CHAPTER 7

Taxonomic Notes on Nearctic Species of *Camponotus*, Subgenus *Myrmentoma* (Hymenoptera: Formicidae)

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Abstract

The thirteen North American species belonging to the subgenus *Myrmentoma* are separated in a key based on the major workers, and pertinent morphological features are illustrated. *Camponotus clarithorax* and *C. discolor*, both previously regarded as subspecies of *C. caryae*, are recognized as separate species; *C. bakeri* is here treated as a distinct species, not a subspecies of *C. hyatti*; *C. sayi californicus* is removed from the synonymy of *C. sayi* to that of *C. hyatti*; *C. decipiens* is removed from the synonymy of *C. nearcticus* as a valid species, and *C. rasilis* is transferred from the synonymy of *C. sayi* to that of *C. decipiens*; *C. pavidus* is also removed from the synonymy of *C. nearcticus* as a separate species. One new species, *C. cuauhtemoc*, is described from Mexico and Texas.

Dedication

Myrmentoma is a group that Gerry and I have discussed from time to time, always with a sense of exasperation. This paper is dedicated to Gerry, a friend and respected colleague, with my thanks for his generous assistance and warm encouragement over the years.

Introduction

The subgenus *Myrmentoma* of *Camponotus* is a small Holarctic group of small to medium-sized carpenter ants. Creighton (1950) recognized eight species in America north of Mexico. One additional species was described by Gregg (1973), and another, previously described, species was included in *Myrmentoma* by Kempf (1972). It is now apparent that Creighton's treatment was not wholly satisfactory, hence the present contribution.

The few species of *Myrmentoma* present in North America are easily recognized; this is one of the few subgenera of *Camponotus* that seems to be a natural or monophyletic group. Both females and workers possess a distinct semicircular median notch on the apical margin of the clypeus; the head of the major, in frontal view, is approximately as broad as long, with the lateral margins not notably convergent from occipital corner to base of mandible. Pilosity, whether as erect hairs or as very fine appressed hairs, is sparse to scattered (except on the gaster of two species). The head shape of the female is similar to that of the worker media rather than that of the worker major.

Except for *C. anthrax* Wheeler and *C. bakeri* Wheeler, all species of *Myrmentoma* nest in preformed cavities in woody tissues, whether tree limbs, stems of various shrubs, or in pithy stalks. At least some species may initiate new colonies in old cynipid galls on oaks and later move to dry, dead branches. So far as known, these ants seldom mine sound, dry wood. Both *C. anthrax* and *C . bakeri* are soil nesting species found in coastal areas of southern California.

Specimens Examined

The bulk of the material used in this study is from the collections of the Natural History Museum of Los Angeles County (LACM). Additional specimens, including important type material, were from the American Museum of Natural History (AMNH), California Academy of Sciences (CAS), California Department of Food and Agriculture (CDFA), Museum of Comparative Zoology (MCZ), National Museum of Natural History (USNM) , and the University of California at Davis (UCD) and at Riverside (UCR); specimens were also examined from the private collections of J. T. Longino, S. Shattuck, J. Trager, and P. S. Ward.

Systematics

Although the number of North American *Myrmentoma* species is small, their systematics has been inordinately difficult. In part, this has been due to the very variable color of some species, with the result that many color variants have been named as subspecies or varieties. Additionally, differences between species in a given complex are often subtle and may become apparent only when long series are available.

Creighton (1950) recognized eight species. Two of these were believed to be polytypic; one was divided into two, and one into three, subspecies. A total of 11 forms were recognized and separated in a key.

The amount of material available to Creighton, especially from western North America, was very limited; the abundance of more recently collected specimens, many samples collected by Creighton, is the basis for the present reevaluation of the status of all the North American forms of *Myrmentoma.*

Kempf (1972) listed *C. montivaga* Forel as a species of *Myrmentoma;* I have examined types of this species and its two subspecies. They clearly are not *Myrmentoma* since the clypeus lacks the characteristic median notch. This ant appears to be most closely allied to those currently placed in the subgenus *Pseudocolobopsis.*

The following key is based wholly on major workers. In most features, except those relating to head shape, the minor workers tend to be similar to their majors, although the mesosoma is usually more slender and the propodeal features are less clearly defined.

It should be noted that figures of head frontal view consistently show a foreshortened clypeus because of its position. The clypeus thus appears to be broader than is true when it is viewed perpendicularly.

Key To American *Myrmentoma* (Major Workers)

1a Gastral terga somewhat satiny to dull, very closely and conspicuously transversely lineolate, piligerous punctures conspicuous and much coarser than hairs arising from them; appressed hairs abundant on terga, some on disc of second segment at least 0.50mm long, distance between adjacent hairs distinctly less than their length 2

b Gastral terga moderately to strongly shiny, transverse lineolation moderate to weak, piligerous punctures (except of long suberect hairs) barely perceptible (at 45x) and hardly coarser than appressed hairs arising from them; appressed hairs short (less than 0.35mm), sparse to scattered, distance between adjacent hairs much greater than length of hairs 3

2a Mandible with six teeth, outer surface smooth and shiny between fine, sparse punctures; front of head, including clypeus and malar area, more or less smooth and shiny ..... *anthrax* Wheeler

b Mandible with five teeth, outer surface closely striatopunctate and interspaces roughened and dull; front of head dull to slightly shiny ..... *cuauhtemoc,* new species

3a Mandible smooth and shiny between fine punctures separated by two puncture diameters or more; mesosomal profile distinctly depressed at metanotal suture (Figs. 20, 28) 4

b Mandible usually closely punctate or striatopunctate and with more or less definitely roughened interspaces; if punctures dis-

tinctly separated by smooth interspaces (*C. essigi*), metanotal suture not depressed (Figs. 24, 25) 5

4a Mesoscutum, in profile, flat or slightly convex, with very short or no descendant posterior portion (Fig. 28); basal face of propodeum about as long as posterior declivity; pronotum with 0-6 long, erect hairs .....

b Mesoscutal profile strongly convex and with relatively long descendant posterior portion (Fig. 20); basal face of propodeum shorter than posterior declivity and their juncture relatively sharp; pronotum with 8 or more long, erect hairs (minors may have fewer) ..... *bakeri* Wheeler

5a Malar area with conspicuous suberect to erect short hairs arising from coarse, somewhat elongate foveae (Fig. 2) 6

b Malar area without suberect or erect hairs (except sometimes near base of mandible) and conspicuously punctate, but without coarse, oval foveae (Fig. 1) 9

6a Clypeus with long erect hairs along margins and with numerous shorter hairs across disc, many about equal in length to those of malar area 7

b Clypeus with long erect hairs along and adjacent to margins (none as short as on malar area) , and few (1-3) or none across disc (Fig. 9) ..... *subbarbatus* Emery

7a Propodeal profile more rounded (Fig. 26); clypeal punctures mostly separated by less than puncture diameter; pronotum with 0-4 erect hairs 8

b Propodeal profile more angular (Fig. 21); clypeal punctures mostly separated by puncture diameter or more; pronotum with 6-14 erect hairs ..... *clarithorax* Emery

8a Erect hairs of clypeus of varying lengths and shortest about as long as those of malar area (Fig. 13); integument light to dark brown . ..... *caryae* (Fitch)

b Erect hairs of clypeus distinctly long and short, short hairs shorter than those of malar area (Fig. 15); head, mesosoma, petiole, and appendages red, gaster blackish ..... *discolor* (Buckley)

9a Propodeum, in profile, with basal face flat, or nearly so, almost entirely on same plane as mesonotum, abruptly rounded or subangulate at juncture with posterior declivity (Figs. 27, 29); basal margin of clypeus with a single long erect seta on each side; southwestern United States and adjacent Mexico 10

b Propodeum, in profile, curved or straight, but sloping toward broadly rounded juncture with declivity (Figs. 24, 25); basal margin of clypeus with 2 or more setae on each side (except C.

decipiens); east of Continental Divide in southern U. S., but extending across northern U. S. and southern Canada to Pacific Northwest 11

10a Pronotum with 4-10 (rarely 2) erect hairs; lower malar area and frontal lobes often subpolished to shiny; color variable, but often wholly blackish .....*essigi* M. R. Smith

b Pronotum usually without erect hairs, rarely with 2-4 hairs; lower malar area and frontal lobes dull, densely tessellate; head, mesosoma, and appendages ferruginous, gaster blackish (some samples in southeastern Arizona may be extensively infuscated) ....*sayi* Emery

11a Clypeus distinctly broader than long and with 4-10 (usually more than 6) erect hairs along margins above level of tentorial pits; color various, but if head and mesosoma reddish, at least gastral tergum 1 also reddish or yellowish or clypeus is distinctly roughened or occipital margin straight 12

b Clypeus about as long as broad or slightly longer and with 2-4 long erect hairs along margin above level of tentorial pits; head, mesosoma, and appendages red to yellowish red; clypeus dull and densely tessellate, but not roughened; occipital margin distinctly concave in frontal view ..... *decipiens Emery*

12a Head and mesosoma usually brownish to blackish, but if somewhat reddish, gaster is wholly black; occipital margin straight to weakly concave (widespread in northern and eastern hardwood forest, to Pacific Northwest) ..... *nearcticus* Emery

b Head, mesosoma, appendages, and first 1 or 2 gastral terga yellowish to yellowish red; occipital margin slightly to moderately concave (SE United States, central Texas to Georgia) .... *pavidus* Wheeler

Camponotus (Myrmentoma) anthrax Wheeler

Camponotus anthrax Wheeler, 1911:96; *W F M.*

Camponotus (Myrmentoma) anthrax: Creighton, 1950:385.

This unusual species is presently known only from coastal southern California, from Santa Barbara to San Diego Counties, and from northern Baja California, Mexico. In California, it has been collected as far inland as 4 mi. E. Hemet, Riverside Co., and at Warner Springs, San Diego Co. It has also been collected on Santa Cruz Island, Santa Barbara Co. Collection elevations range from near sea level to about 3500 feet.

Nests are situated in soil, often under a covering stone, an unusual characteristic within *Myrmentoma* that is shared with the otherwise

dissimilar *C. bakeri*. Habitats for *C. anthrax* range from coastal scrub to chaparral.

This is an easily recognized species by virtue of the sexdentate mandible of both worker and female, a unique characteristic within North American *Myrmentoma*. The head of the largest majors is smooth and shiny, as are the mandibles and clypeus. Workers and females possess a relatively large number of erect hairs on the head and mesosoma, and the gaster is dull to satiny, with conspicuously large punctures; the appressed gastral hairs are long and overlapping, longer than the distance between adjacent hairs.

Camponotus (Myrmentoma) bakeri Wheeler
Figures 1, 20

Camponotus hyatti subsp. bakeri Wheeler, 1904:271; W F.; Wheeler, 1910:346; W F.

Camponotus (Myrmentoma) hyatti bakeri: Creighton, 1950:384, 387.

Although described as a form of *C. hyatti*, I believe this ant must be recognized as a distinct species. The types were collected on Santa Catalina Island, Los Angeles County, California, but the species is common also on San Clemente and Santa Barbara Islands. So far, *C. bakeri* is known only from the southern California Channel Islands. Unlike *C. hyatti*, it appears to nest only in soil, rather than in wood; this characteristic is shared in *Myrmentoma* only with the otherwise dissimilar *C. anthrax*, another species of southern California.

The morphological features that separate *C. bakeri* from *C. hyatti* are set forth in the key and require little further comment. The differences in mesosomal profile noted there are consistent in all worker sizes. Minor workers of *C. bakeri* often have a reduced number of erect hairs on the pronotum and, in this characteristic, are thus not always separable from their *C. hyatti* counterparts. Workers and females of *C. bakeri* have the head and mesosoma bright red; as a rule, these castes in *C. hyatti* are more or less definitely brownish infuscate. The only specimens of *C. hyatti* that are sharply bicolored among the material available to me are the cotypes of *C. sayi bicolor*.

Camponotus (Myrmentoma) caryae (Fitch)
Figures 2, 13

Formica caryae Fitch, 1855:885; W F M. *Camponotus marginatus* subsp. *discolor* var. *cnemidatus* Emery, 1893:6768; W.

Camponotus (Myrmentoma) caryae: M. R. Smith, 1940:139; W F M. Creighton, 1950:385, 386.

Creighton (1950) regarded *C. caryae* as a polytypic species, with *C. clarithorax* and *C. discolor* as subspecies. In my opinion, both of these are better regarded as separate species. The evidence in favor of such an interpretation in the case of *C. clarithorax* is certainly adequate, in my opinion. The status of *C. discolor* is much less certain.

The principle distinction between *C. caryae* and *C. discolor* has always been one of color: *C. caryae* is uniformly dark brown to blackish and *C. discolor* has reddish head, mesosoma, and appendages. This remains the principle character. The only other difference that I have been able to discern seems weak.

In both these species, as in other *Myrmentoma* the basal margin of the clypeus possesses a pair of long setae that arise from large foveae at the clypeal margin below the lower end of the frontal carinae. When the head is viewed in profile, these setae are very clearly longer than the remaining setae of the clypeal disc in *C. discolor* (Fig. 15); in *C. caryae* the discal setae are much more variable in length and some are nearly as long as the basal pair (Fig. 13). The number of hairs on both the clypeus and malar areas appears to be greater, on the average, in *C. caryae* than in *C. discolor*. Perhaps, when more material of *C. caryae* becomes available, it may become necessary to synonymize *C. discolor*, but the case can be argued either way at this point.

In addition to some of the Fitch types from New York, redescribed by M. R. Smith (1940), I have seen cotypes of the var. *cnemidatus*, several short series from Ohio, and a few specimens from Florida: Torreya State Park, Liberty Co., May 20, 1986 (J. C. Trager), on *Carya glabra*. Little is known of the biology of *C. caryae*; according to Creighton (1950) it is associated with hickory trees.

Camponotus (Myrmentoma) clarithorax Emery
Figures 3, 14, 21

Camponotus marginatus var. *clarithorax* Emery, 1893:678; W F M.

Camponotus (Myrmentoma) caryae subsp. *clarithorax*: Creighton, 1950:385, 386.

Camponotus (Myrmentoma) clarithorax: Duffield, 1976:68-73: 168.

Although Creighton (1950) was of the opinion that *C. clarithorax* could not be separated from *C. caryae* except by its color and disjunct distribution, I do not agree. Emery (1893) correctly noted that both the erect hairs and the punctures were less abundant in *C. clarithorax* than in *C. caryae*.

With the head in frontal view, about 8-15 hairs extend beyond the margins of the head in *C. clarithorax* (Fig. 3); in *C. caryae* there are 25

or more such hairs (Fig. 2). The clypeus is dull and densely tessellate in both species, but in C. *clarithorax* the disc has coarse, shallow punctures that are variably spaced; some are less than a puncture diameter apart, but there are interspaces equal to several puncture diameters, especially along the midline. In C. *caryae*, the disc is closely punctate, the punctures separated by less than a puncture diameter, but there may be an impunctate median line, about equal to a puncture diameter.

The propodeal profile of C. *clarithorax* is abruptly rounded between the nearly horizontal basal face and nearly vertical posterior face (Fig. 21). That of C. *caryae* and C. *discolor* is much more evenly convex, with the basal face convex and gradually curved into the posterior face (Fig. 26). I believe that these differences, plus the wholly allopatric ranges of these two forms are ample to warrant specific status for C. *clarithorax*.

Mandibular gland chemistry of males of C. *clarithorax* was discussed by Duffield (1976), who reported a complex array of ten compounds, more than twice the complexity of most other species of *Myrmentoma*. This diversity was equaled only by that of C. *anthrax*, but many of the components differed between the two species. Unfortunately, Duffield was unable to investigate the chemistry of either C. *caryae* or C. *discolor*, the species most closely related to C. *clarithorax*.

Although most abundant in coastal southern California and adjacent Baja California, C. *clarithorax* ranges north to southern Oregon. In southern California it is primarily a species of the chaparral and coastal scrub. Nests are most often in dead branches of oaks, but a wide variety of other trees and shrubs may be utilized. In southern California C. *clarithorax* commonly infests houses and other structures, where it nests in wood damaged by dry rot or termites, in spaces between timbers, in hollow-core doors, or in window casements. Apparently, the ant does not damage sound, dry wood, and it is merely a nuisance, not a structural pest.

Camponotus (Myrmentoma) cuauhtemoc, NEW SPECIES
Figures 10-12, 22-23

Diagnosis

This species differs, in the workers and females, from all previously described North American *Myrmentoma*, except C. *anthrax*, by the obviously textured, somewhat satiny appearing gastral terga, the first three of which are provided with numerous long, fine appressed hairs that are distinctly longer than the distance between adjacent hairs;

from *C. anthrax* it differs by the five-toothed mandible in the female castes. The male, morphologically conservative as usual in *Camponotus*, is recognizable by the presence of numerous appressed hairs on the gastral terga.

For purposes of the following description, workers are termed major or minor based on relative scape length (SL); if SL is less than head width (HW) the specimen is ranked as a major; if SL equals or exceeds HW, the specimen is a minor.

Description

Major worker. Measurements (mm) : HW 2.10; Head length (HL) 2.15; Scape length (SL) 1.60; Weber's length of mesosoma (WL) 2.65; total length (from front of deflected head to apex of gaster) 6.7. Paratype majors: HW 1.68-2.38; HL 1.70-2.36; SL 1.58-1.75; WL 2.30-2.88.

Head (Fig. 10) approximately square, varying from slightly longer than broad to slightly broader than long, Cephalic Index (CI) 95-101; sides in frontal view nearly straight or slightly concave, occipital margin transverse, weakly concave. Scape short, Scape Index (SI) 71-93. Mandible five-toothed, outer face slightly shiny and subcontiguously striatopunctate. Eyes small, oculomandibular distance (OMD) 2.21-2.67 times eye length (EL). Clypeus distinctly convex in profile, about as long as wide at tentorial pits; surface distinctly tessellate and slightly shiny between fine, close punctures. Malar area about as dull as clypeus, becoming shinier and less sharply tessellate toward gula; punctures conspicuous, fine and close. Gena shiny to occipital corner, with sparse, fine punctures. Frons shinier than clypeus, punctures fine, sparser than on clypeus, becoming denser on frontal lobes.

Mesosomal profile as in Fig. 23. Pronotal dorsum dull, finely granulopunctate, with conspicuous sparse piligerous punctures. Remainder of dorsum slightly shiny, finely tessellate. Side of pronotum shinier than dorsum, distinctly tessellate; remainder of mesosomal side duller, more or less distinctly granulopunctate rather than tessellate.

Node of petiole narrowly rounded at summit.

Gastral terga 1-4 with broad translucent yellowish margins; discs sharply and closely transversely lineolate, appearing satiny at some angles, with numerous distinct punctures of two sizes; segments successively shinier.

Front and top of head and dorsum of mesosoma with sparse but conspicuous fine appressed hairs; gastral terga with numerous fine appressed hairs, those of disc of tergum 2 so numerous that their

lengths overlap and lateral distance between hairs is less than their lengths, some hairs up to 0.10 mm long.

Clypeus with one pair of erect hairs above level of tentorial pits, arising from large punctures below lower end of frontal carinae; frontal lobes with about 4 hairs on each side; center of frons, below occipital margin with 8-12 erect hairs; dorsum of pronotum with 10-16 erect hairs of varying length; mesonotum with long anterior pair and, sometimes, with very short posterior pair; dorsum of pronotum at, and anterior to, angle with 8-12 long erect hairs; discs of gastral terga with numerous suberect to erect hairs of varying length.

Head, pronotum, and appendages reddish brown; remainder of mesosoma and entire gaster darker.

Minor worker. Measurements (mm): HW 1.05-1.50; HL 1.23-1.63; SL 1.33-1.53; WL 1.84-2.15.

Agrees generally with description of major, but head (Fig. 12) relatively longer and with broadly rounded occipital corners, CI 86-96; scape consistently longer than HW and usually longer than HL, SI 90-108; eyes more prominent and proportionately longer, OMD 1.67-2.20 times EL; apical notch of clypeus broader and shallower.

Otherwise about as described for major but mesosoma (Fig. 22) more slender and usually with more numerous erect hairs.

Alate female. Measurements (mm): HW 1.98-2.05; HL 2.03-2.08; SL 0.50-0.55; WL 3.55-3.70.

Head (Fig. 11) in frontal view with margins straight, distinctly convergent from occipital corners to mandibular insertions; occipital margin slightly convex; CI 98-99. Antennal scape short, SI 83-85. Ocelli small, interocellar distance more than three times diameter of anterior ocellus and ocellocular distance about 1.3 times interocellar distance. Mandible, clypeus, and sculpture as described for major.

Mesosoma normal for *Camponotus*.

Gaster normal for female *Camponotus*, sculpture as described for major.

Pilosity and color as described for major; wings slightly whitish, veins yellowish.

Male. