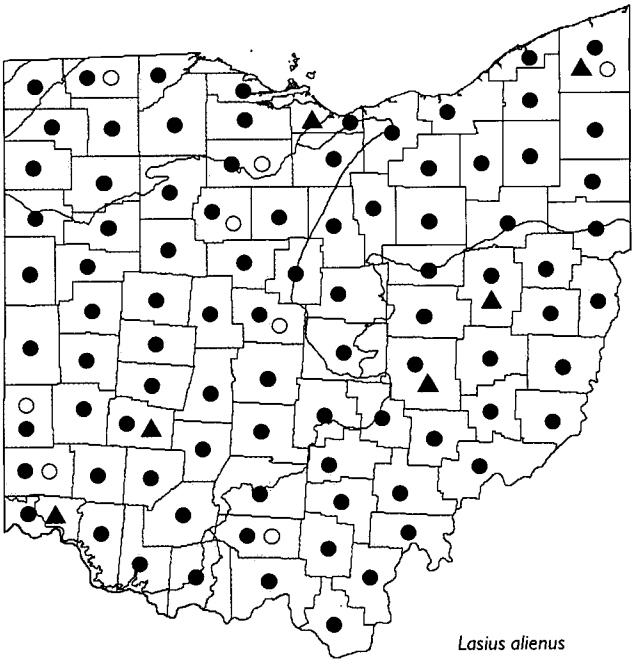
Nests: Nests were most commonly located under rocks, logs, and bark of logs, but were also found in leaf litter, under boards, bases of trees under bark, and in an acorn. One colony was noted with carton structure at base of tuliptree sapling in open (GAC 1745). Colonies moved frequently (every 6 to 30 days) (Hölldobler & Wilson, 1990).

— Colony Organization: Typically large and vigorous.

— Reproductives: Males - June 19-Aug. 23. Females - March 6; June 19-July 22. Headley (1943a) records late July to the middle of Sept. for reproductives.

Range: Nova Scotia, New Brunswick south to Florida, west to southeastern Manitoba, North Dakota, South Dakota, Nebraska, Kansas, Arkansas, Mississippi; disjunct populations from the main range: 1) British Columbia, Montana, Idaho, Washington, Oregon, northern California; 2) southern Arizona; 3) westcentral Mexico; Eurasia.

Ohio Distribution: Statewide. Recorded from all 88 counties.



Lasius alienus

Ohio References: [prob. all partly confused with *neoniger*, q.v.] Ashtabula (Headley, 1943a; E.V. Gregg, 1944), Butler (Gorham, 1956), Delaware (Burns, 1964), Fulton (Fernandes, 1986), Pike (Wesson & Wesson, 1939), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943; E. V. Gregg, 1944), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Wilson, 1955).

Comments: Probably found in every woodland in Ohio, this is one of the two most common ants in Ohio. See

Wilson (1955) for detailed discussion. The common name of "Cornfield Ant" simply does not apply to this species and will not be used here (see *L. neoniger*). This species may occasionally become a house pest.

75 *Lasius (L.) neoniger* Emery
Cornfield Ant

Lasius niger var. *neoniger* Emery, 1893

Identification: TL 2.6-3.8 mm. Yellowish-brown to medium brown, mandibles paler (yellowish-brown), antennae and legs brownish-yellow, femora broadly infuscated medially; head, alitrunk, and gaster micropunctate with covering of micropubescence giving a grayish or silvery sheen, surface moderately dull to weakly glossy. The more abundant pilosity of *L. neoniger*, as outlined in the key, will serve to distinguish this species from *alienus* in our area. This species is consistently paler in color, more pilose, and has a denser covering of appressed pubescence (producing a whitened or dull appearance) as compared to *alienus* (q.v. for further comments). The presence of erect hairs on scapes and tibiae, if present, is diagnostic for *neoniger* in Ohio, but very frequently they are nearly or completely absent, and thus are useless as a key character.

Taxonomy: See *L. alienus* for comments. Most of the Ohio literature confused these two common species.

Ecology:

— Habitat: Found in open lawns, fields, meadows, and near woods' edges, but not normally in woods. Wilson (1955) says "it is frequently the dominant ant in grassy road strips, lawns, cultivated fields, and other disturbed situations . . . making it one of the most abundant and conspicuous insects within its range."

— Food Resources: On bloom of *Pastinaca sativa* (GAC 1893); often taken at bait. Fosters subterranean honeydew excreting insects, but is largely carnivorous (see Headley, 1941; Wilson, 1955).

— Associates: The relationship to this species and the cornroot aphid (*Aphis maidiradicus*) is well known (see Wilson, 1955 for summary). Burrill & Smith (1919) record *Aphis forebesii* on strawberry in Wisconsin.

— Ant Associates: Host to temporary social parasites *Acanthomyops latipes* and *A. murphyi* (see Wheeler et al., 1994), and *Lasius umbratus* (see D.R. Smith, 1979).

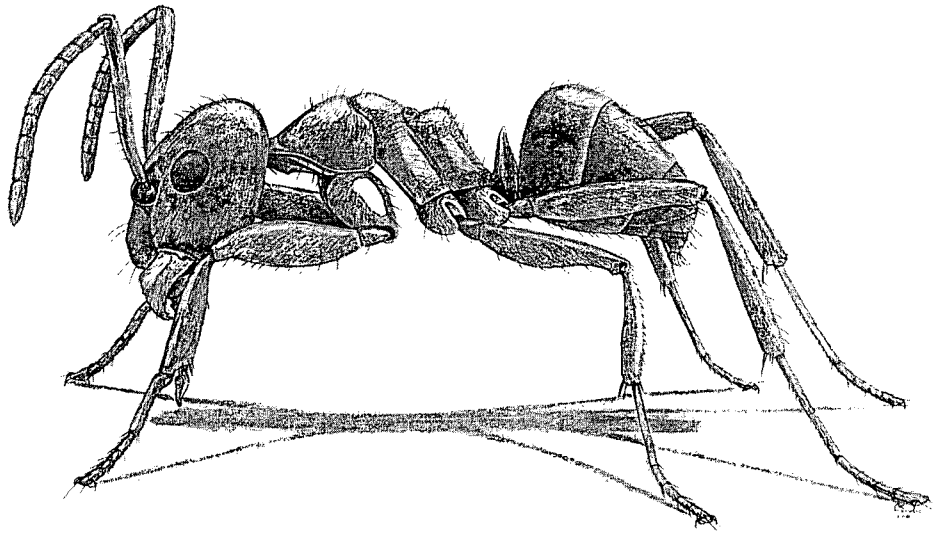
Behavior: Workers found foraging on ground and on foliage in open, and less commonly on tree trunks. They may use feeding trails. In warmer weather they are much more active at night (see Talbot, 1946 for details). This species seems to be very hostile toward *Formica nitidiventris* (see Headley, 1941).

Nests: Usually in soil, entrance marked by small conical mound or crater of granular soil; less frequently under rocks.

— Colony Organization: With single queen (monogynous) (Hölldobler & Wilson, 1990). Colonies may be large with numerous small, crater-like openings in an area (Headley, 1941), then are reduced to a central core at the end of the season (Hölldobler & Wilson, 1990).

— Reproductives: Males - July 2-Sept. 20. Females - Apr. 20; July 2-Oct. 4. Males swarming from nest entrance Sept. 1 (GAC 2340 #29). Talbot (1945a) describes the flight of reproductives from Aug. 30 to Sept. 28.

Hölldobler & Wilson (1994) nickname this species the "Labor Day ant." During the end of Aug. and the first few weeks in Sept., if rain has recently fallen but it is now sunny and the air is warm, still, and humid, vast swarms of winged males and females emerge from their nests around 5:00 PM for a vast mating flight lasting just an hour or two until

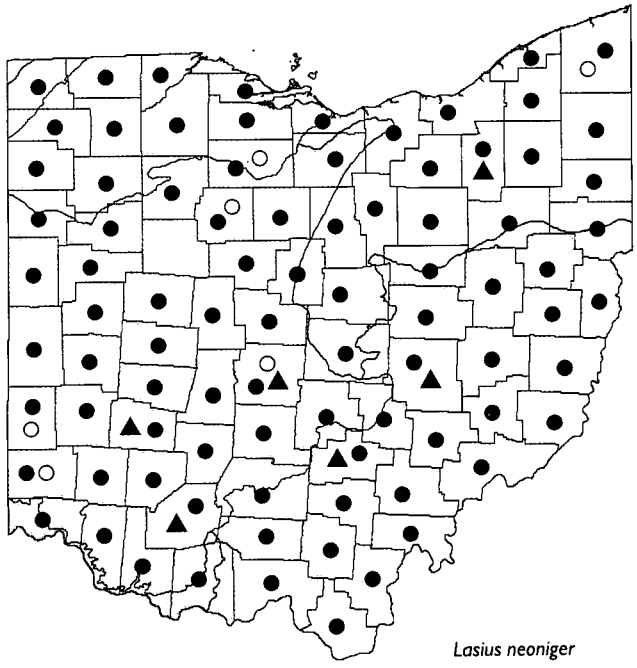


***Lasius (L.) neoniger* Emery.** Drawing by Holly K. Coovert.

twilight. Mating takes place during flight, then the newly mated females land, shed their wings, then search for a suitable place to dig their nest in the now moist soil. But few survive the gauntlet of aerial and ground predators.

Range: Quebec, Maine south to northern Florida, across southern Canada west to Idaho, Wyoming, Colorado, New Mexico; disjunct populations in California (Sierras); Alaska (?).

Ohio Distribution: Recorded statewide from 87 counties.



Lasius neoniger

Ohio References: [prob. all partly confused with *alienus*, q.v.] Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Franklin (Headley, 1941), Preble (Gorham, 1956), Seneca (Talbot, 1943a, 1945a, b - misidentified as *alienus*), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Wilson, 1955).

Comments: This is the dominant ant of open lawns and fields in our area, and is replaced in woodlands by *L. alienus*. It is one of the two most common species in Ohio, and likely one of the most common of all insects in our area. The common name of "Cornfield Ant," "officially" applied to *L. alienus*, which is a woodland species, was obviously intended to be used for *L. neoniger* and was based on misidentifications. I am taking the bold step here of properly utilizing this common name where it was intended, for *Lasius neoniger*.

Lasius (*L.*) *pallitarsis* (Provancher)

Formica pallitarsis Provancher, 1881
Lasius niger sitkaensis Pergande, 1900

Identification: TL 3.5-5.1 mm. Pale to dark yellowish-brown, clypeus and/or mandibles often paler, antennae and legs paler (brownish-yellow), femora weakly infuscated; head, alitrunk, and gaster micropunctate with covering of micropubescence giving a grayish or silvery sheen, surface weakly glossy. The only member of *Lasius (Lasius)* with one or more offset teeth at the basal angle of the masticatory border of the mandible. In pilosity, this species closely resembles *neoniger*, but *pallitarsis* is found to the north and throughout the west and has not been found in Ohio.

Taxonomy: See Wilson (1955).

Ecology:

— Habitat: Mostly found in forested areas (Wilson, 1955). In Michigan reported from low fields, bogs, swamps and marshes (Wheeler et al., 1994).

— Food Resources: Generalized, including tending aphids and scavenging dead insects (Wilson, 1955).

— Associates: See Wheeler & Wheeler (1963) for lists of North Dakota associates.

— Ant Associates: Host to temporary social parasite *Lasius minutus* and *L. umbratus* (Wheeler et al., 1994), and *L. subumbratus* (fide Wilson, 1955).

Behavior: Further data lacking.

Nests: In rotting logs and stumps or under stones (Wilson, 1955). In mounds of soil (Wheeler et al., 1994).

— Colony Organization: Further data lacking.

— Reproductives: Winged forms found from early July to late Sept. based on rangewide data (Wilson, 1955).

Range: Nova Scotia, Quebec west to British Columbia, Alaska; Massachusetts west to New York, Michigan, Wisconsin, Minnesota, South Dakota, New Mexico, Arizona, Nevada, California; small disjunct population in North Carolina; Siberia.

Comments: This is essentially a northern and western species, where it replaces *L. alienus*, and is probably not found in Ohio.

Genus *Lasius*, Subgenus *Cautolasius* Wilson

Lasius subgenus *Cautolasius* Wilson, 1955

Identification: This subgenus has the smallest eyes of our *Lasius*.

Revision(s): Wilson (1955).

Key: The key presented in Wilson (1955) relied solely on the obscure character of the maxillary palps in an attempt to deal with a broad range of geographic variation. This is not necessary when dealing with populations in northeastern North America where a number of characters differ. This phenomenon, in which two species become more strongly differentiated in an area of geographic overlap, is known as character displacement (see Hölldobler & Wilson, 1990:431). Thus a much more "user friendly" key is presented which utilizes these "displaced characters." But it should be kept in mind that these features may not apply outside of northeastern North America.

Comments: These small yellowish ants have reduced eyes and are mostly found in logs or soil, being essentially subterranean.

Key to *Lasius (Cautolasius)* of Northeastern North America

1. Antennal scape longer, always surpassing the occipital border of the head; eyes very tiny, consisting of only 9 to 17 facets, usually flattened and flush with surface of head; gena height 4.3 to 4.8 X eye height; head subquadrate, very little narrowed below; scale of petiole usually convex on crest; terminal segment of the maxillary palp usually longer than the penultimate segment ..... ***L. (C.) nearcticus***

   Antennal scape shorter, at most reaching the occipital border of the head; eyes larger, consisting of 13 to 28 facets, usually normally convex and extended out from surface of head; gena height 2.8 to 3.0 X eye height; head subtriangular, distinctly narrowed below; scale of petiole usually emarginate on crest; terminal segment of the maxillary palp at most as long as the penultimate segment ..... ***L. (C.) flavus***

76 *Lasius (C.) flavus* (Fabricius)

Formica flava Fabricius, 1781
Lasius brevicornis Emery, 1893
Lasius flavus myops Forel, 1894
Lasius (Formicina) brevicornis microps Wheeler, 1917

Identification: TL 3.2-3.9 mm. Yellowish-orange to pale orangish-brown, alitrunk paler, mandibles slightly darker with toothed border very dark, antennae and legs concolorous; head, alitrunk, and gaster micropunctate with covering of fine micro-pubescence giving a grayish or silvery sheen, surface moderately dull. This species has the eyes larger and more convex, with shorter scapes, and a broader, narrowed head than *nearcticus*. Additionally, the color tends to be darker and the queens are consistently larger.

Taxonomy: Ohio records used the synonymous name *brevicornis*. See Wilson (1955).

Ecology:

— Habitat: "Found occasionally in dry woods, usually under stones." (Wesson & Wesson, 1940). In Michigan in grasslands and open woods (Wheeler et al., 1994). Wilson (1955) reports dry to moist open woods with bare to thinly covered soil.

— Food Resources: Workers may attend aphids on roots of grasses. (D. R. Smith, 1979).

— Associates: Tends root aphids of grasses (Wheeler & Wheeler, 1963).

Behavior: A subterranean ant.

Nests: Nests in various situations but most often under stones. Known to build mounds in northern Eurasia. (Wilson, 1955).

— Colony Organization: Colonies founded by 2 or more queens, but once established, they spread out in the nest to reduce interaction; queens can live as long as 22 years (Hölldobler & Wilson, 1990). In Tennessee colonies are "usually not large and consist of at most one hundred individuals" (Cole, 1940b).

— Reproductives: Alates appear about the middle of Aug. in Connecticut (Wheeler, 1916).

Range: Nova Scotia, New Brunswick, Quebec south to North Carolina, Alabama, west to Alberta, Washington, Oregon, California; Eurasia.

Ohio Distribution: Recorded only from Summit Co. plus an unspecified southcentral Ohio record.

Lasius flavus

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

Comments: More typical of northern areas, this species has been rarely taken in Ohio. This Holarctic (northern parts of Europe and North America) species was described by the famous Danish zoologist Otto Fabricius (1744-1822). See the discussion in Wilson (1955) concerning geographic variation in *L. flavus* and its strong differentiation with *L. nearcticus* where the ranges of the two species overlap.

77 *Lasius (C.) nearcticus* Wheeler

Lasius flavus nearcticus Wheeler, 1906

Identification: TL 2.9-3.6 mm. Pale yellow to orangish-yellow, alitrunk very slightly paler in some, mandibles slightly darker with toothed border very dark, anten-

nae and legs concolorous; head, alitrunk, and gaster micropunctate with covering of fine micropubescence giving a faint grayish or silvery sheen, surface moderately dull. The tiny eyes, longer antennal scapes, and subquadrate head should easily distinguish this species from *flavus*. Besides the characters outlined in the key, *nearcticus* tends to be paler in color (a very pale yellow).

Taxonomy: Formerly considered a subspecies of *L. flavus*; see Wilson (1955) for full discussion.

Ecology:

— Habitat: Found in woods and open woods. Wesson & Wesson (1940) report upland woods. Wilson (1955) reports moist to dense woods with thick litter and humus cover.

— Food Resources: Probably primarily honeydew.

— Associates: Further data lacking.

Behavior: Workers found foraging in leaf litter in woods.

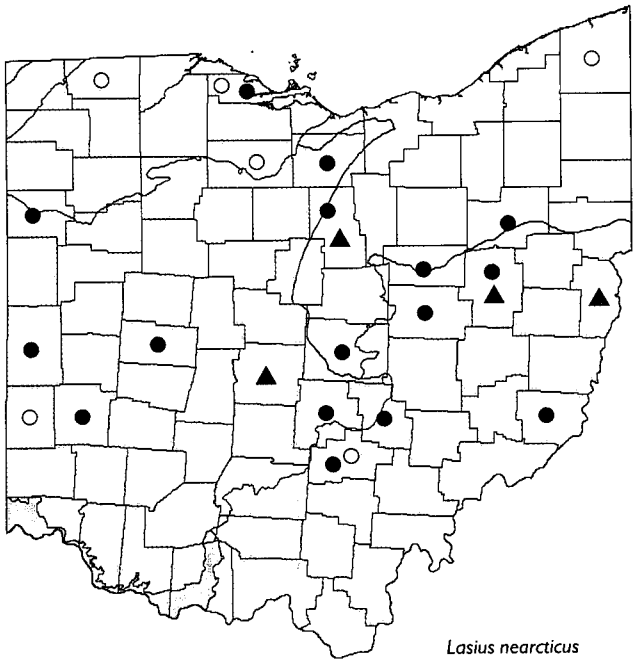
Nests: In soil under rocks and logs.

— Colony Organization: Colonies are small.

— Reproductives: Males - Aug. 11-Sept. 13. Females - Aug. 11-Sept. 13.

Range: Quebec, Ontario south to North Carolina, Tennessee, west to Michigan, South Dakota, Wyoming, Colorado.

Ohio Distribution: Widespread in Ohio. Recorded from 22 counties.



Lasius nearcticus

Ohio References: Ashtabula (Headley, 1943a), Fulton (Fernandes, 1986), Hocking (Williams, 1961), Ottawa (Wilson, 1955), Preble (Gorham, 1956), Seneca (Headley, 1952), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This is essentially a subterranean ant with reduced eyes. It is our most common species of this subgenus. The species name refers to the Nearctic (North America north of Mexico) biogeographic province, in which this species is endemic.

Genus *Lasius*, Subgenus *Chthonolasius* Ruzsky

Chthonolasius Ruzsky, 1913

Identification: This subgenus has medium-sized eyes as outlined in the key above.

Revision(s): Wilson (1955).

Key: See comments below.

Comments: These ants have somewhat reduced eyes and are essentially subterranean.

Key to *Lasius* (*Chthonolasius*) of Northeastern North America

1. 2nd gastral tergite almost completely devoid of appressed pubescence at least medially, and only a few scattered erect hairs present, the surface extremely smooth and very glossy ..... ***L. (Ch.) speculiventris***

   2nd gastral tergite with uniform covering of moderately abundant to dense appressed pubescence and numerous erect hairs, the surface often at least somewhat dulled **2**

2. 1st gastral tergite with abundant, long hairs, the longest hairs from the middle (excluding the longer posterior row) often as long or longer than the width of hind tibia medially; eyes relatively large, height of gena 2.0 to 2.1 X eye height; 3rd gastral tergite with appressed pubescence dense, as dense as that on 2nd tergite; very small species, total length ca. 3.2 to 4.0 mm ..... ***L. (Ch.) minutus***

   1st gastral tergite with somewhat shorter, often less abundant hairs, the longest hairs from the middle (excluding the longer posterior row) never as long as the width of hind tibia medially; eyes smaller, height of gena 2.4 to 3.2 X eye height; 3rd gastral tergite with appressed pubescence relatively sparse, often distinctly sparser than that on 2nd tergite (or 2nd equally sparse); size variable, often larger **3**

3. Eyes relatively small, height of gena 3.0 to 3.2 X eye height; scapes and tibiae usually with at least a few erect hairs; gula with erect hairs abundant; appressed pubescence of gaster sparse, not obscuring the glossy surface; color yellow ("clear yellow") ..... (*L. (Ch.) subumbratus*)

   Eyes relatively large, height of gena 2.4 to 2.7 X eye height; scapes and tibiae lacking erect hairs; gula with erect hairs sparse to absent; appressed pubescence of gaster variable, usually dense and partially concealing glossy surface; color brownish-yellow ..... ***L. (Ch.) umbratus***

78 *Lasius (Ch.) minutus* Emery

Lasius umbratus minutus Emery, 1893

Identification: TL 3.2-4.0 mm. Pale to medium orangish-brown, mandibles concolorous or slightly paler, margins darkened, antennae and legs concolorous; head, alitrunk, and gaster micropunctate with covering of fine micropubescence giving a grayish or silvery sheen, surface moderately dull to weakly glossy. The very long hairs of the gaster, the dense gastral pubescence, and the relatively large eyes combine to differentiate this species. The small size alone cannot distinguish *minutus* as I have seen very small *umbratus* specimens, recognized by much shorter gastral hairs and smaller eyes.

Taxonomy: See Wilson (1955).

Ecology:

— Habitat: Prefers to nest in sphagnum bogs and swampy meadows, but also occurs in dry, open forests (Wilson, 1955).

— Food Resources: Primarily or entirely honeydew (Kannowski, 1959a).

— Associates: Tend aphids (*Prociphilus* sp.) on grass and sedge roots in Michigan (Kannowski, 1959a).

— Ant Associates: Temporary social parasite of *Lasius alienus* and *L. pallitarsis* and host of temporary social parasite *Lasius speculiventris* (see Wheeler et al., 1994).

Behavior: See Kannowski (1959a).

Nests: Nests most often in large mounds or masonry domes, rarely in logs (Wilson, 1955).

— Colony Organization: Kannowski (1959a) found that colonies consist of one or more mounds (i.e. polydomous) in Michigan

— Reproductives: Further data lacking.

Range: Nova Scotia, Quebec, Maine south to Virginia, west to Michigan, Minnesota, Iowa.

Lasius minutus

Ohio Distribution: Recorded only from Lucas Co. in Ohio. At its regional southern range limit in Ohio.

Ohio References: Lucas (Wilson, 1955).

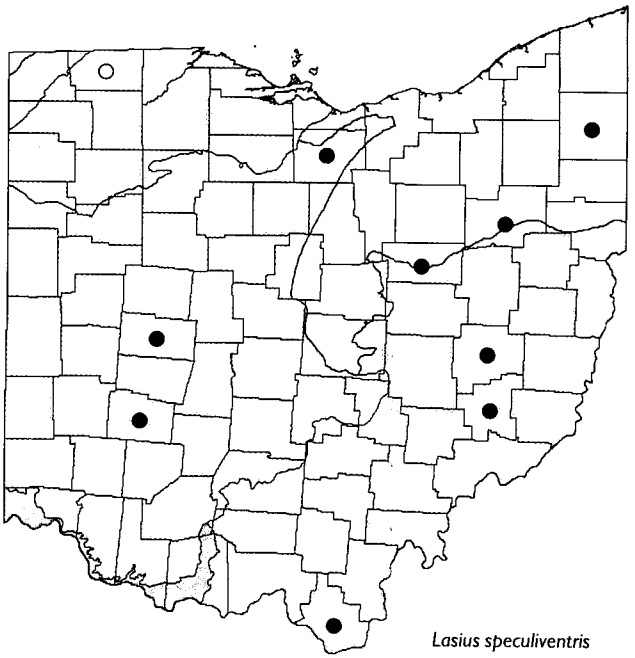
Comments: A northern species that is rare in Ohio. The self-explanatory species name of *minutus* is characteristic of this species.

79 *Lasius (Ch.) speculiventris* Emery

Lasius speculiventris Emery, 1893

Identification: TL 4.5-5.2 mm. Yellowish- to usually orangish-brown, alitrunk slightly paler, gaster dorsally somewhat darker, mandibles darker, edged with black, legs slightly paler; head, alitrunk, and gaster micropunctate with relatively sparse covering of fine micropubescence giving a very faint grayish or silvery sheen, surface moderately glossy, 2nd gastral tergite almost completely devoid of appressed pubescence at least medially, surface thus smooth and very glossy, sometimes this bare area more extensive. This is a very distinctive species, recognized by the very glossy, large area of the gaster devoid of appressed pubescence, and the reduced number of erect hairs. In many specimens, the scapes have the pubescence suberect, not appressed, and there may also be some longer suberect hairs.

Taxonomy: See Wilson (1955).



Lasius speculiventris

Ecology:

— Habitat: Found in woodlands. Also reported from pastures or wooded areas (D. R. Smith, 1979) and moist woods and swamps (Wheeler et al., 1994).

— Food Resources: Probably largely honeydew.

— Associates: Further data lacking.

— Ant Associates: Temporary social parasite of *Lasius minutus* (Wheeler et al., 1994).

Behavior: Workers not normally found above ground.

Nests: Under log and under bark of logs. "Nests have been found under rocks and in rotting wood" (D. R. Smith, 1979). "In mounds of soil" (Wheeler et al., 1994).

— Colony Organization: Further data lacking.

— Reproductives: Females - Aug. 21-Sept. 20. Stray dealate females Sept. 9-19.

Range: Quebec, New Jersey, Pennsylvania, Ohio, Michigan, Illinois, west to Minnesota, Iowa, Kansas.

Ohio Distribution: Widespread. Recorded from 10 counties.

Ohio References: Fulton (Fernandes, 1986), Ohio (Gorham, 1956), both unpublished.

Comments: This beautiful, distinctive species represents a new state record for Ohio. The species name ("mirror belly") refers to the glossy surface of the gaster.

Lasius (Ch.) subumbratus Viereck

Lasius umbratus subumbratus Viereck, 1903

Identification: TL 3.8-4.7 mm. Pale yellow to orangish-yellow, alitrunk slightly paler in some, mandibles darker, margins darkened, antennae and legs concolorous; head, alitrunk, and gaster micropunctate with fine covering of micropubescence giving a grayish or silvery sheen, surface weakly glossy. This species has the smallest eyes of our *Chthonolasius* (but has distinctly more facets than our *Cautolasius*). The greater abundance of erect hairs, sparser gastral pubescence, and yellow color will differentiate it from *umbratus*. In addition, *subumbratus* has somewhat longer erect hairs on the gaster, and averages larger in size.

Taxonomy: See Wilson (1955).

Ecology:

— Habitat: Found in meadows and forests (Wilson, 1955).

— Food Resources: Probably primarily honeydew.

— Ant Associates: A temporary social parasite of *Lasius pallitarsis* - (see Wilson, 1955).

Behavior: See Wilson (1955) for description of social parasitism.

Nests: Under stones or rotting logs (Wilson, 1955); and in soil (Wheeler et al., 1994).

— Colony Organization: New queens start colonies by gaining admission to established nests of *Lasius pallitarsis*.

— Reproductives: Females - Aug. 5, nuptial flight (Maine) (Wing, 1939); July 6 or 7 (New Mexico) (Wilson, 1955).

Range: Nova Scotia, Quebec, Maine west to northern Michigan, Saskatchewan, Washington, Oregon, south in the moutains to New Mexico, Arizona, Nevada.

Comments: This is a northern and western species unlikely to be found in Ohio but included for completeness.

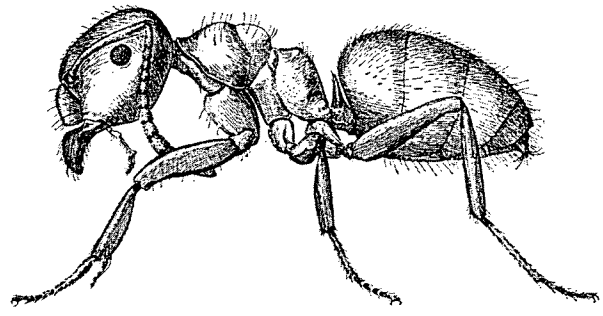
80 *Lasius (Ch.) umbratus* (Nylander)

Formica umbrata Nylander, 1846
Formica mixta Nylander, 1846
Formica aphidicola Walsh, 1862
Lasius umbratus epinotalis Buren, 1944
Lasius (Chthonolasius) umbratus mixtus aphidicola Walsh

Identification: TL 3.9-4.9 mm. Yellowish-brown to orangish-brown, head and gaster often darkened dorsally, mandibles concolorous with margins darkened, legs paler; head, alitrunk, and gaster micropunctate with fine covering of micropubescence giving a faint grayish or silvery sheen, surface weakly glossy. This species is variable in the density of the pubescence and pilosity, but should readily key out. The appressed pubescence of the gaster never approaches the sparsity of *speculiventris*, usually being dense on the first and second tergites and thinner on the third. The eye size and length of erect hairs on the gaster will differentiate it from *minutus* and *subumbratus*.

Taxonomy: Most earlier Ohio literature used the archaic quadrinomial (see synonymy above). See also Wilson (1955).

One series of 14 workers from Scioto Co. (GAC 2292 #17) seems quite different. They are distinctly smaller (total length ca. 3.4 mm), have very sparse and longer gastral pubescence (hairs approximately half the length of erect hairs and separated by nearly their own length), and a lower, more rounded propodeum. They key out in Creighton (1950) to his "*subumbratus epinotalis*." That taxon was synonymized by Wilson (1955:167) who dismissed the "unusually sparse gastric pubescence" and propodeal shape as within the range of variation of *umbratus*. I have seen nothing close to this in other Ohio material. Further study is needed, but I reluctantly leave it for now as an extreme of *umbratus*.



***Lasius (Ch.) umbratus* (Nylander).** From Smith (1947a).

Ecology:

— Habitat: Found in woods, open woods, and semi-open areas.

— Food Resources: Generally thought to subsist on honeydew from subterranean root aphids and coccids.

— Associates: Tending white root aphids (GAC 1949).

See Wheeler & Wheeler (1963) for list of aphids on grass roots in N. Dakota. See Park (1932) for a full discussion of myrmecophiles found in Portage Co., Ohio colonies, including the beetles *Philiothermus glabriculus* (Colydiidae), *Ceophyllus monilus* (Pselaphidae), and *Adranes lecontei* (Clavigeridae), plus the aphid *Prociphilus* sp. and the mite *Antennophorus wasmanni*. Seevers & Dybas (1943) discuss the myrmecophilous beetle *Limulodes paradoxus* (Limulodidae).

— Ant Associates: A temporary social parasite of *Lasius alienus*, *L. niger*, and *L. neoniger* (D. R. Smith, 1979). Wheeler et al. (1994) add *L. pallitarsis*.

Behavior: Workers rarely found foraging above ground on tree trunks, usually in rotten wood, leaf litter, or in ground, thus almost exclusively subterranean.

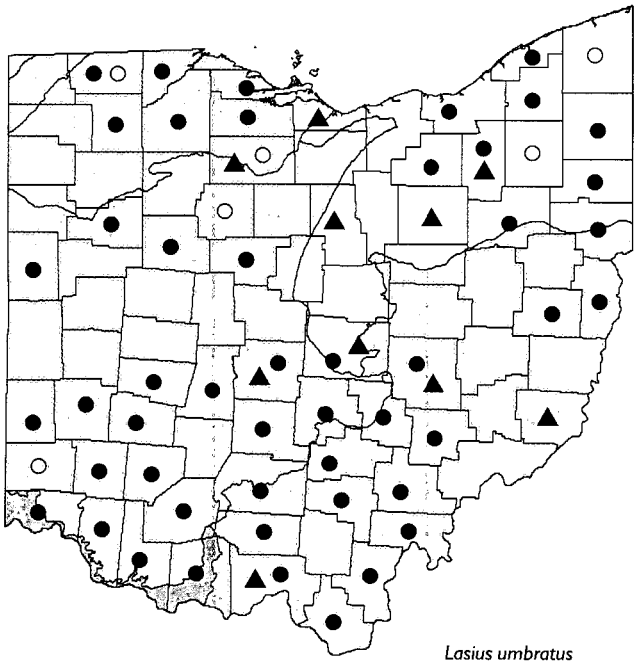
Nests: In soil under rocks, logs, and branches, and in rotten logs and rotten roots of trees. Amstutz (1943) found nests "in the moist roots of grass which was growing at the base of trees in the woods ... and from mounds located near a ditch."

— Colony Organization: Headley (1943a) reports on a nest with a single queen, as does Park (1932). Colonies usually large.

— Reproductives: Males - Aug. 19-Sept. 28. Females - July 2, Aug. 19-Oct. 15. Mating pair, Sept. 10 (GAC 2355 #30). Large swarm, Sept. 10 (GAC 2360 #38). Stray dealate females frequently encountered: Apr. 27, June 11-July 25, Sept. 10-Oct. 11.

Range: Nova Scotia, New Brunswick, Quebec south to Florida, west to Idaho, Utah, Nevada, Arizona; Eurasia.

Ohio Distribution: Statewide. Recorded from 58 counties.



Lasius umbratus

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Portage (Park, 1932), Seneca (Headley, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940),

Comments: Ohio's most common subterranean *Lasius* species, it produces a faint citronella odor. Conspicuous when the numerous winged reproductives are produced. The species name *umbratus* means "shaded, shadowed, covered."

Genus *Acanthomyops* Mayr

Acanthomyops Mayr, 1862

Identification: The short 3-segmented maxillary palp is a diagnostic character for this group. The yellow to orange coloration and relatively coarse hairs are also distinctive. In life, the strong and distinctive citronella (or lemon verbena) odor (expelled from glands in the head) is a very good diagnostic character (weak in only one species of *Lasius*, absent in all others in our area).

Immatures: Larvae pogonomyrmecoid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Wing (1968) provides a detailed revision with keys to workers, males, and females of the Nearctic species.

Key: With the exception of *A. bureni* from Wisconsin and *A. pubescens* from Minnesota, the key presented below covers species from northeastern North America. For these areas and western species, consult Wing (1968).

Comments: This is a group of yellow or orange subterranean ants with a very distinctive odor.

