



Taxonomy of some little-understood North American ants (Hymenoptera: Formicidae)

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Introduction

The North American ant fauna has a long and detailed taxonomic history, and the fauna is relatively well characterized compared with those of many other regions. The vast majority of taxon names are clearly defined, being treated as either valid or invalid (primarily junior synonyms). Because of this, though considerable revisionary work will be necessary in the future, specimens collected from this region may often be placed with reasonable confidence either to species, or in some cases, to species complexes even if the status of the specific taxa involved are uncertain.

However, over the past 150 years, the fauna has accumulated a number of taxon names that are unresolved for a variety of reasons. Some taxa lack type material and thus may be evaluated only with reference to the original descriptions. In other cases type material exists, but the taxa have not received a recent assessment, and their status and relationship to their congeners remains problematic. Many of the existing subspecies fall into this latter category.

The purpose of this study is to re-examine these unresolved taxa and clarify their status, thereby clearing up these minor problems and providing a better basis for future revisionary work on the North American ant fauna. Here, we examine a number of these little-used names and propose a number of changes. The majority of these changes involve the synonymy of subspecies or the raising of subspecies to full species status. In several cases species are newly synonymized. The changes are summarized in the following list:

Acromyrmex versicolor (Pergande, 1893)

Acromyrmex versicolor chisosensis Wheeler, W.M., 1907, new synonym

Aphaenogaster boulderensis Smith, M.R., 1941

Aphaenogaster boulderensis smithi Gregg, 1949, new synonym

Aphaenogaster azteca Enzmann, J. 1947, new status

Aphaenogaster fulva azteca Enzmann, J. 1947, raised to species

Aphaenogaster fulva Roger, 1863

Myrmica (Monomorium) aquia Buckley, 1867, new synonym

Aphaenogaster occidentalis (Emery, 1895)

Aphaenogaster subterranea valida Wheeler, W.M., 1915, new synonym

Aphaenogaster texana Wheeler, W.M., 1915

Aphaenogaster huachucana crinimera Cole, 1953, new synonym

Aphaenogaster treatae Forel, 1886

Aphaenogaster treatae pluteicornis Wheeler & Wheeler, 1934, new synonym

Crematogaster missouriensis Emery, 1895, new status

Crematogaster victima missouriensis Emery, 1895, raised to species

Crematogaster minutissima smithi Creighton, 1950, new synonym

Formica obscuriventris Mayr, 1870

Formica obscuriventris clivia Creighton, 1940, new synonym
Formica oreas Wheeler, 1903
Formica oreas comptula Wheeler, 1913, new synonym
Myrmica trullicornis Buren, 1944, new status
Myrmica sabuleti trullicornis Buren, 1944, raised to species
Myrmica incompleta Provancher, 1881
Myrmica brevinodis var. *frigida* Wheeler, 1917, new synonym
Myrmica brevinodis whymperi Forel, 1913, new synonym
Myrmica brevinodis var. *sulcinodoides* Wheeler, 1917, new synonym
Nomamyrmex esenbeckii (Westwood, 1842)
Nomamyrmex esenbeckii mordax (Santschi, 1929), new synonym
Nomamyrmex esenbeckii wilsoni (Santschi, 1920), new synonym
Temnothorax ambiguus (Emery, 1895)
Leptothorax foveata Smith, M.R., 1934, new synonym
Leptothorax ambiguus pinetorum Wesson & Wesson, 1940, new synonym

Discussion

Acromyrmex versicolor (Pergande, 1893)

Atta versicolor Pergande, 1893: 31. Syntype workers, Calamajué (as Calamujuet) [29°38'N 114°25'W], Baja California, Mexico (National Museum of Natural History) [<https://www.antweb.org/specimen/CASTYPE00618>].

Acromyrmex versicolor chisosensis Wheeler, W.M., 1907: 705. Syntype workers, Chisos Mountains [29°16'N 103°18'W], Texas (O.W. Williams); Terlingua [29°19'N 103°37'W], Texas (W.M. Wheeler) (Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:21162>]. New synonym.

Wheeler (1907) established *A. versicolor chisosensis* from a number of workers taken by Judge O. W. Williams in the Chisos Mountains of southwestern Texas, and a few workers taken by himself at Terlingua, also in southwestern Texas. His new subspecies was differentiated from typical *versicolor* as being distinctly lighter and more yellowish in color, with much less pronounced sculpture and in having only a few (about 12) pointed tubercles on each side of the median gastral depression. Creighton (1950) pointed out that the number of gastral tubercles varies with the size of the worker in *A. versicolor* and small workers of both taxa have a similar number of tubercles. Fowler (1988) was of a similar view. Although additional collections from western Texas would be helpful, an examination of current holdings of *A. versicolor* has failed to convince us that Wheeler's characters represent meaningful differences. The type material of *A. chisosensis* seems to represent little more than pale (likely faded) and lightly sculptured individuals of *A. versicolor*. Pending the discovery of evidence to the contrary, *A. chisosensis* is best regarded as a synonym of *A. versicolor*.

Acromyrmex versicolor is known from northern Mexico (including Baja California) and the United States (Arizona, California, Texas).

Aphaenogaster boulderensis Smith, M.R., 1941

Aphaenogaster (Attomyrma) boulderensis Smith, M.R. 1941: 120. Holotype worker and 13 worker paratypes, Sentinel Island (as Horseshoe Island), Lake Mead [36°03'N 114°45'W], Nevada (V. M. Tanner) (National Museum of Natural History) [<https://www.antweb.org/specimen/FMNHINS0000062660>].

Aphaenogaster boulderensis smithi Gregg, 1949: 171. Holotype worker and 38 worker paratypes, Valley of Fires (as the Malpais Lava Beds), near Carrizozo [33°41'N 105°55'W], New Mexico (C.P. Stroud) (Field Museum of Natural History, Museum of Comparative Zoology, National Museum of Natural History) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:28232>] New synonym.

Aphaenogaster boulderensis was described by Smith (1941) based on a series of workers from Sentinel Island (as Horseshoe Island), Lake Mead, Nevada. It is a distinctive member of the North American ant fauna, being one of the few *Aphaenogaster* species that lacks propodeal spines (the propodeal angle being rounded and with at most a pair of low ridges). It is also characterized by its relatively elongate head and mesosoma and yellowish-brown body color, with the gaster darker in some specimens.

The subspecies *A. boulderensis smithi* was established by Greg (1949) for workers from the Valley of Fires (as the Malpais Lava Beds), near Carrizozo, New Mexico. Gregg noted it was different from typical *A. boulderensis* in having a longer and more tapered head, a more elongate mesosoma with a shorter propodeum, and heavier sculpturing giving it a more opaque appearance when compared to *A. boulderensis*. In addition, the propodeal angle has more noticeable ridges, it lacks a minute spine on the anteroventral surface of the petiole, and it is a richer red color with a uniformly black gaster (the black extending onto the postpetiole in some specimens).

Neither *A. boulderensis* nor *A. smithi* is frequently collected and *Aphaenogaster smithi* has received little mention in the published literature since its description. However, the scanty material available provides little support for the separation of *A. smithi* and *A. boulderensis*. Of the characters used by Greg (1949), the shape of the head differs only slightly between specimens identified as belonging to these taxa (Fig. 1), with *A. smithi* specimens averaging slightly wider for a given head length when compared with *A. boulderensis* specimens. Likewise, mesosoma length, propodeal structure, and sculpture all show considerable overlap, especially in smaller specimens. Gaster color has also been reported as being useful in segregating specimens into two forms. However, this color pattern appears to form an east-west cline, with western populations (Arizona, Nevada) having the gaster similar in color to the mesosoma while more eastern specimens (Arizona, New Mexico, Texas, Chihuahua) have the gaster much darker red-black. Given the limited evidence, we believe these two morphs are most probably representatives of a single taxon, with western populations having a slightly narrower head and paler gaster while eastern forms have a slightly broader head and darker gaster. *A. smithi* is thus best regarded as a synonym of *A. boulderensis*.

A. boulderensis is known from Mexico (Baja California, Chihuahua) and the United States (Arizona, California, Colorado, Nevada, New Mexico, Texas, Utah).

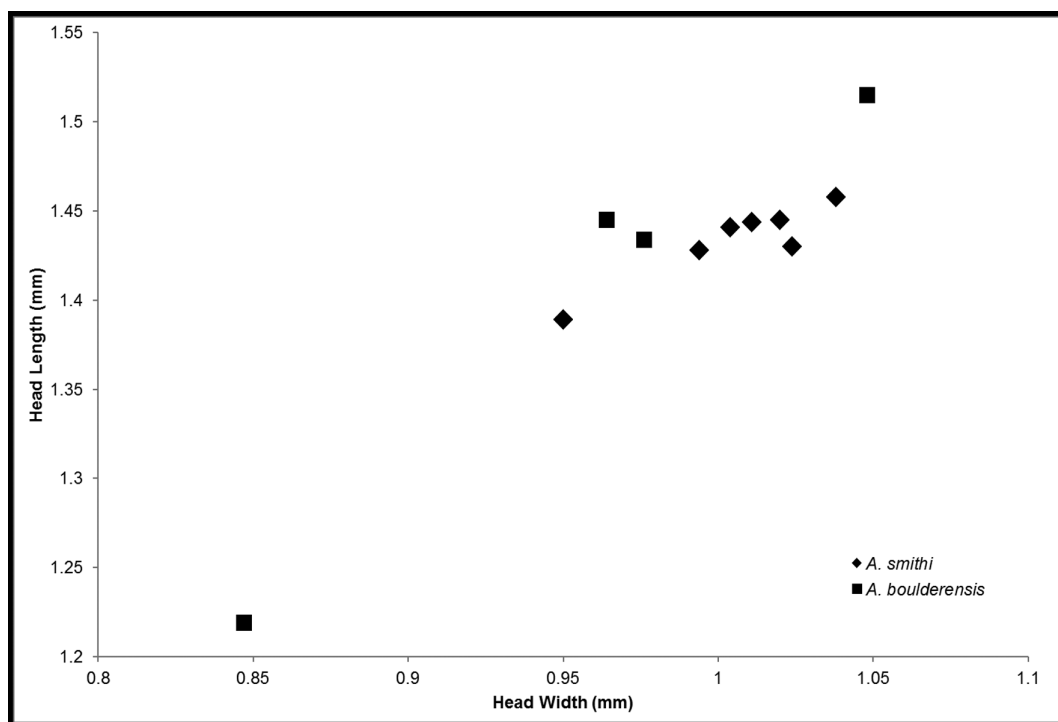


FIGURE 1. Head length versus head width (in mm) for specimens identified as *A. boulderensis* and *A. smithi*.

***Aphaenogaster azteca* Enzmann, J. 1947, new status**

Aphaenogaster fulva azteca Enzmann, J. 1947: 150. Syntype workers, Mexico (Museo Civico di Storia Naturale, Genoa) [<https://www.antweb.org/specimen/CASENT0904168>]. Raised to species.

Emery (1895) established the infrasubspecific (and therefore unavailable) name “*Stenamma* (*Aphaenogaster*) *fulvum* subsp. *aquia* var. *aztecum*” for several workers from Mexico (specific locality not given and currently unknown). Enzmann (1947) was the first to use this name as a trinomial and thereby made the name available as *Aphaenogaster fulva azteca*. Emery (1895) separated his variety from others based on its very “rough” sculpturing,

long and almost horizontal propodeal spines and dark black-brown body color with bright red legs. An image of a syntype is available on AntWeb (at www.antweb.org/specimen/CASENT0904168) and single worker labeled as “*Aphaenogaster fulvum aquia* var. *aztecum* Em, Mexico” and “from Emery” and matching Emery’s description is held in the MCZC. While not labeled as a type it seems highly likely that if not a true type this specimen was certainly identified by Emery and is likely to be conspecific with the true type material.

When comparing Emery’s specimen of *A. azteca* with *A. fulva* specimens, similar body color and development of sculpturing can be found in *A. fulva* specimens. However, darker *A. fulva* workers also have darker legs, which are similar in color to the body. In contrast, the legs in *A. azteca* are distinctly lighter in color compared to the body. Also, as noted by Emery, the propodeal spines in *A. azteca* are directed posteriorly (are nearly horizontal) while in *A. fulva* these spines are directed strongly upwards. These last two characters readily separate these two taxa. Finally, *A. fulva* is most abundant in the eastern and southeastern US although it is known from as far west as New Mexico (a doubtful record) and eastern Texas, but has been only rarely encountered there. *A. azteca* was collected from an unknown locality in Mexico, an area where *A. fulva* does not occur, or at least not commonly. These morphological and geographic differences strongly suggest that these two taxa are both distinct and we propose raising *A. azteca* to full species status.

***Aphaenogaster fulva* Roger, 1863**

Aphaenogaster fulva Roger, 1863: 190. Syntype workers, “North America” (Berlin Museum für Naturkunde der Humboldt-Universität) [<https://www.antweb.org/specimen/FOCOL1231>].

Myrmica (Monomorium) aquia Buckley, 1867: 341. Neotype worker (here designated) from Concord, Hapgood Wright Town Forest at junction of Route 2 and Route 126 [42°26'N 71°20'W], Middlesex County, Massachusetts, 4 July 1998 (S.P. Cover, SPC#5024) (Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:552000>; http://www.antwiki.org/wiki/Aphaenogaster_aquia]. New synonym.

Creighton (1950) provides an exhaustive history of the name *A. aquia*. Buckley (1867) did not designate types, leaving us with little more than speculation as to what his name might represent. From the meager description, *A. aquia* could be any *Aphaenogaster* native to the northeast, excepting perhaps *A. tennesseensis* or *A. treatae*. Mayr (1886) believed it to be a synonym of *A. fulva* while Emery (1895) treated it as a subspecies of *A. fulva*. Creighton (1950) felt that what Emery called *A. aquia* was an intergrade between *A. picea* and *A. rudis*, both of which were considered to be subspecies of *A. fulva* at that time, with *A. picea* being the higher elevation form occurring in the Appalachian Highlands and *A. rudis* a lower elevation form found in the piedmont areas at the base of the Highlands. He concluded that “We do not know what Buckley's *aquia* was. Emery's *aquia* appears to have been an intergrade which should never have been named. I propose, therefore, to place *aquia* in the list of unrecognizable forms.” Subsequent authors followed Creighton’s lead and have left the name *aquia* alone for over 50 years.

To permanently resolve the status of Buckley’s *aquia* we here designate a neotype. This specimen is conspecific with the currently accepted concept of *A. fulva*, and thus *Myrmica (Monomorium) aquia* Buckley becomes a junior synonym of *A. fulva* Roger.

***Aphaenogaster occidentalis* (Emery, 1895)**

Stenamma (Aphaenogaster) subterraneum occidentale Emery, 1895: 301. Syntype or holotype worker(s), Pullman, Washington [46°44'N 117°11'W], United States (T. Pergande) (probably Museo Civico di Storia Naturale, Genoa, not seen) [types of junior synonym *A. subterranea borealis* Wheeler, W.M. 1915 examined: 13 syntype workers, Lardeau (as Lardo), Kootenay Lake, British Columbia [50°09'N 116°57'W], Canada (J.C. Bradley) (Museum of Comparative Zoology) [http://www.antwiki.org/wiki/Aphaenogaster_occidentalis]].

Aphaenogaster subterranea valida Wheeler, W.M., 1915: 411. Worker, queen and male syntypes, North Cheyenne Cañon, near Colorado Springs [38°48'N 104°53'W], Colorado (W.M. Wheeler) (Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:20609>].

Creighton (1950) considered *A. occidentalis* and *A. valida* to be geographic “races” of *A. subterranea*, the former occurring from California and Nevada northward through Oregon and Washington and into British Columbia while the latter occurred from Colorado and Wyoming northward into Montana and then west into southern British Columbia. He reported a broad area of integration between the two forms, from British Columbia, eastern Washington, northern Idaho and western Montana, where they showed greatly increased variability. He

separated the two based on size, *A. valida* ranging up to 6mm in length while *A. occidentalis* reaching only 4.5mm, and color, *A. valida* being “usually castaneous brown” and *A. occidentalis* “usually piceous brown.” However, he noted that large numbers of workers were required to separate the two forms with certainty and that it was often impossible to identify isolated workers.

Little has changed since Creighton’s study. Examination of recent collections suggests that while western populations do average slightly smaller than eastern populations, there is considerable overlap, making reliable separation impossible. Color shows a similar pattern with geographic differentiation but considerable overlap. It seems apparent that these two forms are variants of a single variable species. We therefore consider *A. subterranea valida* Wheeler to be a junior synonym of *A. occidentalis* (Emery).

This species is found from British Columbia south to California and east to Montana and Colorado.

***Aphaenogaster texana* Wheeler, W.M., 1915**

Aphaenogaster texana Wheeler, W.M. 1915: 412. 2 worker syntypes, Texas (specific locality not given) (probably Museo Civico di Storia Naturale, Genoa, not seen).

Aphaenogaster huachucana crinimera Cole, 1953: 82. Holotype and paratype workers, queens, males, campground area at Bandelier National Monument [35°48'N 106°17'W], New Mexico, 6050ft., 30 July 1952 (A.C. Cole) (Los Angeles County Museum of Natural History, Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:29078>]; paratype workers, queens, males, 5 mi. south Mescalero (as Mescalera) [33°07'N 105°43'W], New Mexico, 6950ft., 19 August 1952 (A.C. Cole) (Los Angeles County Museum of Natural History, National Museum of Natural History, Museum of Comparative Zoology, collections of W.F. Buren, W.S. Creighton, R.E. Gregg, M. Talbot, G.C. Wheeler, E.O. Wilson). New synonym.

Aphaenogaster huachucana crinimera was established by Cole (1953) based on a series of nests collected at two high-elevation sites in New Mexico. He stated that his new subspecies was apparently very closely related to *A. huachucana* but differed in having more prominent sculpturing, sharper and longer propodeal spines, more hairy legs and considerably darker body color. It is puzzling that Cole chose to associate his new subspecies with *A. huachucana*. The differences cited by Cole between *A. huachucana* and *A. crinimera* are real, but Cole overlooked the most important difference of all: *A. crinimera* lacks the prominent lobe at the base of the antennal scape that separates *A. huachucana* from all other North American congeners. In all other respects, *A. crinimera* is, frankly, inseparable from *A. texana*, the sole member of the *Aphaenogaster rudis* complex present throughout much of Arizona and New Mexico. Recent collections of *A. texana* show that the species varies in color from dark brown to reddish or yellowish brown, but is morphologically consistent across its range. The *A. crinimera* types are typical *A. texana* from a population on the darker side of the color spectrum. Because of this we consider *A. crinimera* to be a junior synonym of *A. texana*.

A. texana is found from Arkansas west through Texas, New Mexico and Arizona, and south into northern Mexico. Western populations typically occur in middle elevation mesic oak-pine forests. The ant is especially common in protected canyon slope and bottom forests that are not subject to flooding. Nests are in soil and litter and are most commonly found under rocks in dappled to moderate shade.

***Aphaenogaster treatae* Forel, 1886**

Aphaenogaster treatae Forel, 1886: xl. Syntype workers, Vineland [39°29'N 75°2'W], New Jersey (Mary Treat) (Musée d'Histoire Naturelle Genève) [<https://www.antweb.org/specimen/CASENT0907701> (specimen labeled as lectotype but designation unpublished, thus syntype); <https://www.antweb.org/specimen/CASENT0900414>, labeled as “cotype” is not a true type as it is not from the type locality].

Aphaenogaster treatae pluteicornis Wheeler & Wheeler, 1934: 7. Numerous worker, 4 queen, 4 male, a few larva and pupa syntypes, Poteau [35°03'N 94°37'W], Oklahoma, 17 June 1929 (G.C. & E.W. Wheeler) (Los Angeles County Museum of Natural History, not seen). New synonym.

Wheeler and Wheeler (1934) described several taxa as “forms” of *A. treatae*, basing their distinctions on minor differences in sculpture, color, pilosity, head shape, and the shape of the distinctive basal antennal flange that distinguishes *A. treatae* from its congeners. *Aphaenogaster treatae pluteicornis* was established based on material collected in Oklahoma and Texas while two varieties of *A. pluteicornis*, “alabamensis” (from Alabama) and “oklahomensis” (with the same type locality as *A. pluteicornis*) were also described. These last two names were established as infrasubspecific (quadrinomials) and are thus unavailable.

Creighton (1950) was the first to consider these forms and reduced the number of valid taxa from four to two, treating “alabamensis” as a synonym of *A. treatae* and “oklahomensis” as a synonym of *A. treatae pluteicornis*. He separated *A. treatae* from *A. treatae pluteicornis* based on differences in head shape (longer and narrower and with the posterior margin narrower and flatter in *A. pluteicornis*) and sculpturing (longitudinal rugae present on the front of the head in *A. treatae*, only rarely present in *A. pluteicornis*).

None of the differences cited by the Wheelers or by Creighton hold up, especially given the availability of new material collected in the Florida panhandle and in eastern Texas (in MCZC). In general, workers from southern populations are reddish brown to yellowish brown in color; workers from populations from North Carolina and north tend to be darker, commonly a medium to dark brown. Cephalic sculpture tends to be a bit more prominent in northern populations, but head shape, the differences in antennal flange shape, and pilosity cited by the Wheelers are not especially convincing. From this examination we conclude that *A. treatae pluteicornis* is best considered a synonym of *A. treatae*.

Aphaenogaster treatae occurs from Maine south to the Gulf Coast (northern Florida) and west to eastern Texas, Oklahoma and north to Indiana and Illinois. Note that in the eastern states, *A. treatae* nests in well-drained, often sandy soils in open habitats. Nests are generally inconspicuous and are commonly found under grass clumps. In eastern Texas, the second author found the species in open, sometimes recently burned pine-oak forests and in small gaps in such forests. Of five collections, two were nests in soil, but three colonies were in red rotten pine branches or logs on the soil surface.

***Crematogaster missouriensis* Emery, 1895, new status**

Crematogaster victima missouriensis Emery, 1895: 287. 2 worker syntypes, Missouri (specific locality not given) (T. Pergande) (Museo Civico di Storia Naturale, Genoa, Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:20816>]. Raised to species.

Crematogaster minutissima thoracica Creighton, 1939: 138 (junior primary homonym of *C. thoracica* Santschi, replacement name *C. smithi* Creighton, 1950: 205). Holotype and paratype workers, Miller Canyon, Huachuca Mountains [31°25'N 110°16'W], Arizona, 6000ft., (W.M. Mann) (Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:23667>]. New synonym.

Crematogaster minutissima smithi Creighton, 1950: 205 (new replacement name for *C. thoracica* Creighton, 1939: 138). New synonym.

Crematogaster minutissima and its associated taxa *C. missouriensis* and *C. smithi* are the northernmost representatives of a neotropical species group within *Crematogaster*. Longino (2003) reports the occurrence of *C. minutissima* in Costa Rica, but here we are concerned solely with the forms reported from North America north of the Mexican border. The relationships between these forms and the Caribbean and Central American representatives of this complex deserve future investigation.

Crematogaster minutissima was described by Mayr (1870) from specimens collected in “Texas.” *Crematogaster missouriensis* was described by Emery (1895) as a subspecies of *C. victima*, apparently on the recommendation of Pergande (as the original description attributes the name to him). Creighton (1939) correctly recognized that *C. missouriensis* was actually more similar to *C. minutissima* than *C. victima* and regarded it as “northern race” of *C. minutissima*, maintaining it as a subspecies but transferring it from *C. victima* to *C. minutissima*. *Crematogaster smithi* was described by Creighton (1939) using the name *C. thoracica*, not realizing that that name had previously been used by Santschi (1921). Creighton (1950) corrected this oversight by proposing the replacement name *C. smithi*, the name it has been known by since.

Since the original describers were dealing with extremely limited material, the first meaningful assessment of these three taxa is Creighton (1939). Creighton regarded *C. missouriensis* and *C. smithi* as subspecies of *C. minutissima*, and separated all three using differences in mesosomal sculpturing and propodeal spine length. These matters stood until Mark Deyrup, drawing on extensive field experience in Florida, realized there were two species of yellow *Crematogaster* present in the state. One is found throughout Florida. It is a forest ant, nesting in rotten wood, nuts, pine bark at the base of large trees, and in thick litter. Colonies are diffuse, polydomous, highly polygynous, and the queens are small (4-4.8 mm long). The second occurs only in northern Florida, and creates inconspicuous nests in soil (sometimes surmounted by a small crater) in open or semi-open habitats. Colonies are monogynous, monodomous, and modest in size, often consisting of 100-200 workers. Queens are distinctly larger, 5-6 mm long. Collecting by the second author, Mark Deyrup, and others has revealed that precisely the same

situation prevails throughout most of the southeastern and south-central states. The small queen species occurs from North Carolina south, and then west along the Gulf Coast to Arkansas, Missouri, Oklahoma, and central Texas. It maintains its distinctive nesting habits and population structure throughout. Likewise, the large queen species occurs from North Carolina and Tennessee south to northern Florida, and west to Iowa, Oklahoma, and Texas. It too is consistent in its ecology and colony structure.

The small queen species is clearly Mayr's *C. minutissima*. Mayr gives the length of the syntype queen as 4.2 mm, which is decisive. A specimen of the original Pergande collection of *C. missouriensis* from Missouri is present in the MCZC (see Creighton, 1939). Its longer propodeal spines and lack of longitudinal rugae on the promesonotal dorsum matches Creighton's concept of *C. missouriensis*, separates it from *C. minutissima*, and therefore establishes it as a worker of the large queen species. It is here considered a full species in its own right and not a subspecies of *C. minutissima*.

This leaves us with *Crematogaster smithi*. The worker of this ant was diagnosed as having a relatively smooth and shiny mesosomal dorsum compared to the dull surface supposedly found in close relatives, and as lacking longitudinal rugae on the pronotum (or when present they are lateral and wavy). In related species these rugae are well developed and more central on the pronotum. However, Creighton noted that the rugae in *C. missouriensis* are variable and can also occur laterally, but in these cases the rugae are more prominent than those found in *C. smithi*. Also, in dorsal view the petiole of *C. smithi* was described as diverging posteriorly and with the widest point near the insertion of the postpetiole while in *C. minutissima* and *C. missouriensis* the petiole is quadrate with sub-parallel sides, the widest point (when noticeable) being near the center. Finally, Creighton noted that the propodeal spines were short and in other respects this taxon was very similar to *C. minutissima*.

An examination of recent collections has convinced us that the morphological characters cited by Creighton are all more variable than he suspected and that there is considerable overlap with *C. missouriensis* and *C. minutissima*. In addition, recent collecting has narrowed the distributional gap between these forms. *C. smithi* was described from specimens collected in Huachuca Mtns. in south-central Arizona. Since then, it has been found widely in Arizona, and two additional important collections have been made: one in the Davis Mtns of west Texas (including queens) and another from Roosevelt Co., New Mexico (both in MCZC). The Davis Mtns. collection clearly matches Creighton's concept of *C. missouriensis* and the Roosevelt Co. specimens are a good match for his concept of *C. smithi*. This may seem confusing, but natural history comes to our rescue here. Queen size, colony structure, and ecology of *C. smithi* all closely match those of *C. missouriensis*.

Our assessment of the evidence is that there are only two species: *C. minutissima*, and *C. missouriensis*. In the eastern and central parts of their range, where *C. minutissima* is present, the workers of *C. missouriensis* are fairly consistent morphologically and separable from those of *C. minutissima*. In the absence of *C. minutissima* (not present west of the Hill Country in central Texas), western populations display greater variation in worker morphology, a situation reminiscent of classical character displacement. However, the western populations are firmly linked to *C. missouriensis* by queen size, colony structure, and ecology. *C. smithi*, therefore, is best regarded as a synonym of *C. missouriensis*.

***Formica obscuriventris* Mayr, 1870**

Formica truncicola obscuriventris Mayr, 1870: 951. Syntype workers, Connecticut (specific locality not given) (Norton) (Naturhistorisches Museum Wien, Vienna; Berlin Museum für Naturkunde der Humboldt-Universität) [<https://www.antweb.org/specimen/CASENT0915637>, <https://www.antweb.org/specimen/FOCOL2745>].

Formica rufa clivia Creighton, 1940: 8. Holotype and paratype workers, Fish Creek Ranger Station, Glacier National Park [48°33'N 113°59'W], Montana, 8-12 July 1934 (W.S. Creighton) (American Museum of Natural History, Field Museum of Natural History) [<https://www.antweb.org/specimen/FMNHINS0000062712>].

To say that North American ants of the *Formica rufa* species group have had a troubled taxonomic history is to indulge in a talent for understatement. In the late 19th and early 20th century, numerous names were generated by early taxonomists, with little reference to ecology, distributional data, comparative context, or sense. To be fair, most of these early workers were dealing with very limited material. Creighton (1940, 1950) was the first to attempt to make sense of the resulting hodgepodge of names. Since then, some infraspecific taxa have proven to be valid species, others have been synonymized, but a few problematic names remain.

Formica clivia was described as a subspecies of *F. rufa* (Creighton, 1940) and transferred to *F. obscuriventris*

by Creighton (1950). Creighton delimited the subspecies based on color and pilosity and claimed distributional support: *F. obscuriventris* being primarily eastern, with a few high altitude populations in the southern Rockies; *F. clivia* being primarily western and being present at lower altitudes in the Rockies. An examination of material from over the entire enormous range of *F. obscuriventris* provides little support for Creighton's scheme. Eastern populations vary in color, but do not show the deep infuscation present in some western populations. Colonies with heavily infuscated workers occur throughout much of the American west, but the infuscation is variable and colonies with little or no infuscation are not infrequently encountered. Pilosity in this species is notably variable, but it doesn't seem to co-vary with color as Creighton thought. As such, there is little evidence to justify the maintenance of *F. clivia* as separate from *F. obscuriventris*. For these reasons, *F. clivia* is here synonymized with *F. obscuriventris*.

Formica obscuriventris is known from Canada (all southern provinces) and the United States (north from Oregon, Nevada, Utah, Colorado, South Dakota, Tennessee and Georgia).

***Formica oreas* Wheeler, 1903**

Formica oreas Wheeler, W.M. 1903: 643. 4 worker, 4 queen syntypes, Woodland Park [38°59'N 105°03'W], Colorado, 8500ft., 26 July 1903 (W.M. Wheeler) (Museum of Comparative Zoology, examined); 6 worker syntypes, Manitou Springs (as Manitou) [38°52'N 104°55'W], Colorado (W.M. Wheeler) (Museum of Comparative Zoology) [http://www.antwiki.org/wiki/Formica_oreas].

Formica oreas comptula Wheeler, 1913: 460. 10 worker, 2 queen syntypes, Pullman [46°44'N 117°11'W], Washington, 10 April 1908 (W.M. Mann) (Museum of Comparative Zoology) [<http://mczbase.mcz.harvard.edu/guid/MCZ:Ent:22717>]. New synonym.

Wheeler (1913) described this taxon as a variety of *F. oreas*, stating that it was darker in color and more pilose than *F. oreas*. Creighton (1950) could not confirm the pilosity differences but did find the darker color significant enough, when combined with the more northern distribution, to treat *F. comptula* as a subspecies of *F. oreas*. Syntype workers of *F. comptula* in the MCZC differ little in color or pilosity from collections of *F. oreas* from other parts of its range. However, Wheeler (1913) also described pilosity differences in the queen caste. These are far more noteworthy than the supposed differences in the workers. The syntype queens of *F. comptula* have longer, coarser, more erect, and more abundant pilosity than queens of typical *F. oreas*. Queens from Arizona, Colorado, and Utah, all show typical shorter, fine-textured, "silky" *F. oreas* pilosity. Given the small amount of *F. comptula* material available, we provisionally interpret this as population level variation. Further collecting is needed to see whether queens from populations in the northern and far western states show pilosity like the *F. comptula* syntypes and if the variation is clinal rather than discrete. Pending better evidence, we feel it best to synonymize *F. comptula* with *F. oreas* at this time.

The known distribution of *Formica oreas* includes Alberta, Canada and the following states in the US: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, Washington and Wyoming.

***Myrmica trullicornis* Buren, 1944, new status**

Myrmica sabuleti trullicornis Buren, 1944: 281. 34 worker syntypes, near Ames [42°02'N 93°38'W], Iowa, 30 April 1941 (W.F. Buren.) (The Natural History Museum) [<https://www.antweb.org/specimen/CASENT0900350>]; 11 worker, 1 queen syntypes, near Boone [42°04'N 93°53'W], Iowa, 3 May 1941 (W.F. Buren). Raised to species.

This taxon was originally described as a subspecies of *M. sabuleti* by Buren (1944), then, a few years later Weber (1948) synonymized it with *M. americana*, where it remained for a short period before Creighton (1950) revived it from synonymy and placed it as a subspecies of *M. hamulata*; a status it has maintained until the present. However, even a cursory examination reveals that the structure of the flange at the base of the antennal scape is unique and readily separates this taxon from close relatives. This flange lacks the elongate hook found in *M. hamulata* while the flange is absent in *M. sabuleti*. As noted by Buren (1944) in the original description, *M. trullicornis* is distinct from *M. spatulata*, differing in numerous characters including having the antennal flange much broader and almost dish-like compared to the narrower and more elongate flange of *M. spatulata*. There is little doubt that this taxon should be recognized as a distinct species, a treatment recommended here.

This species has been recorded from Illinois and Iowa, United States.

***Myrmica incompleta* Provancher, 1881**

Myrmica incompleta Provancher, 1881: 359. Syntype worker, Cap-Rouge [46°46'N 71°21'W], Quebec (probably, specific details lacking) (Provancher) (Museo Civico di Storia Naturale, Genoa) [<https://www.antweb.org/specimen/CASENT0905772>].

Myrmica brevinodis var. *frigida* Wheeler, 1917: 502. Syntype workers, Ice River Valley, British Columbia, 5000ft. (Whymper) (Musée d'Histoire Naturelle Genève; Museo Civico di Storia Naturale, Genoa) [<https://www.antweb.org/specimen/CASENT0904082>, <https://www.antweb.org/specimen/CASENT0907634>]. New synonym.

Myrmica brevinodis whymperi Forel, 1913: 215. Syntype workers, Vermillion Pass [51°14'N 116°03'W], Alberta; near Field [51°24'N 116°29'W], British Columbia; near Lake Louise, British Columbia [51°26'N 116°11'W] (Whymper) (Musée d'Histoire Naturelle Genève; Museo Civico di Storia Naturale, Genoa) [<https://www.antweb.org/specimen/CASENT0907635>; <https://www.antweb.org/specimen/CASENT0904080>]. New synonym.

Myrmica brevinodis var. *sulcinodoides* Wheeler, 1917: 502. Syntype workers, South Dakota, Utah, Maine (no specific localities given) (Museo Civico di Storia Naturale, Genoa) [<https://www.antweb.org/specimen/CASENT0904081> from Park City, Utah possible type specimen]. New synonym.

The taxonomic history of the forms centering on what is presently called *Myrmica incompleta* Provancher is a saga calculated to make the wicked laugh and the judicious weep. While contemplating this tangle, keep in mind that *M. incompleta* is a common ant in cold climates across Canada and the northern United States, from the Maritime Provinces west to Alaska, south to New England and the Great Lakes region, and with an enormous southern extension in the Rocky Mountains, Washington, Oregon, and the Sierra Nevada in California. Over this vast expanse its ecology and colony structure seem to be pretty consistent. It is an ant of moist, open or semi-open habitats, often forming dense populations at the edges of bogs, fens, and wet depressions in meadows. Colonies can be very large, are usually highly polygynous, and appear at times to form large, unicolonial populations. The workers vary in size more than in most *Myrmica* both within and between colonies, and show variation in sculpturing, propodeal spine length, and color.

Because the ant is commonly collected, its variability attracted the attention of early ant taxonomists who, following the conventions of their times, named whatever variants they came across. The result was a jumble of taxon names based on small variations in color or sculpture. After much work by Creighton (1950) and Francoeur and Beique (1966), the complex is presently arranged as follows:

Myrmica incompleta Provancher, 1881

= *Myrmica rubra brevinodis* Emery, 1895

= *Myrmica rubra canadensis* Wheeler, 1916

= *Myrmica rubra subalpina* Wheeler, 1917

Myrmica whymperi Forel, 1913

= *Myrmica brevinodis sulcinodoides* Wheeler, 1917

= *Myrmica rubra frigida* Wheeler, 1917

Our concern here is with the name *Myrmica whymperi* Forel, which is still valid. The name was established as a variety of *M. brevinodis* by Forel (1913) but only a few years later Wheeler (1917) synonymized it with *M. sulcinodoides*. Creighton (1950) considered this complex and found that "... it is necessary to synonymize the varieties *canadensis*, *frigida*, *subalpina*, *sulcinodoides* and *whymperi* with *brevinodis* ..." as the material he examined had shown "...the impossibility of satisfactory separation on either a structural or a distributional basis. In every case the structural distinctions involved consist of exceedingly slight differences in sculpture, pilosity or color." Thus *M. whymperi* fell into synonymy with *M. brevinodis*. Unfortunately, Creighton's perspicacity in this matter was not emulated by his successors. The next year Smith (1951), without comment, removed *M. sulcinodoides* from synonymy and placed it as a subspecies of *M. brevinodis*. He also transferred *M. frigida* and *M. whymperi* from synonymy with *M. brevinodis* to synonymy with *M. brevinodis sulcinodoides*. Francoeur & Beique (1966), while examining the type material of Provancher, realized that what Creighton (1950) had thought was *M. brevinodis* was actually Provancher's *M. incompleta*. As a result *M. brevinodis* fell into synonymy with *M. incompleta* and *M. frigida* and *M. whymperi* became synonyms of *M. incompleta sulcinodoides* rather than *M. brevinodis sulcinodoides*. Mackay, Lowrie et al. (1988) treat *M. sulcinodoides* as a full species in their

identification key although no discussion is given and no mention was made of how its synonyms should be treated. *M. incompleta* and *M. whymperi* (as *M. sulcinodoides*) are separated based on sculpture and color. Finally, Bolton (1995) recognized that while the name *sulcinodoides* had been used as the valid name for this taxon, in fact *whymperi* was the older name and had priority. Thus we arrived at the arrangement listed above.

After examining numerous specimens from throughout the range of *M. incompleta*, and a syntype of *M. whymperi* present in the MCZC, we are certain that Creighton (1950) was correct. All of the taxa listed above are best regarded as variants of a single geographically widespread species. This includes *M. whymperi*. The syntype worker has slightly stronger sculpturing and longer propodeal spines than most examples of *M. incompleta*, but specimens with similar attributes are occasionally found in populations far from the *M. whymperi* type locality. In the absence of additional support for the significance of such differences, there is no reason at present to maintain *M. whymperi* as a distinct species in its own right.

Myrmica incompleta is known from southern Canada and the United States from Alaska and from California and Arizona north and east through Colorado, South Dakota and Illinois to Maine. It is the host for the xenobiotic social parasite *Formicoxenus provancheri*.

***Nomamymex esenbeckii* (Westwood, 1842)**

Labidus esenbeckii Westwood, 1842: 75. Holotype male, Vendinha [29°47'S 51°33'E], Brazil, 10 September 1828 (W. Burchell) (Oxford University Museum of Natural History) [<https://www.antweb.org/specimen/CASENT0901959>].

Eciton crassicorne mordax Santschi, 1929: 415. Holotype worker, Cernavaca [18°55'N 99°13'W], Mexico (Naturhistorisches Museum Basel) [<https://www.antweb.org/specimen/CASENT0911413>]. New synonym.

Eciton esenbecki wilsoni Santschi, 1920: 366. Holotype male, Las Borragas, near Brownsville [25°54'N 97°30'W], Texas, June [year uncertain] (C. Schaeffer) (Brooklyn Museum, not seen). New synonym.

As noted by Watkins (1977), *Nomamymex esenbeckii* has accumulated a large number of names to describe its various forms. The number of these names considered as valid has gradually decreased as additional material has revealed intermediate morphologies, diverse combinations of character states and distinct geographic patterns. As a result we are currently down to just a single species with two recognized subspecies, *N. mordax* and *N. wilsoni* (Watkins, 1977; Wild, 2007). However, even this relatively simple system has proven problematic. In a detailed but unpublished analysis, Roy and Gordon Snelling (<http://www.armyants.org/armyants/genusaccounts/nomamymex/noma.html>, accessed 19 June 2014) provide the following notes:

“It is true that the morphological features on which the several subspecies of *N. esenbeckii* are based are generally representative of their respective populations. Equally true, however, is that many specimens within these populations do not possess the required characteristics of that named population. Samples from areas of sympatry are, as may be expected, intermediate between the respective phenotypes. In the worker caste, there is a north/south trend that is continuous. In northern specimens, the posterior margin of the mesonotum, in dorsal view, is definitely concave, and the longitudinal rugules of the propodeal dorsum are short and weak. Proceeding into Central America and through South America, the margin of the mesonotum becomes straight or even convex; the propodeal rugulae strengthen and run the entire length of the dorsal face. Similar trends are evident in the male structures employed by Watkins (1977) in segregating *N. esenbeckii* into four subspecies. In fact, differences in genitalic structures may be greater within any given population than those that separate purported subspecies. Under the circumstances, there would appear to be little justification for these subspecies and we propose to reduce all to synonymy.”

Wild (2007) accepted these recommendations when he synonymized *N. crassicorne* and we now apply this careful analysis by the Snellings to the remaining subspecies.

Nomamymex esenbeckii is exceptionally widespread, occurring from southern Texas, United States, south through Central America to northern Argentina and Paraguay.

***Temnothorax ambiguus* (Emery, 1895)**

Leptothorax curvispinosus ambiguus Emery, 1895: 320. Syntype workers, Hill City [43°56'N 103°34'W], South Dakota, 8 July 1890 (Pergande) [<https://www.antweb.org/specimen/CASENT0904763>]; Cleveland [41°28'N 81°40'W], Ohio (Wasmann); New York [40°44'N 73°56'W], New York (Schmelter) (Museo Civico di Storia Naturale, Genoa).

Leptothorax foveata Smith, M.R., 1934: 211. Holotype worker, Plainfield [41°36'N 88°12'W], Illinois, 25 May 1933 (Mary Talbot) (National Museum of Natural History, not seen). New synonym.

Leptothorax ambiguus pinetorum Wesson & Wesson, 1940: 97. 12 worker, 1 dealate queen, 2 alate queen, 5 male syntypes, Jackson County [39°01'N 82°37'W], Ohio, 10 July 1938 (not seen). New synonym.

Smith (1934) described *T. foveatus* based on a single worker from Illinois. At the time he considered it “so different from all of the *Leptothorax* [now *Temnothorax*] with which I am familiar that I am somewhat hesitant in trying to assign it to its proper taxonomical position.” However, some time later he reconsidered this view and Creighton (1950) reports that Smith “now regards the insect which he described as the species *foveata* in 1934 as very closely related to *ambiguus* if not actually a synonym of that species.” We concur with Smith’s later interpretation and consider *T. foveatus* to be a synonym of *T. ambiguus*. Note that Smith had two workers of this taxon, one of which was clearly abnormal. The abnormal worker has been imaged and placed in the USNM’s Ant Type database. The description makes clear that Smith did not consider it a type. Excepting its deformity in the structure of the petiole and postpetiole, it is otherwise a typical worker of *Temnothorax ambiguus*.

Wesson & Wesson (1940) established *T. ambiguus pinetorum* from specimens collected in Ohio, separating it from *T. ambiguus* based on the longer propodeal spines and less conspicuous mesosomal rugae. The queen and male were also described, the queen being separated from the queen of *T. ambiguus* by its smaller body size and longer propodeal spines, while the male was reported as differing from *T. ambiguus* in being smaller and less hairy.

Modern collecting has revealed *T. ambiguus* to be a geographically widespread species. There is variation in propodeal spine length, color, and queen size, and this is accompanied by comparable (but independent) geographic variation in nest site preference, colony size, and habitat selection. In the context of this bigger picture, the characters cited by Wesson & Wesson (1940) fall well within the observed variation in *T. ambiguus*. The types of *T. pinetorum* appear to come from a colony where the workers have somewhat longer propodeal spines and finer mesosomal sculpturing than average. Because of this we have no hesitation in considering *T. pinetorum* to be a junior synonym of *T. ambiguus*.

This taxon is known to occur from eastern and central Canada south to New Jersey, the Great Lakes region, and the northern Great Plains in the United States.

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