Key to *Acanthomyops* of Northeastern North America

1. Erect hairs on dorsum of 2nd to 4th gastral tergites restricted to posterior edges (these hairs relatively long, 0.23 mm or longer); appressed pubescence on gena relatively dense and crowded, separated by distance ca. 1/2 length of hair; appressed pubescence of dorsum of gaster sparse, most hairs separated by distance equal to length of hair; mandible usually with 1 or more denticles on basal margin; crest of petiole sharp and emarginate; larger species with relatively long scapes (scape length 0.89 mm or longer) ..... ***A. interjectus***

   Erect hairs on dorsum of 2nd to 4th gastral tergites more evenly distributed (these hairs shorter, 0.22 mm or shorter); appressed pubescence on gena sparse to dense (if dense, then gastral pubescence dense); appressed pubescence on dorsum of gaster sparse to dense (if sparse, then pubescence on gena sparse); mandible and crest of petiole variable; smaller species with relatively short scapes (scape length 0.91 mm or less) **2**

2. Many of the erect hairs (especially on dorsum of alitrunk) with plumose tips (feather-like tips, easily seen at higher power, with side branches much longer than thickness of hair shaft); erect hairs on dorsum of gaster relatively abundant, many at least barbulate; relatively small species ..... (*A. plumopilosus*)

   None of the erect hairs with plumose tips, most simple, but some may be weakly to strongly barbulate (i.e. side branches barely longer than thickness of hair shaft); erect hairs on dorsum of gaster sparser, most usually simple; usually somewhat larger species **3**

3. Gula with entire surface bearing numerous (20 to 40) long, erect hairs (seen in side view); crest of petiole (in side view) moderately to very blunt, in anterior (or posterior) view crest straight to convex, not emarginate **4**

   Gula with hairs absent on at least lower 1/4 to 1/2, total present distinctly less than 20; crest of petiole (in side view) moderately to very sharp, in anterior view crest usually with distinct median emargination **5**

4. Erect hairs on dorsum of propodeum about twice as abundant as on pronotum; erect hairs relatively short (only slightly longer than eye height); crest of petiole with numerous short, erect hairs producing brush-like appearance ..... (*A. murphyi*)

   Erect hairs on dorsum of propodeum about as abundant as on pronotum; erect hairs relatively long (distinctly longer than eye height); crest of petiole with few, long, usually somewhat wavy erect hairs, not appearing brush-like ..... ***A. latipes***

5. Appressed pubescence of gena and dorsum of gaster sparse to moderately dense, the hairs on gena separated by their length, those on gaster by at least half their length; fore femora with many erect hairs (6 or more) on lateral (posterior) face ..... ***A. claviger***

   Appressed pubescence of gena and dorsum of gaster moderately dense to dense, the hairs on gena separated by half their length, those on gaster by much less than half their length; fore femora with few or no erect hairs (5 or fewer) on lateral (posterior) face ..... (*A. subglaber*)

81 *Acanthomyops claviger* (Roger)

Smaller Yellow Ant

Formica clavigera Roger, 1862
Lasius (Acanthomyops) parvula Smith, 1934

Identification: TL 3.7-4.5 mm. Brownish-yellow to orangish-brown, head slightly darker, mandibles slightly darker, edged in black, legs slightly paler; body smooth and glossy. This species is recognized by the less numerous erect gular hairs (generally less than 20) and a petiole which usually has a relatively sharp, emarginate crest. *Acanthomyops claviger* can hybridize with *A. latipes* (fide Wing, 1968) and a variant of *A. claviger* can have more numerous gular hairs. I had previously misidentified some *A. claviger* as *A. latipes* based on their moderately blunt petiolar scale, but came to realize that the number of gular hairs was a more reliable character for differentiating these two species. For intermediate or possibly hybrid specimens consult Wing (1968).

Taxonomy: See Wing (1968).

Ecology:

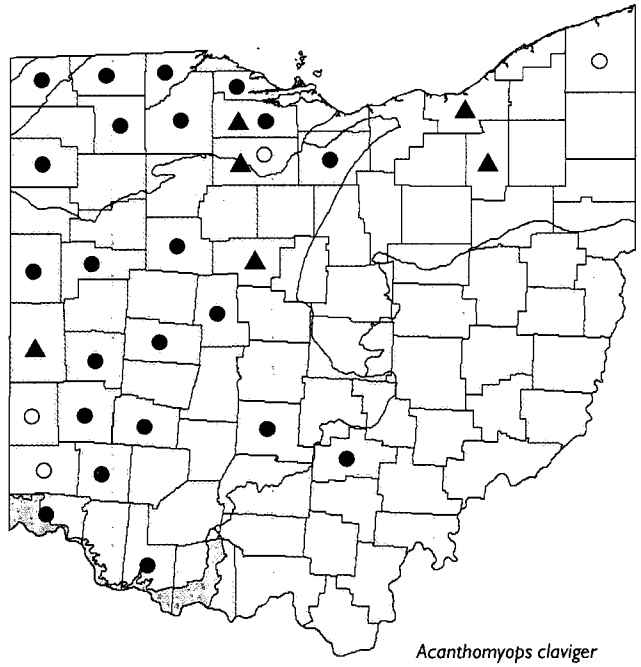
— Habitat: Found in open woods, woods' edges, and semi-open areas. "Found in woodlands, pastures, or open fields" (D. R. Smith, 1979). See Wing (1968) for details.

— Food Resources: Largely or exclusively honeydew from root aphids and coccids.

— Associates: Tends white root aphids (Headley, 1943a). See Wing (1968) for full list of associates. Seevers & Dybas (1943) discuss the mymecophilous beetle *Limulodes paradoxus* (Limulodidae).

— Ant Associates: Associated with *Solenopsis molesta* (GAC 1937). See Wheeler & Wheeler (1963) for list of other species found in N. Dakota.

Behavior: Workers found foraging below ground under rocks or in rotten wood, rarely at bases of trees or on ground. Essentially subterranean.



Acanthomyops claviger

Nests: In soil, usually under rocks and logs and other objects, and in rotten logs. See Talbot (1963) for details.

— Colony Organization: Colonies can be populous.

— Reproductives: Males - Sept. 8-Oct. 8. Females - Sept. 22-Oct. 12. Talbot (1963) describes flights in Michigan from mid-Aug. to early Sept. The resulting dealate queens overwinter above ground in considerable numbers, either singly or in groups (Wing, 1968).

Range: Massachusetts, Ontario, New York south to Florida, west to Minnesota, Nebraska, Kansas, Mississippi.

Ohio Distribution: Recorded from 30 counties in Ohio, mostly glaciated, western Ohio, although the distribution map in Wing (1968) shows a record from southeastern Ohio, plus a recent record from Hocking Co.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Preble (Gorham, 1956), Seneca (Headley, 1952; Talbot, 1963), Ohio (Wing, 1968).

Comments: Our most common yellow ant which has a very strong, distinctive citronella odor and is a common house pest. The species name *claviger* means club-bearer in reference to the antennae.

82 *Acanthomyops interjectus* (Mayr)

Larger Yellow Ant

Lasius (Acanthomyops) interjectus Mayr, 1866

Identification: TL 4.5-5.4 mm. Brownish-yellow to orangish-brown, mandibles darker, edged in black, legs very slightly paler; body smooth and glossy, head with relatively dense appressed micropubescence and less glossy, dorsum of gaster with this pubescence very sparse and thus glossier. This is the most distinctive species in our area, recognized by its larger size and lack of erect hairs on the discs of the 2nd to 4th gastral tergites (but with the usual row on the posterior border). The combination of relatively dense appressed pubescence on the gena and sparse pubescence on the gaster is also diagnostic.

Taxonomy: See Wing (1968).

Ecology:

— Habitat: Found in woods and woods' edges; occasionally under foundations of buildings. "Found in woodlands, pastures or meadows." (D. R. Smith, 1979). See Wing (1968) for further details.

— Food Resources: Largely or exclusively honeydew from root aphids.

— Associates: See Wing (1968) for detailed list.

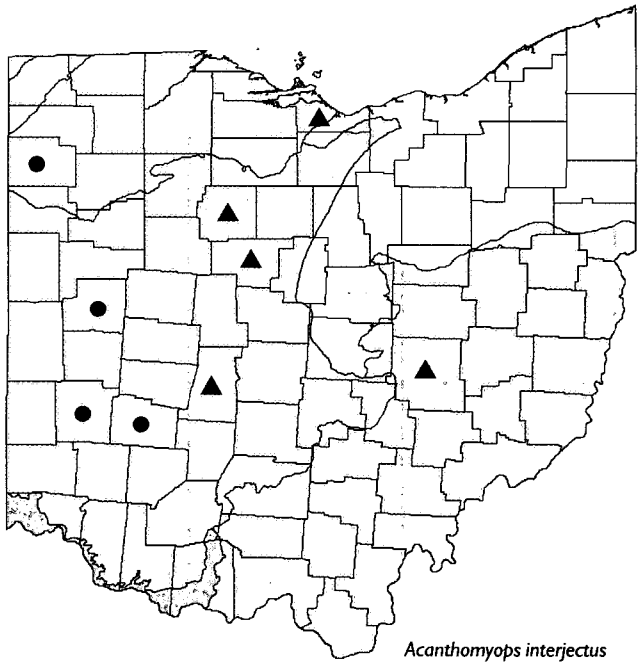
Behavior: Like all *Acanthomyops*, largely or entirely subterranean.

Nests: Under rotten log and in red, rotten logs. "They may nest in exposed soil where the nest is sometimes surmounted by a mound, under stones or other objects, in rotting logs and stumps, or next to foundation walls of buildings." (D. R. Smith, 1979). See Talbot (1963) and Wing (1968) for details.

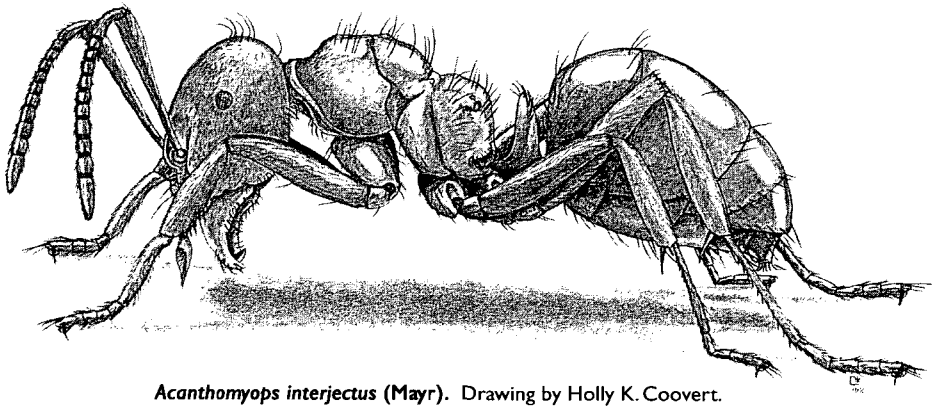
— Colony Organization: Colonies populous.

— Reproductives: Males - Feb. 19, Sept. 22. Females - Feb. 19, Apr. 6, Sept. 23. (spring dates all in buildings). Wing (1968) reports mid-June through Aug. for naturally occurring flights through its range. See also Talbot (1963).

Range: Massachusetts, New York south to Georgia, west to Michigan, Montana, Idaho, Utah, New Mexico.



Acanthomyops interjectus



***Acanthomyops interjectus* (Mayr).** Drawing by Holly K. Coovert.

Ohio Distribution: Recorded from 9 counties in glaciated western Ohio, plus Muskingum Co. which lies on the western edge of the unglaciated region.

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), northcentral Ohio (Wing, 1968), Ohio (Gorham, 1956).

Comments: Our largest species of *Acanthomyops* with the typical, distinctive citronella odor. A frequent house pest that nests next to foundation walls of buildings and is made conspicuous when the winged reproductives swarm. The species name *interjectus* ("thrown between") refers to the supposed transition between *Acanthomyops* and *Lasius*.

83 *Acanthomyops latipes* (Walsh)

Formica latipes Walsh, 1862

Identification: TL 4.2-4.6 mm. Yellow to brownish-yellow, head slightly darker, mandibles darker, edged in black; body smooth and glossy, alitrunk less so due to punctation. This species is most easily confused with *A. claviger*, but *latipes* always has more numerous erect gular hairs which extend to the lower margin of the head and has a blunter petiolar crest which is not emarginate. The two species can hybridize (fide Wing, 1968); see *A. claviger* for more information.

Taxonomy: See Wing (1968).

Acanthomyops latipes

Ecology:

— Habitat: Found in open woodlands, but more frequently in meadows or pastures (Wing, 1968). Talbot (1963) found most nests at edges of woods.

— Food Resources: Like all *Acanthomyops*, presumed to be honeydew from root aphids and coccids.

— Associates: Wheeler & Wheeler (1986) list the mealybug (*Cryptoripersia tuberculata*) in Nevada.

— Ant Associates: Temporary social parasite of *Lasius neoniger*, *L. alienus*, and *L. crypticus* (see Wing, 1968 for more details).

Behavior: Like all *Acanthomyops*, largely or entirely subterranean.

Nests: In exposed soil commonly surmounted by a mound, under stones or other objects, or at the base of stumps (D. R. Smith, 1979). See also Talbot (1963).

— Colony Organization: Apparently colonies are usually large. One described by Talbot (1963) covered an area of 6 x 10 m.

— Reproductives: Flights primarily in early Sept. (see Wing, 1968). Talbot (1963) describes the flights in Michigan as occurring from mid-Aug. to early Sept.

Range: Quebec, Maine, west to British Columbia, south to South Carolina, Tennessee, Illinois, Iowa, Oklahoma, New Mexico, Arizona, California.

Ohio Distribution: A single, unspecified literature record from northwest Ohio (see below).

Ohio References: Northwest Ohio (Wing, 1968).

Comments: A northern and western species rarely found in Ohio. The species name means "broad foot." Described by Benjamin D. Walsh, whose types apparently were destroyed in the Chicago fire of 1871.

Acanthomyops murphyi (Forel)

Lasius (Acanthomyops) Murphii Forel, 1901

Identification: TL 3.2-3.7 mm. Pale to medium orangish- or brownish-yellow, mandibles slightly darker, edged in dark brown or black; body smooth and glossy. The main diagnostic character of this species is the much more abundant hairs on the propodeum as compared to the pronotum. Also the crest of the petiole has a distinctive fringe of hairs. The queens are especially distinctive, with matted, beard-like hair on the head, propodeum, and petiole.

Taxonomy: See Wing (1968).

Ecology:

— Habitat: Found in open woodlands or edges of woodlands, showing a preference for sandy soil (Wing, 1968), while Wheeler et al. (1994) list it from grassy habitats in Michigan, and Cover & Sanwald (1988) list it from open habitats in New York.

— Food Resources: Like other *Acanthomyops*, presumably honeydew from root aphids and coccids.

— Associates: Further data lacking.

— Ant Associates: Temporary social parasite of *Lasius neoniger* (Wing, 1968; Cover & Sanwald, 1988).

Behavior: See below and Cover & Sanwald (1988) for nest founding behavior.

Nests: Usually nests in the soil under or next to stones; nests can be quite large, 5 m or more in extent (Wing, 1968). See also Talbot (1963).
— Colony Organization: Colonies are founded by a newly mated queen invading and killing the host *Lasius neoniger* queen. The parasite queen is then accepted by the host workers. Eventually a pure colony results as the host workers die of attrition. Resultant colonies can be quite large.
— Reproductives: Mostly late July and early August (Wing, 1968). Talbot (1963) describes flights in Michigan during most of August.
Range: New York, Ontario, south to Georgia in moutains, west to Michigan, Saskatchewan, Idaho, northern California, Utah, New Mexico.
Comments: The range is northern with southerly extensions in the mountains; doubtful but possible for Ohio.

Acanthomyops plumopilosus (Buren)

Lasius (Acanthomyops) plumopilosus Buren, 1941

Identification: TL 3.3-3.7 mm. Orangish- to brownish-yellow, mandibles slightly darker, dark-edged, antennae gradually darkened apically; body smooth and glossy. This is the only species of *Acanthomyops* with plumose tips on the hairs. This feature is readily discerned under higher power. The erect hairs on the gaster are also more abundant than our other species.
Taxonomy: See Wing (1968).
Ecology:
— Habitat: Found in forests.
— Food Resources: Like other *Acanthomyops*, presumably honeydew from root aphids and coccids.
— Associates: Further data lacking.
Behavior: Like all *Acanthomyops*, largely or entirely subterranean.
Nests: Found under stones and in rotting logs (Wing, 1968).
— Colony Organization: Wing (1968) discusses possible colony founding modes but nothing definite is known.
— Reproductives: Probably Aug. and Sept. (Wing, 1968).
Range: North Carolina, Michigan, Minnesota, Iowa.
Comments: This aptly named species is easily recognized by the plumose hairs on the body. This is a rare species that has a scattered distribution and could possibly be found in Ohio.

Acanthomyops subglaber (Emery)

Lasius claviger var. *subglaber* Emery, 1893

Identification: TL 3.5-4.7 mm. Orangish-yellow to orangish-brown, mandibles slightly darker, dark-edged, antennae gradually darkened apically; body generally smooth and glossy, genae with relatively dense appressed micropubescence and thus duller; appressed micropubescence on dorsum of gaster relatively dense, imparting a grayish cast. This species is recognized by characters outlined in the key. Especially distinctive is the relatively dense appressed pubescence on the gaster, often giving a grayish cast to the surface.
Taxonomy: See Wing (1968).
Ecology:
— Habitat: Mostly found in woodlands, less frequently in the open (Wing, 1968).
— Food Resources: Like other *Acanthomyops*, presumably honeydew from root aphids and coccids.
— Associates: Further data lacking.
Behavior: Like all *Acanthomyops*, largely or entirely subterranean.
Nests: Mostly under stones but often forms mounds, or in or under rotting logs and stumps (Wing, 1968).
— Colony Organization: Further data lacking.
— Reproductives: Males - Aug. 18 (Michigan). Females - Aug. 8-18 (Michigan). Wing (1968) reports most flights in early to late Aug.
Range: Quebec, Maine south to Georgia, Tennessee, in north west to Saskatchewan, North Dakota, South Dakota.
Comments: The range of this species shown in Wing (1968:124) lies to the north and west of Ohio, but its presence throughout Michigan and northern Illinois indicates that it could be found in Ohio.

Tribe Formicini

Genus *Formica* Linnaeus

Formica Linnaeus, 1758
Serviformica Forel, 1913
Raptiformica Forel, 1913
Formica subg. *Neoformica* Wheeler, 1913
Coptoformica Mueller, 1923

Identification: The characters presented in the key will serve to identify this genus.
Immatures: Larvae pogonomyrmecoid; pupae generally in cocoons (Wheeler & Wheeler, 1976). Certain species may have cocoons and naked pupae together in the same nest.
Taxonomy: I follow D. R. Smith (1979) and subsequent myrmecologists in recognizing species groups rather then subgenera, although Buren (1968a) does give good support for recognizing *Raptiformica* for the *F. sanguinea* group.
Revision(s): Creighton (1950) remains the only revision and key for the group as a whole, but see revisions of species groups below.
Key: The key below differentiates all of the species groups found in America north of Mexico.

Comments: This is the largest genus of ants in northeastern North America. They are big ants with a diverse array of habits.

Key to Species Groups of *Formica* of America North of Mexico

1. Clypeus with anterior (ventral) border distinctly notched or emarginate medially as a narrow to broad and shallow, often subtriangular, concave impression; body surface dull to feebly glossy; appressed pubescence dense, at least on gaster; bicolored – head and alitrunk yellowish-red, gaster brown to black; propodeum short and distinctly angulate in profile (as viewed from side); [facultative slave makers] .... ***sanguinea* Group**

   Clypeus with anterior border not normally notched (if so, pubescence is very sparse and body glossy); other characters various **2**

2. Propodeum evenly rounded in profile (as viewed from side), dorsum and posterior face (declivity) thus not strongly differentiated; surface generally glossy; slender species **3**

   Propodeum distinctly roundly angulate in profile, dorsum and declivity thus distinctly differentiated; surface usually dull; generally more robust species **4**

3. Antennal scapes shorter, less than 1.25 X head length; 3rd and 4th funicular segments shorter, slightly less than 2 X as long as wide; frontal carinae shorter, about as long as width between them at top, subparallel to slightly diverging; gula and propodeum with at least a few erect hairs; smaller species, total length 3.5 to 5.6 mm ..... ***neogagates* Group**

   Antennal scapes longer, 1.25 to 1.33 X head length; 3rd and 4th funicular segments longer, distinctly more than 2 X as long as wide; frontal carinae longer, usually longer than width between them at top, curved, often slightly converging at top; gula and propodeum with or without erect hairs; larger species, total length 4.5 to 7.8 mm ..... ***pallidefulva* Group**

4. Occipital border distinctly and usually strongly concave (seen in full-face view), especially in larger workers; pronotum roundly-angulate in profile (as viewed from side) ..... ***exsecta* Group**

   Occipital border usually flat or slightly convex, rarely very slightly concave; pronotum evenly and gently convex in profile, not angulate **5**

5. Distinctly bicolored species – head and alitrunk yellowish- to brownish-red and distinctly contrasting with darker gaster (if infuscated, darkened areas not completely masking reddish ground color and upper part of head not darker than dorsum of alitrunk), surface mostly dull; frontal carinae distinctly divergent above, gently angled from lower portions, frontal triangle distinctly glossy in contrast to surrounding area ..... ***rufa* and *microgyna* Groups**

   Usually concolorous blackish-brown to black species (if bicolored, upper part of head darker than alitrunk and lighter areas medium- to yellowish-brown); surface often largely semiglossy; frontal carinae weakly divergent to nearly parallel above, strongly angled from lower portions, frontal triangle usually not distinctly glossy in contrast to surrounding area ..... ***fusca* Group**

Genus *Formica*, Species Group Neogagates

Identification: The characters outlined in the key will identify members of this group. They are generally smaller than members of the related *pallidefulva* group.

Revision(s): Wilson & Brown (1955) provide notes on some of the species, and MacKay et al. (1988) provide a worker key to North American species, except for *F. vinculans* which is discussed in Snelling & Buren (1985).

Key: A number of western species reach Minnesota, but the key below will separate species in the rest of northeastern North America.

Comments: These ants are smaller than typical members of the genus. They are often enslaved by other species.

Key to *Formica* Neogagates Group of Northeastern North America

1. Antennal scape bearing a number of short, very delicate erect, whitish hairs (especially on anterior face of scape; best seen against a black background) ..... ***F. lasioides***

   Antennal scape without erect hairs except for a small group at the extreme tip **2**

2. Alitrunk generally paler than the gaster, often paler than the head; appressed pubescence of gaster moderately long and dense, separated by a distance approximately equal to length of hair .. ***F. vinculans***

   Alitrunk dark and generally concolorous with head and gaster; appressed pubescence of gaster short and very sparse, separated by a distance distinctly greater than length ..... ***F. neogagates***

84 *Formica lasioides* Emery

Formica lasioides Emery, 1893

Identification: TL 4.1-5.0 mm. Dark reddish-brown to brownish-black, alitrunk generally paler, especially ventrally, mandibles somewhat paler, black-edged, antennae paler, especially basally, legs paler, especially apically; body generally smooth and glossy. The tiny erect hairs on the scape, best viewed against a dark background, are diagnostic.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in grasslands (D. R. Smith, 1979); and in fields and woods' edges in Michigan (Wheeler et al., 1994). Buren (1944) found it in woodlands in Iowa.

— Food Resources: Michigan specimen on *Asclepias* bloom (specimen caught by pollenia).

— Associates: See Wheeler & Wheeler (1963) for North Dakota data.

— Ant Associates: Serves as host to *Formica rubicunda*, *F. subintegra*, and *Polyergus lucidus* (D. R. Smith, 1979).

Behavior: Wheeler & Wheeler (1986) report workers as rapid-moving and timid but in larger colonies they are more aggressive with an annoying bite.

Nests: Under stones or in nests with exposed entrances or small craters (D. R. Smith, 1979). See Wheeler & Wheeler (1963) for North Dakota data.

— Colony Organization: Colonies are smaller than *F. vinculans* (see Talbot, 1985), probably composed of a few hundred individuals (Creighton, 1950).

— Reproductives: Further data lacking.

Range: Nova Scotia, Quebec west to British Columbia, south to Massachusetts, Michigan, northern Ohio, South Dakota, Colorado, New Mexico, Arizona, California.

Formica lasioides

Ohio Distribution: Recorded from 2 counties in extreme northwestern Ohio. At its southern range limit in Ohio.

Ohio References: Ohio (Gorham, 1956) - unpublished.

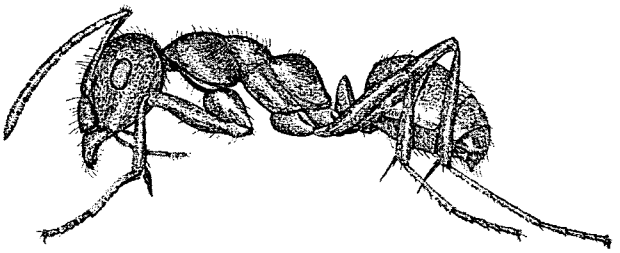
Comments: This typically northern species is readily recognized by the erect hairs on the antennal scape. This represents a new state record for Ohio. The species name means "Lasius-like."

85 *Formica neogagates* Viereck

Formica fusca subpolita var. *neogagates* Emery, 1893
Formica fusca var. *neogagates* Viereck, 1903

Identification: TL 3.7-4.8 mm. Dark reddish-brown to usually brownish-black, alitrunk essentially concolorous, mandibles somewhat paler, black edged, antennae paler, especially basally, legs paler; body generally smooth and glossy. The darker alitrunk and shorter and sparser gastral pubescence will separate this species from *vinculans*.

Taxonomy: Until very recently, combined and confused with *F. vinculans*.



***Formica neogagates* Viereck.** From Smith (1947a).

Ecology:

— Habitat: Found in mesic woods (Wheeler et al., 1994).

— Food Resources: Honeydew, among other things. Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York.

— Associates: See Wheeler & Wheeler (1986) for Nevada species. See also Wheeler & Wheeler (1963).

— Ant Associates: Serves as host to *Formica creightoni*, *F. rubicunda*, *F. subintegra*, and *Polyergus lucidus* (D. R. Smith, 1979 - but *F. vinculans* not recognized).

Behavior: Workers found foraging on ground or on foliage in woods, and can move swiftly. Snelling & Buren (1985) mention that "disturbed workers exhibit panic alarm behavior" in contrast with *F. vinculans* (q.v.).

Nests: Under stones or in the soil in open with or without an irregular mound or crater (D. R. Smith, 1979).

— Colony Organization: Colonies smaller than *F. vinculans* (see Talbot, 1985), probably composed of a few hundred individuals (Creighton, 1950).

— Reproductives: Further data lacking.

Formica neogagates

Range: Nova Scotia, Quebec, west to Alaska, south to North Carolina, Illinois, Iowa, Nebraska, New Mexico, Nevada, Arizona, California [including *F. vinculans* in part].

Ohio Distribution: Recorded from 3 counties in northeastern Ohio.

Ohio References: Ashtabula (Headley, 1943a) - probably this species, but could be *vinculans*; (record repeated by Gorham, 1956).

Comments: A typically northern species, uncommonly found in northeast Ohio. The species name means "new" *gagates*, a close European relative.

86 *Formica vinculans* Wheeler

Formica (Proformica) neogagates var. *vinculans* Wheeler, 1913

Identification: TL 3.5-5.6 mm. Head and alitrunk brownish-orange to yellowish-brown to dark orangish-brown, usually darkened dorsally, gaster darker, dark orangish-brown to brownish-black, mandibles nearly concolorous with adjacent head, dark edged, antennae somewhat paler basally, legs nearly concolorous with adjacent alitrunk; body generally smooth and glossy. The paler alitrunk and longer and denser gastral pubescence will separate this species from *neogagates*.

Taxonomy: Although synonymized in D. R. Smith (1979), Talbot (1975) stated that "it seems to be a good species." It was considered valid in Snelling & Buren (1985:76) and subsequently in Wheeler et al. (1994). I certainly agree that this is a valid species. The type locality is Rockford, Illinois. Part of the records for *F. neogagates* certainly apply to this species.

Ecology:

— Habitat: Found in open fields, mowed areas, and meadows. Listed for *F. neogagates* "in grasslands in dry and stony situations" (D. R. Smith, 1979). Snelling & Buren (1985) state "apparently always in open, sunny, prairie-like locations."

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Serves as host to *Formica gynocrates* (D. R. Smith, 1979), and probably others, as *F. vinculans* was not previously differentiated from *F. neogagates* (q.v.).

Behavior: Workers found foraging on ground or pavement in open. "When nests are disturbed the workers display aggressive alarm" (Snelling & Buren, 1985).

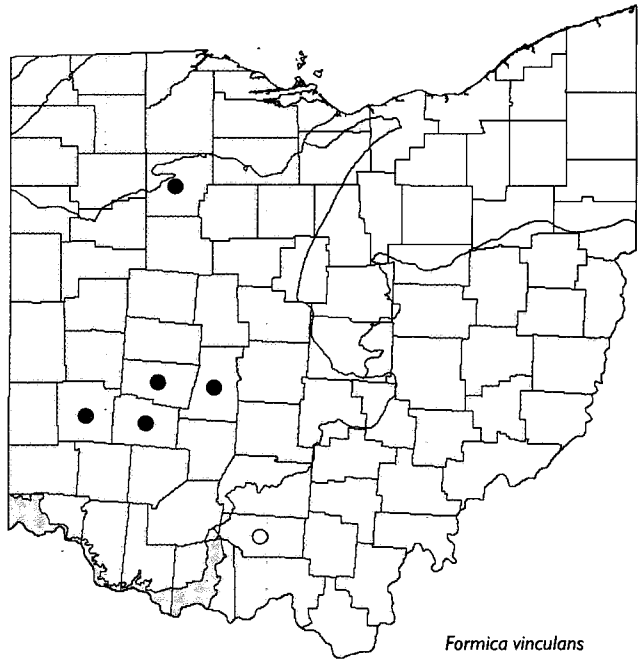
Nests: Under piles of organic debris. In soil (Wheeler et al., 1994).

— Colony Organization: Colonies are more populous than *F. neogagates* (Snelling & Buren, 1985).

— Reproductives: Male - July 29 (July 2, Michigan).

Range: Michigan, Ohio, Illinois [prob. more extensive; see *F. neogagates*].

Ohio Distribution: Recorded from 6 counties in western Ohio.



Formica vinculans

Ohio References: Pike (Wesson & Wesson, 1940) - probably this species, but could be *neogagates*.

Comments: This recently recognized species is a new state record and the most commonly encountered species in this group.

Genus *Formica*, Species Group Pallidefulva

Identification: Members of this group are generally more slender and glossy than other species of *Formica*. The rounded propodeum and longer scapes will further aid in identification.

Revision(s): Creighton (1950), with key to workers. This group is in need of revison.

Key: The revised key below uses the more obvious character of the appressed pubescence of the gaster rather than petiolar shape in the first couplet.

Comments: These are slender, fairly active species of ants with longer antennae than the previous group.

Key to *Formica* Pallidefulva Group of Northeastern North America

1. Short, appressed pubescence on gaster dorsally long and abundant, separated by distance subequal to approximately half the length of hair, giving gaster a silky appearance **2**

   Short, appressed pubescence on gaster dorsally very short and sparse, separated by distance usually greater than length of hair, giving abdomen a glossy appearance **3**

2. Gastral pubescence dense and partially obscuring the surface sculpture; gaster little or no darker than the alitrunk ..... (*F. schaufussi dolosa*)

   Gastral pubescence not dense enough to obscure the surface sculpture; gaster usually darker than the alitrunk ..... ***F. s. schaufussi***

3. Color clear golden yellow to orangish-yellow, the gaster little or no darker than the alitrunk, its surface feebly glossy ..... ***F. pallidefulva***

   Head and alitrunk reddish- or yellowish-brown to piceous brown, the gaster distinctly darker, its surface moderately glossy ..... ***F. nitidiventris***

87 *Formica nitidiventris* Emery

Formica pallide-fulva nitidiventris Emery, 1893
Formica pallide-fulva schaufussi var. *incerta* Emery, 1893
Formica pallide-fulva fuscata Emery, 1893
Formica pallidefulva nitidiventris Emery
Formica pallidefulva nitidiventris fuscata Emery
Formica pallidefulva schaufussi incerta Emery

Identification: TL 4.5-6.8 mm. Typically head and alitrunk dark yellowish-brown to dark orangish-brown, darkened dorsally, gaster dark brown to nearly black, varying to head dark brown, alitrunk dark brown with paler sutures, or overall dark brown, mandibles nearly concolorous with lower part of head, antennae paler basally, legs paler apically; head and gaster smooth and glossy, alitrunk minutely sculptured and satiny. The short, sparse appressed pubescence on the gaster plus the dark coloration of the gaster, resulting in a bicolored body, will serve to distinguish this species.

Taxonomy: The taxonomy of this species has long been in a confused state. Creighton (1950) brought a great deal of order to the situation by synonymizing several previously recognized varieties under the name *F. pallidefulva nitidiventris* in opposition to *F. schaufussi* and its subspecies *dolosa*. Francoeur (1977) and later Bolton (1996) recognized *F. nitidiventris* as distinct from *F. pallidefulva*, with *incerta* and *fuscata* as synonyms. This current study confirmed the distinctness of *F. nitidiventris* and *F. pallidefulva* early on as both were found sympatrically. In addition, abdominal pile characters (see key) were discovered to differentiate these two from *F. schaufussi*. The difference in petiole shape mentioned by Creighton (1950) is present but not distinct enough to be used in a key.

Ironically, it is now suspected that the two synonyms, *incerta* and *fuscata*, may turn out to be valid biological species. Hölldobler & Wilson (1990:215-16) mention several cases of closely related species pairs, one of which is monogynous (single queen) and the other polygynous (multiple queens), and specifically mention *incerta* and *nitidiventris*, citing Talbot (1948, q.v.). Talbot describes differences in nests, flight times, percentages of pupae enclosed in cocoons, and most importantly, the observation that *F. nitidiventris* (as *F. pallidefulva nitidiventris*) always has a single queen, while *F. incerta* (as *F. pallidefulva schaufussi* var. *incerta*) usually has multiple queens. She mentions the features used to differentiate the two (a few hairs on gula and petiolar border for *incerta*, while *nitidiventris* lacks these), but goes on to state that "individuals vary so much from colony to colony or even within a colony that it is hard to decide whether a certain ant or colony belongs to one group or the other." Wesson & Wesson (1940) likewise had similar experience. I made an earnest attempt to separate these two taxa and searched for additional differences, but nothing obvious and reliable could be found. While I feel that *incerta* is a distinct biological species, there is simply no reliable way to differentiate the two at this time. Extremes can be assigned to one name or the other, but invariably, intermediates will be found. Until a detailed taxonomic revision delineates reliable characters, it is felt that these two are best considered members of a species complex. Note that Wheeler et al. (1994), in their Michigan list, recognize only *F. pallidefulva nitidiventris*, even though Talbot's material came from Michigan.

The other member of this group, known for many years as *F. pallidefulva nitidiventris* var. *fuscata*, is more-or-less uniform dark brown as opposed to the bicolored *nitidiventris*. Furthermore it is a woodland species in contrast to *nitidiventris* which is generally found in open fields. When colonies of this form were encountered, the correlation of color and habitat seemed more like specific differences than merely varietal. But again, a search for useful characters was unsuccessful and intermediates were likewise found. Like *incerta*, I also feel that this form will eventually turn out to be a valid biological species. Further research is needed,

but until reliable characters are found, this form will be considered synonymous with *nitidiventris*.

Chromosome or DNA work could be potentially quite helpful in resolving this probable species complex.

Ecology:

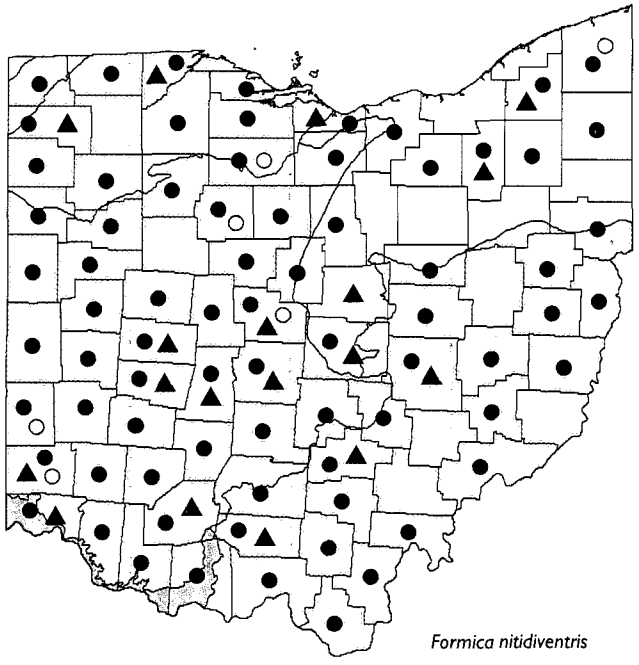
— Habitat: (*nitidiventris*): Found in open fields, mowed areas, meadows, and woods' edges; (*fuscata*): open woods.

— Food Resources: On bloom of *Pastinaca sativa* (GAC 1893), *Asclepias syriaca* (GAC 1904 - note pollinia on one leg), *Daucus carota* (13 GAC records), *Solidago* sp. (GAC 1953, 1962, 1965, 2174), honeydew (below); often taken at bait. Seeds of myrmecochore *Uvularia perfoliata* (see Beattie & Culver, 1981).

— Associates: With staphylinid *Xenodusa cava* in nest (Kennedy coll.); staphylinid inquinlines ? (GAC 1778), aphids on *Lactuca* (GAC 1940). Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*). Wood (1982) reports tending the membracid *Enchenopa binotata*.

— Ant Associates: Observed raids by *F. rubicunda* (GAC 2102 #15, in which alate females were flushed out), and *Polyergus lucidus* (GAC 1820). Found in mixed colony with *Formica pergandei* (along with *F. subsericea*) (GAC 1971 #12, poss. GAC 2145 #18), *F. pergandei* (GAC 2124 #16) and *Polyergus lucidus* (GAC 1867). D. R. Smith (1979) additionally lists *F. nitidiventris* as serving as host to *F. subintegra* and *Polyergus breviceps*.

Behavior: Workers found foraging on ground, tree trunks, or foliage, and can run rather swiftly. Workers are most active midday (see Talbot, 1946 for details).



Formica nitidiventris

Nests: (*nitidiventris*): In ground, with single or often multiple entrances; (*incerta*): normally with single entrance; entrances ca. diameter of pencil, often with granular soil pile spread out; (*fuscata*): under rocks, logs, or bark. See Talbot (1948).

— Colony Organization: With single or multiple queens (see discussion above) and up to 2,000 adults (Talbot, 1948).

— Reproductives: Males - July 21. Females - June 28-Aug. 2. Talbot (1945a) describes the flights of alates between July 21-24 in one year and July 12-18 in another.

Range: Ontario, Quebec south to Georgia, west to Wisconsin, South Dakota, Wyoming, Colorado, New Mexico.

Ohio Distribution: Statewide. Recorded from 76 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Delaware (Burns, 1964), Preble (Gorham, 1956), Seneca (Talbot, 1945a; Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940).

Comments: A common, slender, swiftly moving ant of open areas. The species name means "shining belly" in reference to the glossy gaster.

88 *Formica pallidefulva* Latreille

Formica pallide-fulva Latreille, 1802
Formica pallide-fulva var. *succinea* Wheeler, 1904

Identification: TL 5.2-7.2 mm. Pale to medium brownish-yellow to brownish-orange, head and alitrunk slightly darkened dorsally, gaster weakly brown-tinged, mandibles slightly darkened, antennae distinctly darkened apically, legs concolorous with alitrunk; head, alitrunk, and gaster smooth and glossy, propodeum minutely sculptured and satiny. The short, sparse appressed pubescence on the gaster plus the pale, nearly uniform coloration will distinguish this species.

Taxonomy: In some specimens there is a slight infuscation on the gaster, especially apically, but the overall color is still much paler than *nitidiventris*, and this species tends to have more abundant erect pile on the alitrunk than most *nitidiventris*.

Ecology:

— Habitat: Found in open fields and semi-open areas.

— Food Resources: On bloom of *Daucus carota* (GAC 1913, 2347); on apple (GAC 2203). Barton (1986) records visiting extrafloral nectaries of partidge pea (*Cassia fasciculata*) in Florida

— Associates: Further data lacking.

— Ant Associates: Serves as host to *Formica dakotensis*, *F. difficilis*, and possibly *F. pergandei* (D. R. Smith, 1979).

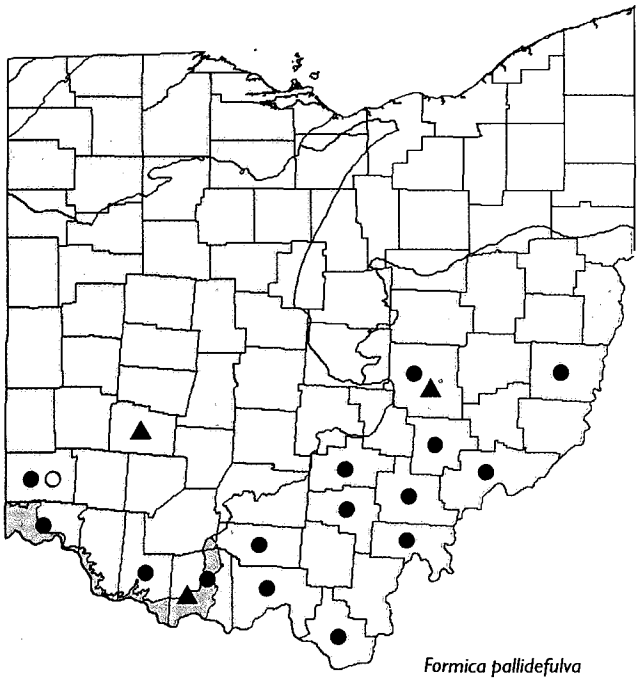
Behavior: Workers found foraging on ground or on tree trunks and can run swiftly. Hölldobler & Wilson (1990) report that workers learned a six-point maze only two or three times slower than laboratory rats.

Nests: In soil. DuBois & LaBerge (1988) note "in soil at base of grass stems, under stones" for Illinois.

— Colony Organization: Workers able to reproduce in queenless nests (Hölldobler & Wilson, 1990).
— Reproductives: Males - June 19. Females - July 18-22.

Range: New York, New Jersey south to Florida west to Ohio, Illinois, Colorado, Oklahoma, Texas.

Ohio Distribution: Recorded from 16 counties in southern Ohio. At its regional northern range limit in Ohio.



Formica pallidefulva

Ohio References: Butler (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940 - as Form no. 1).

Comments: A distinctive species due to its uniform pale coloration. The species name means "pale tawny or reddish-yelow," accurately describing its color. Described by the French entomologist P. A. Latreille in 1802.

Formica schaufussi dolosa Buren

Formica pallide-fulva schaufussi var. *meridionalis* Wheeler, 1904 [preocc.]
Formica pallide-fulva schaufussi var. *dolosa* Wheeler, 1912 [n. name]
Formica (Neoformica) pallidefulva subsp. *dolosa* Buren, 1944

Identification: TL 6.0-7.8 mm. Rather uniformly yellowish-orange, slightly tinged with brown, antennae slightly darkened apically, legs concolorous with alitrunk; head, alitrunk, and gaster smooth, but less glossy due to appressed micropubescence, propodeum minutely sculptured and satiny. The denser gastral pubescence and the paler gaster will distinguish this subspecies.

Taxonomy: Although some Ohio specimens of *F. s. schaufussi* do have a relatively pale gaster, they are not referrable to this subspecies.

Ecology:
— Habitat: Found in bright grassy areas or in open woods in Tennessee (Cole, 1940b).
— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: In soil beneath stones (Cole, 1940b).
— Colony Organization: Further data lacking.
— Reproductives: Males and alate females were in the nests during June in Tennessee A mating flight was observed July 7 (Cole, 1940b).

Range: Virginia south to North Carolina, Tennessee, Florida, west to Iowa, Colorado, Texas.

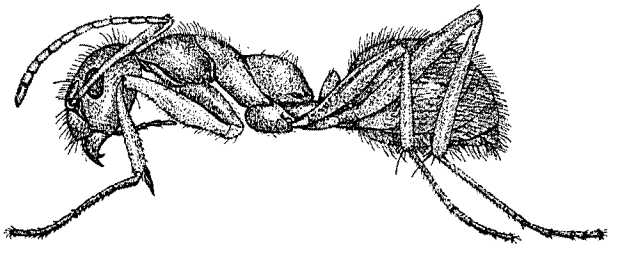
Comments: This subspecies occurs well south of Ohio in the eastern United States, but is included for completeness.

89 *Formica schaufussi schaufussi* Mayr

Formica Schaufussi Mayr, 1886
Formica pallidefulva schaufussi Mayr

Identification: TL 5.8-7.6 mm. Head and alitrunk orangish-yellow to orangish-brown, often faintly darkened with brown dorsally, gaster dark to blackish-brown, sometimes paler on base, mandibles slightly darker, antennae slightly paler basally, legs concolorous; head smooth and glossy, alitrunk and gaster less glossy due to appressed micro-pubescence, propodeum minutely sculptured and satiny. The longer and denser appressed pubescence on the gaster will readily distinguish this species from *pallidefulva* and *nitidiventris*.

Taxonomy: I have found the feature of the shape of the petiole, used by Creighton (1950), too variable to be a useful diagnostic character. Other characters were searched for, resulting in the discovery of the differences in gastral pubescence, which are much more reliable.



***Formica schaufussi schaufussi* Mayr.** From Smith (1947a).

Ecology:
— Habitat: Found in open woods and open fields and meadows, usually on somewhat barren ground. In Michigan listed in grasslands and field edges (Wheeler et al., 1994).
— Food Resources: On bloom of *Daucus carota* (GAC 1913). Generally feeds on honeydew and dead insects (Wheeler, 1913).

—Associates: Host to the larvae of the myrmecophilous syrphid *Microdon ocellaris*, and *M. fulgens* (cf. Duffield, 1981). New Jersey specimen with histerid, *Hetaerius blanchardi*.

—Ant Associates: Serves as host to *Formica rubicunda*, *F. subintegra*, *Polyergus breviceps*, and *P. lucidus* (D. R. Smith, 1979).

Behavior: Workers found foraging on ground or on saplings. Can run swiftly. Wheeler (1913) calls it an "extremely timid ant," fleeing when the nest is disturbed.

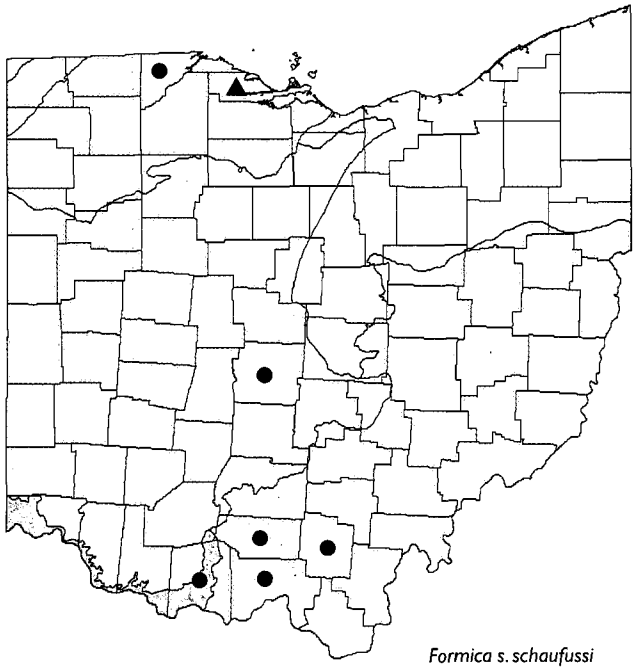
Nests: In soil (large entrance hole marked by downhill soil pile - GAC 2082) or under rocks. See also Cole (1940b).

— Colony Organization: The colonies are, as a rule, populous (Cole, 1940b).

— Reproductives: Males, females - July 25.

Range: Quebec, Ontario south to North Carolina, Tennessee, west to Michigan, Ohio, Indiana, Illinois, Wisconsin, Iowa.

Ohio Distribution: Widespread. Recorded from 7 counties.



Formica s. schaufussi

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940 - as Form no. 2), Ohio (Gorham, 1956).

Comments: Recognized by the longer and denser pubescence on the gaster. Described by Gustav Mayr (1830-1908), one of the major early European myrmecologists.

Genus *Formica*, Species Group Fusca

Identification: Most of the members of this group are concolorous blackish-brown to black. The characters in the key will further identify them.

Taxonomy: This has historically been a difficult group taxonomically. Long known by subspecific and varietal names, members of the *subsericea* complex (sensu Francoeur, 1973) were synonymized by Creighton (1950) due to difficulty in recognition, and justified as a wide range of variation. Francoeur (1973), in his monographic revision of the entire group, raised Creighton's total of 13 species to 33. But recognition was still quite difficult in many cases (see discussion under *glacialis*). The key included herein hopefully alleviates most of these difficulties.

Revision(s): Francoeur (1973), including keys to all castes.

Key: The revised key below places more reliance on the appressed pubescence on the gaster rather than erect pile. This has resulted in a much better understanding of this group for me. The key does not include *F. hewitti* Wheeler, recorded from Maine and northern Michigan, but should work for most other areas of the northeastern United States.

Comments: This is a fairly large group of *Formica* and are usually a solid black. They often build fairly large mounds and are frequently enslaved by members of the sanguinea group.

Key to *Formica* Fusca Group of Ohio

1. Gula with at least 2 erect hairs; abundant erect hairs on pronotum, mesonotum, propodeum, dorsal edge of petiole, and at least a few on mesopleuron; body at least partially brown in color and often bicolored ..... ***F. montana***

   Gula lacking erect hairs; a few erect hairs may be present on pronotum, but all the other mentioned areas lacking erect hairs; body usually concolorous brown to black (appendages often paler) (partially brown or bicolored in one species) **2**

2. Body distinctly bicolored, head and gaster dark brown, alitrunk at least partially yellowish- or reddish-brown, contrasting with darker areas, lower half of head sometimes paler; erect hairs on dorsum of gaster very short; gena rather uniformly covered with coarse, elongate punctures ..... (*F. neorufibarbis*)

   Body concolorous dark brown to black, without contrasting paler areas; erect hairs on dorsum of gaster longer; gena with surface interrupted by coarse, elongate punctures but restricted to posterior area and immediately below eye, or entirely absent **3**

3. Appressed micropubescence on dorsum of gaster relatively dense, usually separated by no more than a hair's width, uniformly distributed on first 3 tergites and imparting a distinct sheen to gaster which obscures underlying glossy black integument **4**

Appressed micropubescence on dorsum of gaster sparser on 3rd tergite (especially medially), hairs distinctly separated by more than a hair's width (often by a hair's length medially) and distinctly sparser than on 1st tergite, the glossy black integument of at least the 3rd tergite not obscured by sheen from micropubescence **6**

4. Gena lacking coarse, elongate punctures posteriorly and immediately below eyes, the surface finely, uniformly microsculptured; 4th tergite with appressed pubescence as dense as on 3rd; body brown to blackish-brown; appressed pubescence on gena and dorsum of 1st 4 gastral tergites dense to very dense, imparting a silvery sheen ..... ***F. argentea***

Gena with surface interrupted by at least a few coarse, elongate punctures posteriorly and immediately below eye; 4th tergite with appressed pubescence sparser than on 3rd; body dark brownish-black to usually black; appressed pubescence on gena and dorsum of first 3 gastral tergites comparatively not as dense, imparting a silky to silvery sheen **5**

5. Normally without erect hairs on pronotum (rarely 1 to 3 very short ones); mesonotum lacking erect hairs; scapes always as long or longer than head, usually distinctly so; larger on average, length of alitrunk 1.85 to 2.95 mm; head more rounded in full-face view, occipital margin distinctly convex, becoming straight medially on the largest workers; [common throughout northeastern United States] ..... ***F. subsericea***

Pronotum normally with 1 to 15 erect hairs, mesonotum with 1 to 5, rarely absent; scapes often shorter than length of head, if longer, not greatly so; smaller on average, length of alitrunk 1.55 to 2.60 mm; head more trapezoidal, occipital margin usually straight but may be slightly convex on smaller workers [restricted to extreme northern portions of northeastern United States and west of Mississippi River] ..... (*F. podzolica*)

6. Erect hairs on 1st gastral tergite (exclusive of posterior row) more abundant, 8 to 32 (average of 17), rarely less than 10; density of appressed pubescence on 1st and 2nd gastral tergites essentially uniform and distinctly denser in contrast to sparser pubescence of 3rd tergite ..... ***F. glacialis***

Erect hairs on 1st gastral tergite (exclusive of posterior row) less abundant, 0 to 13 (average of 5), usually less than 10; density of appressed pubescence on 1st gastral tergite distinctly denser in contrast to sparser pubescence of 2nd and 3rd tergites ..... (*F. fusca*)

90 *Formica argentea* Wheeler

Formica fusca var. *argentata* Wheeler, 1902 [preocc.]
Formica fusca var. *argentea* Wheeler, 1912 [n. name]

Identification: TL 5.7-7.4 mm. Medium brown to blackish-brown, mandibles reddish-brown with black edges, antennae brownish-yellow, legs brownish-yellow to medium brown, darker basally; whole body covered with very dense silvery appressed micropubescence. This species has the heaviest covering of appressed pubescence of all of our *fusca* group members. The uniform density of this covering on the first four tergites along with the lack of the elongate punctures on the gena, plus the somewhat paler color will serve to distinguish it.

Taxonomy: See Francoeur (1973).

Ecology:

— Habitat: Found in open or semi-open situations (D. R. Smith, 1979), and field-woods' edges (Wheeler et al., 1994). See also Francoeur (1973).

— Food Resources: Further data lacking.

— Associates: Host to the larvae of the myrmecophilous syrphid *Microdon lanceolatus* (cf. Duffield, 1981). See Wheeler & Wheeler (1986) for Nevada data.

— Ant Associates: Serves as host to *Polyergus breviceps* (D. R. Smith, 1979).

Behavior: Further data lacking.

Nests: Usually in sandy soil under rocks or with a low mound (D. R. Smith, 1979).

— Colony Organization: Workers able to reproduce in queenless nests (Hölldobler & Wilson, 1990).

— Reproductives: Further data lacking.

Range: Quebec west to British Columbia, south to South Carolina, Ohio, Illinois, Iowa, South Dakota, New Mexico, Arizona, Nevada, southern California.

Formica argentea

Ohio Distribution: Only recorded from Summit Co. in Ohio (see below). At its regional southern range limit in Ohio.

Ohio References: Summit (Francoeur, 1973), Ohio (D. R. Smith, 1979).

Comments: This typically northern and western mountain species is rare in Ohio. The species name *argentea* means silvery in reference to the dense appressed pubescence.

Formica fusca Linnaeus

Formica fusca Linnaeus, 1758
Formica fusca var. *subaenescens* Emery, 1893 [in part]

Identification: TL 4.2-6.1 mm. Dark brownish-black to black, mandibles dark yellowish- to reddish-brown with black edges, antennae paler especially basally, legs paler especially apically except tips; front and top of head, alitrunk, and first gastral tergite covered with dense silvery appressed pubescence, thinner on other areas. The sparser appressed pubescence of the 2nd and 3rd gastral tergites in comparison with the 1st, along with the fewer erect hairs on the 1st, and small size should serve to distinguish this species.

Taxonomy: Francoeur (1973) recognizes two forms: *subaenescens* which is essentially eastern and *marcida* which is mostly western. Much of the literature prior to this was using *Formica fusca* in the broad sense, and could include especially *F. glacialis*, *F. podzolica*, and *F. subsericea*.

Ecology:

— Habitat: Found in forests or open areas (D. R. Smith, 1979), and mesic woods (Wheeler et al., 1994). See Francoeur (1973).

— Food Resources: Further data lacking.

— Associates: Host to the larvae of the myrmecophilous syrphid *Microdon albicomatus* (cf. Duffield, 1981).

— Ant Associates: *Formica fusca* in the old, broad sense is listed as serving as host to a large number of species (D. R. Smith, 1979), but the closely related species in the *F. fusca* group were not differentiated in these records. However, I rather suspect that the ant parasites are no more discerning than earlier mymecologists. These listed social parasites and slave-raiders are: *F. exsectoides*, *F. ulkei*, *F. dakotensis*, *F. querquetulana*, *F. aserva*, *F. pergandei*, *F. rubicunda*, *F. subintegra*, and *Polyergus breviceps*. Wheeler et al. (1994) add *F. nepticula* as a temporary social parasite.

Behavior: Further data lacking.

Nests: Under rocks, logs, in soil, or in rotting wood (D. R. Smith, 1979).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Newfoundland (insular) west to Yukon, south to South Carolina (in mountains), Michigan, northern Illinois, Iowa, South Dakota, New Mexico, Nevada, Arizona, California; Holarctic.

Comments: Another Linnaean species, it was described in 1758. Several earlier Ohio records used the name "*Formica fusca*" but are attributable to *F. subsericea* (q.v.). True *F. fusca* is a northern and western montane species. As it occurs throughout Michigan and in the mountains of West Virginia, it could possibly be found in Ohio. The common name of "Silky Ant" was applied when the taxon *F. fusca* was used in its broad sense and included *F. subsericea*. It is misapplied to *F. fusca* in the strict sense and will be used in this work, instead, where it was intended, for *F. subsericea*.

91 *Formica glacialis* Wheeler

Formica fusca var. *glacialis* Wheeler, 1908

Identification: TL 3.9-6.2 mm. Dark brownish-black to black, mandibles dark reddish-brown with black edges, antennae slightly paler basally, legs slightly paler apically except tips; front and top of head, alitrunk, and first two gastral tergites covered with dense silvery appressed pubescence, thinner on other areas. The sparser appressed pubescence on the 3rd gastral tergite compared with the 2nd, and more abundant erect hairs on the 1st tergite will distinguish this species. Compared to our common *F. subsericea*, *F. glacialis* averages smaller, with somewhat shorter antennal scapes, and the appressed pubescence on the gaster tends to be less dense overall.

Taxonomy: Although differentiated by Francoeur (1973) in his monographic revision of the *fusca* group, there has been obvious problems in recognizing this and related species. Wheeler & Wheeler (1986), modifying Francoeur's key, formally synonymized both *glacialis* and *podzolica* under *subsericea*, obviously showing problems in differentiating the three. But in Wheeler et al. (1994), in their Michigan checklist, they recognized all three, without, of course, saying how. I, likewise, encountered similar difficulties, until I carefully compared the appressed pubescence on the gastral tergites. It was only then that I could readily distinguish this and other members of the group with confidence. The revision of the key herein reflects these observations.

Ecology:

— Habitat: Found in woods, woods' edges, and semi-open areas. In Michigan it is cited from low, moist sites (Wheeler et al., 1994). See Francoeur (1973).

— Food Resources: On bloom of *Daucus carota* (GAC 2154, 2155, 2156, 2173, 2174, 2316), *Solidago* sp. (GAC 2174, 2191), and on smashed apples (GAC 2211). Also utilizes honeydew (below).

— Associates: Tending membracids, *Publilia concava* (GAC 2358 #36). Judd (1978) records tending the aphid *Brachycaudus cardui* on *Onopordum acanthium* in Ontario.

—Ant Associates: Observed raids by *Formica subintegra* (GAC 2316 #10). Found in mixed colony with *Formica pergandei* (GAC 2211 #11). Host to temporary social parasite *Formica ulkei* (Wheeler et al., 1994). See comments under *F. fusca*.

Behavior: Workers found foraging on ground, tree trunks, or on foliage in open woods.

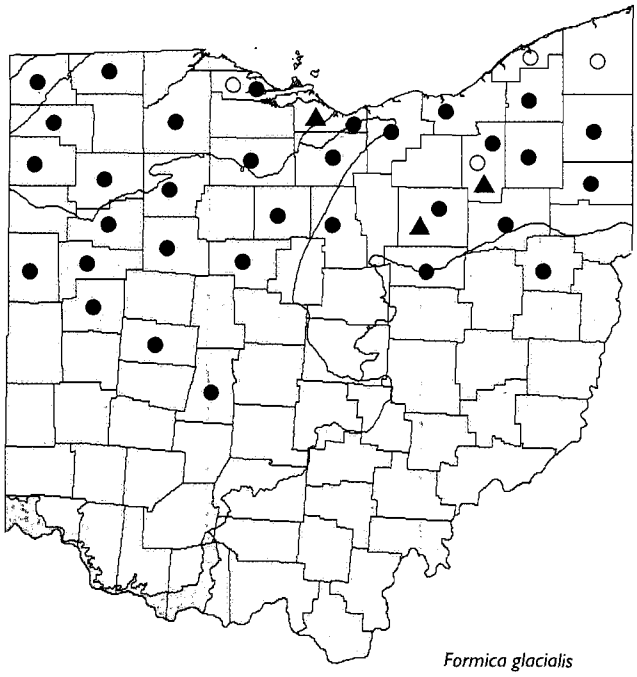
Nests: Typically a low, spread out mound up to 0.75 m in diameter; one mound nearly 1 m high (GAC 2172); smaller, less conspicuous mounds, often at edge of woods.

— Colony Organization: Further data lacking.

— Reproductives: Females - Aug. 1-10.

Range: Newfoundland (insular), Quebec, south to New York, west to Manitoba, eastern North Dakota, northern Illinois.

Ohio Distribution: Recorded from 34 counties in the northern glaciated half of Ohio. At its regional southern range limit in Ohio for this northern species. Completely replaced by *F. subsericea* southward.



Formica glacialis

Ohio References: Ashtabula (Francoeur, 1973), Lake (Francoeur, 1973), Ottawa (Francoeur, 1973), Summit (Francoeur, 1973).

Comments: This is the common species of this group in northern Ohio. As its name implies, it is largely restricted to the glaciated region. A species of the northeast and northern Great Lakes region.

92 *Formica montana* Wheeler

Prairie Mound-building Ant

Formica fusca subpolita var. *? montana* Emery, 1893
Formica cinerea var. *neocinerea* Wheeler, 1913
Formica cinerea cinerea var. *rutilans* Wheeler, 1913

Identification: TL 3.8-6.1 mm. Yellowish-brown to dark brown, lower part of head and front edge and sutures of alitrunk usually paler, gaster dark brown to blackish-brown, antennae paler especially basally, legs paler especially apically except tips; whole body covered with moderately dense silvery appressed pubescence. This is the most easily recognized member of the *fusca* group in Ohio. The gular hairs, and erect hairs on the dorsum of the alitrunk, petiole, and sides of the mesopleuron are all diagnostic. In addition, the brown coloration should leave no doubt as to its identity.

Taxonomy: The several minor varieties of earlier authors have been synonymized (see above). See Francoeur (1973). Even though Emery proposed this name, he did so in an invalid quadrinomial. W. M. Wheeler (1910b) was the first author to use the name in a valid (trinomial) form and is thus credited with the name (see Bolton, 1995).

Ecology:

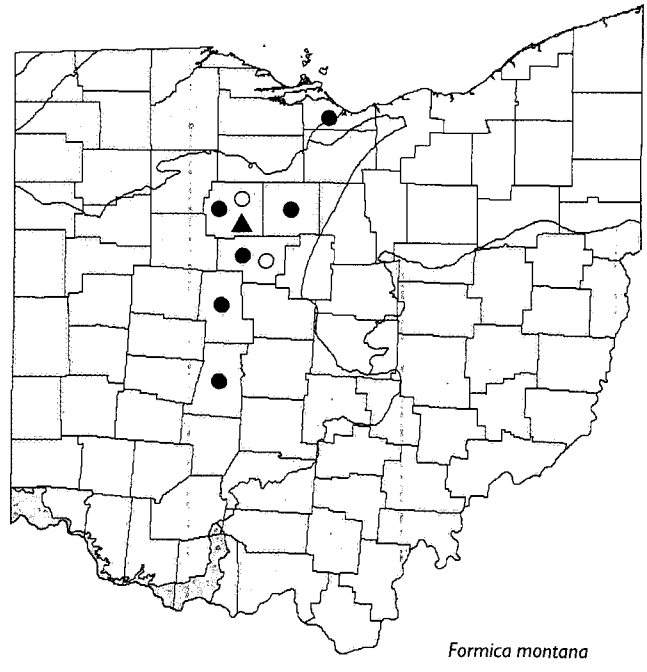
— Habitat: Found in open fields and prairies. See also Francoeur (1973).

— Food Resources: On bloom of *Solidago* sp. (GAC 2174), honeydew (below).

—Associates: Tending membracids on sunflower (GAC 1949). Burrill & Smith (1919) record tending the membracid *Publilia concava* on *Helianthus* and the aphid *Aphis pomi* on apple in Wisconsin. See Wheeler & Wheeler (1963) for North Dakota data.

—Ant Associates: Serves as host to *Formica dakotensis*, *F. aserva*, *F. rubicunda*, *F. subintegra*, and *Polyergus breviceps* (D.R. Smith, 1979).

Behavior: For mating behavior see Kannowski & Johnson (1969). Workers found foraging on ground in open. May become active early in the season (BSR 34 notes activity on mound at temp. of 45-50°, Feb. 27).



Formica montana

Nests: Builds low or tall, conical mounds, often utilizing thatching on top. GAC 1949 from a mound 1 m x 0.75 m high in area of abundant mounds. See Amstutz (1943) for more discussion of mounds in the Kildeer Plains. Gregg (1944) reports on a nest nearly 2 m across.

— Colony Organization: Further data lacking.

— Reproductives: Males - Aug. 2. Alates in North Dakota matured between July 3 and Aug. 8 and were usually of only one sex in any given colony (Kannowsi & Johnson, 1969).

Range: Central Ohio, west to Manitoba, North Dakota, South Dakota, Nebraska, Kansas.

Ohio Distribution: Recorded from 6 counties in north-central Ohio. All of these correspond with present or past prairie areas.

Ohio References: Marion (Francoeur, 1973), Wyandot (Amstutz, 1943; Francoeur, 1973), Ohio (Crieghton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This is a prairie species only found in a restricted area in Ohio, where it may be locally abundant. This is a species of the central and northern plains with Ohio as an eastern outlier.

Formica neorufibarbis Emery

Formica fusca var. *neorufibarbis* Emery, 1893

Identification: TL 4.0-5.6 mm. Head and gaster dark brown to brownish-black, head often paler distally, alitrunk usually paler, often with yellowish- or reddish-brown areas which contrast with darker areas, mandibles slightly to distinctly paler with dark edges, antennae paler, especially basally, legs paler especially apically except tips; front and top of head, alitrunk, and at least first gastral tergite with moderately dense silvery appressed pubescence, thinner on other areas. The bicolored body is distinctive; the generally uniform distribution of the elongate pits on the gena is diagnostic, and the very short erect hairs on the gaster will confirm the identify.

Taxonomy: See Francoeur (1973). Hölldobler & Wilson (1990) note that this may be a complex of two sibling species, at least in the White Mountains of New Hampshire.

Ecology:

— Habitat: Typically found in forests. In Michigan found in bogs (Wheeler et al., 1994). See also Francoeur (1973).

— Food Resources: Honeydew, dead arthropods, and plant nectar (Wheeler & Wheeler, 1986).

— Associates: Further data lacking.

— Ant Associates: Serves as host to *Formica aserva*, *F. rubicunda*, and *Polyergus breviceps* (D. R. Smith, 1979).

Behavior: A fast, aggressive ant with an annoying bite (Wheeler & Wheeler, 1986).

Nests: Usually nests in rotting wood but occasionally in the soil under rocks (D. R. Smith, 1979). In Michigan nests in hummocks of moss (Wheeler et al., 1994).

— Colony Organization: Colonies with multiple queens (Hölldobler & Wilson, 1990).

— Reproductives: Further data lacking.

Range: Newfoundland (Labrador) west to Alaska, south to Massachusetts, Michigan, Minnesota, South Dakota, New Mexico, Arizona, California.

Comments: A dominant ant of the boreal and alpine forests, it has been recorded throughout Michigan by Wheeler et al. (1994) from hummocks of moss in bogs and should be sought in northern Ohio.

Formica podzolica Francoeur

Formica podzolica Francoeur, 1973

Identification: TL 4.1-6.0 mm. Dark brownish-black to black, mandibles dark reddish-brown with black edges, antennae slightly paler basally, legs slightly paler apically except tips; front and top of head, alitrunk, and first three gastral tergites covered with dense silvery appressed pubescence, thinner on other areas. Distinguished by the normal presence of erect hairs on the promesonotum along with a uniformly dense covering of appressed pubescence on the first three gastral tergites. Compared with *F. subsericea*, this species averages smaller in size, has shorter antennal scapes, and a more flattened head shape dorsally.

Taxonomy: Described by Francoeur (1973), this species was previously confused with *F. fusca*, as were a number of other valid species. See discussion in *F. glacialis* taxonomy above.

Ecology:

— Habitat: Typically found in forests. In Michigan found in deep woods and swamps (Wheeler et al., 1994). See also Francoeur (1973).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: See comments under *Formica fusca*.

Behavior: Further data lacking.

Nests: In the soil, commonly sandy soil on beaches or shores. Nests are craterlike or moundlike (D. R. Smith, 1979).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Nova Scotia, Quebec, west to Alaska, south to Pennsylvania (Philadelphia), northern Michigan, Wisconsin, Iowa, South Dakota, New Mexico, Arizona, California.

Comments: Largely a species of the boreal and alpine forests of North America. As it has not been recorded from the southern half of Michigan (Wheeler et al., 1994), I doubt that it occurs in Ohio, but if so, would more likely be found in the northern part of the state.

93 *Formica subsericea* Say

Silky Ant

Formica subsericea Say, 1836
Formica lecontei Kennedy and Dennis, 1937
Formica fusca subsericea Say

Identification: TL 5.5-7.3 mm. Dark brownish-black to black, mandibles dark reddish-brown with black edges, antennae very slightly paler basally, legs very slightly paler apically except tips; head, alitrunk, and first three gastral tergites covered with dense silvery appressed pubescence, thinner on fourth tergite. The larger size, dark color, and uniform and dense covering of appressed micropubescence on the first three tergites will distinguish this species along with the presence of a few elongate punctures below the eye. *Formica argentea*, rare in Ohio, lacks the punctures below the eye and has dense appressed pubescence on the 4th tergite which is sparse in *subsericea*. *Formica podzolica*, not recorded for Ohio, has at least a few erect hairs on the promesonotum which are usually lacking in *subsericea* and has shorter antennal scapes. *Formica glacialis*, which tends to replace *F. subsericea* in many areas of northern Ohio, is distinguished by the noteably sparser pubescence of the 3rd tergite in comparison with the 2nd, while *F. fusca* has both the 2nd and 3rd tergites more sparsely pubescent.

Taxonomy: Like other species in this group, *F. subsericea* was often confused with *F. fusca*. The revision of Francoeur (1973) established the validity of these species.

Ecology:

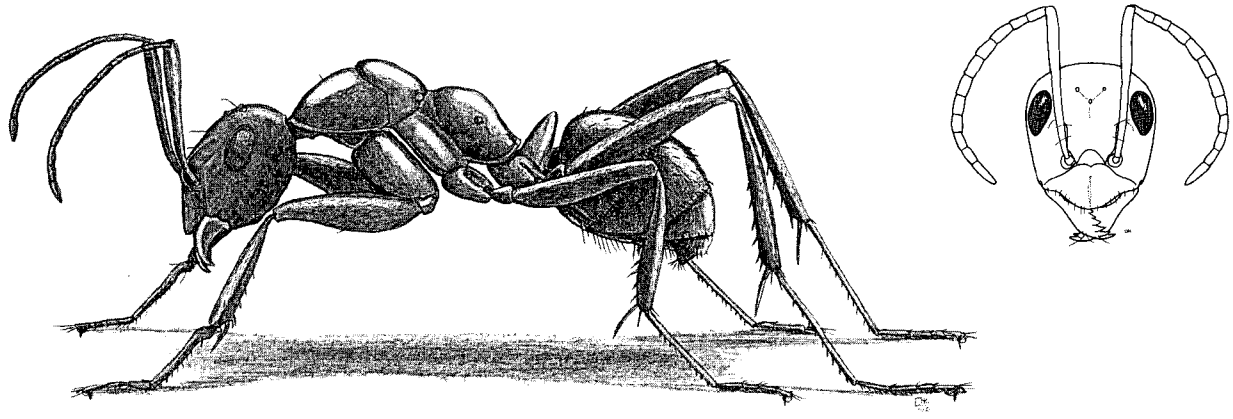
— Habitat: Found in open woods, woods' edges, and open areas near woods. See also Francoeur (1973).

— Food Resources: On bloom of *Sassafras albidum* (GAC 1724), *Rubus* sp. (GAC 1737), *Solidago* sp. (GAC 1952, 1967, 1983, 2191), and *Daucus carota* (GAC 2029, 2033, 2302). Commonly utilizes honeydew (below); often taken at bait. Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York Seeds gathered from myrmecochorous plants for nutritious elaiosomes (Beattie & Culver, 1981). See also Fellers (1987).

— Associates: Tending membracids (*Publilia concava*) on *Ambrosia trifida* (GAC 255); tending membracids (*Publilia concava*) on Joe-Pye-Weed (GAC 1737 #14); and tending aphids on thistle (*Cirsium*) (GAC 2337 #21). Possible inquiline beetles (Pselaphidae, Staphylinidae) (GAC 2010). Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*). Host to the larvae of the myrmecophilous syrphid *Microdon megalogaster* (cf. Duffield, 1981). Specimens from Illinois and Massachusetts with histerid *Hetaerius brunneipennis* (det. P. Kovarik). See Burrill & Smith (1919) for list of associates from Wisconsin. Nault et al. (1976) list species tended and describe an alarm pheromone produced by the aphids. See also Appendix II herein for more detail.

— Ant Associates: Observed several raids upon this species by *Formica subintegra* (GAC 2121 #9, 2327 #19), one by *F. pergandei* (GAC 2292 #15), and one by *F. rubicunda* (GAC 2124 #12). Found in mixed colony with *Formica subintegra* (numerous), *F. rubicunda* (GAC 1965 #11, 2324 #1), and *F. pergandei* plus *F. nitidiventris* (GAC 1971 #12, GAC 2145 #18). Wheeler et al. (1994) list *F. aserva* (as *F. subnuda*) and *Polyergus breviceps* as dulotic on this species. See comments under *Formica fusca*. See Appendix II herein for more detail.

Behavior: Workers found foraging on ground, tree trunks, and foliage in woods. Specimens observed with swollen gasters on *Rhododendron* apparently returning to nest. Workers will plug the entrances to their nest after being raided (Talbot & Kennedy, 1940; see also Appendix II herein). Workers forage mostly during the day, avoiding competition with *Camponotus pennsylvanicus* (see Klotz, 1984).



***Formica subsericea* Say**, habitus and full face view of head. Drawing by Holly K. Coovert.

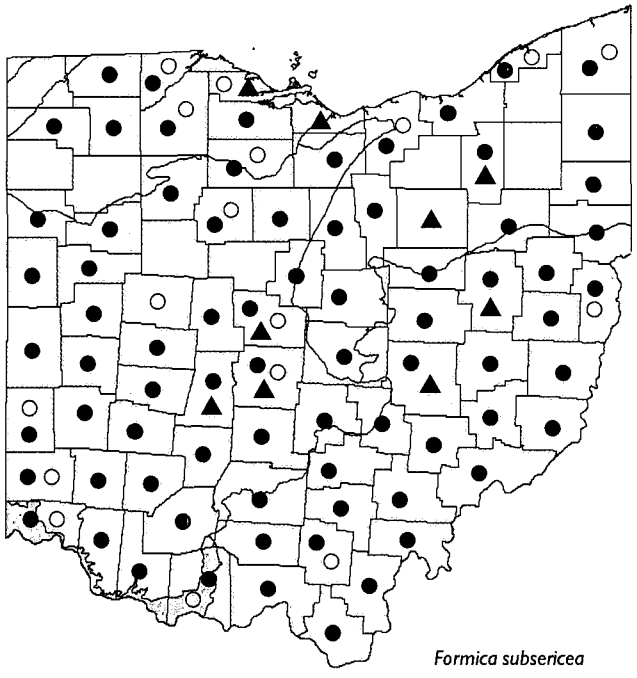
Nests: Typically a low, spread out mound with multiple entrances, occasionally nesting under stones or other objects.

— Colony Organization: Colonies are usually rather large.

— Reproductives: Males - Aug. 1-4. Females - July 23-Sept. 4.

Range: New Brunswick, Quebec south to northern Florida, west to Manitoba, Montana, Iowa, Kansas, Missouri, Mississippi.

Ohio Distribution: Recorded from 80 counties statewide but largely replaced by *F. glacialis* northward.



Formica subsericea

Ohio References: Adams (Talbot & Kennedy, 1940), Ashtabula (Headley, 1943a; Francoeur, 1973), Butler (Gorham, 1956), Delaware (Burns, 1964), Franklin (Talbot & Kennedy, 1940; Francoeur, 1973), Hamilton (Francoeur, 1973), Jackson (Francoeur, 1973), Jefferson (**Type locality** — *lecontei* - Kennedy & Dennis, 1937), Lake (Francoeur, 1973), Logan (Francoeur, 1973), Lorain (Talbot & Kennedy, 1940), Lucas (Francoeur, 1973), Ottawa (Talbot & Kennedy, 1940; Francoeur, 1973), Preble (Gorham, 1956), Seneca (Talbot, 1945b; Headley, 1949, 1952), Wood (Francoeur, 1973), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Smith, 1951).

Comments: This is the most common black *Formica* found in Ohio. See comments under *F. fusca* concerning the common name of "Silky Ant." The species name *subsericea* means "somewhat silky." This common species was posthumously described by Thomas Say (1787-1834), the father of American entomology, in 1836.

Genus *Formica*, Species Group Exsecta

Identification: The strongly concave top of the head is diagnostic for members of this group, along with the angulate profile of the pronotum and the angulate propodeum.

Revision(s): Creighton (1950), with a key to workers.

Key: The key presented below applies to workers and queens; and all but the last character also applies to the males.

Comments: These large, bicolored ants are best known for their conspicuous, often very large mounds. The group is named after the European mound-builder, *Formica exsecta*.

Key to *Formica* Exsecta Group of Northeastern North America

1. Erect hairs sparse or absent on the lower edge (anterior face) of the pronotum and on the anterior face of the fore coxa; dorsum of promesonotum usually lacking erect hairs (at most 1 or 2 small ones); erect hairs on the gaster confined to the posterior half ..... ***F. exsectoides***

   Erect hairs on the lower edge of the pronotum and on the anterior face of the fore coxa long and numerous; dorsum of promesonotum with numerous erect hairs; erect hairs present throughout the dorsal surface of the gaster ..... ***F. ulkei***

94 *Formica exsectoides* Forel

Allegheny Mound Ant

Formica exsectoides Forel, 1886
Formica exsectoides exsectoides var. *davisi* Wheeler, 1913

Identification: TL 5.5-7.9 mm. Head and alitrunk orangish-brown to brownish-red, at most slightly darkened dorsally, gaster brownish-black to black, mandibles darkened, antennae paler basally, legs darker; head and alitrunk satiny due to microscopic texturing and appressed micropubescence, gaster more glossy but with moderate covering of appressed micropubescence. The characters in the key should readily separate this species. Compared to *ulkei*, *exsectoides* has the head much less infuscated and not nearly as glossy.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in open fields or usually edges of fields near woods' edge; often a conspicuous roadside feature.

— Food Resources: Honeydew (below). Smith (1947a) notes "flesh of small arthropods supplemented by honeydew and the sap of plants." See Haviland (1947) for more detail.

— Associates: Tending membracid (*Publilia reticulata*) on *Solidago* stem (GAC 1737 #4); tending scale (Coccidae, *Toumeyella liriodendri*) on tuliptree sapling (GAC 1766 #12); tending aphids, on tuliptree (GAC 1766); tending membracid nymphs on *Cirsium* stems & leaves (GAC 1846); tending membracid nymphs (GAC 2256); tending membracids (BSR 18 #6); tending membracids on *Solidago* (BSR 22 #20A). Headley (1943a) observed workers attending green aphids on tree leaves. Davis & Bequaert (1922) list tending of the membracid *Vanduzea arquata* on locust in New York; see also for list of myrmecophilous beetles. Andrews (1929) discusses attendence of the scale *Eulecanium tulipiferae* on tulip and the membracids *Vanduzea arquata* and *Thelia bimaculata* on black locust in Maryland. The myrmecophilous staphylinid *Megastilicus formicarius* is discussed by Wheeler (1910b) and Kistner (1982). The latter author also mentions the possible association of the pselaphid *Batrisodes globosus*. Host to the larvae of the myrmecophilous syrphid *Microdon abstrusus* (cf. Duffield, 1981). Massachusetts specimens with the histerid *Hetaerius brunneipennis* (det. P. Kovarik). Parshal et al. (2001) cite an assoication with larvae of Edward's Hairstreak, *Satyrium edwardsii*.

— Ant Associates: The founding female may behave as a temporary social parasite on members of the *Formica fusca* group.

Behavior: Workers found foraging on ground and on foliage in woods. They are able to become active relatively early in the season (BSR 38-March 21). Workers are aggressive when disturbed and are known to bite off the heads of other ants (Headley, 1943a).

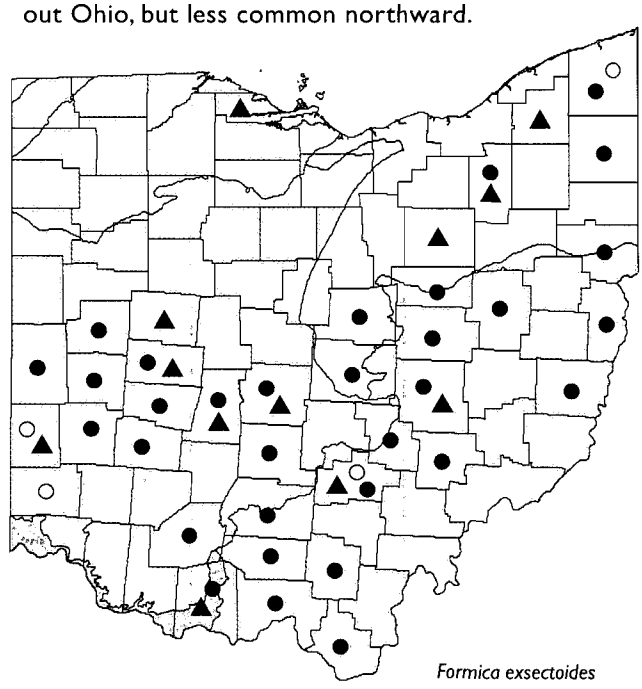
Nests: Build large conical mounds usually covered with a fine layer of thatch or in one case (GAC 2187) fine bits of shale; mounds up to 1 m high and 2 m in greatest diameter, but usually half that size. Usually more than one mound is found in an area, and they are often numerous. A colony can occupy the same mound for up to 30 years. These structures are primarily for regulation of temperature and humidity.

— Colony Organization: Nests contain several to many queens (Cole, 1940b). One nest (19 inches high), counted by Cory & Haviland (1938) in Maryland, consisted of an estimated 237,103 workers and 1,407 dealate queens. A single nest may contain over 300,000 adults (Hölldobler & Wilson, 1990). The large aggregation of mounds often found in close proximity are apparently founded by budding, a process in which a relatively small force of workers from the main nest are accompanied by one or more queens. Thus, these aggregations are of a single colony. Aparently it is only the workers and dealate queens which overwinter (Haviland, 1947). Forbes (1938) provides a graph for estimating colony size from the height of a mound.

— Reproductives: Males - July 5-Aug. 4. Females - July 19-Aug. 4.

Range: Nova Scotia, Ontario south to Georgia, west to Wisconsin, Iowa, Kansas, Colorado, New Mexico.

Ohio Distribution: Recorded from 38 counties throughout Ohio, but less common northward.



Formica exsectoides

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Hocking (Williams, 1961), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940), southwestern Ohio (Dreyer, 1942).

Comments: The conspicuous mounds of this ant are often seen along roadsides in southern and eastern Ohio. For this reason, I consider this species a "sixty mile-per-hour" ant, as it is the only species that can be consistently and correctly identified at the given speed. This species builds the largest mounds of any Ohio ant. Its name is in reference to its similarity to the European mound ant, *F. exsecta*.

95 *Formica ulkei* Emery

Formica ulkei Emery, 1893
Formica ulkei var. *hebescens* Wheeler, 1913

Identification: TL 5.4-6.9 mm. Head dark brown above, yellowish-brown on clypeus and genae, alitrunk brownish-yellow clouded with brown dorsally on pronotum and mesonotum, gaster brownish-black to black, mandibles slightly darkened, antennae slightly paler basally, legs darker; body moderately glossy with microscopic texturing and appressed pubescence. Readily identified in the key, this species has a distinctly glossy head which is usually darkly infuscated above in contrast with *exsectoides*, in which the head is at most lightly infuscated and dull to feebly glossy.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in low, open fields close to the water table. D. R. Smith (1979) cites woods or grasslands. See Talbot (1961) for more details in Michigan

— Food Resources: On bloom of *Daucus carota* (GAC 2316). Honeydew (below). Talbot (1961) reports that honeydew is the chief food, but they also forage for dead insects.

— Associates: Tending membracids (mostly nymphs, *Entylia bactriana*) on thistle (GAC 2174 #8). Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*). The myrmecophilous staphylinid *Megastilicus formicarius* is discussed by Wheeler (1910b) and Kistner (1982). The latter author also mentions *Goniusa obtusa*, and the pselaphid *Batrisodes globosus*.

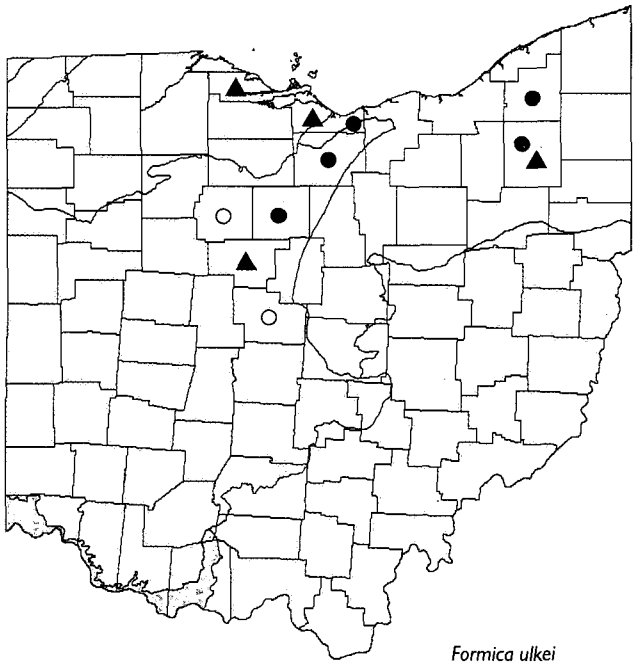
— Ant Associates: The founding female behaves as a temporary social parasite on members of the *Formica fusca* group (see Talbot, 1961). Specifically listed is *F. glacialis* in Wheeler et al. (1994).

Behavior: Workers were found on ground in open in foraging trail. See Kannowski & Johnson (1969) for mating behavior.

Nests: Conical mounds up to 0.3 m high x 0.6 m wide (GAC 2162) or usually somewhat smaller; normally thatched on top. See Dreyer (1942) for details of Illinois mounds. The mounds function as very effective moisture and temperature regulators (Scherba, 1959, 1962).

— Colony Organization: New nests are formed by budding from active nests (Scherba, 1959; Talbot, 1961), thus polygyny is implied.

— Reproductives: Males - July 2. Females - July 2. Scherba (1959) notes that mating takes place in July with queens returning to established nests. Talbot (1959) details flight activities in Michigan from June 26 to July 18, with abundant males flying, and females primarily dispersing on the ground.



Formica ulkei

Range: Nova Scotia, Quebec, west to Manitoba, south to Ohio, Indiana, Illinois, Iowa, North Dakota, Wyoming.

Ohio Distribution: Recorded from 9 counties in northern Ohio. At its regional southern range limit in Ohio.

Ohio References: Delaware (Burns, 1964), Wyandot (Amstutz, 1943), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: Another mound builder, more typical of northern Ohio. Named after Titus Ulke by Carlo Emery (1848-1925), an influential Italian myrmecologist .

Genus *Formica*, Species Group Rufa

Identification: Members of this group are distinctly bicolored and generally robust, and have an angulate propodeum. They are distinguished from the *microgyna* group by the slender erect hairs on the body, not short and blunt-tipped.

Taxonomy: Wheeler & Wheeler (1986), followed by MacKay et al. (1988), combined the *rufa* and *microgyna* groups because of problems differentiating the two. I have followed this same practical solution for the key, but I still feel that the two groups are distinct biologically and phylogenetically and will thus be listed separately. Members of the *rufa* group lack the thickened, blunt-tipped hairs of the *microgyna* group and the queens are larger than the largest workers. They are also often larger and more robust than members of the *microgyna* group.

Revision(s): Letendre & Huot (1972) provide some preliminary considerations, but no key; Creighton (1950) still contains the most recent key for the group.

Key: As discussed above, the key combines the *rufa* and *microgyna* groups. Several more northerly species (as well as western species) are not included in the keys, plus the workerless *F. talbotae* from southern Michigan, but the key will still work for most areas of the northeastern U.S.

Comments: This is a group of large, robust, bicolored ants. The group is named for the European wood ant *Formica rufa* which builds huge mounds, often 2 m high.

Key to *Formica* Rufa / Microgyna Groups of Ohio

1. Middle and hind tibiae with numerous erect hairs on all surfaces in addition to the usual double row on the ventral (flexor) surfaces; femora with at least some short erect hairs scattered on all surfaces; erect hairs present on head, pronotum, mesonotum, and propodeum **2**

Middle and hind tibiae lacking erect hairs except for the usual double row on the ventral (flexor) surfaces; femora lacking erect hairs (rarely with a few ventrally); erect hairs variable on remaining structures, often lacking on one or more **4**

2. Body generally moderately to distinctly glossy, especially dorsum of gaster, which has very sparse appressed micropubescence which does not obscure surface; occipital corners of head lacking erect hairs; hairs of body generally somewhat thickened and microscopically blunt apically ..... (*F. nepticula*)

Body generally dull to at most feebly glossy, especially dorsum of gaster which has very dense appressed micropubescence which effectively obscures surface; occipital corners of head with erect hairs; hairs of body thin and microscopically pointed apically **3**

3. Erect hairs on dorsum of alitrunk (especially propodeum) relatively short, shorter than median thickness of antennal scape; majority of erect hairs on head distinctly longer than those on pronotum; middle of clypeus with abruptly descending slope to deep, pit-like clypeal fossa on each side ..... ***F. obscuriventris***

Erect hairs on dorsum of alitrunk (especially propodeum) relatively long, as long or longer than median thickness of antennal scape; most erect hairs on head essentially the same length as those on pronotum (or only slightly longer); middle of clypeus with evenly descending slope to indented but less pit-like clypeal fossa on each side ..... (*F. obscuripes*)

4. Scale of petiole (viewed from behind) with the crest flat or broadly concave, the sides of the upper half parallel, tapering inward only on the lower half; erect hairs on pronotum short and sparse, absent on mesonotum, propodeum, and gula ..... ***F. dakotensis***

Scale of petiole (viewed from behind) with the crest convex or angularly produced upward in the middle, the sides tapering, angled or curved, not parallel above; erect hairs variable, but often present on mesonotum, propodeum, and gula **5**

5. Erect hairs absent on head and dorsum of alitrunk; erect hairs sparse to absent on disc of clypeus (usual fringe on ventral edge present); large, robust species with broad head, the vertex in full-face view essentially flat ..... ***F. integra***

Erect hairs present on at least pronotum, usually abundant on head and most of dorsum of alitrunk; at least a few erect hairs present on disc of clypeus; smaller, less robust species with vertex of head usually gently convex in full-face view **6**

6. Erect hairs on head, dorsum of alitrunk, and gaster thin and microscopically pointed apically; scale of petiole low and thick, not extending above the level of the propodeal spiracle in full upright position, crest usually blunt **7**

Erect hairs on head, dorsum of alitrunk, and gaster somewhat thickened and microscopically blunt apically; scale of petiole tall and relatively thin, extending above the level of the propodeal spiracle in full upright position, crest usually sharply produced **8**

7. Dorsum of the gaster with numerous, delicate erect hairs; base of gaster reddish in color .. (*F. ferocula*)

Dorsum of the gaster essentially lacking erect hairs except for a few at the base and apex; gaster not distinctly reddish at base ..... ***F. prociliata***

8. Front and vertex of the head usually lacking erect hairs, rarely 1 or 2 reduced ones present; erect hairs absent on mesonotum and propodeum ..... (*F. indianensis*)

Front and vertex of the head with at least a few erect hairs; erect hairs present on mesonotum and usually on propodeum **9**

9. Dorsum of propodeum lacking distinct, erect hairs (1 to 6 minute stubs may be present); crest and sides of the petiole usually lacking erect hairs; gula and occipital corners of head (above and behind eyes) with erect hairs (at least in larger workers) ..... ***F. postoculata***

Dorsum of propodeum with at least a few short erect hairs; crest and sides of petiole with at least a few short erect hairs; gula and occipital corners with erect hairs present or absent **10**

10. Occipital corners (above and behind eyes) and gula with at least a few erect hairs present; mesopleuron usually with at least a few erect hairs (in addition to smaller ones near ventral edge) ..... ***F. difficilis***

Occipital corners and gula lacking erect hairs; mesopleuron lacking erect hairs (except smaller ones near ventral edge) ..... ***F. querquetulana***

Formica ferocula Wheeler

Formica ferocula Wheeler, 1913

Identification: TL 5.0-6.6 mm. Head and alitrunk brownish-orange, gaster dark brown with base and sternites

brownish-red, smaller workers with head and alitrunk darkened dorsally. Recognized by the slender hairs, placing it in the *rufa* group, and differentiated by the characters presented in the key.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Type specimens were found nesting in a dry open field (Wheeler, 1913).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Forms small crater nests about the roots of plants (Wheeler, 1913).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Illinois (Rockford).

Comments: A rare species only known from Illinois, it was not found by DuBois & LaBerge (1988) in their Illinois study.

96 *Formica integra* Nylander

Formica integra Nylander, 1856
Formica truncicola integra Nylander

Identification: TL 5.0-8.8 mm. Weakly polymorphic (see Kloft et al., 1973 for details). Head and alitrunk a rich brownish-yellow, brownish-orange, or brownish-red, alitrunk slightly paler than head, gaster brownish-black to black, mandibles darkened, antennae darkened distally, legs essentially concolorous; body with fine covering of appressed micropubescence, head and alitrunk moderately dull to weakly satiny, gaster satiny with a faint grayish cast. Readily distinguished by the lack of erect hairs on the legs and body.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in woods, open woods, and woods' edges, rarely in open meadows.

— Food Resources: Honeydew is a major foodsource (see below). Seeds of *Viola* spp. occasionally gathered for nutritious elaiosomes (Culver & Beattie, 1978).

— Associates: Gorham (1956) reports tending aphids in a large oak tree. Burns (1964) reports tending of tuliptree scale (*Toumeyella liriodendri*) in Ky. Davis & Bequaert (1922) report tending the membracid *Thelia bimaculata* and attending galls of *Disholcaspis mamma* on oak in New York. Kloft et al. (1973) report tending of the aphid *Neosymydobius* sp. in Georgia. Webster & Nielsen (1984) describe an association with larvae of the lycaenid butterfly *Satyrium edwardsi* as well as the membracid *Similia camelus* in Michigan The myrmecophilus staphylinid *Goniusa obtusa* is listed by Kistner (1982).

Behavior: Workers found foraging on ground in open woods. Frequently observed in feeding columns, often resulting in distinct, cleared trails ca. 25 mm in width and extending for considerable distances. These trails are often at or just below the surface, forming a "subway system" that is partly roofed over and actively utilized. Workers are aggressive when disturbed.

Nests: Under or at base of stumps and logs, typically with mounded covering of thatch. One large thatch mound by log in woods (GAC 2146) measured 2 m in length plus an outlier at the base of a stump nearby. A thatch colony ca. 30 cm in diameter was built atop a pile of year-old sumac stems in *Andropogon* meadow (GAC 2375).

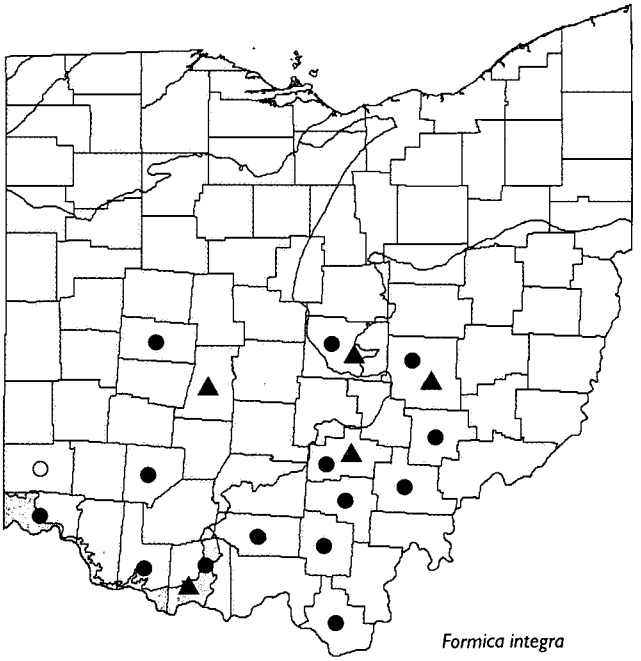
— Colony Organization: Colonies are typically large. See Kloft et al. (1973) for details in Georgia. They report the species as polygynous, finding 74 queens in one nest.

— Reproductives: Male - June 2 (Kennedy 374). Females - June 19 (GAC 2096 #15)-July 1. Stray dealate females - June 19-30.

Range: Nova Scotia, Quebec, south to Georgia, west to Michigan, South Dakota, Illinois, Mississippi.

Ohio Distribution: Recorded from 16 counties in the southern half of Ohio. Interestingly, this species is recorded from Michigan, but not the southern third of the state (Wheeler et al., 1994).

Ohio References: Butler (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940).



Formica integra

Comments: A large robust species of *Formica* which can often form large woodland colonies. Described by W. Nylander (1822-1899), a Swedish myrmecologist who mainly worked with the European boreal fauna.

Formica obscuripes Forel
Western Thatching Ant

Formica rufa obscuripes Forel, 1886
Formica rufa obscuriventris var. *melanotica* Emery, 1893
Formica rufa aggerans Wheeler, 1912

Identification: TL 5.0-9.0 mm. Variable in color, head and alitrunk brownish-yellow to brownish-orange, at least partially darkened dorsally, gaster blackish-brown to nearly black, mandibles slightly darkened, antennae and legs darker; body with fine covering of appressed micropubescence, head and alitrunk moderately dull to weakly satiny (glossier on sides of head), gaster satiny with a faint grayish cast. The features presented in the key will distinguish this species. A fairly large, robust species closest to *obscuriventris* and differentiated by the different clypeal shape.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in open areas (D. R. Smith, 1979) and dry grasslands (Wheeler et al., 1994). Essentially a prairie species. See Wheeler & Wheeler (1963) for North Dakota data.

— Food Resources: Omnivorous on dead and moribund invertebrates, plus honeydew from aphids and other homopterans (Beattie & Culver, 1977). Tilman (1978) details the mutualistic relationship of *F. obscuripes* with black cherry (*Prunus serotina*) in Michigan. The early spring leaf nectaries, which the ants utilize, are timed when the larvae of the major defoliator, the eastern tent caterpillar (*Malacosoma americanum*), is small enough to be preyed upon by the ants.

— Associates: Burrill & Smith (1919) record this species from Wisconsin attending the membracids *Publilia concava* on *Helianthus* and *Thelia bimaculata* on locust. Host to the larvae of the myrmecophilous syrphids *Microdon albicomatus*, *M. cothurnatus*, and *M. xanthopilis* (cf. Duffield, 1981). See Wheeler & Wheeler (1963) for North Dakota data and (1986) for Nevada data.

— Ant Associates: Serves as host to *Formica talbotae* (Wilson, 1976; Talbot, 1977), and the xenobiotic *Formicoxenus hirticornis*.

Behavior: Workers are very active and aggressive with an annoying bite (see Wheeler & Wheeler, 1986 for more detail).

Nests: Mounds are "usually started at the base of a plant. Extensive use is made of thatching (Wheeler & Wheeler, 1963, 1986) for details. Nests are occupied for 3.1 to 7.8 years (Hölldobler & Wilson, 1990).

— Colony Organization: Colonies are often very large, up to 50,000 adults (Talbot, 1976).

— Reproductives: Talbot (1959) reports on flights in Michigan June 4 to 29, with a temp. of 69° to 70° required for the start of flights. Males and females conduct nuptial swarms on the ground.

Range: Quebec, Michigan, Indiana, Illinois, Manitoba west to British Columbia, south to New Mexico, Nevada, Utah, California.

Comments: A common thatching ant of the western states. As it has been found in Indiana, northern Illinois, and southern Michigan, it should be sought for in northern Ohio, especially in prairie areas.

97 *Formica obscuriventris obscuriventris* Mayr

Formica truncicola var. *obscuriventris* Mayr, 1870
Formica truncicola obscuriventris Mayr

Identification: TL 4.6-8.1 mm. Head and alitrunk a rich brownish-yellow, brownish-orange, or brownish-red, alitrunk slightly paler than head, gaster brownish-black to black, mandibles slightly darkened, antennae and legs darker; body with fine covering of appressed micropubescence, head and alitrunk dull, gaster satiny with a faint grayish cast. The shape of the clypeus, with its abruptly descending slopes, is a diagnostic feature, but is better discerned with comparative material. The erect hairs on the tibiae and femora and the distribution and relative lengths of hairs elsewhere will distinguish this species. Generally a fairly large, robust species.

Taxonomy: Since it can be hard to discern the clypeal character without comparative material, I have subordinated this character in the key. See Creighton (1950).

Ecology:

— Habitat: Found in a small clearing in a moist, deep woods by Wesson & Wesson (1940). Generally in woods and grasslands (D. R. Smith, 1979).

— Food Resources: Honeydew.

— Associates: Massachusetts specimen with the histerid *Hetaerius brunneipennis* (det. P. Kovarik). See Wheeler & Wheeler (1963) for North Dakota data and (1986) for Nevada data.

Formica o. obscuriventris

Behavior: This species will send out foraging columns (Wheeler & Wheeler, 1986). Buren (1944) states "it is very fierce and aggressive in the defense of its nest."

Nests: Under logs and makes moderate use of thatching (D. R. Smith, 1979). DuBois & LaBerge (1988) note in soil marked with a thatch covered mound in Illinois.

— Colony Organization: Further data lacking.

— Reproductives: Males - Aug. 5. Females - Aug. 20.

Range: Quebec, Maine south to Virginia, west to North Dakota, Iowa, Colorado, Nevada.

Ohio Distribution: Recorded from 4 counties in southern and northern Ohio.

Ohio References: Scioto (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

Comments: A robust species uncommonly found in Ohio. The species name means "obscure, dark belly" in reference to the darkened gaster.

Formica prociliata

98 *Formica prociliata* Kennedy and Dennis

Formica prociliata Kennedy and Dennis, 1937

Identification: TL 5.5-8.0 mm. Head and alitrunk brownish-orange, slightly darkened dorsally, gaster blackish-brown to nearly black; mandibles and antennae concolorous, legs slightly darker; body with fine covering of appressed micropubescence, head and alitrunk moderately dull to weakly satiny (glossier on sides of head), gaster satiny with a distinct grayish cast. Recognized by features in the key, this is a smaller species than most other members of the *rufa* group.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in open oak woods on a rocky limestone ridge at the type locality (see Kennedy & Dennis, 1937).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: Possibly a temporary social parasite of *Formica nitidiventris* (see Buren, 1944).

Behavior: Poorly developed trails radiate 15 to 60 m from the nest area (Kennedy & Dennis, 1937).

Nests: Under stones on ledges, lacked thatching (Kennedy & Dennis, 1937).

— Colony Organization: With multiple queens (Kennedy & Dennis, 1937). Lives in fairly populous colonies in Iowa (Buren, 1944).

— Reproductives: Further data lacking.

Range: Ohio, Michigan, Wisconsin, Iowa.

Ohio Distribution: Only known from Ottawa Co. in Ohio. Apparently at its eastern and southern range limit in Ohio.

Ohio References: Ottawa (**Type locality** — Kennedy & Dennis, 1937; Creighton, 1950), Ohio (Gorham, 1956; Smith, 1951; D. R. Smith, 1979).

Comments: This rare, unusual species was originally described from Ohio. The name is in reference to the more primitive queens compared to *F. ciliata*, to which it is related. The species is described as "striking and beautiful" by Creighton (1950).

Genus *Formica*, Species Group Microgyna

Identification: Members of this group are distinctly bicolored and have an angulate propodeum. They are distinguished from the *rufa* group by the short and blunt-tipped hairs on the body. They tend to be less robust and are generally smaller. Diagnostic are the unusually small females, which are generally no larger than the largest workers.

Revision(s): Letendre & Huot (1972) provide some preliminary considerations, but no key. Creighton (1950) still contains the most recent key for the group.

Key: Combined with the *rufa* group above; see comments. The key does not include *F. talbotae*, a workerless inquiline in nests of *F. obscuripes*.

Comments: This group of bicolored ants have small queens and are temporary social parasites of other members of the genus. The group is named for the western *Formica microgyna*.

99 *Formica dakotensis* Emery

Formica dakotensis Emery, 1893
Formica montigena Wheeler, 1904

Identification: TL 5.7-7.3 mm. Head and alitrunk pale to dark brownish-orange, slightly darker dorsally in

some, gaster brownish-black to black, mandibles slightly darkened, antennae distally and legs slightly darker; body with relatively sparse covering of appressed micropubescence, head and alitrunk moderately glossy, duller dorsally, gaster glossy. Readily recognized by the distinctively shaped petiolar scale and the lack of erect hairs on mesonotum, propodeum, and gula.

Taxonomy: Most authors place this species in the *rufa* group. Our specimens of *F. dakotensis*, readily recognized by the distinctive petiolar scale, have distinctly clavate or spatulate hairs on the pronotum, clearly a feature of the *microgyna* group. This, combined with the small queens, and being the only two characters used to define the group, clearly points to inclusion of *dakotensis* in the *microgyna* group. See Creighton (1950) and Brown (1957b) for nomenclature.

Ecology:

— Habitat: Found in open fields. "Usually found in grasslands" (D. R. Smith, 1979).

— Food Resources: On bloom of *Daucus carota* (GAC 2028).

— Associates: Further data lacking.

— Ant Associates: A temporary social parasite of *Formica fusca*, *F. lepida*, *F. montana*, and *F. pallidefulva*. (D. R. Smith, 1979).

Behavior: Workers found foraging on ground in open (GAC 2028, 2208).

Nests: D. R. Smith (1979) notes "nests in earthen mounds or under stones about roots of plants, and in grass clumps banked with considerable detritus."

— Colony Organization: Further data lacking.

— Reproductives: Females - Aug. 26 (Ontario, Kennedy 3451).

Range: Nova Scotia, Ontario west to Alaska, British Columbia, south to Ohio, Indiana, Iowa, New Mexico, Nevada.

Formica dakotensis

Ohio Distribution: Recorded from 4 counties in glaciated western Ohio. At its regional southern and eastern range limit in Ohio.

Ohio References: Madison (Brown, 1957), Ohio (Smith, 1967; D. R. Smith, 1979).

Comments: This distinctive species of northern and western plains is uncommon in Ohio. Another species described by the prolific Carlo Emery (1848-1925).

100 *Formica difficilis* Emery

Formica rufa difficilis Emery, 1893
Formica difficilis var. *consocians* Wheeler, 1904
Formica habrogyna Cole, 1939

Identification: TL 5.3-6.5 mm. Head and alitrunk brownish-yellow to brownish-orange, alitrunk slightly paler, both usually darkened dorsally, gaster dark brown to nearly black, may be slightly paler basally and ventrally, mandibles usually darkened, antennae darker distally, legs darker; body with fine covering of appressed micropubescence, head and alitrunk moderately dull, gaster satiny with a distinct grayish cast. Distinguished by characters in the key, especially greater abundance of erect hairs than any other related species. Superficially similar to some individuals of *montana*, but that species has a darker head dorsally and the frontal carinae are typical of the *fusca* group.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in dry, bushy fields (Wesson & Wesson, 1940) and woodlands (D. R. Smith, 1979). Cole (1940b) notes "bright grassy places" in Tennessee.

— Food Resources: Honeydew. Seeds of the myrmecochorous sedge *Carex jamesii* are gathered for the nutritious elaiosomes (Beattie & Culver, 1981).

— Associates: See Davis & Bequaert (1922) for description of thatch shelters for membracid nymphs (*Thelia bimaculata*) at the base of locust in New York.

— Ant Associates: Temporary social parasite of *Formica pallidefulva*. (D. R. Smith, 1979).

Behavior: Workers are pugnacious and eject formic acid when disturbed (Cole, 1940b).

Nests: Nests are "under stones and logs which it banks with vegetable debris" (Wesson & Wesson, 1940).

— Colony Organization: Cole (1940b) notes that "all colonies found were rather populous," and apparently have a single queen.

— Reproductives: A migratory female was taken in mid July by Wesson & Wesson (1940). Alates were found in Tennessee in nests during June (Cole, 1940b).

Range: Massachusetts south to Georgia, west to Iowa.

Ohio Distribution: Only known from an unspecified record from southcentral Ohio (below).

Formica difficilis

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

Comments: This uncommon species is recognized by the more abundant erect pile on the body. Apparently uncommon in our area; not recorded from Michigan (Wheeler et al., 1994), Indiana (Munsee et al., 1985), nor Illinois (DuBois & LaBerge, 1988).

Formica indianensis Cole

Formica indianensis Cole, 1940

Identification: TL 5.5-6.5 mm. Head and alitrunk dark reddish-brown, darkened dorsally, gaster very dark reddish-brown, lighter ventrally and apically, legs darker; head and alitrunk dull, gaster satiny with a distinct grayish cast. The characters presented in the key should serve to distinguish this species; particularly significant is the lack of erect hairs on the head, mesonotum, and propodeum.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in grassy field (Cole, 1940a).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: Under a stone banked along its margin with grass debris (Cole, 1940a).

— Colony Organization: The type colony was described as populous by Cole (1940a).

— Reproductives: Males - July 4 (Indiana, Cole, 1940a).

Range: Indiana (Jasper Co.).

Comments: Currently known only from northwestern Indiana, this species certainly could be found in Ohio. The Iowa record (Buren, 1944) is *F. postoculata* fide Creighton (1950:502).

Formica nepticula Wheeler

Formica nepticula Wheeler, 1905

Identification: TL 5.4-5.9 mm. Head and alitrunk pale to dark orangish-brown, head somewhat darker dorsally, alitrunk darkened dorsally, gaster blackish-brown to black, antennae distally and legs a medium brown; head and alitrunk moderately dull to satiny, head glossy on sides, gaster satiny to glossy with sparse appressed micropubescence. The only member of the *microgyna* group with erect hairs on all surfaces of the tibiae and femora, and a moderately to distinctly glossy body.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in open woods (D. R. Smith, 1979).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: A temporary social parasite on *Formica fusca* group species (Wheeler et al., 1994).

Behavior: Further data lacking.

Nests: Under stones or rotting limbs which are banked with plant debris (D. R. Smith, 1979).

— Colony Organization: Further data lacking.

— Reproductives: Alates appear during July in Connecticut (Wheeler, 1916) and also Iowa (Buren, 1944).

Range: Quebec, Massachusetts, Connecticut, southern Michigan, Illinois, Iowa.

Comments: This distinctive species could possibly occur in northern Ohio, as it has been recorded from northern Illinois (Gregg, 1944) and southern Michigan (Wheeler et al., 1994). This is typically a more northern species.

101 *Formica postoculata* Kennedy and Dennis

Formica postoculata Kennedy and Dennis, 1937

Identification: TL 4.4-6.3 mm. Head and alitrunk brownish-yellow to dark brownish-orange, both usually darkened dorsally, gaster brownish-black to black, mandibles slightly darkened, antennae darker distally, legs concolorous to slightly darkened; head and alitrunk moderately dull to satiny, head glossy on sides, gaster satiny with a distinct grayish cast from relatively dense appressed micropubescence. The usual lack of erect hairs on the propodeum, and their presence on the gula and occipital corners in combination with other characters in the key should distinguish this species. Head and alitrunk generally lighter in color than *querquetulana*. Smaller individuals may lack the erect hairs on the occipital corners but should otherwise key out.

Taxonomy: The type locality of Aurora (Ohio Co.) Indiana is adjacent to the southwestern corner of Ohio.

Ecology:

— Habitat: Found in open meadow of *Andropogon* and forbs, plus old field. Type locality is a grassy pasture.

— Food Resources: Honeydew (below).

— Associates: Tending aphid nymphs on bigtooth aspen sapling (GAC 1802); numerous workers found on oak sapling, possibly visiting wounds in branches produced by periodical cicada oviposition (GAC 2087).

Behavior: Workers found foraging on foliage and saplings in open. A feeding column (trail?) was noted across a grassy lane in open meadow (GAC 2227). Workers observed conducting adult transport (GAC 2410), apparently moving nest site, which occurs frequently.

Nests: Thatch mound of fine plant debris ca. 15 cm high at base of clump of grass (GAC 1810, 2012, 2238), or under board (GAC 2257). Smaller thatch mounds were found to be occupied for short periods, then apparently moved. The type series (Indiana) was between two boulders and covered with plant debris (Kennedy & Dennis, 1937).

— Colony Organization: Further data lacking.

— Reproductives: Female - July 2 (GAC 2276). Stray dealate female - July 9 (GAC 2283).

Range: Pennsylvania, Ohio, Indiana, Illinois, Iowa.

Ohio Distribution: Only known from 2 counties in Ohio.

Formica postoculata

Ohio References: Butler (Gorham, 1956) - unpublished.

Comments: This thatching ant represents a new state record for Ohio and apparently the first known females. The name refers to the hairs located on the occipital corners, behind the eyes. Locally abundant at the Coovert preserve in Hocking Co.

102 *Formica querquetulana* Kennedy and Dennis

Formica querquetulana Kennedy and Dennis, 1937

Identification: TL 4.0-7.0 mm. Head and alitrunk orangish- to reddish-brown, may be slightly darkened dorsally, gaster brownish-black to black, mandibles slightly darkened, antennae distally and legs a medium brown; head and alitrunk moderately dull, gaster satiny with a distinct grayish cast from relatively dense appressed micropubescence. Differentiated by characters given in the key. The head and thorax are generally darker in color than *difficilis* or *postoculata*. Smaller individuals may have a reduction in the hairs on the propodeum and petiolar scale.

Taxonomy: The material in Wesson & Wesson, (1940), identified as *F. microgyna rasilis*, is considered to be *F. querquetulana*, as mentioned in Creighton (1950:506).

Ecology:

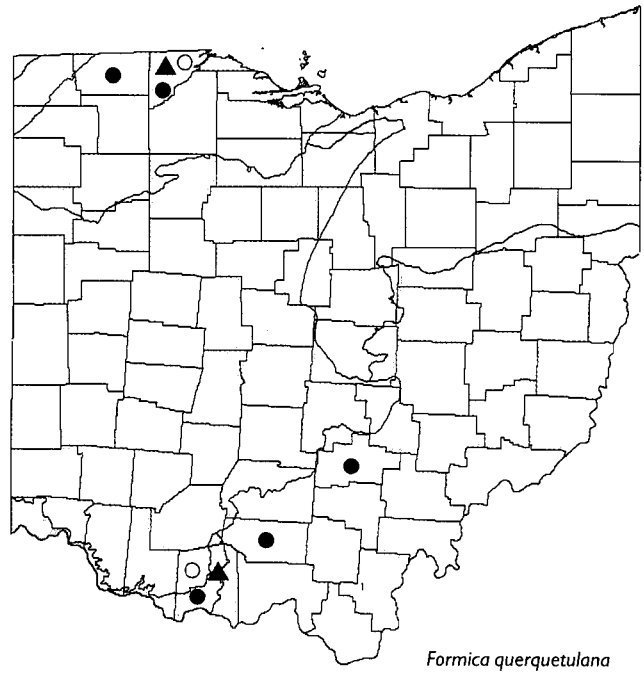
— Habitat: Found in edge of oak woods (GAC 1931). "Common in very open, dry woods and in upland fields, especially where there are scattered bushes and small trees" (Wesson & Wesson, 1940). See also Kennedy & Dennis (1937).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: A temporary social parasite of *Formica fusca* group.

Behavior: Further data lacking.



Formica querquetulana

Nests: In sandy soil in bank (GAC 1931), and under large board (GAC 2082 #29). D. R. Smith (1979) notes "usually beneath objects and commonly covered with loose trash."

— Colony Organization: Further data lacking.

— Reproductives: Females - June 9 (GAC 2082 #29), July 11 (Kennedy 2444). "Migratory females have been taken in early July." (Wesson & Wesson, 1940).

Range: New England to Ohio, Michigan, Indiana, westward to Montana, Nevada, California (Wheeler & Wheeler, 1986).

Ohio Distribution: Recorded from 5 counties in northern and southern Ohio.

Ohio References: Adams (Kennedy & Dennis, 1937), Lucas (**Type locality** — Kennedy & Dennis, 1937; Creighton, 1950; Smith, 1951), southcentral Ohio (Wesson & Wesson, 1940; c.f. Creighton, 1950:506), Ohio (Gorham, 1956; D. R. Smith, 1979).

Comments: This uncommon species was originally described from Ohio. The name refers to occurrence in oak forests where this ant is characteristically found.

Formica talbotae Wilson

Formica talbotae Wilson, 1976

Identification: Workerless; see Wilson (1976) for description of queen and males.

Taxonomy: See Wilson (1976) for original description.

Ecology:

— Habitat: See *F. obscuripes* for details. This host is essentially a prairie species (Talbot, 1976).

— Food Resources: Further data lacking.

— Associates: Further data lacking.

— Ant Associates: A workerless social parasite of *F. obscuripes*.

Behavior: Further data lacking.

Nests: See *F. obscuripes* for details.

— Colony Organization: Multiple queens produce only males and females. See Talbot (1976) for details.

— Reproductives: Alates mid-June to late Sept. (Talbot, 1976), which is a relatively long flight season.

Range: Southern Michigan, Iowa, North Dakota (Wilson, 1976).

Comments: This species is a workerless inquiline in mounds of *Formica obscuripes*. Both this species and its host, *F. obscuripes*, are recorded from southern Michigan and should be sought in northern Ohio, especially in prairie areas. Described by Edward O. Wilson, the current dean of world myrmecology. Named for Mary Talbot who discovered this species and did extensive work on ants in Michigan and Ohio.

Genus *Formica*, Species Group Sanguinea

Identification: The notched clypeus is diagnostic for this group of bicolored *Formica*.

Revision(s): The revision of Wilson & Brown (1955), in which most species were synonymized, has been convincingly replaced by Buren (1968a) and Snelling & Buren (1985), who present keys to the workers. Once the general nature of the diagnostic characters is grasped, identification is no more difficult than in other groups.

Key: The key below, modified from the last two revisions above, covers all species of northeastern North America.

Comments: This group of larger bicolored ants are slave makers (dulotic) and most of our species regularly conduct slave raids. The group is named for the European *Formica sanguinea*.

Key to *Formica* Sanguinea Group of Northeastern North America

1. Erect hairs absent on <u>both</u> gula and dorsum of pronotum (rarely up to 6 minute (less than 0.01 mm) stiff, blunt bristles on pronotum); crest of petiole lacking tiny erect setae; mesonotum and propodeum normally completely lacking erect hairs; erect hairs on dorsum of gaster sparse ..... ***F. aserva***

   Gula normally with at least 1 or 2 long, erect hairs present; dorsum of pronotum with 6 or more longer flexuous bristles (some of which are 0.10 mm or longer); crest of petiole with at least a few short erect setae; mesonotum and propodeum often with distinct erect hairs; erect hairs on dorsum of gaster sparse to abundant **2**

2. Erect hairs on dorsum of alitrunk and gaster short (0.06 to 0.14 mm long), stiff and bristle-like, usually more or less flattened and blunt-tipped, or abruptly tapering apically **3**

   Erect hairs on dorsum of alitrunk and gaster distinctly longer (0.10 to 0.25 mm long), finer and more flexible, and evenly tapering to tip **4**

3. Crest of petiole (in profile) blunt, the crest rounded, usually with only a very few inconspicuous erect setae; angle between anterior and posterior slopes of propodeum close to 90°; angle between the mesonotum and anterior slope of propodeum thus comparatively deep (i.e. profile "saddle-backed"); color comparatively paler; propodeum usually lacking erect hairs ..... ***F. subintegra***

   Crest of petiole (in profile) sharp, the crest thin and acute, usually with a number of distinct erect setae; angle between anterior and posterior slopes of propodeum distinctly greater than 90°; the angle between the mesonotum and anterior slope of propodeum thus comparatively shallow (profile less angulate); color comparatively darker; propodeum usually with distinct erect hairs on angle ..... ***F. rubicunda***

4. Erect hairs on dorsum of gaster relatively short and sparse, less than 0.13 mm long and separated by more than their own length on 2nd tergite; head distinctly longer than broad in all sizes; scape longer than head ..... (*F. creightoni*)

   Erect hairs on dorsum of gaster relatively long and dense, longest 0.13 mm or longer and separated by less than their own length on 2nd tergite; head as broad as long or broader, and / or scape length distinctly less than head length **5**

5. Gula with 1 or 2 erect hairs usually present on each side; head usually broader than long, with outer margins of eyes well removed from lateral margins of head in full-face view; mesopropodeal impression deep; sides of head and portions of alitrunk decidedly glossy ..... ***F. pergandei***

   Gula with erect hairs often absent; head longer than broad (rarely as broad as long) and outer margins of eyes approaching or exceeding head margins in frontal view; mesopropodeal impression shallow; sides of head and alitrunk feebly glossy to dull .... (*F. gynocrates*)

103 *Formica aserva* Forel

Formica sanguinea rubicunda var. *subnuda* Emery, 1895
Formica sanguinea aserva Forel, 1901

Identification: TL 4.9-7.8 mm. Head and alitrunk light to dark orangish-brown, often darker dorsally, gaster dark reddish-brown to nearly black, segments may be paler basally; mandibles slightly darkened, antennae darkened distally, legs concolorous to slightly darker; head dull dorsally, weakly glossy on sides, alitrunk dull, glossier on propleuron, gaster satiny to moderately glossy, with a distinct grayish or silvery cast from relatively dense appressed micropubescence. The lack of erect hairs on both the gula and pronotum will distinguish this species. The only possible confusion would be with sparsely haired *subintegra* but that species has a blunt petiolar crest, quite different from the sharp crest of *aserva*. *Formica aserva* actually resembles *F. rubicunda* more in general appearance but is much less pilose.

Taxonomy: Since the name *subnuda* was originally a quadrinomial and thus unavailable, *aserva* has seniority (see Bolton, 1995). See also Buren (1965a) as *F. subnuda*.

Ecology:

— Habitat: Found in the edge of woods in sunny places (Headley, 1943a). Found in mesic woods in Michigan (Wheeler et al., 1994).

— Food Resources: Honeydew. See also host species.

— Associates: Host to the larvae of the myrmecophilous syrphid *Microdon cothurnatus* (cf. Duffield, 1981). See Wheeler & Wheeler (1963) for North Dakota data. See also host species.

— Ant Associates: A social parasite and slave-maker of *Formica altipetens*, *F. fusca*, *F. montana*, *F. neorufibarbis*, and *F. subpolita*. (D. R. Smith, 1979). Wheeler (1910b) adds *F. glacialis*. Talbot (1985) and Wheeler et al. (1994) specifically mention *F. subsericea*. Wheeler & Wheeler (1986) add *F. argentea*. This species often has no slaves, especially the larger colonies (Buren, 1968a).

Behavior: According to Cole (1940b) and others, the workers are not slave raiders, so eventually the colony becomes pure. Buren (1944) reports that it is very fierce and aggressive.

Nests: In and under logs or stumps, using thatch beside the log (Talbot, 1985). See also Headley (1943a).

— Colony Organization: Colonies can be populous (Wheeler & Wheeler, 1986).

— Reproductives: Females - July 5-7 (Michigan). Flights between July 15 and 18 in Michigan (Talbot, 1985).

Range: Newfoundland west to Yukon, central Alaska, south to New York, northern Ohio, Indiana, Illinois, Minnesota, North Dakota, Colorado, New Mexico, Arizona, Nevada, California.

Ohio Distribution: Only known from a possibly questionable record in Ashtabula Co. (below and comments).

Formica aserva

Ohio References: Ashtabula (Headley, 1943a), Ohio (Gorham, 1956). See comments.

Comments: This northern slave-maker is questionably recorded from Ohio. I am beginning to doubt the Headley (1943a) Ohio record. I have seen supposed material of *F. subnuda* turn out to be *F. subintegra*. Our concepts of species limits in this group have radically changed recently. I have not seen nor verified any Ohio

material as *F. aserva* but do have ample material from Michigan, and feel that this may be a predominantly northern species. I will leave the record stand because this species certainly could be found in northern Ohio. The species name *aserva* means "without slaves," an important characteristic of this species.

Formica creightoni Buren

Formica (Raptiformica) creightoni Buren, 1968

Identification: TL 5.8-7.4 mm. Head and alitrunk dark reddish-brown, head distinctly darker than alitrunk, gaster black; head and alitrunk dull, gaster moderately dull to satiny, with a relatively dense covering of appressed micropubescence. The characters in the key should distinguish this species, especially the sparser hairs on the gaster and the longer head.

Taxonomy: See Buren (1968a).

Ecology:

— Habitat: Found in woods (Wheeler et al., 1994).

— Food Resources: See host species.

— Associates: See host species.

— Ant Associates: A social parasite and slave-raider of *Formica neogagates* and *F. lasioides* (Talbot, 1985).

Behavior: Further data lacking.

Nests: In and under logs or in piles of leaves (Talbot, 1985).

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Michigan, Illinois, Iowa.

Comments: An uncommon species with a distinctively shaped head. As this species has been recorded from southern Michigan, it should be sought in Ohio. Named for William Steel Creighton (1902-1973), foremost American myrmecologist.

Formica gynocrates Snelling & Buren

Formica gynocrates Snelling & Buren, 1985

Identification: TL 5.2-7.6 mm. Head and alitrunk orangish-brown, gaster dark brownish-black to black, mandibles, antennae, and legs concolorous or nearly so; head and alitrunk dull, gaster dull to satiny, with a grayish or silvery cast from relatively dense appressed micropubescence. The characters presented in the key should serve to distinguish this species. Compared to *pergandei*, it has a duller surface and relatively shorter scapes (see Snelling & Buren, 1985 for further details).

Taxonomy: See Snelling & Buren (1985).

Ecology:

— Habitat: They are always found in open, prairie-like situations according to Snelling & Buren (1985). Found in dry, sparsely vegetated fields in Michigan (Wheeler et al., 1994). See also Talbot (1985).

— Food Resources: Honeydew from tended aphids and plundered brood of other ants (see Talbot, 1985 for details). See also host species.

— Associates: See host species.

— Ant Associates: A social parasite and slave-raider of *Formica vinculans* and to a lesser degree *F. lasioides* (Snelling & Buren, 1985).

Behavior: See Snelling & Buren (1985) and especially Talbot (1985). A more aggressive species than the others.

Nests: In soil, usually marked by thatch piles around bases of plants which enclose aphids (Talbot, 1985).

— Colony Organization: See Talbot (1985).

— Reproductives: Flights recorded between July 5 and Aug. 14 in Michigan (Talbot, 1985).

Range: Southern Michigan (Livingston Co.), North Dakota, Wyoming, Colorado.

Comments: This recently named species was originally described from Michigan and recorded from southern Michigan. It should be sought in Ohio.

104 *Formica pergandei* Emery

Formica pergandei Emery, 1893
Formica sanguinea rubicunda var. *sublucida* Wheeler, 1913

Identification: TL 5.1-7.4 mm. Light to dark orangish-brown, alitrunk often slightly paler, gaster dark brownish-black to black, mandibles somewhat darkened, antennae darkened distally, legs slightly darker; head and alitrunk satiny, distinctly glossy on sides, especially head, gaster satiny to moderately glossy, with a distinct grayish or silvery cast from relatively dense appressed micropubescence. The relatively long, fine-tipped hairs will distinguish *F. pergandei* from the other Ohio species. The characters in the key should further distinguish it. *Formica rubicunda* has distinctly shorter, blunter, more bristle-like hairs and is larger, darker, has a broader, sharper crest on the petiole, and the surface of the body is generally duller than in *pergandei*.

Taxonomy: Prior to Buren (1968a), *F. pergandei* was seldom recognized, since the type series consists mostly of small (minor) workers. This resulted in all earlier keys, especially the revision of Wheeler (1913), to attribute a narrower head to *pergandei*, and thus many specimens of *F. pergandei* were misidentified as *F. rubicunda*. In actuality, *F. pergandei* is identified by the longer, finer, evenly tapering hairs as discussed in Buren (1968a). I am confident that the Wesson & Wesson (1940) record (below) is of *F. pergandei* and not *rubicunda*, based on known distribution and the lack of earlier recognition of *F. pergandei*.

Ecology:

— Habitat: Found in woods, woods' edges, semi-open, and open areas near the woods' edge.

— Food Resources: Brood of *Aphaenogaster treatae*, *A. rudis*, and *Lasius pallitarsis* (Talbot, 1985). See also host species.

— Associates: The braconid *Elasmosoma petulans* is parasitic on *F. pergandei* (Muesebeck, 1941 - misidentified as *F. rubicunda*). See also Appendix II herein. See also host species.

— Ant Associates: Observed raiding *Formica nitidiventris* (GAC 2121 #16) and *F. subsericea* (GAC 2292 #15). Found in mixed colony with *Formica glacialis* (GAC 2211 #11) and *F. subsericea* plus *F. nitidiventris* (GAC 1971 # 12, GAC 2145 # 18). D. R. Smith (1970) lists *Formica fusca* and questionably *F. pallidefulva* as hosts.

Behavior: Workers were only found in progress of raiding or in mixed colonies. See Kannowski & Johnson (1969) for mating behavior. Produces the same chemical (propoganda pheromones) as in *F. subintegra* (q.v.).

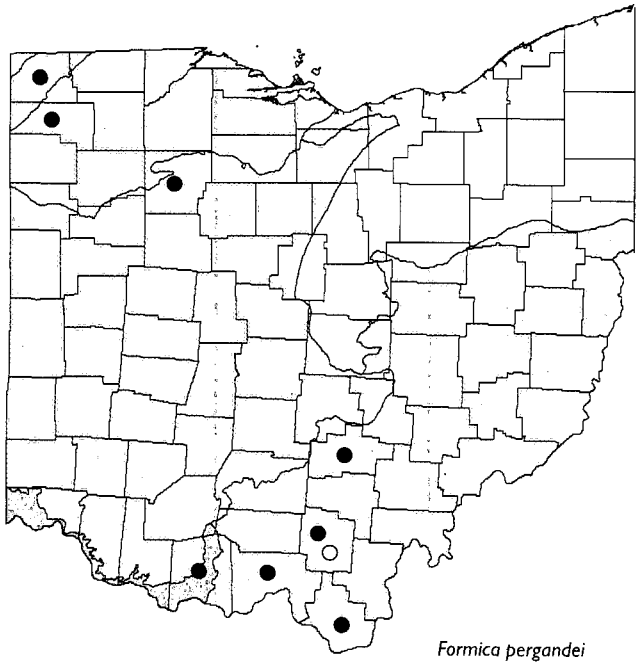
Nests: Under rotten log (GAC 1971) and under large branch (GAC 2145). In soil (Wheeler et al., 1994). See also Talbot (1985). Colonies started in nest of host species.

— Colony Organization: Workers can reproduce in queenless colonies (Hölldobler & Wilson, 1990).

— Reproductives: Flights occur between July 6 and 27 in Michigan (Talbot, 1985). Kannowski & Johnson (1969) report finding alates between July 18 and Aug. 29 in North Dakota, usually of only one sex in a given nest.

Range: Quebec, New Hampshire, south to North Carolina, west to Michigan, North Dakota, South Dakota, Iowa, Colorado.

Ohio Distribution: Recorded from 8 counties in northwest and southcentral Ohio.



Formica pergandei

Ohio References: Jackson (Wesson & Wesson, 1940; Muesebeck, 1941) - probably *pergandei* and not *rubicunda* as reported. The above two references refer to the same material.

Comments: A moderately common slave-raiding species in Ohio. This represents a new state record for Ohio, undoubtedly missed because of misidentifications. Named after Theodore Pergande, American entomologist (1840-1916), who supplied the Italian Carlo Emery with much of his North American ant material.

105 *Formica rubicunda* Emery

Formica sanguinea rubicunda Emery, 1893

Identification: TL 7.0-8.1 mm. Head and alitrunk dark orangish-brown to usually dark reddish-brown, gaster black or nearly so, mandibles darkened, antennae darkened distally, legs slightly darker distally; head and alitrunk dull, satiny or moderately glossy on sides, especially sides of head, gaster satiny to moderately glossy, with a faint golden sheen from relatively dense appressed micropubescence. This species should readily key out, being consistently more pilose than *aserva*. Compared with *subintegra*, which is distinguished by the blunt crest of the petiole, *rubicunda* has a strong tendency to be darker in color, with the head, legs, and alitrunk a brownish-red and the gaster black. It is also generally larger and more robust. The other species have longer and finer-tipped hairs.

Taxonomy: See Buren (1968a).

Ecology:

— Habitat: Found in open woods, edge of woods.

— Food Resources: Brood of *Myrmica* (Talbot, 1985). See also host species.

— Associates: See host species.

— Ant Associates: Observed raiding *Formica nitidiventris* (GAC 2102 #15) and *F. subsericea* (GAC 2124 #12). Found in mixed colony with *Formica subsericea* (GAC 1965 #11, GAC 2324 #1). D. R. Smith (1979) lists *Formica altipetens*, *F. bradleyi*, *F. fossaceps*, *F. fusca*, *F. lasioides*, *F. lepida*, *F. montana*, *F. neoclara*, *F. neogagates*, *F. neorufibarbis*, *F. obscuriventris clivia*, *F. nitidiventris*, and *F. schaufussi* as hosts, although some of these host records are probably based on misidentifications of the slave-raider.

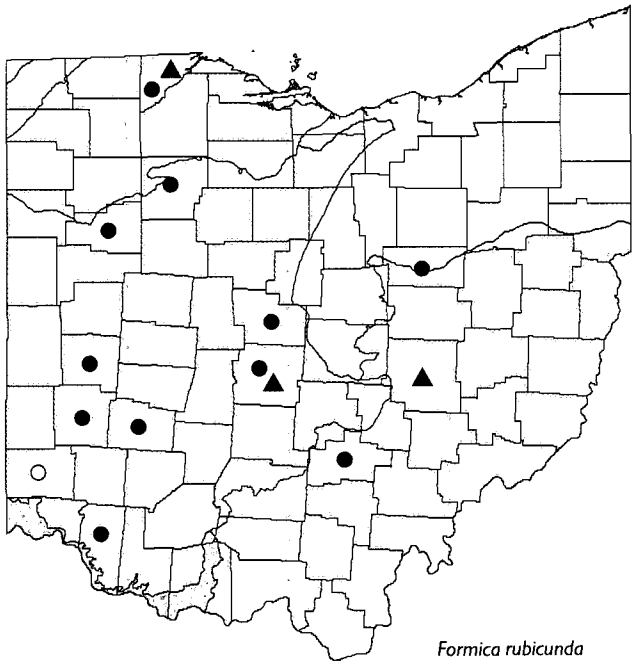
Behavior: Workers found only in process of raiding or in mixed colonies. A distinctly more aggressive species with workers avidly biting.

Nests: Low mound ca. 0.5 x 0.6 m with fine gravel and debris on top (GAC 1904); under large rock (GAC 2324). Apparently acquiring, at least partially, the characteristics of the host in which the colony is started. See also Talbot (1985).

— Colony Organization: Forms fairly large colonies.
— Reproductives: Female - July 6-Aug. 16. Stray dealate females - July 6-11. Flights recorded between July 12 and Aug. 4 in Michigan (Talbot, 1985).

Range: Quebec, Ontario south to North Carolina, Tennessee, west to Michigan, Montana, Colorado, New Mexico.

Ohio Distribution: Recorded from 13 counties in glaciated western Ohio, or just into the unglaciated area.



Formica rubicunda

Ohio References: Butler (Gorham, 1956) - unpublished.

Comments: This large, robust slave-raider is moderately common in Ohio. Reported from southcentral Ohio (Wesson & Wesson, 1940), but probably based on a misidentification of *F. pergandei* (q.v.). The species name means red or reddish.

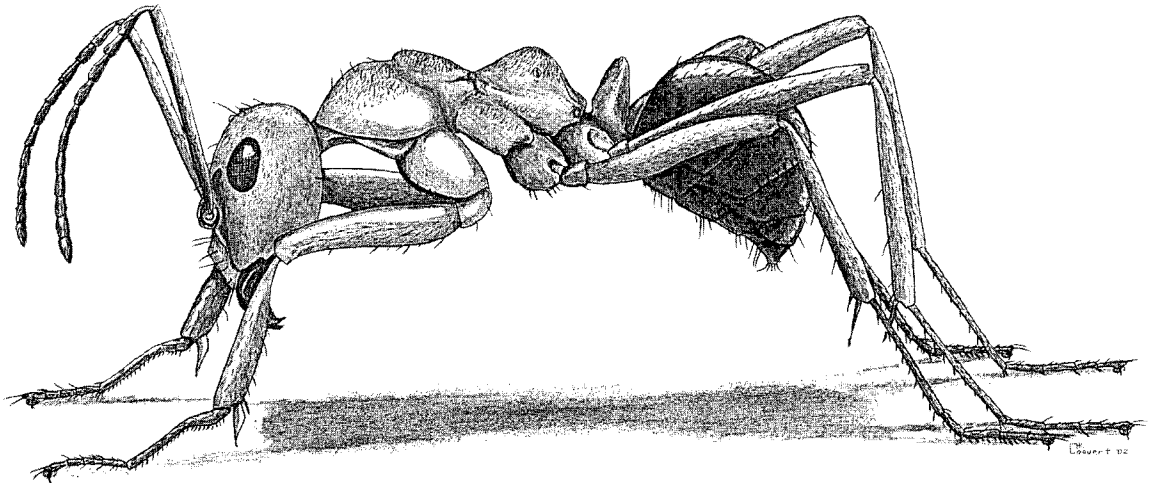
106 *Formica subintegra* Emery

Formica sanguinea rubicunda var. *subintegra* Emery, 1893
Formica sanguinea subintegra var. *gilvescens* Wheeler, 1913
Formica sanguinea subintegra Emery

Identification: TL 4.9-7.2 mm. Head and alitrunk yellowish-orange to medium orangish-brown, gaster blackish-brown, often orange-tinged basally, mandibles somewhat darker than face, antennae darkened distally, legs concolorous with alitrunk; head and alitrunk dull with sides of head and propleura glossy, gaster satiny to moderately glossy, with a faint golden sheen from relatively dense appressed micropubescence. The blunt crest of the petiole is diagnostic for this species. The sparse, short, and usually blunt-tipped hairs will further distinguish it. Both *aserva* and *rubicunda* have a sharply-crested petiole. Compared to *rubicunda*, *subintegra* is smaller and usually paler in color, with the head, legs, and alitrunk usually tending to be a yellowish-orange and the gaster brown with a slightly paler base. In contrast, *rubicunda* is usually brownish-red with the gaster black.

Taxonomy: See Buren (1968a). Previous Ohio records used one of the synonymous combinations above.

Ecology:
— Habitat: Found in woods, or usually open woods, woods' edges, or open fields near woods' edge.
— Food Resources: Davis & Bequaert (1922) report on a raid on an *Aphaenogaster* colony as food. See also host species.
— Associates: A number of braconids (*Elasmosoma petulans*) collected hovering over slave-raiding column at entrances to *Formica subsericea* colony being raided (GAC 2312). See Appendix II herein. See also host species.
— Ant Associates: Observed raiding *Formica glacialis* (GAC 2316 #10) and *F. subsericea* (GAC 2121 #9, GAC 2327 #19). Several raiding columns were



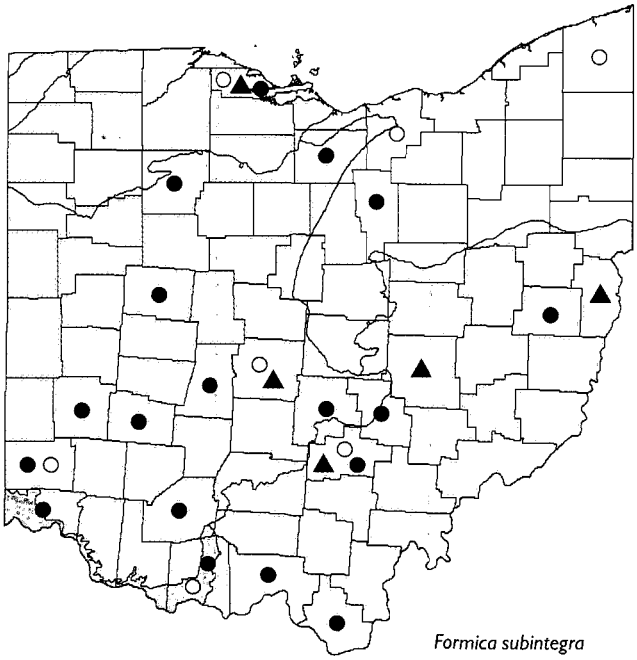
***Formica subintegra* Emery.** Drawing by Holly K. Coovert.

paced off at 76 m (GAC 2121 #9) and 91 m (GAC 2311). Found in mixed colonies with *F. subsericea* numerous times. See Appendix II herein for more detail.

D. R. Smith (1979) lists *Formica fusca*, *F. lasioides*, *F. montana*, *F. neogagates*, *F. nitidiventris*, *F. schaufussi*, and *F. subpolita* as hosts, although some of these host records are probably based on misidentification of the slave-raider.

Behavior: Workers rarely found foraging on ground in woods, mostly found in progress of raiding or in mixed colonies. A less aggressive species than *F. rubicunda*. When disturbed, this species has a strong tendency to move its colony to a new nest site. A prolonged move was observed over a number of days, with many workers carrying another curled up and tucked below by locking their jaws together. (See Hölldobler & Wilson, 1990 who describe the same behavior, known as adult transport, for *Camponotus*). Both slaves and slave-raiders carried nest mates of either species in this manner. See Talbot & Kennedy (1940) for a full account of slave raiding and other behavior.

Raiding workers spray a combination pheromone (termed "propoganda substances") that recruits their own workers and panics and disperses the defenders (Hölldobler & Wilson, 1990).



Formica subintegra

Nests: In soil with a very low, spread out, unthatched mound and numerous entrances, but may be under rocks, logs, or other objects. Probably acquires the characteristics of the host species, at least in part. See also Talbot & Kennedy (1940) and Talbot (1985). Colonies are started in the nest of a host species.

— Colony Organization: Forms fairly large colonies.

— Reproductives: Male, female - July 27 (Kennedy 2136). Females - July 4-10. Dealate stray females - July 14-20. Talbot & Kennedy (1940) observed flights between July 6 and Aug. 3. Flights recorded between July 7 and Aug. 8 in Michigan (Talbot, 1985).

Range: Newfoundland, Nova Scotia, Ontario south to South Carolina, Tennessee, west to North Dakota, Iowa, Kansas.

Ohio Distribution: Widespread. Recorded from 23 counties.

Ohio References: Adams (Talbot & Kennedy, 1940), Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Franklin (Talbot & Kennedy, 1940), Hocking (Wesson & Wesson, 1940), Lorain (Talbot & Kennedy, 1940), Ottawa (Talbot & Kennedy, 1940), Ohio (Smith, 1951).

Comments: Our most common slave-raiding *Formica*. The species name means "nearly integra" in reference to its (superficial) similarity to *Formica integra*.

Genus *Polyergus* Latreille

Polyergus Latreille, 1804

Identification: This genus is readily identified by the distinctive falcate, or sickle-shaped, mandibles which are minutedly serrated and lack the strong teeth of other genera, plus the prominent, rounded petiolar node.

Immatures: Larvae pogonomyrmecoid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Revision(s): Creighton (1950) provides a key to all forms and J. Wheeler (1968) synonymizes the minor varieties of *P. breviceps*. Although outdated taxonomically, the revision of Smith (1947b) should be consulted.

Key: The key below treats both North American species, but does not differentiate *P. lucidus longicornis* from North Carolina, South Carolina, and Georgia.

Comments: Members of this genus are true, or obligatory, slave-making ants, with the distinctive reddish workers regularly conducting slave raids later in the year. The name is from the Greek *polyergos*, meaning hard-working, in reference to their conspicuous and energetic raids.

Key to *Polyergus* of Northeastern North America

1. Gaster very glossy; minute appressed pubescence extremely fine and sparse dorsally; erect hairs on dorsum of gaster very sparse, usually nearly absent on 1st and 2nd tergites; scapes longer, reaching or surpassing the top of the head, gradually enlarged apically ..... ***P. lucidus***

   Gaster with grayish sheen due to relatively dense appressed pubescence; erect hairs on dorsum of gaster very dense; scapes shorter, not reaching the top of the head, rather abruptly dilated apically..... ..... (*P. breviceps*)

Polyergus breviceps Emery

Polyergus rufescens breviceps Emery, 1893
Polyergus rufescens bicolor Wasmann, 1901

Identification: TL 5.9-6.7 mm. Variable in color, yellowish-orange to yellowish-brown or reddish-brown, gaster darker in some; mandibles, antennae, and legs concolorous or nearly so; body generally smooth and dull to weakly glossy, gaster with fine covering of appressed micropubescence giving surface a grayish sheen. The grayish sheen on the gaster and the abundant long, erect hairs and shorter antennal scapes differentiate this species from *lucidus*.

Taxonomy: See J. Wheeler (1968).

Ecology:

— Habitat: Found in grasslands (Wheeler et al., 1994). See host species.

— Food Resources: Fed by host species (q.v.); raided pupae also serve as food source.

— Associates: See host species.

— Ant Associates: A social parasite and obligatory slave-raider of *Formica altipetens*, *F. argentea*, *F. fusca*, *F. lepida*, *F. montana*, *F. neoclara*, *F. neorufibarbis*, *F. nitidiventris*, *F. schaufussi*, and *F. subpolita*. (D. R. Smith, 1979). Smith (1947a) and Wheeler et al. (1994) additionally list *F. subsericea*, and Wheeler & Wheeler (1986) add *F. manni*. In Arizona slaves are *F. gnava* and *F. occulta* (see Topoff, 1999).

Behavior: See Wheeler (1910b) for an account of slave raids (as *bicolor*). See also Wheeler & Wheeler (1986) for a good account of a raid on *F. argentea* in Nevada, and Topoff (1984) for a raid in Arizona.

Nests: In soil (Wheeler et al., 1994). See host species.

— Colony Organization: Typical colony size of 3,000 raiders with 6,000 slave workers. Winged queens forego mating flights and join a slave raid, mating along the way. New colonies are founded by either this newly mated queen staying behind in a plundered nest or locating another more distant colony on her own. In either case, she will locate and kill the host queen, repeatedly biting and licking her. She is then accepted by the host workers, apparently obtaining the proper scent (Topoff, 1999). Workers are able to reproduce in queenless nests (Hölldobler & Wilson, 1990).

— Reproductives: Gregg (1944) reports swarming July 13 and Aug. 10 in Illinois.

Range: Quebec, Ontario, Michigan west to British Columbia, south to Indiana, Illinois, Missouri, Kansas, New Mexico, Arizona, Nevada, California.

Comments: A western obligatory slave-raider possibly found in Ohio. Wheeler (1968) shows the range of this essentially western species extending to extreme northwestern Ohio, but no records substantiate this. It certainly could occur in this part of Ohio and should be looked for. Gregg (1944) describes this species as a "handsome ant."

107 *Polyergus lucidus lucidus* Mayr
Shining Slave-maker Ant

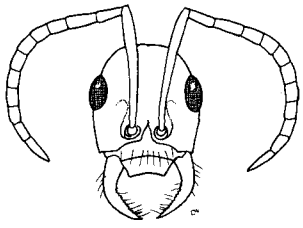
Polyergus lucidus Mayr, 1870
Polyergus lucidus montivagus Wheeler, 1915

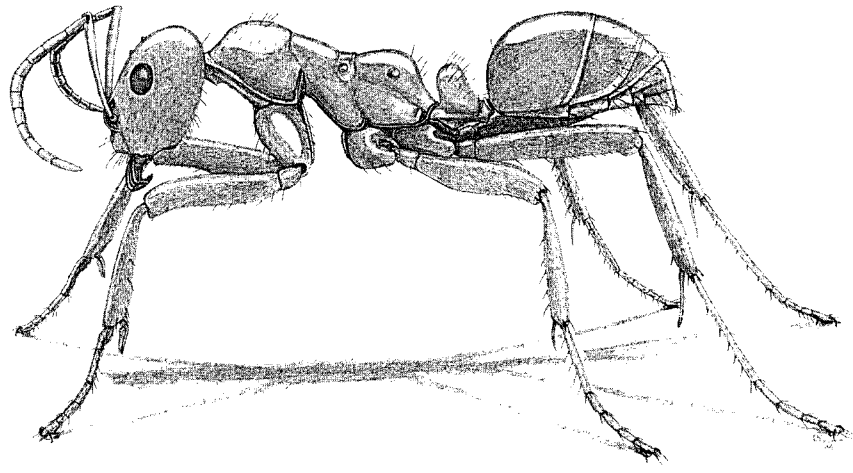
Identification: TL 6.1-7.4 mm. Body brownish-orange to dark orangish-brown, gaster often black apically, antennae and legs concolorous to slightly darker; body satiny to mostly glossy, gaster with dorsal appressed micropubescence very sparse. The very glossy gaster and the sparse erect hairs and longer antennal scapes differentiate this species from *breviceps*.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Usually in open fields or mowed areas, less commonly in open woods. See Carter (1962) for North Carolina habitat notes. See also host species.





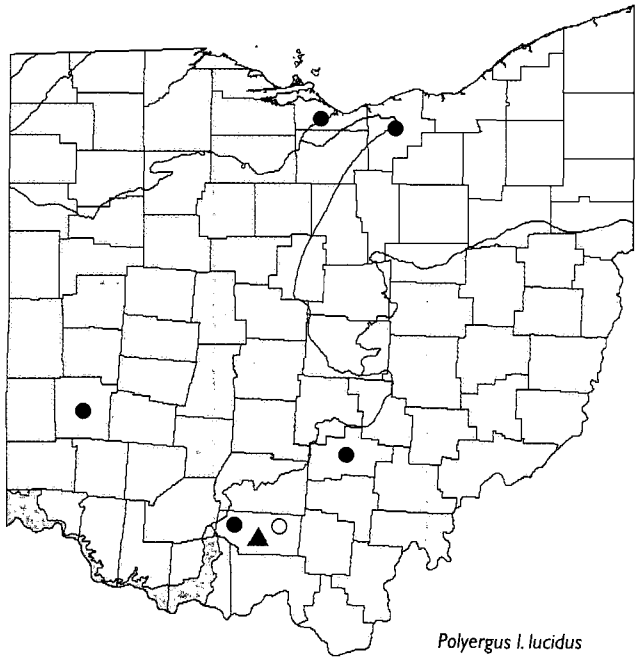
***Polyergus lucidus lucidus* Mayr**, full face view of head and habitus. Drawing by Holly K. Coovert.

— Food Resources: Apparently strictly dependent on their slaves for obtaining food (by regurgitation or trophallaxis) (Wheeler, 1901b). See host species for further detail; raided pupae also an important food source.

— Associates: Host to the larvae of the myrmecophilous syrphid *Microdon fulgens* (cf. Duffield, 1981). See also host species.

— Ant Associates: Observed raiding *Formica nitidiventris* (GAC 1820). Found in mixed colony with *F. nitidiventris* (GAC 1867). Observed end of raid (GAC 2138 #22). A social parasite and obligatory slave-raider of *Formica lasioides*, *F. neogagates*, *F. nitidiventris*, and *F. schaufussi* (D. R. Smith, 1979). Marlin (1971) discusses ant enemies.

Behavior: Two workers found apparently scouting on concrete path in woods (GAC 2136), otherwise normally only found in progress of raiding or in mixed colonies. Wesson & Wesson (1940) give a good account of a raid. See also Wheeler (1910b), Talbot (1967), and Marlin (1968, 1971).



Polyergus l. lucidus

Nests: In ground, with characteristics of the host, *Formica nitidiventris*. See also other host species.

— Colony Organization: Talbot (1967) gives details of colony size in Michigan, which consisted of a single queen, 291 workers, 115 alate females, and 407 males. There were 4,527 slave workers. This much greater ratio of slaves to slave-raiders is typical for the species. See Hölldobler & Wilson (1990) for more details. Colonies often founded by budding, in which a dealate female and workers take over a slave species' nest and remain (Marlin, 1968).

— Reproductives: Males - Aug. 2 (Kennedy 2317). "Winged females were observed leaving a colony on August 5." (Wesson & Wesson, 1940). Males - Aug. 9 in New York (Wheeler, 1910b). Marlin (1971) records flights between July 10 and Sept. 4 in Illinois between noon and 3 pm on hot, sunny days.

Range: Massachusetts south to South Carolina, west to Michigan, North Dakota, Iowa, Colorado, New Mexico.

Ohio Distribution: Recorded from 5 widespread Ohio counties.

Ohio References: Pike (Smith, 1947b), southcentral Ohio (Wesson & Wesson, 1940; Jones, 1943), Ohio (Gorham, 1956).

Comments: This is certainly one of Ohio's most interesting and beautiful species of ant. It is a dedicated slave-raiding species, dependent on this behavior (termed obligate dulosis). The name *lucidus* means shining or bright, in reference to the glossy exterior. This is a relatively uncommon species throughout its range.

Tribe Camponotini

Genus *Camponotus* Mayr

Camponotus Mayr, 1861

Identification: This genus is identified by the sharply formed anteroventral edge of the mesopleuron and the evenly convex outline of the alitrunk. The placement of the antennal sockets and the reduced metapleural gland will further identify it.

Immatures: Larvae pogonomyrmecoid; pupae generally in cocoons (Wheeler & Wheeler, 1976).

Taxonomy: See comments under *C. castaneus*, formerly included in the subgenus *Tanaemyrmex*.

Revision(s): Creighton (1950), with a key to workers.

Key: The included key to subgenera does not include typically southeastern and southwestern subgenera.

Comments: This is a large genus of ants primarily nesting in wood, soil, or in hollow twigs or branches. Workers are polymorphic, gradually ranging in size from minors to majors.

Key to Subgenera of *Camponotus* of Northeastern North America

1. Ventral border of clypeus usually with a distinct median (often triangular) impression and narrow notch (best viewed from in front and below; may be absent in smaller workers); hind tibia with at most a few, short, suberect bristles confined to apical 1/5 of ventral (flexor) surface; gena with short erect hairs (in all but one species); smaller species, total length of major worker 8 mm or less ..... ***Camponotus (Myrmentoma)***

   Ventral border of clypeus lacking median impression and notch (rarely obscurely notched); hind tibia with

more numerous short, suberect bristles on apical 1/3 or more of ventral (flexor) surface; gena lacking short erect hairs; larger species, total length of major worker usually more than 8 mm ..... ***Camponotus (Camponotus)***

Genus *Camponotus*, Subgenus *Camponotus* Mayr

Camponotus Mayr, 1861

Identification: This subgenus lacks the clypeal notch of *Myrmentoma* and they are generally larger species.

Revision(s): Creighton (1950), with a key to workers.

Key: The key below is a revision of existing keys and is largely based on the relative length of the appressed pubescence of the gaster, found to be a very reliable character. See additional comments under *C. chromaiodes*.

Comments: This group of large ants nests in wood or soil, and several are commonly referred to as carpenter ants.

Key to *Camponotus (Camponotus)* of Northeastern North America

1. Appressed pubescence of dorsal surface of gaster inconspicuous, tiny and very sparse to mostly absent, individual hairs separated by several times their length or more; gaster and head dorsally very smooth and glossy, microsculpturing extremely minute; color of alitrunk and gaster yellowish- to brownish-orange, gaster sometimes lightly infuscated apically but never nearly black **2**

   Appressed pubescence of dorsal surface of gaster much more conspicuous, short to moderately long, and moderately sparse to dense, individual hairs separated by their length or less; gaster and especially head dorsally feebly glossy, satiny, or dull, microsculpturing fine but distinct; color of alitrunk dark reddish-brown to black, gaster mostly to completely black **3**

2. Distinctly bicolored, head dark brown to black and strongly contrasting with remainder of body ..... ***C. (C.) americanus***

   Essentially unicolorous, head at most slightly darker brownish-orange and not strongly contrasting with remainder of body ..... ***C. (C.) castaneus***

3. Appressed pubescence of dorsal surface of gaster relatively short and sparse, most individual hairs separated by their own length and not imparting a silky appearance; the posterior fringe of appressed pubescence on the 2nd to 4th gastral tergites falling short of the border; gaster comparatively glossy .. ***C. (C.) noveboracensis***

   Appressed pubescence of dorsal surface of gaster longer and denser, most individual hairs separated by 1/2 to 2/3 their length or less and usually imparting a silky appearance; the posterior fringe of appressed pubescence on the 2nd to 4th gastral tergites nearly reaching or surpassing the posterior border; gaster comparatively dull **4**

4. Appressed pubescence of dorsal surface of gaster relatively short (less than 1/4 as long as erect hairs), not extending over posterior borders of tergites. ..... (*C. (C.) herculeanus*)

   Appressed pubescence of dorsal surface of gaster relatively long (1/4 to 1/2 as long as erect hairs), extending over posterior borders of tergites **5**

5. Appressed pubescence of gaster finer, white or very pale yellow-tinged, those on posterior border only extending beyond border by 1/4 their length or less; appressed pubescence of occiput short, no more than 1/2 as long as width of scape near base; color all dark, dark brownish-black to black ..... ***C. (C.) pennsylvanicus***

   Appressed pubescence of gaster heavier, golden-colored, those on posterior border extending beyond border by 1/3 to 1/2 their length; appressed pubescence of occiput longer, 2/3 to nearly as long as width of scape near base; color of alitrunk and base of gaster usually dark reddish-brown and often distinctly contrasting with remainder of body (but may be all dark) ..... ***C. (C.) chromaiodes***

108 *Camponotus (C.) americanus* Mayr

Camponotus americanus Mayr, 1862
Camponotus castaneus americanus Mayr

Identification: TL 7.1-12.0 mm. Head dark reddish-brown to black, clypeus usually paler, alitrunk and gaster usually brownish-yellow to yellowish-brown, alitrunk sometimes mottled with very dark brown, gaster sometimes dark brown to black apically, legs basally pale brownish- or yellowish- to dark reddish-brown, darker apically; body with extremely minute microsculpturing, surface smooth and glossy. The very sparse gastral pubescence and dark head distinguish this species.

Taxonomy: Long placed as a subspecies of *C. castaneus* (q.v.). See Creighton (1950).

Ecology:

— Habitat: Found in woods' edges. Wesson & Wesson (1940) note "in open, well-drained woods." In grasslands and woods in Michigan (Wheeler et al., 1994).

— Food Resources: Further data lacking.
— Associates: Further data lacking.

Behavior: Workers usually found foraging on ground in woods, but also under logs and on foliage and tree limbs. See Hölldobler & Wilson (1990) for description of threat display.

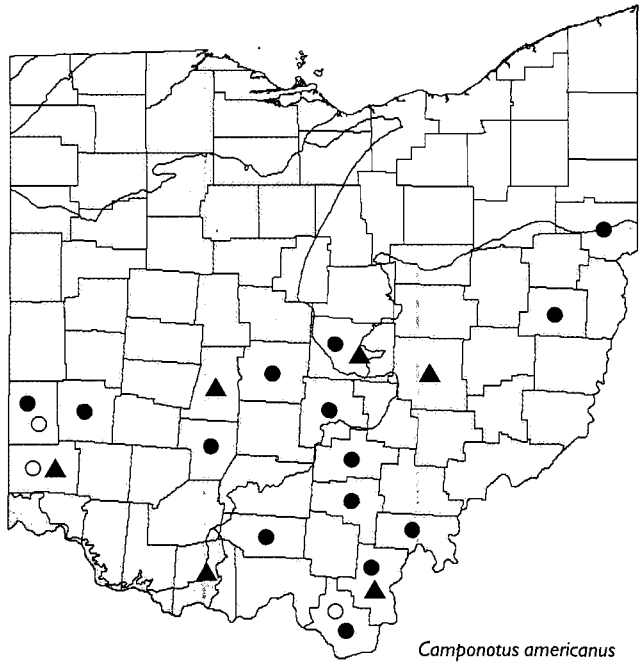
Nests: In soil. "Prefers to nest in the soil, usually under stones or rotten logs." (D. R. Smith, 1979). The location of nest sites in soil is unusual for this genus.
— Colony Organization: Further data lacking.
— Reproductives: Male - May 12-24; "Fall". Female - May 23 (in nest). Cole (1940b) discusses finding alates in nests in Tennessee Oct. 7, 17, and again March 7, Apr. 3, and May 7 and theorizes that they overwinter. Buren (1944) reports likewise with data from Iowa.

Range: Ontario south to Florida, west to Michigan, Iowa, Missouri, Oklahoma, Texas.

Ohio Distribution: Recorded from 18 counties in the southern half of Ohio.

Ohio References: Butler (Gorham, 1956), Lawrence (Wesson & Wesson, 1939), Preble (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938).

Comments: This fairly abundant species is recognized by the dark head. A species named by Gustav Mayr (1830-1908), prominent early European myrmecologist, in commemoration of North America.



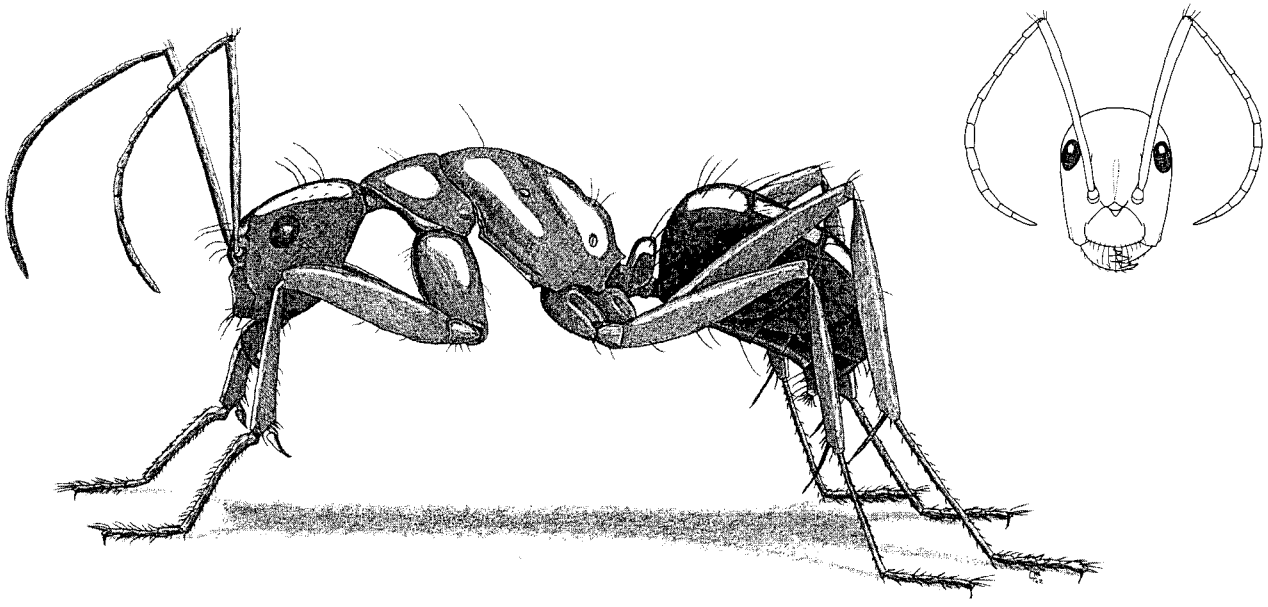
Camponotus americanus

109 *Camponotus (C.) castaneus* (Latreille)

Formica castanea Latreille, 1802

Identification: TL 8.6-11.0 mm. Pale brownish-yellow to orangish-brown, alitrunk often slightly paler than head and gaster, mandibles usually darker than head, antennae slightly darker, legs concolorous; body with extremely minute microsculpture, surface smooth and glossy. The very sparse gastral pubescence and head the same color as alitrunk will distinguish this species.

Taxonomy: Wheeler (1910a) stated that he could find no difference between *C. americanus* and *C. castaneus* other than a very slight distinction in the cephalic sculpture and the color. Creighton (1950) supposedly found much greater differences: "The head of the major worker of *americanus* is slightly broader than long and it lacks the very prominent median impression or excavation which is present



***Camponotus (C.) castaneus* (Latreille)**, habitus and full face view of head. Drawing by Holly K. Coovert.

in *castaneus*. The clypeus of the major [of *castaneus*] is virtually ecarinate, although there is a small ridge immediately in advance of the frontal area which may represent the carina." But presence of a carina along with the flattened base of the antennal scape, another feature at most weakly developed in *castaneus*, are the main key characters Creighton used to differentiate the subgenus *Tanaemyrmex*, where he placed *castaneus*. He goes on to say "...while there may be some objection to the transfer of *castaneus* to the subgenus *Tanaemyrmex*, there can be none to according *americanus* the specific status which it deserves."

I have critically compared all castes of these two species and I agree that they should be considered distinct species, but they are clearly very closely related and should, in no way, be placed in different subgenera. I have, therefore, moved *castaneus* back into *Camponotus* s. str. with *americanus*. Note the similar preferred nesting sites in soil as opposed to the usual sites in wood for other *Camponotus*, lending further credence to the close relationship.

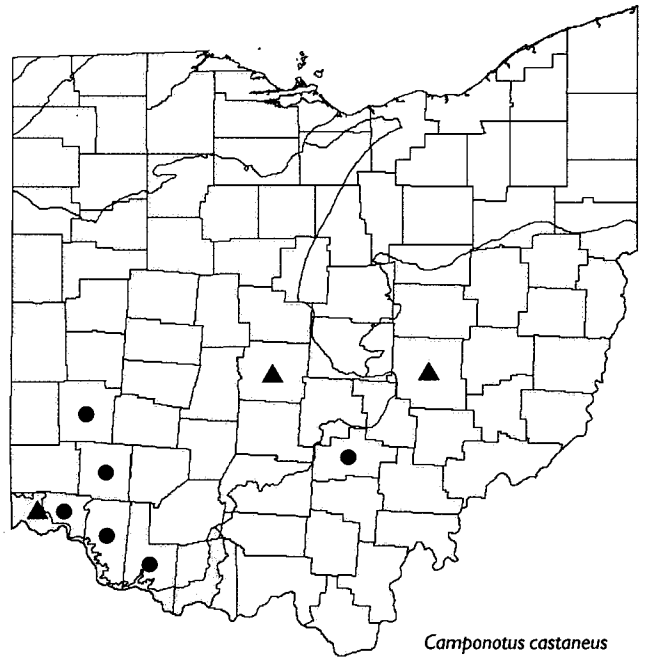
Ecology:

— Habitat: Found in woods. Wesson & Wesson (1940) note "open, dry, upland oak woods. On very rocky, barren or washed soil it is commoner than *C. americanus*." DuBois & LaBerge (1988) cite open fields for Illinois, and black oak dunes by Gregg (1944).

— Food Resources: Foraging on fruits of *Campsis radicans* (GAC 2063).

— Associates: Wood (1982) reports tending the membracid *Enchenopa binotata*.

— Ant Associates: Colony under same rock with *Aphaenogaster rudis*, with immatures adjacent to large clutch of *C. castaneus* pupae (GAC 1918).



Camponotus castaneus

Behavior: Workers found foraging on ground and tree trunks in open woods. Wheeler (1910a) states "the workers are very timid and probably nocturnal."

Nests: Under rock (GAC 1918). "Galleries are often found under stones." (Wesson & Wesson, 1940). "Nests in rotting logs and stumps, exposed soil, or in soil under objects. Occasionally enters buildings usually in search of food." (D. R. Smith, 1979).

— Colony Organization: Colonies are moderately populous (Wheeler, 1910a). Cole (1940b) reports on a colony in Tennessee of 200 workers, plus alates. See Van Pelt (1958) for Florida data.

— Reproductives: Males - May16-June 16. Females - June 6-21. Stray dealate female - June 26. Alates recorded Apr. 12 in Tennessee (Cole, 1940b).

Range: New York south to Florida, west to Illinois, Iowa, Oklahoma, Texas.

Ohio Distribution: Recorded from 8 counties in southern Ohio. A southern species reaching its regional northern range limit in Ohio.

Ohio References: Southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938; Gorham, 1956).

Comments: This large, uniformly pale-colored species is moderately common in Ohio. The name refers to chestnut, the predominant color of this ant. Variously described as a "handsome" or "beautiful species." Named by the French entomologist Pierre Andre Latreille (1762-1833) in 1802.

110 *Camponotus (C.) chromaiodes* Bolton

Red Carpenter Ant

Formica ferruginea Fabricius, 1798 [preocc.]
Camponotus chromaiodes Bolton, 1995
Camponotus herculeanus pennsylvanicus ferrugineus (Fabricius)

Identification: TL 5.3-13.1 mm. Head and gaster black, alitrunk yellowish- to dark reddish-brown, sometimes nearly concolorous with head and gaster, legs commonly nearly concolorous with head and gaster, pronotum dorsally often suffused with black, base of gaster often tinged with reddish-brown, mandibles slightly redder than adjacent head, coxae, trochanters, and femora usually concolorous with alitrunk, legs darker distally; body with minute microsculpture; surface mostly satiny or dull, only weakly glossy in small areas, appressed pubescence of gaster relatively long, dense, and golden in color. The long appressed gastral pubescence, as described in the key, is diagnostic.

Taxonomy: Creighton (1950:369) could find no differences between *pennsylvanicus* "except the striking and beautiful coloration of *ferruginea*..." and thus left them as subspecies of each other. Brown (1950:158) considered the two species distinct, but still could find no differences other than color. I have found both species living sympatrically in Hocking Co., Ohio and found specimens seemingly intermediate in color. A closer

examination revealed the gaster pile characters used in the present key. These characters have consistently held up and I have had no problem differentiating the two species on this character alone, even very dark or very small specimens of *chromaiodes* which, on color alone, would have been misidentified as *pennsylvanicus*.

Although well-known as *C. ferrugineus* (earlier authors often using the archaic quadrinomial above), this name is a junior primary homonym of *Formica ferruginea* Christ, 1791 and must therefore be replaced. Oddly, no one previous to Bolton (1995) had noticed this.

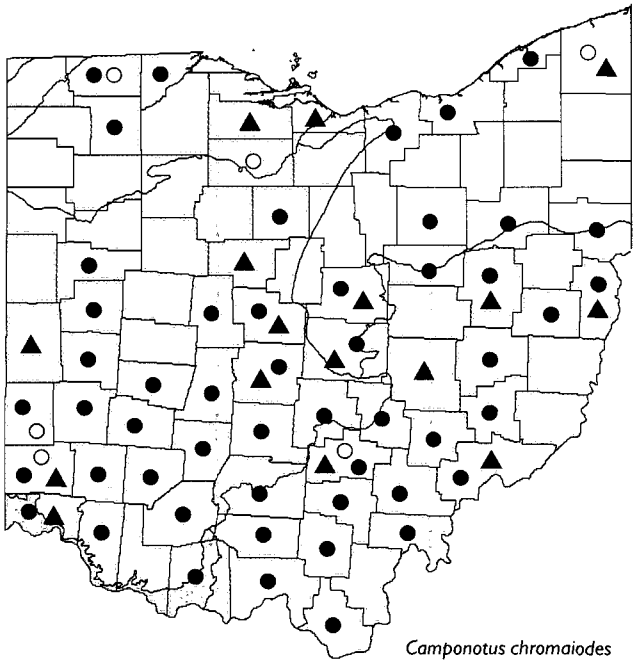
Ecology:

— Habitat: Found in moist, rich woodlands.

— Food Resources: On bloom of *Aster* sp. (GAC 2208), honeydew (below). Davis & Bequaert (1922) list attending extrafloral nectaries of bigtooth aspen in New York. See Fellers (1987) for more detail.

— Associates: Tending aphids on underside of leaves of *Viburnum* (GAC 1965); tending aphids (GAC 2032); tending membracids (mostly nymphs, *Entylia bactriana*) on thistle (GAC 2174 #8).

Behavior: Workers found foraging on ground and in leaf litter, on tree trunks, and on foliage in woods.



Camponotus chromaiodes

Nests: In rotten logs, under bark of logs, and in decayed wood in bases of trees, one record under rock (against base of beech tree in adjacent wood). "Nests are located in and beneath well-rotted stumps with galleries often extending into the soil. They have also been found in dead standing trees and occasionally in moist or faulty wood in buildings." (D. R. Smith, 1979).

— Colony Organization: Hölldobler & Wilson (1990) discuss dominance hierarchy among multiple founding queens.

— Reproductives: Males - Apr. 25-May 18, June 4. Females - April 11-May 31. The Apr. 11 females (GAC 2409) were found in the nest and apparently overwintered.

Range: New York south to Georgia, west to Michigan, Illinois, Nebraska, Kansas

Ohio Distribution: Found statewide. Recorded from 58 counties.

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Hocking (Williams, 1961), Preble (Gorham, 1956), Seneca (Headley, 1952), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This common species is usually darkly bicolored. It seems to often largely replace *C. pennsylvanicus* in southern Ohio woodlands.

Camponotus (C.) herculeanus (Linnaeus)

Formica herculeana Linnaeus, 1758

Identification: TL 5.9-12.3 mm. Dark reddish-black to black, propodeum, petiole, and sometimes ventral areas of alitrunk and legs, reddish-brown; mandibles and antennae slightly paler than head; body with minute microsculpture, surface mostly satiny or dull, only weakly glossy in small areas, appressed pubescence of gaster moderately short, sparse, slightly gold-tinged. The appressed gastral pubescence does not overhang the posterior borders of the tergites but is longer and denser than in *noveboracensis*. The majors have shorter antennal scapes than *F. chromaiodes* and *F. pennsylvanicus*, and normally have some dark red coloration on the alitrunk.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in forests.

— Food Resources: Honeydew, juice from wounded plant tissues, and animal matter, particularly insects (Sanders, 1970).

— Associates: Spruce/fir root aphids (*Cinara* spp.) in Ontario (see Sanders, 1970). Host to the larvae of the myrmecophilous syrphid *Microdon piperi* (cf. Duffield, 1981).

Behavior: See Sanders (1970) for details of foraging tunnels in Ontario.

Nests: In rotting logs and stumps, especially conifers (D. R. Smith, 1979).

— Colony Organization: Colonies often large, with a maximum over 13,000, with multiple queens which spread out in the nest to avoid contact. Queens can live for over 10 years (Hölldobler & Wilson, 1990).

— Reproductives: In Ontario mating flights occur from last week of May to first week of June (Sanders, 1970), with reproductives overwintering.

Range: Across Canada and the northern states from Newfoundland (Labrador and insular) west to Alaska, with southern extensions into the mountains of New York and Pennsylvania, and the Rocky Mountains to Arizona, New Mexico; Eurasia.

Comments: A dominant ant in the forests of boreal and alpine regions of North America. Found in the mountains of Pennsylvania; also in northern Michigan, but absent in the southern part of the state (Wheeler et al., 1994). If present in Ohio, it would most likely be found in the northeastern corner of the state. Another Linnaean species described in 1758, named after the legendary Hercules, presumably because of the strength of this ant.

111 *Camponotus (C.) noveboracensis* (Fitch)

Formica noveboracensis Fitch, 1855
Camponotus herculeanus ligniperdus noveboracensis (Fitch)

Identification: TL 4.9-11.5 mm. Head and gaster reddish-black, alitrunk and petiole orangish- to dark reddish-brown, mandibles and antennae concolorous with head, legs basally concolorous with alitrunk, darker distally; body with very minute microsculpturing, surface smooth and weakly glossy, dull on head dorsally. The relatively short and sparse gastral pubescence, as described in the key, is diagnostic.

Taxonomy: See Creighton (1950). Earlier Ohio records used the quadrinomial above.

Ecology:

— Habitat: Usually found in open bogs but also found in wet woods.

— Food Resources: On bloom of *Solidago* sp. (GAC 2191); at smashed apples (GAC 2211). Sanders (1970) reports honeydew, plant juices, and animal matter, particularly insects.

— Associates: Burrill & Smith (1919) record workers attending the membracid *Thelia bimaculata* on locust and found staphylinid beetles (*Anomognathus cuspidatus*) in nests in Wisconsin. Sanders (1970) reports spruce/fir root aphids (*Cinara* spp.) in Ontario. Wheeler & Wheeler (1963) record the myrmecophilous staphylinid beetle *Xenodusa ? reflexa* from nests in North Dakota Host to the larvae of the myrmecophilous syrphids *Microdon cothernatus* and *M. tristis* (cf. Duffield, 1981).

Behavior: Workers found foraging on foliage and bushes. See Sanders (1970) for details of foraging tunnels in Ontario.

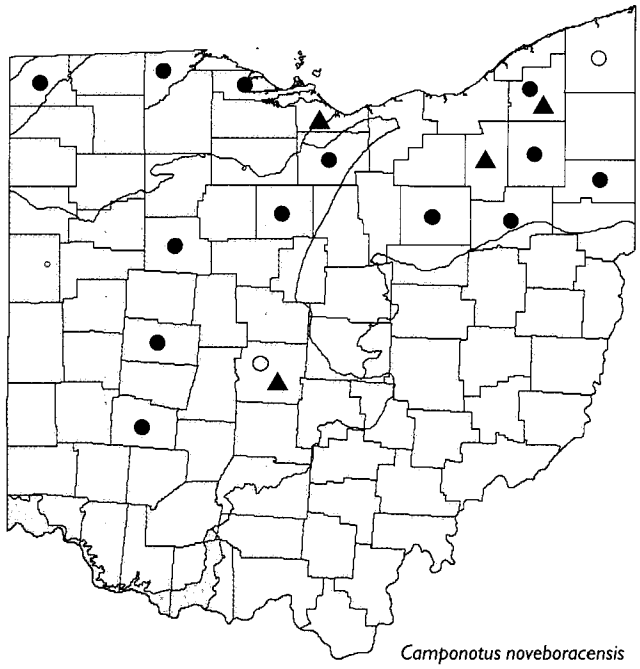
Nests: Normally nests in rotting logs and stumps (D. R. Smith, 1979).

— Colony Organization: Colonies moderately large, up to 10,800 (Hölldobler & Wilson, 1990).

— Reproductives: Females - May 20-July 31. Males, females - Sept. 16 (Ontario). Sanders (1970) reports mating flights in Ontario from end of June through July, with reproductives overwintering.

Range: Nova Scotia, Quebec south to Virginia, west to British Columbia, Oregon, Utah, Colorado.

Ohio Distribution: Recorded from 17 counties in glaciated northern Ohio. This northern species reaches its regional southern range limit in Ohio.



Camponotus noveboracensis

Ohio References: Ashtabula (Headley, 1943a), Franklin (Wesson & Wesson, 1940), Ohio (Gorham, 1956).

Comments: This is a species of northern bogs and wetlands and fairly commonly encountered in northern Ohio. The species name means "from New York," where it was originally described by Asa Fitch (1809-1879), one of the more important early American entomologists.

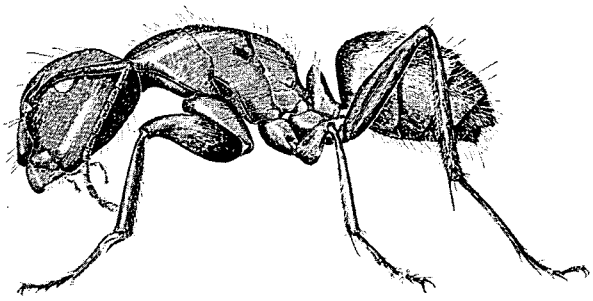
112 *Camponotus (C.) pennsylvanicus* (De Geer)
Black Carpenter Ant

Formica pensylvanica (!) De Geer, 1773
Camponotus herculeanus herculeanus herculeano-pennsylvanicus Forel, 1879
Camponotus herculeanus pennsylvanicus (De Geer)

Identification: TL 5.2-15.0 mm. Black, mandibles black, antennal funiculus dark brown, legs black, partially to completely dark reddish-brown, slightly paler distally; body with minute microsculpture, surface mostly satiny or dull, alitrunk and sides of head weakly glossy, appressed pubescence of gaster relatively long, dense, and usually silvery or white in color. This species is recognized by the relative length of the appressed pubescence of the gaster, which overhangs the posterior

borders of the tergites by no more than one-fourth their length. The body is completely black in contrast to *chromaiodes* which usually is partly reddish.

Taxonomy: See *C. chromaiodes* taxonomy above. See also Creighton (1950).



***Camponotus (C.) pennsylvanicus* (De Geer).** From Smith (1947a).

Ecology:

— Habitat: Found in woods, woods' edges, open wooded parkland, and in wooden buildings.

— Food Resources: On bloom of *Daucus carota* (GAC 2330). Makes extensive use of honeydew (*below*).

— Associates: Tending membracids (*Entylia bactriana*) (GAC 255); tending membracid nymphs on *Ambrosia trifida* (GAC 2333). Davis & Bequaert (1922) report tending of the membracid *Thelia bimaculata* on locust in New York plus attending extrafloral nectaries of bigtooth aspen. Wood (1982) reports tending the membracid *Enchenopa binotata*. Parasitized by the phorid fly *Apocephalus pergandei* (see Feener, 1981). Host to the larvae of the myrmecophilous syrphids *Microdon cothernatus* and *M. tristis* (cf. Duffield, 1981). See also Wheeler & Wheeler (1963).

Behavior: Workers found foraging mostly on ground and on tree trunks in woods and open woods. Recorded from a wide variety of tree species. Mostly forage at night (for details see Klotz, 1984).

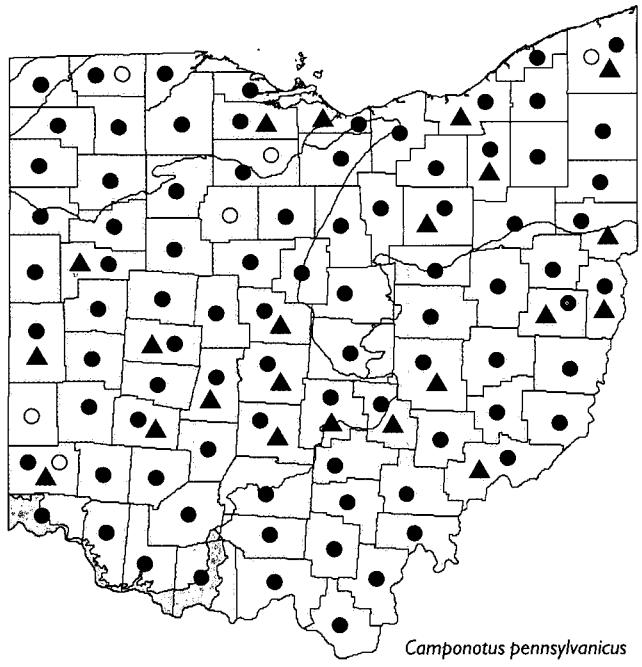
Nests: In rotten logs, under bark of logs, or in rotten wood of live or dead trees. Newly founded colonies typically under bark of rotten log. "Found commonly nesting in dead branches or cavities of trees, rarely in dry logs or stumps" (Wesson & Wesson, 1940). "Nests are started in buildings usually in moist or faulty wood" (D. R. Smith, 1979).

— Colony Organization: Colonies are moderately large, up to 2,500 (Hölldobler & Wilson, 1990).

— Reproductives: Males and females - scattered dates from March 20-21 to early Oct.

Range: New Brunswick, Quebec south to Florida, west to North Dakota, Texas.

Ohio Distribution: Statewide. Recorded from all 88 Ohio counties.



Camponotus pennsylvanicus

Ohio References: Ashtabula (Headley, 1943a), Butler (Gorham, 1956), Fulton (Fernandes, 1986), Preble (Gorham, 1956), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Dennis, 1938).

Comments: This is the common large black carpenter ant often found in houses. Brown (1950:159-60) sets the record straight on the mistaken belief that *pennsylvanica* nests only in decaying parts of wood. He does go on to say that to get started, they probably utilize decayed or otherwise damaged portions of wood. Thus, as far as being a pest in homes are concerned, if carpenter ants are present, they undoubtedly got started due to some already damaged wood, but can certainly go on to damage otherwise sound wood. This was the first native species of North American ant to be described. It was described by Baron Carl De Geer (1720-1778) in 1773. This is our largest species of Ohio ant with the greatest range in size.

Genus *Camponotus*, Subgenus *Myrmentoma* Forel

Myrmentoma Forel, 1912

Identification: The notched clypeus is diagnostic for this genus.

Revision(s): Snelling (1988) revised the subgenus and provides a key to workers.

Key: The key below covers all species found in northeastern North America.

Comments: These ants are smaller in size than members of the subgenus *Camponotus*. They are readily identified by the notched clypeus. They usually nest in various plant cavities or under bark.

Key to *Camponotus (Myrmentoma)* of Northeastern North America

1. Gena ("cheek") lacking suberect to erect hairs, but with minute appressed pubescence arising from finer punctures ..... ***C. (M.) nearcticus***

   Gena with numerous short but conspicuous suberect to erect hairs (best seen in full-face view against dark background) arising from foveae (deeper, distinct punctures) in addition to minute appressed pubescence **2**

2. Clypeus with long erect hairs along and adjacent to margins and few (1 to 3) or none across disc, but no hairs as short as on gena; punctures on clypeus shallow, indistinct, and sparse, especially on disc; gaster dark brown with pale base or often pale yellowish-brown with brown bands ..... ***C. (M.) subbarbatus***

   Clypeus with long erect hairs along margins in addition to numerous shorter hairs across disc, many about equal in length to those on gena (best seen in side profile against dark background); foveae (each bearing a hair) on clypeus moderately to very abundant and distinct (especially in major worker); gaster usually entirely dark brown to black **3**

3. Head, alitrunk, petiole, and legs uniformly orange to pale brownish-red, distinctly contrasting with dark gaster; erect hairs of clypeus distinctly either long or short, short hairs shorter than those on cheeks ..... ***C. (M.) discolor***

   Color usually very dark brown to black, some with slightly paler areas on legs and alitrunk but head always dark; erect hairs of clypeus of varying lengths, the shortest about as long as those on cheeks ..... ***C. (M.) caryae***

113 *Camponotus (M.) caryae* (Fitch)

Formica caryae Fitch, 1855
Camponotus marginatus discolor var. *cnemidatus* Emery, 1893
Camponotus caryae discolor cnemidatus Emery

Identification: TL 4.0-7.6 mm. Usually uniformly brownish-black to black but some may have lower part of head and alitrunk suffused with reddish-brown, mandibles, antennae, and legs concolorous; head with coarse, elongate punctures on clypeus and genae, satiny dorsally, glossy on sides, alitrunk and gaster smooth and glossy. The characters given in the key should distinguish this species. The usually uniformly dark coloration will distinguish this species from *C. subbarbatus*. *Camponotus nearcticus*, the other *Myrmentoma* that is uniformly dark, lacks the erect hairs on the gena.

Taxonomy: See Snelling (1988). See synonymy above for combinations used in Ohio literature.

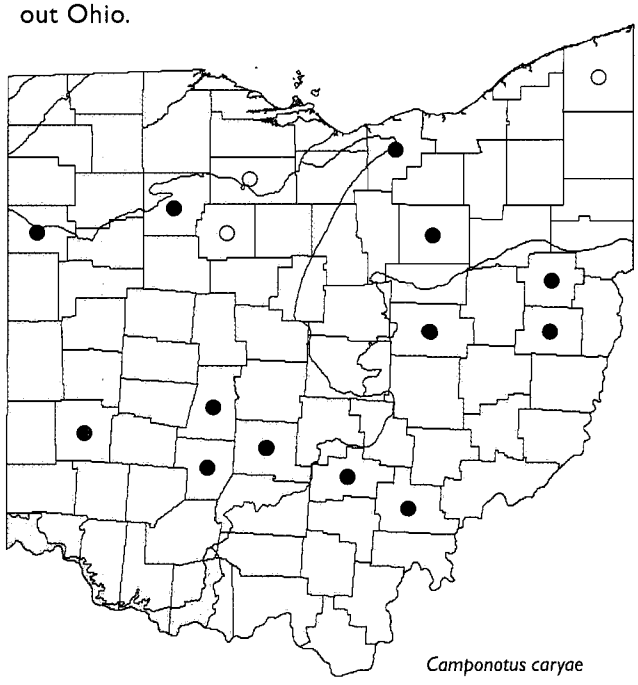
Ecology:
- — Habitat: Found in woods' edges and open woods. According to Creighton (1950), it is associated with hickory.
- — Food Resources: Further data lacking.
- — Associates: Further data lacking.

Behavior: The specimens in this study were found as strays on tree trunks. "Workers of this species have been seen running on the trunks of nearly every large oak or hickory examined, less often on the trunks of other trees" (Wesson & Wesson, 1940).

Nests: Nests are "cavities in the bark or dead branches, sometimes in the bark of logs lying on the ground" (Wesson & Wesson, 1940). "Loose bark of trees and hollow twigs formed the nests for this species" (Amstutz, 1943). One colony in Tennessee was in an abandoned hornet's nest (Cole, 1940b).
- — Colony Organization: Colonies are small.
- — Reproductives: Males, females - Sept. 23 (Kennedy 5139). "Winged females were found in August." (Amstutz, 1943).

Range: Quebec, New York south to Florida, west to Michigan, Ohio, Indiana, Illinois.

Ohio Distribution: Recorded from 16 counties throughout Ohio.



Camponotus caryae

Ohio References: Ashtabula (Headley, 1943a), Seneca (Headley, 1949, 1952), Wyandot (Amstutz, 1943), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Creighton, 1950; Dennis, 1938; Gorham, 1956; D. R. Smith, 1979; Snelling, 1988).

Comments: This moderately common species is recognized by the clypeal hairs and dark color. The name is in reference to hickory, in which colonies are often found.

114 *Camponotus (M.) discolor* (Buckley)

Formica discolor Buckley, 1866
Camponotus caryae discolor Emery

Identification: TL 4.6-7.5 mm. Head, alitrunk, and appendages pale orangish-brown, head darker in majors, gaster brownish-black to black, mandibles somewhat darker than head; head with scattered punctures on clypeus and genae, satiny dorsally, weakly glossy on sides, alitrunk and gaster smooth and glossy. The presence of erect hairs on the gena plus the essentially uniformly orange to pale brownish-red coloration contrasting with the dark gaster should render this species distinct.

Taxonomy: Snelling (1988:68) had "some misgivings" about recognizing *C. discolor* as distinct from *C. caryae* and other than color, considered his characters weak, but found no intermediates.

Ecology:

— Habitat: Found in field by Wesson & Wesson (1940). Snelling (1988) considers this species most commonly associated with oaks of several species, but it has also been taken on hickory, willow, and cottonwood.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Further data lacking.

Nests: "A single colony was taken from an insect gallery in a living branch of a red oak in a field" (Wesson & Wesson, 1940). "Nests are in plant cavities in twigs, branches, under bark, in logs and stumps, or in insect galls. A house-infesting ant thay may nest in woodwork in houses, especially in preformed cavities or in rotting or faulty wood" (D. R. Smith, 1979).

Camponotus discolor

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Ohio, South Carolina, Florida west to North Dakota, Iowa, Kansas, Texas.

Ohio Distribution: Only recorded from Gallia and Muskingum Cos. in Ohio (see below).

Ohio References: Gallia (Wesson & Wesson, 1940 - see comments below), Ohio (Creighton, 1950; Gorham, 1956; Smith, 1951; D. R. Smith, 1979; Snelling, 1988).

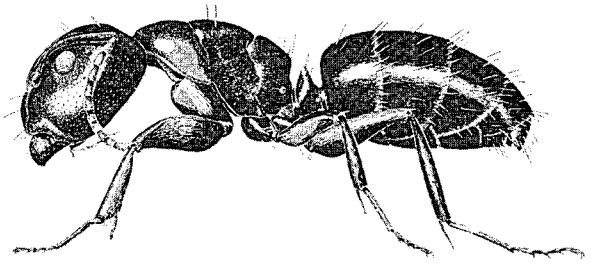
Comments: This bicolored species is only known from two Ohio records. The only definite Ohio literature record is that of Wesson & Wesson (1940) from Gallia Co. But that single colony had the heads infuscated "possibly indicating a transition toward [*caryae*]." Ironically, Ohio is one of the states in which Snelling (1988) suggested to look for intermediates. The major worker from Muskingum Co. (OSUC 0059802) had only slight infuscation on the head medially, and seems quite typical and distinct from *C. caryae*. I have studied authentic material of *C. discolor* from Kansas and Texas, and would leave the species as distinct for now.

115 *Camponotus (M.) nearcticus* Emery

Camponotus (Camponotus) marginatus var. *nearcticus* Emery, 1893
Camponotus fallax fallax var. *pardus* Wheeler, 1910
Camponotus caryae var. *pardus* Wheeler

Identification: TL 3.7-6.8 mm. Usually uniformly brownish-black to black, some with head ventrally and pronotum or ventral alitrunk somewhat paler, mandibles dark reddish-brown, antennae medium brown, legs generally concolorous but paler distally; body generally smooth and glossy, head less glossy dorsally. The notched clypeus plus the absence of erect hairs on the gena is diagnostic. This is typically a fairly uniform dark brown to black species, but some specimens may have the head, alitrunk, and appendages a dark brownish-red. The only other species which is usually all black is *caryae* which has very distinct and abundant erect hairs on the gena.

Taxonomy: See Snelling (1988). See synonymy above for combinations used in previous Ohio literature.



***Camponotus (M.) nearcticus* Emery.** From Smith (1947a).

Ecology:

— Habitat: Found in woodlands and occasionally in houses.

— Food Resources: Further data lacking.

— Associates: Further data lacking.

Behavior: Workers were found foraging on ground, tree trunks, logs, and foliage in woods.

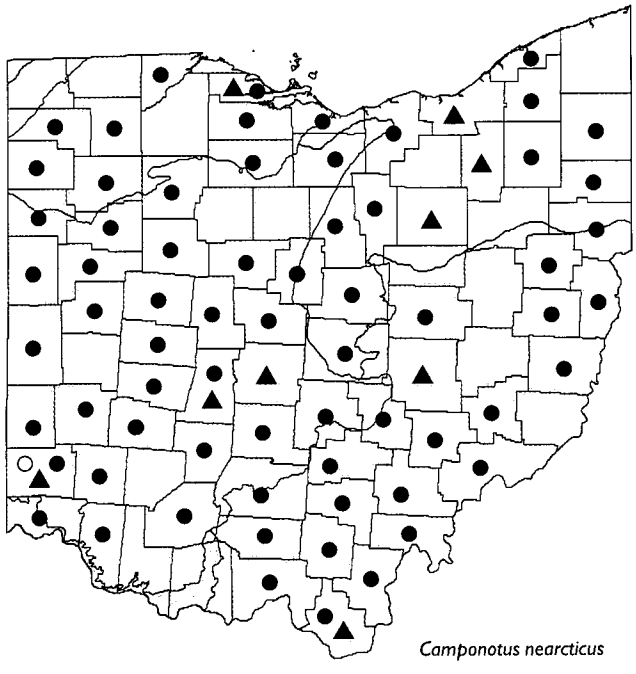
Nests: Under bark of oak logs, limbs, or stumps. "A colony was found in a hollow weed stem in a thicket along a woodland road" (Wesson & Wesson, 1940). D. R. Smith (1979) further notes "dead twigs and branches, under bark of live and dead trees, in insect galls, pine cones, and rotting logs and stumps; also in wood products such as fence posts and in woodwork of houses, especially the roofing."

— Colony Organization: Colonies are small, usually less than 100 (Van Pelt, 1958).

— Reproductives: Males - May 4-June 15, Aug. 8-Oct. 8, Nov. 4. Females - May 31, Aug. 8-Oct. 8, Nov. 4. Males and females found in a colony in a small pump housing Feb. 11. Males and females from house - Feb. Stray dealate females - May 15, 19, July 15, 20, Sept. 10.

Range: Quebec, Ontario south to Florida, west to British Columbia, Washington, Nevada, Utah; California (?).

Ohio Distribution: Statewide. Recorded from 72 counties.



Camponotus nearcticus

Ohio References: Butler (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940).

Comments: This is our only species of *Myrmentoma* that lacks the erect hairs on the gena; this plus the usual all-black color should serve to distinguish it. The species name refers to the Nearctic zoological province, of which this species is endemic.

116 *Camponotus (M.) subbarbatus* Emery

Camponotus (Camponotus) marginatus subbarbatus Emery, 1893
Camponotus caryae subbarbatus Emery

Identification: TL 4.0 6.2 mm. Head and alitrunk dark orangish-brown, head often darkened on front or occiput, alitrunk often mottled with darker or paler areas, gaster brownish-black, usually with base and transverse bands on both sides of sutures brownish-yellow, gaster usually darker in smaller individuals, mandibles usually concolorous, antennae and legs with paler areas; body generally smooth and glossy, head less glossy dorsally. The combination of erect hairs on the gena, sparse, long clypeal hairs, and coloration should distinguish this species.

Taxonomy: See Snelling (1988).

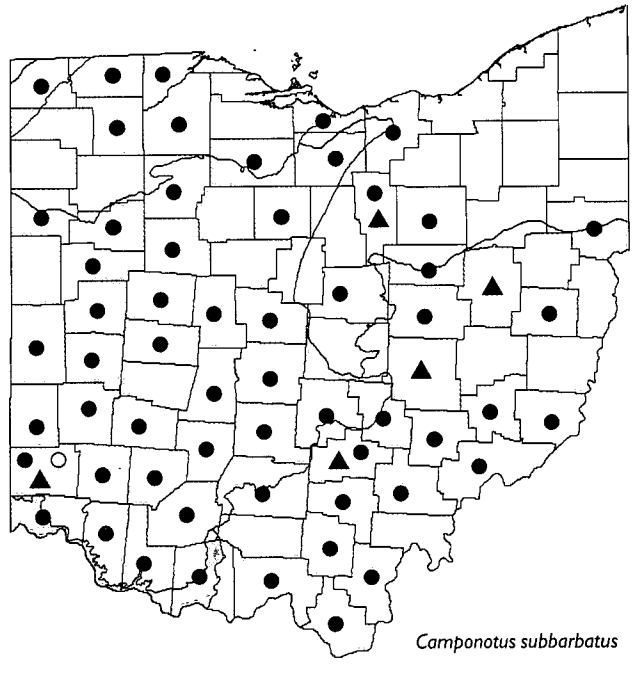
Ecology:

— Habitat: Found in woods and open woods. "Found abundantly in and along the edge of woods" (Wesson & Wesson, 1940).

— Food Resources: On bloom of *Viburnum acerifolium* (GAC 1738), *Solidago caesia* (GAC 1964), and *Cimicifuga racemosa* (GAC 2278). Also utilizes honeydew (below).

— Associates: Tending aphids on *Viburnum acerifolium* (GAC 1738 #18).

Behavior: Workers were commonly found foraging on foliage of low bushes and saplings, apparently hunting for droplets of honeydew, but were also found on the ground and at bases of trees.



Camponotus subbarbatus

Nests: In dry rotten log, cavities in branches on ground, and in nuts on ground. "The nests are located in cavities in hollow sticks and stems on the ground" (Wesson & Wesson, 1940).

— Colony Organization: Further data lacking.
— Reproductives: Males - June 4-Aug. 5. Females - May 19-June 6, Sept. 28.

Range: New England south to North Carolina, Georgia, Mississippi, west to Michigan, Ohio. The Iowa and Kansas records in D. R. Smith (1979) are beyond the range given in Snelling (1988) and may be another species.

Ohio Distribution: Statewide. Recorded from 60 counties.

Ohio References: Butler (Gorham, 1956), southcentral Ohio (Wesson & Wesson, 1940), Ohio (Snelling, 1988).

Comments: A fairly common *Camponotus (Myrmentoma)* often found as strays foraging on foliage. The species name means "below barbatus," apparently in reference to its relationship to the Asiatic species.

Genus *Colobopsis* Mayr

Colobopsis Mayr, 1861

Identification: The majors and queens of this genus are readily identified; the minor workers have distinctly impressed sutures on the alitrunk and a concave crest of the petiole that will distinguish them from *Camponotus*.

Immatures: Larvae pogonomyrmecoid; naked pupae (Wheeler & Wheeler, 1976).

Taxonomy: Most authors, including Bolton (2003), have considered *Colobopsis* a subgenus of *Camponotus*, but Hölldobler & Wilson (1990) recognize this group as a valid genus (but without further justification), a view that is followed here. Although the rest of the larvae of the tribe Camponotini are so similar that they could not be distinguished, Wheeler & Wheeler (1953:181) found differences of generic magnitude in *Colobopsis*. Besides these structural differences, *Colobopsis* larvae do not form cocoons, another major difference from other larvae in the tribe as well as the subfamily. These larval characters plus differences in the workers, as outlined in the key, lend credence to the recognition of this group as a valid genus. Additional characters include the distinctive head of workers and queens and the very weakly developed acidopore.

Revision(s): Creighton (1950), with a key to workers.

Key: Largely a southeastern and southwestern group, the two species found in northeastern North America are included in the key below. The characters given in the key for minors were derived from a number of specimens associated with queens and majors and seem to be consistent and diagnostic.

Comments: This group of remarkable ants is known for the enlarged plug or cork-shaped head of the majors which they use to plug the same-sized nest opening in hollow twigs. The same distinctive head shape is present in the queens. The minors are small ants with normal heads, thus these species are strongly dimorphic.

Key to *Colobopsis* of Northeastern North America

1. Head enlarged and very distinctly truncated in front, the face flattened to concave: Majors and Queens **2**

   Head of more normal size and shape: Minors..... **3**

2. The margin of the head (where the strongly truncated and weakly concave to flattened face meets the sides) bluntly angled but not produced as a sharply carinate flange; punctures of head much larger and coarser, the surface at least somewhat dulled ..... ***C. impressa***

   The margin of the head (where the strongly truncated and distinctly concave anterior face meets the sides) produced as a sharply carinate flange or rim; punctures of head comparatively smaller, especially on face, this surface semiglossy ..... ***C. mississippiensis***

3. Profile (side view) of alitrunk distinctly uneven, interrupted by distinct and strongly impressed promesonotal and metanotal sutures, the metanotal suture particularly deep, often exposing the metanotum as a small bump within the deep suture; propodeum strongly and roundly angled, usually projecting upward as a rounded point with a slight concavity just before the projection ..... ***C. impressa***

   Profile of alitrunk a fairly even curve interrupted by weakly impressed promesonotal and metanotal sutures; propodeum strongly and roundly angled but not distinctly projecting upward ..... ***C. mississippiensis***

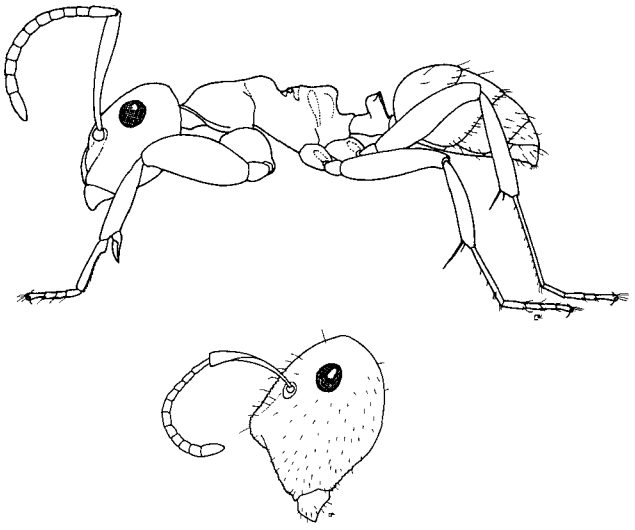
117 *Colobopsis impressa* Roger

Colobopsis impressa Roger, 1863

Identification: MAJOR: TL 4.2-4.7 mm. Head and alitrunk orangish-brown to dark reddish-brown, the head paler apically, alitrunk slightly paler than head, often with lighter mottling, gaster dark brown to nearly black, usually with the bases of the first three tergites paler, antennae and legs concolorous with area of attachment; front half of head heavily punctate and dull, smooth and glossy dorsally, alitrunk and gaster smooth and glossy. MINOR: TL 3.2-4.0 mm. Similar to major but paler areas less evident, sculpturing of head reduced and glossier.

The margins of the head in majors and queens are more rounded and the punctures of the head are larger and coarser. The minors have an uneven outline of the alitrunk due to strongly impressed dorsal sutures and an angularly projecting propodeum.

Taxonomy: See Creighton (1950).



***Colobopsis impressa* Roger**, Minor form and lateral view of head of major. Drawings by Holly K. Coovert.

Ecology:

— Habitat: Found in deciduous woods.

— Food Resources: Primarily honeydew excreted by aphids and scale insects.

— Associates: Further data lacking.

Behavior: For a general account of behavior, see Creighton (1950).

Nests: "Colonies have been found in culms of sedges" (D. R. Smith, 1979).

— Colony Organization: See Van Pelt (1958) for Florida data.

Colobopsis impressa

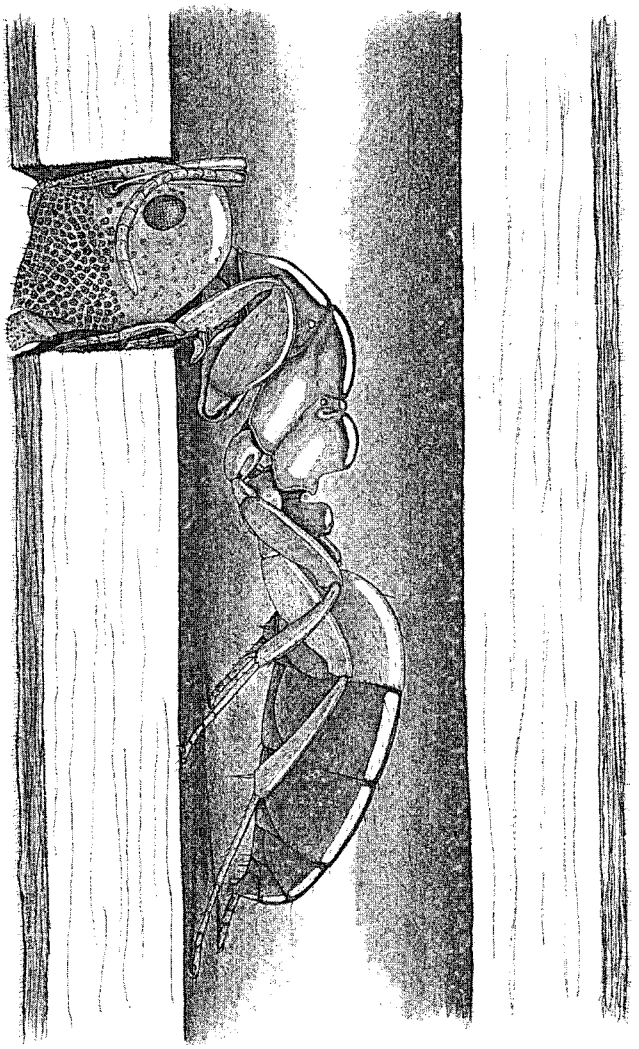
— Reproductives: Females - July (Kennedy colln.), Aug. 20 (OSUC).

Range: Maryland south to Florida, west to Ohio, Illinois and central Texas.

Ohio Distribution: The two records are from Henry Co. in northwestern Ohio and Muskingum Co. in eastcentral Ohio..

Ohio References: Kennedy (1948:29) mentioned an undetermined species of *Colobopsis* represented by queens taken in light traps in Ohio by C.R. Neiswander. Four of these alate queens (Kennedy # 3333, 1 mi. S. Holgate, Henry Co., Ohio, July, 1939), definitely of this species, are now in the DMNH collection.

Comments: This southern species is a new state record for Ohio. The species name is in reference to the impressed or concave face of the major.



***Colobopsis impressa* Roger**, major form in hollow stem. Drawing by Holly K. Coovert.

118 *Colobopsis mississippiensis* (Smith)

Camponotus (Colobopsis) mississippiensis Smith, 1923

Identification: MAJOR: TL 4.8 - 5.7 mm. Head and alitrunk orangish-brown to dark brown, the head paler apically, sometimes mostly so, or darker apically and paler dorsally, gaster dark brown to nearly black, usually with the bases of the first two tergites paler, antennae and legs concolorous with area of attachment; front half of head heavily punctate and dull, smooth and glossy dorsally, alitrunk and gaster smooth and glossy. MINOR: TL 3.4-3.9 mm. Similar to major but with reduced or absent paler areas and generally darker (dark reddish-brown to nearly black); sculpturing of head reduced and glossier, alitrunk satiny dorsally.

The sharply carinate flange of the margin of the head of queens and majors is distinctive and diagnostic. Minors, more difficult to identify, have only weakly impressed dorsal sutures.

Taxonomy: See Creighton (1950).

Ecology:

— Habitat: Found in woods and woods' edges.

— Food Resources: Primarily honeydew excreted by aphids and scale insects.

— Associates: Further data lacking.

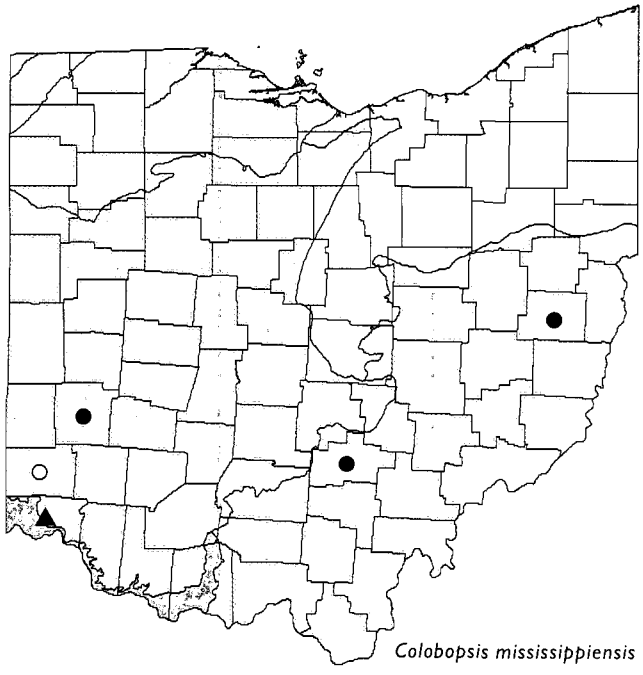
Behavior: Workers were found foraging on ground in woods. For a general account of behavior, see Creighton (1950).

Nests: In hollow twigs and branches in Illinois (DuBois & LaBerge, 1988). Carter (1962) notes hollow living hickory and ash branches in North Carolina

— Colony Organization: Further data lacking.

— Reproductives: Further data lacking.

Range: Maryland south to Florida, west to Ohio, Indiana, Illinois, Tennessee, Oklahoma, Mississippi, Louisiana.



Colobopsis mississippiensis

Ohio Distribution: The only known and verified material is the single minor worker from each of four counties shown on the distribution map. These counties are in southwestern and eastern Ohio.

Ohio References: The unpublished record in Gorham (1956:58) from Oxford Twp., Butler Co., Ohio is listed as *C. impressus* ("identification tentative") and is based on a single minor worker. From the description given of a "slightly impressed" metanotal suture and propodeum with a rounded angle, it is more likely that it is *C. mississippiensis*, where it is now included.

Comments: A new state record, this species is uncommonly found in Ohio. Described by Marion R. Smith (1894-1981), a major figure in American myrmecology, in his first taxonomic paper on ants.

Appendix I. Rare Ohio Species

In order to begin to consider species of Ohio ants that are rare enough that they could be considered potentially or actually threatened, endangered, or extirpated in Ohio (i.e."state listed"), a list was drawn up of the 34 species represented by only one or two records. Four of these species are apparently introduced species and will not be further considered (*Hypoponera gleadowi*, *Pheidole bilimeki*, *Anergates atratulus* (but see below), and *Linepithema humile*). All of the remaining 30 species, listed below, should be more thoroughly studied to better determine their status. Comments follow each species.

Species 7 *Neivamyrmex carolinensis*. Represented by an unspecified and later questioned literature record. Questionably found in Ohio.

Species 17 *Aphaenogaster lamellidens*. A single unspecified literature record for Ohio. Should be actively studied to determine if this is an Ohio species.

Species 26 *Pheidole tysoni*. Two verified county records plus several unspecified Ohio records. Wesson & Wesson (1940) consider this species "very common in dry fields and meadows and grazed hillside pastures..." This species will likely be found to be more common with renewed collecting efforts.

Species 32 *Solenopsis carolinensis*. A single unspecified southcentral Ohio record (Wesson & Wesson, 1940). Probably more common once specifically searched for.

Species 34 *Solenopsis texana*. A new state record only represented by one county. More data is needed on this species.

Species 38 *Leptothorax* (*Myrafant*) *minutissimus*. Represented by two records. This rare, workerless social parasite should be found through more careful searching.

Species 40 *Leptothorax* (*Myrafant*) *smithi*. Represented by two verified records plus several literature records. Wesson & Wesson (1940) mention finding "many" colonies. This species will likely be found more commonly with increased collecting efforts.

Species 41 *Leptothorax* (*Myrafant*) *texanus*. Recorded from two counties in widely separated parts of the state. Further collecting will probably reveal this species to be more abundant.

Species 44 *Leptothorax* (*Leptothorax*) *muscorum* COMPLEX. Represented by a single literature record from Ashtabula Co. A northern species probably very restricted in its range in Ohio. Further study is needed.

Note: All of the *Smithistruma* species are cryptic by nature and require careful collecting and the widespread use of Berlese funnel extraction. Intense collecting could reveal all of them to be more abundant than currently known, but those represented by a single record should be more thoroughly sought.

Species 49 *Smithistruma abdita*. Represented by two widely separated county records. More intense collecting will probably show this species to be more abundant.

Species 50 *Smithistruma bimarginata*. Represented by the single type locality (Adams Co.). Further study is needed.

Species 51 *Smithistruma clypeata*. Only known from Jackson Co. Further study is needed.

Species 53 *Smithistruma missouriensis*. Only known from Pike Co. Further study is needed.

Species 55 *Smithistruma ornata*. Only known from Pike Co. Further study is needed.

Species 57 *Smithistruma pilinasis*. Only known from Pike Co. (type locality of *S. medialis*, a synonym). Further study is needed.

*** Species 62** *Trachymyrmex septentrionalis*. Only known from Adams and Jackson Cos., the later from a literature record. The Adams Co. site is in a remnant Prickly Pear habitat along the Ohio River. An intense effort was made in 1999 to locate further sites for this species, but to no avail. As this species seems to be restricted in its habitat requirements, further study is needed. A **priority species** requiring further study.

Species 65 *Dolichoderus taschenbergi*. Known from two widely separated counties plus a southcentral Ohio literature record. Further collecting will probably locate more sites for this species.

Species 67 *Forelius pruinosus*. Recorded from two widely separated counties. Further collecting will probably reveal this species to be more abundant.

* **Species 68** *Dorymyrmex grandulus*. Only known from the Oak Openings area in Lucas Co. A new state record. Due to the restricted habitat and range, I would consider this a **priority species** for further study.

Species 76 *Lasius (Cautolasius) flavus*. Recorded from Summit Co. and an unspecified southcentral Ohio literature record. Further collecting should reveal more sites.

Species 78 *Lasius (Chthonolasius) minutus*. Only known from Lucas Co. Further study is needed in Ohio for this northern species.

Species 83 *Acanthomyops latipes*. Unspecified literature record from NW Ohio. Further study is needed in Ohio for this northern and western species. See below.

Species 84 *Formica lasioides*. Known from two NW Ohio counties. A state record for which further study in Ohio is needed for this northern species.

Species 90 *Formica argentea*. Only known from a Summit Co. literature record. Further study is needed.

* **Species 98** *Formica prociliata*. Only known from the type locality at Catawba Island, Ottawa Co. Due to its restricted range in the Lake Erie region, I would consider this a **priority species** requiring further study.

Species 100 *Formica difficilis*. Only known from an unspecified southcentral Ohio record. Further study is needed.

Species 101 *Formica postoculata*. Only known from an unverified, unpublished literature record plus a Hocking Co. site where it is locally abundant. Further study is needed.

Species 103 *Formica aserva*. Only known from one questionable literature record (Ashtabula Co.). Should be actively studied to determine if this is an Ohio species.

Species 114 *Camponotus (Myrmentoma) discolor*. Only known from two records. Further study is needed to find more recent records.

Species 117 *Colobopsis impressa*. Only known from Henry and Muskingum counties. Further study is needed of this interesting species.

The following Ohio species are on the 2000 IUCN (International Union for Conservation of Nature and Natural Resources) Red List of Threatened Species (Hilton-Taylor, 2000).

Species 38 *Leptothorax (Myrafant) minutissimus*. See above.

Species 43 *Leptothorax (Leptothorax) duloticus*. A rare species only known from Ohio (5 counties) and Michigan (2 counties).

Species 45 *Protomognathus americanus*. Recorded from 8 Ohio counties.

Species 48 *Anergates atratulus*. A single Ohio record of this rare introduced species.

Species 83 *Acanthomyops latipes*. The data in Wing (1968) does not indicate a particularly rare species outside of Ohio. See above.

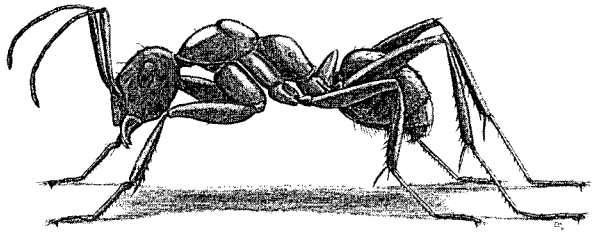
Species 107 *Polyergus lucidus*. Recorded from 5 Ohio counties.

Most are apparently listed because they are slave-raiding (dulotic) or workerless social parasites. Not that this isn't a useful category, but it is somewhat questionable to simply blanket list such species. Further consideration, though, should be given to these species given their status on this list.

Again, all of these species require further study. But three of these species (marked with an "*") I would consider **priority species** most needing further study: *Trachymyrmex septentrionalis*, *Dorymyrmex grandulus*, and *Formica prociliata*. I would strongly recommend that these three species be studied specifically to determine their status as far as state listing is concerned, and possibly list them as "special concern" status now.

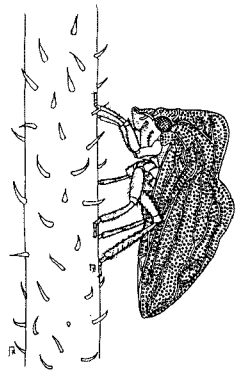
APPENDIX II. Ecological interrelationships of *Formica subsericea*

This moderately large, all-black ant is very abundant throughout northeastern North America (considered to be the third most common ant in this region, next to our two common species of *Lasius*). Like any organism, its life history involves a number of interrelationships with other organisms. Those selected here have all been documented in the literature, and all species have been recorded for Ohio, in most cases from Hocking County. This has been done so as to illustrate actual interrelationships in a single area, not merely a collection of hypothetical ones. Each of the 'major players' in this drama will, in turn, be discussed. But it should be mentioned that many other species interract with *Formica subsericea*, and each of these associates, in turn, have associations with other species.



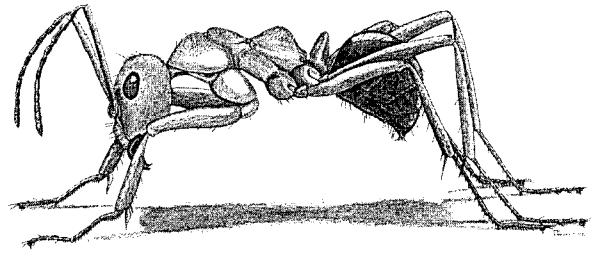
***Formica subsericea* Say, Formicidae**

The life history of this ant is fairly typical for ants of this region. A newly mated queen, after dropping her wings, excavates a small brood chamber, usually under a rock. She will raise the first set of brood on her own, converting the massive wing muscle tissue to sustain her. Once this first set of brood is raised to adult workers, they take over the work of nest construction, food gathering, and care of the brood. The nests eventually grow to a fairly large size, usually a low, spread-out mound or "bed," which is often located in the open at the edge of a woods. Once the colony has reached sufficient size, it will produce winged males and females, thus starting the cycle anew. They rely on a wide range of food sources, foraging for insects, scavenging, and visiting various Homoptera for honeydew.



***Publilia concava* (Say), Membracidae**

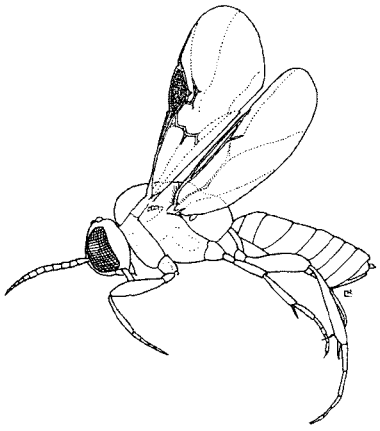
This treehopper (order Homoptera) is commonly seen in aggregations of nymphs and adults on leaves and stems of sunflowers (various *Helianthus* species), goldenrods (*Solidago* spp.), and Joe-Pye-Weed (*Eupatorium* spp.). They obtain their source of energy from sucking the juices of the plants that they live on. They are commonly attended by ants which afford the treehoppers some protection, and in turn, the ants obtain a rich source of nutrition in the hoppers' exudations known as honeydew. This relationship is termed mutualism in that both parties obtain some benefit. Without ant attendance, the adult female treehoppers remain with their brood, but with the increased protection of ant attendance, the female will readily desert her first brood so as to produce additional clutches of young (based on the closely related *Publilia reticulata*; cf. Bristow, 1983). The same honeydew sources may be used by several species of ants, but at different times of the day (Klotz, 1984).



***Formica subintegra* Emery, Formicidae**

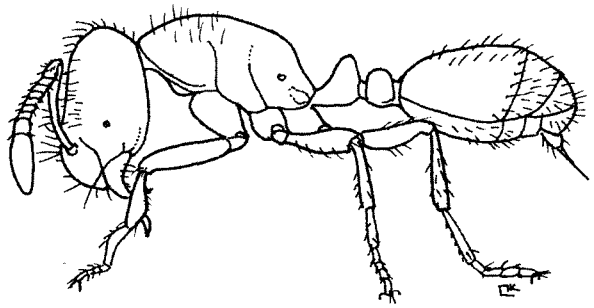
This ant may well have the greatest impact on a colony of *Formica subsericea*. This bicolored red-and-black ant is a slave raiding species, a behavior known as dulosis. A mature colony of *F. subintegra* is normally composed of a queen and workers of their own species plus worker slaves of one other (rarely two or more) species of *Formica*. In Ohio, this slave species is usually *Formica subsericea*. Slave raids are more commonly conducted in mid- to late summer. Scouts, once they locate a suitable colony, will recruit a number of other raiders and head off in a quite noticeable column for the target nest. This is often hundreds of feet away. Once there, they will enter the alien nest and return with plundered pupae. *Formica subsericea*, often described in the literature as a "timid" or "cowardly" ant, seldom offers substantial resistance. But after being raided, they will plug the nest entrances used by the raiders, and remove traces of the carnage in an attempt to discourage future raids (Talbot & Kennedy, 1940). Some of the plundered pupae are apparently eaten, but most are allowed to mature to adult workers which bolster the *F. subintegra* work force. This relationship is termed facultative in that a *Formica*

subintegra colony is not dependant upon this behavior, but commonly practices it.



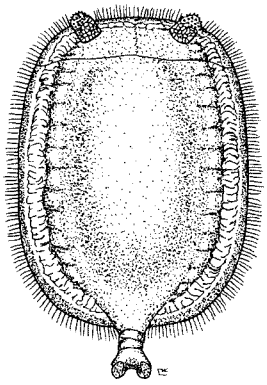
***Elasmosoma petulans* Muesebeck, Braconidae**

This rarely collected small braconid wasp is a parasitoid of ants, including both *Formica subsericea* and the slave raider *Formica subintegra*. The term parasitoid is applied to insects which completely consume their host, as compared to parasites which merely derive sustenance but do not normally kill the host. These wasps presumably lay their egg(s) directly on their victim. Once hatched, the wasp larva will begin to consume noncritical tissue at first, eventually consuming the entire ant internally, where they will pupate inside the ant exoskeleton. I have collected specimens of *Elasmosoma petulans* hovering above a column of *Formica subintegra* in the process of raiding *F. subsericea* in Hocking Co., Ohio (GAC 2312), as well as above a feeding column of the red- and-black *Formica integra* Nylander in Pike Co., Ohio (GAC 2082 #2). They were also recorded by Wesson & Wesson (1940:101) "hovering above the *rubicunda* army [another slave raider; probably based on a misidentification; see *Formica pergandei*] as it attacked a *subsericea* nest" in southcentral Ohio. These specialized wasps are probably keyed to the chemical pheromones used to mark trails by *Formica* ants. (See Musesebeck, 1941).



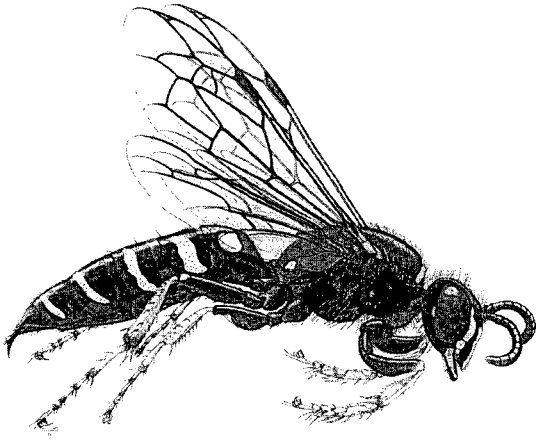
***Solenopsis molesta* (Say), Formicidae, "Thief Ant"**

This minute species is the smallest ant in Ohio. It commonly builds its small nests in close proximity to other ant nests, often within the walls. It is known as the Thief Ant because it will steal food from the ants with which it lives in proximity. This behavior is known as lestobiosis. but it also forages extensively on its own.



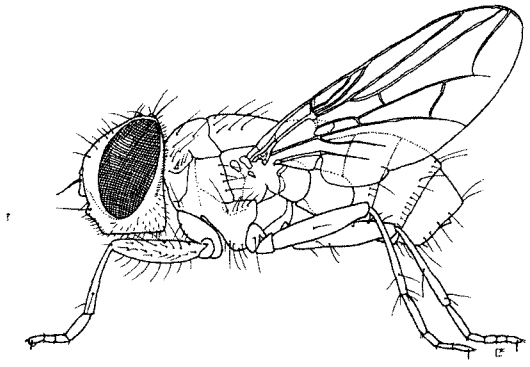
***Microdon megalogaster* Snow, Syrphidae**

The larvae of this primitive genus of hoverflies are myrmecophiles of various species of ants. This particular species, *Microdon megalogaster*, has been recorded (Duffield, 1981) utilizing *Formica subsericea* as its host. The slow-flying adults are normally only found in the proximity of their host ant nest. The larvae of the flies are apparently not bothered by the host ants because of chemical mimicry (ants being very dependent on pheromones for recognition). Although the food source of the larvae is not specifically known for this species, it is, in all likelihood, the brood of the ants, as documented for other species. The young larvae of one species is known to enter ant cocoons to feed, later feeding on ant larvae. They can even fold themselves lengthwise to mimic ant cocoons (Paulson & Akre, 1994). When the larva of the fly is mature, it will make its way upward but remain in the ant nest where it will pupate. The adult fly will then emerge at night and quickly leave the nest, otherwise it would be promptly attacked by the ants, having now lost its chemical subterfuge.



***Aphilanthops frigidus* (Smith), Philanthidae**

This wasp is a specialist on winged queens of *Formica subsericea*. It will apparently only capture winged specimens, ignoring the recently mated and wingless stray queens on the ground. The wasp will immediately sting its prey, then grasp the ant in its legs as she flies off with this heavy burden to her nesting site in sandy ground. Usually the wasp will drop the ant outside her already constructed burrow, turn around, then drag the ant by its antennae down the 12 to 25 cm main burrow to a storage chamber. The wings are removed from the ant before it is placed in the brood cell. Usually two or three ants are provisioned in each brood cell, and four or more brood cells are located up to 45 cm from the surface (Bohart & Menke, 1976). There is a fine line between predation, where the predator may take the captured prey to its offspring, and parasitoidism, a term applied to parasitic insects which completely consume their host. Most parasitoids simply lay their egg or eggs on the host and leave. This wasp is further characterized as a provisioner, stockpiling more than one prey item for its offspring. (See also Evans, 1962, 1963; Bohart, 1966).



***Senotainia trilineata* (Wulp), Sarcophagidae**

This fly is a parasitoid on the prey items of several species of wasps, including *Aphilanthops frigidus* (cf. Ristich, 1956). Unlike related species of sarcophagids, which will enter the burrow of the host wasp, *Senotainia trilineata* will hover around the host wasp and repeatedly dart in, laying one or more larvae upon the ant being transported. The larvae will then feed on the ants provisioned by the wasp and intended for her young. This relationship is considered hyperparasitoidism, a term which applies to a parasitoid of a parasitoid. In this case the main (and possibly sole) food is the provisioned prey items. The relationship is further characterized as cleptobiotic since the provisioned ants of the wasp are being absconded by the sarcophagid fly. One author referred to this fly as an "entomological cuckoo." Because the fly utilizes a fairly wide range of prey items from a number of different wasps, it is more of a generalist than the wasp *Aphilanthops*.

Final Comments

To substantiate that these interrelationships actually take place in a single area, I offer the following documentation from our 35 acre property in Benton Twp. (SE corner of section 6), Hocking Co., Ohio. I collected specimens of *Solenopsis molesta* atop a fairly large *Formica subsericea* mound at the edge of an open meadow near the woods edge, the very mound that was later raided by *Formica subintegra* four years later (GAC 2311). The following week, I collected the specimens of the braconid *Elasmosoma petulans* (GAC 2312) above a raiding column of the same *F. subintegra* colony. On the same property, I have collected *F. subsericea* tending *Publilia concava* on a young Joe-Pye-Weed plant. I have not taken the other three species on this particular property yet, but have studied numerous specimens of *Microdon megalogaster* from Hocking Co., in addition to a specimen of *Aphilanthops frigidus* from Hocking Co. *Senotainia trilineata* is represented by a number of Ohio specimens, and certainly occurs in the county.

A chart (Fig. 6) on the next page summarizes the participants and relationships in this complex ecological scenario. Please refer to the literature citations given for additional documentation.

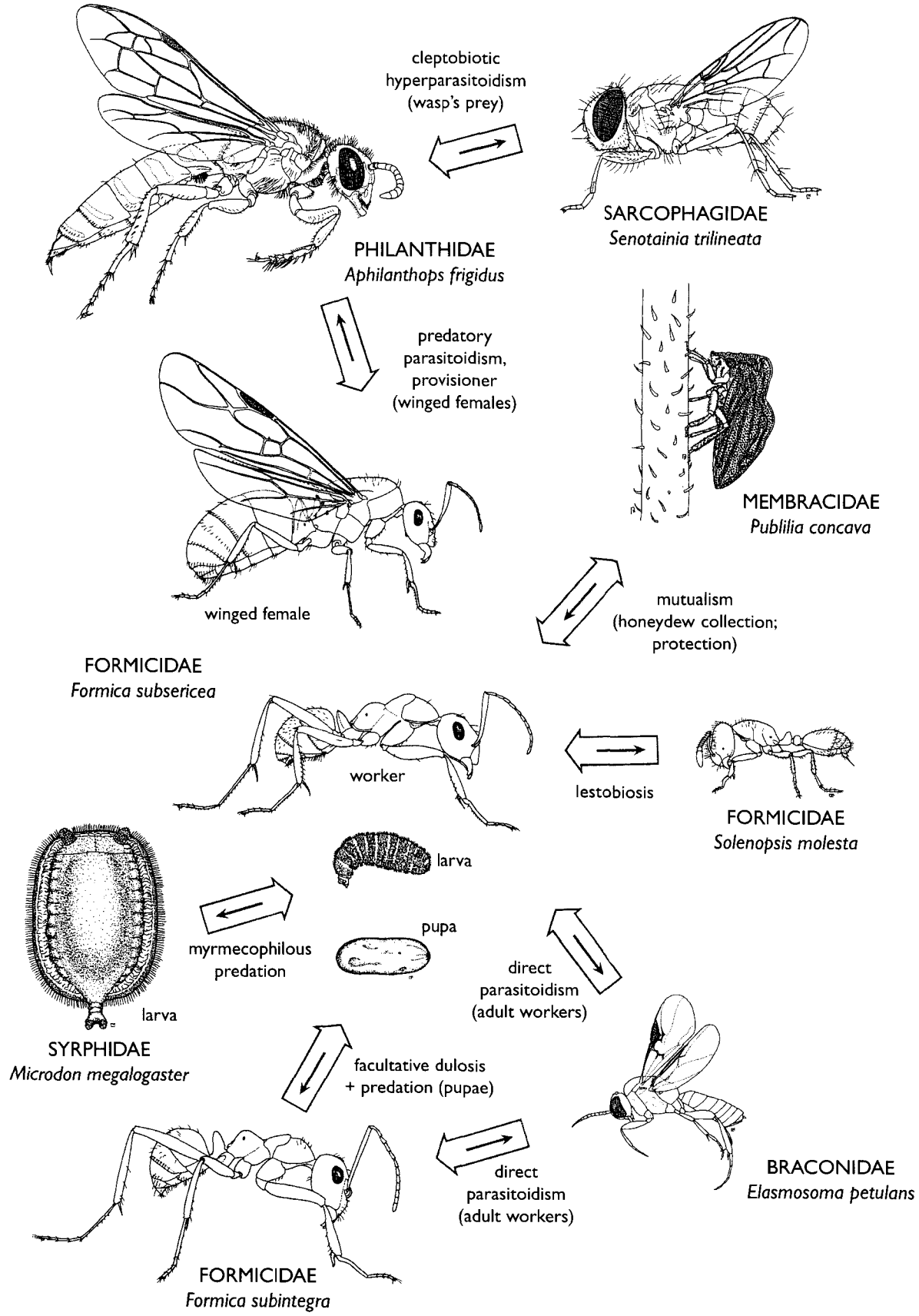


Figure 6. Ecological interrelationships for *Formica subsericea*.

Glossary of Terms[1]

Abdomen The classical term for the third main body part of an insect. The abdomen in ants consists of the propodeum, petiole, postpetiole (where present), and the gaster. For this reason, the term is rarely used in the study of ants (myrmecology).

Acidopore The oriface at the tip of the gaster of ants of the subfamily Formicinae and diagnostic for that subfamily. This short nozzle-like structure is generally fringed with a circle of stiff hairs (setae) at its apex. It is used to expel formic acid for defense, the circlet of hairs aiding in the rapid evaporation of this substance.

Alate Winged.

Alitrunk The second apparent major body segment of ants, functionally equivalent to the thorax, but actually composed of the thorax plus the fused propodeum. (=mesosoma)

Anepisternum The upper sclerite of the mesopleuron.

Antennal fossa The depression in which the antenna is attached.

Antennal scrobe A long groove, impression, or excavation on the head above the insertion of the antennae into which the antenna folds when in repose. Found in only a few genera.

Anterior Toward the front or head end.

Apical Toward the apex or end opposite the point of attachment.

Appressed Referring to a hair lying flat on the surface or nearly so (includes recumbent). See erect.

Basal Toward the base or point of attachment.

Bicolored With two contrasting colors.

Carina (carinula) A sharp elevated ridge or keel. -ula = diminutive.

Carton The material certain ant nests are constructed from, consisting of particles of wood, dry vegetable material, and soil glued together with sugary secretions collected by the ants as honeydew.

Caste A set of individuals in a colony that is both morphologically distinct and specialized in behavior. Usual castes are male, female, and worker castes.

Clavate Thickened toward the tip or distal end; club-shaped.

Cleptobiosis (cleptobiotic) The relationship in which one species steals food or scavenges from another species, but does not nest in close association with it (cf. lestobiosis).

Clypeus The plate or sclerite on the lower part of the head above the mandibles, forming the anterior margin of the head in full-face view.

Commensalism A symbiotic relationship in which one species benefits without harming or benefitting the other.

Concolorous Of a uniform color throughout.

Condyle The rounded basal end of the antennal scape which forms a ball-and-socket joint with the head.

Coxa The small basal segment of the leg which is directly attached to the corresponding segment of the thorax. Pro-, meso-, and meta- refer to the front or fore, middle, and hind.

Dealate Wingless after having shed the wings, as a mated female.

Declivity A downward-sloping surface, as the posterior face of the propodeum.

Dimorphism (dimorphic) The existence in a colony of two distinct size classes of workers which often differ dramatically in head size or shape.

Distal The point farthest away from the body.

Dorsal Pertaining to the upper surface or top; opposed to ventral.

Dorsum The upper surface or top; opposed to venter.

Dulosis (dulotic) The symbiotic relationship in which workers of a social parasitic ant species raid the nests of another species, capture brood (usually pupae) and return with them to rear them as enslaved nestmates. This slave-raiding relationship is termed facultative when it is optional (i.e. the dulotic species can survive without slave-raiding), or obligatory when the dulotic species is dependent upon this behavior.

Elaiosome The specialized organ or appendage of a seed that is attractive to ants. Also called an aril, these nutritious appendages contain lipids, protein, starch, sugars, and vitamins.

Epinotum An out-dated term for the propodeum, but much-used in earlier papers on ants.

Erect Referring to a hair that is distinctly standing up off of the surface, usually 45 degrees or more to the surface. [For simplification, several terms have been combined in this paper: erect, which is technically at or near 90° to the surface; suberect, ca. 70° to 80° to the surface; subdecumbent, ca. 45°; and decumbent, ca. 10 to 40° to the surface].

Ergatogyne A form that is morphologically intermediate between the worker and the queen, i.e. possessing characters of each.

Facet Common term for ommatidium (q.v.).

Femur (femora, pl.) The first large, stout segment of the leg which is directly attached to the trochanter. Pro-, meso-, and meta- refer to the front or fore, middle, and hind.

Ferrugineous Rusty reddish-brown.

[1] For further detail see Hölldobler and Wilson (1990) and Bolton (1994).

Fovea/foveate A deep depression or pit with well-marked sides, or with such sculpturing.

Front The area of the face above the clypeus and between the frontal carinae; dorsally it passes without definite boundary into the vertex.

Frontal carinae (singular carina) A pair of longitudinal ridges on the head, located above the clypeus and between the antennal sockets. These are commonly expanded as the frontal lobes.

Frontal lobe An expansion or flange of the frontal carinae which often extends partially over the antennal socket.

Funiculus The series of smaller segments of the antenna beyond the scape, including the terminal or end segments which may be enlarged to form an antennal club. (=funicle)

Fuscous Brownish-gray.

Gaster The abdominal segments beyond the petiole and postpetiole (where present); the apical, enlarged portion of the abdomen.

Gena The "cheek" of the head located between the lower margin of the compound eye and the insertion of the mandible.

Gula The posterior surface of the head.

Head The first main body part of an insect where the eyes, antennae, and mouthparts are attached.

Honeydew The sugar-rich fluid excreted by sap-feeding aphids and other insects which is derived from the phloem sap of plants. A principal food of many kinds of ants.

Humerus (humeri) The shoulder; the anterior corners of the pronotum.

Hyperparasitoid A parasitoid of another parasitoid.

Hypogaeic Living primarily underground (subterranean) or beneath such cover as leaf litter, stones, and bark (cryptobiotic).

Hypostoma The anteroventral region of the head immediately behind the mouthparts.

Infuscated Darkened.

Inquilinism (inquiline) The symbiotic relationship in which an organism spends their entire life cyle in the nest of its host species. In general works the term is restricted to a benign relationship, but *Hölldobler & Wilson (1990)* expand it to include permanent social parasitism (q.v.).

Katepisternum The lower sclerite of the mesopleuron.

Labial palps The pair of jointed appendages originating from the labrum.

Labrum The second maxilla, forming a lower lip beneath the maxillae.

Lamina Flat sheet or plate-like projection (e.g. on the scape of some *Myrmica*).

Lestobiosis (lestobiotic) The relationship in which colonies of a smaller species nest within the walls of the nests of larger species and subsequently prey on brood or steal food stores.

Longitudinal Running lengthwise, as opposed to transverse.

Mandibles The first or principle set of jaws.

Maxillae The second pair of jaws which are kept folded beneath the mandibles.

Maxillary palps The pair of jointed appendages originating from the maxillae.

Medial On or toward the midline of the body or structure in question. (=mesal)

Mesonotum The dorsal (upper) part of the second or middle segment of the thorax.

Mesopleuron The lateral portion or sclerite (i.e. pleuron) of the mesothorax. May be divided into an upper anepisternum and a lower katepisternum. The largest pleurite.

Mesothorax The second or middle segment of the thorax corresponding to the second pair of legs.

Metanotal groove The dorsal groove of the alitrunk separating the mesonotum from the propodeum and often slightly exposing the metanotum. (= mesopropodeal suture).

Metanotum The dorsal (upper) part of the third or posterior segment of the thorax. Often partially or completely covered by the propodeum, thus at most a small portion exposed.

Metapleuron The lateral portion or sclerite (i.e. pleuron) of the metathorax.

Metathorax The third or posterior segment of the thorax corresponding to the third pair of legs. Usually partially or entirely covered dorsally by the propodeum, thus often only exposed ventrally

Monogynous The existence of a single functional queen in a colony.

Mutualism A symbiotic relationship that benefits both members.

Myrmecochory (myrmecochore) The dispersal of seeds by ants attracted by the elaiosomes; plants that produce such seeds.

Myrmecology The scientific study of ants.

Myrmecophile (myrmecophilous) An organism that is adapted to spending at least part of its life cycle within an ant colony.

Node The rounded, knob-like swollen upper portion of the petiole; if sharply crested, known as the scale.

Occiput Top (uppermost) part of the head.

Ocellus/ocelli (plural) The two or three simple eyes on top of the head; composed of a single ommatidium each; absent in most worker ants, but usually present in males and females.

Ommatidium A single facet or optical component of the compound eye; some ants only have a single ommatidium rather than a compound eye.

Parasitism (parasite) A symbiotic relationship in which one species (parasite) benefits at the expense of the other (host), but usually not resulting in the death of the host. By this definition, aphids and membracids, along with many other plant-feeding insects, are parasites of plants.

Parasitoid A parasite which slowly and ultimately kills the host near the end of the parasite=s larval development.

Pectinate Comb-like structure (e.g. the tibial spurs).

Pedicel Outdated term for the petiole and postpetiole.

Peduncle The narrow anterior section of the petiole joined to the propodeum.

Petiole The narrowed segment of the body immediately following the alitrunk and in front of the gaster. Morphologically, this is the second segment of the abdomen, the first being the propodeum.

Piceous Pitch black or black with a slight reddish tinge.

Pleurite/pleuron Lateral sclerites of the thorax proper (i.e. alitrunk minus the propodeum), thus on the side of the thorax.

Plumose Referring to hairs that are branched laterally and are thus feather-like.

Polydomous Pertaining to single colonies which occupy more than one nest site.

Polygynous The existence of more than one functional queen in a colony (multiple queens).

Polymorphism (polymorphic) The existence of a wide gradual range in size classes in the worker caste.

Posterior Toward the back or hind end opposite the head.

Postpetiole The second narrowed segment of the body immediately following the alitrunk and in front of the gaster. Morphologically, this is the third segment of the abdomen, the first being the propodeum, and the second the petiole. Presence diagnostic of several subfamilies.

Promesonotum The combined or fused pronotum and mesonotum; usually there is a distinct suture that separates these two, known as the promesonotal suture.

Pronotum The dorsal (upper) part of the first or anterior segment of the thorax. The propleuron in ants is relatively small and mostly concealed by the lateral part of the pronotum, thus the pronotum is effectively equivalent to the prothorax.

Propodeal lobe One of a pair of lobes on the lower posterior portion of the propodeum at the base of the propodeal declivity (concavity). (=metapleural lobe)

Propodeal spine One of a pair of spines at the upper posterior end of the propodeum above the propodeal declivity (concavity). May be reduced to teeth, sharp or rounded angles, or completely absent. (=epinotal spine)

Propodeum Morphologically, the tergite of the first abdominal segment, fused to the thorax and forming most of the posterior portion of the alitrunk. (=epinotum)

Prothorax The first or anterior segment of the thorax corresponding to the first pair of legs.

Pubescence A covering of small to minute hairs.

Punctate Dotted with minute shallow pits or impressions like pinpricks.

Reticulate Fine, net-like sculpturing; network of carinae, striae, or rugae.

Rugose Wrinkled sculpturing with fine to heavy, raised ridges.

Scale The upright, crested upper portion of the petiole; if rounded and swollen, known as the node.

Scape The elongate basal or first segment of the antenna. The small basal, ball-and-socket-like condylar bulb is a portion of the scape and is not to be counted as a separte segment.

Sclerite Any area of the body set off by ridges, grooves, or membranes; a single plate of the exoskeleton.

Scrobe See antennal scrobe.

Social parasitism One species of social insect relying on another (host) to rear its young. The relationship is termed temporary if the parastic relationship only exists during colony founding with the host queen being killed and her workers gradually dying of attrition. It is termed permanent when the entire life cycle of the parasite is spent in the nest of its host; workers are either scarce and degenerate in behavior, or completely lacking. Hölldobler & Wilson (1990) refer to permanent social parasitism as inquilinism (q.v.), a term generally employed for more benign guests. See also dulosis.

Sternite The lower (ventral) sclerite of a segment (the tergite is the upper; the pleurite is lateral on the alitrunk); applied to the alitrunk and gaster.

Sting The sharply pointed organ for delivering venom at the tip of the gaster of certain ants; presence diagnositic for the subfamilies Ecitoninae, Myrmicinae, and Ponerinae.

Striae/striate Grooves or indented or impressed lines, or with such lines.

Suture Line of junction between two sclerites, effectively dividing them.

Symbiosis (symbiote) The condition of two or more different species living together in close association. This association is usually relatively protracted and often dependent. In the past, symbiosis implied mutual benefit, but the term is now used in a broad, neutral sense. The three principal kinds of symbiosis reflect whether the relationship is beneficial to both (mutualism), beneficial to one and harmful to the other (parasitism), or beneficial to one and indifferent to the other (commensalism).

Tarsus (tarsi, pl.) The series of apical segments of the leg which is directly attached to the tibia. In ants, composed of 5 segments and terminating in a pair of claws. Pro-, meso-, and meta- refer to the front or fore, middle, and hind.

Tergite Upper (dorsal) sclerite of a segment (the sternite is the lower; the pleurite is lateral on the alitrunk); applied to the alitrunk and gaster.

Thorax The classical term for the second or middle main body part of an insect to which the legs are attached. Composed of three segments, the pro-, meso-, and metathorax. In most insects the thorax is distinct, but in ants it is fused with the propodeum. Thus in ants what appears as the thorax is in actuality the alitrunk.

Tibia (tibiae, pl.) The elongate segment of the leg which is directly attached to the femur and tarsus. Pro-, meso-, and meta- refer to the front or fore, middle, and hind.

Transverse Running across, as opposed to longitudinal.

Trochanter The small basal segment of the leg which is directly attached to the coxa and basal to the femur. Pro-, meso-, and meta- refer to the front or fore, middle, and hind.

Trophallaxis The exchange of liquid by regurgitation among colony members or between colony members and (xenobiotic) guests.

Tubercle/tuberculate Small thick spine or pimple-like structure, or with such sculpturing.

Venter The underneath side or surface; opposed to dorsum.

Ventral Pertaining to the underneath side or surface; opposed to dorsal.

Vertex The top of the head below the occiput and above the eyes and front.

Xenobiosis (xenobiotic) The parasitic relationship in which a colony of one species lives unhindered in the nest of another species and obtains food from them by regurgitation (trophallaxis) or other means. Brood is kept separate. A form of inquilinism (q.v.).

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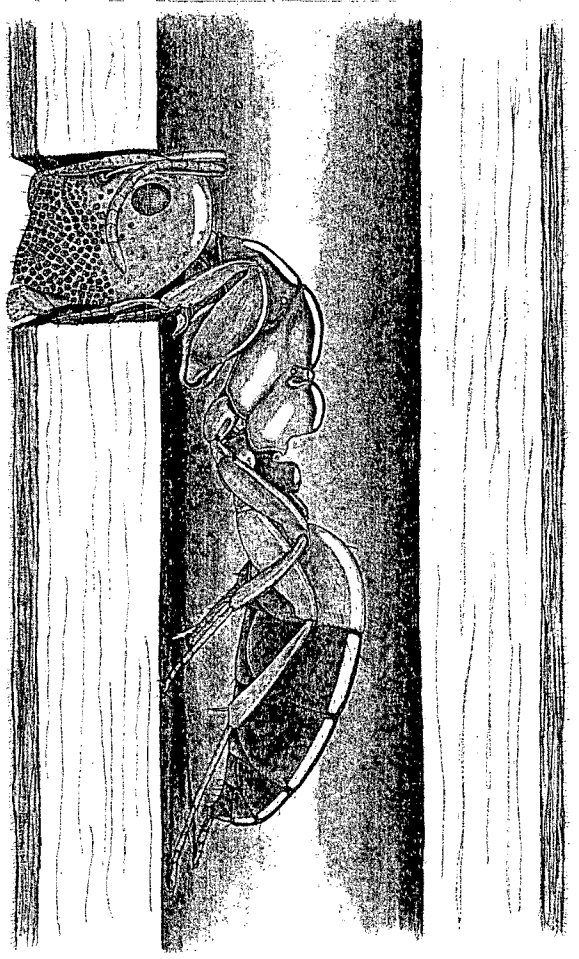
* Primary page or range of pages in bold



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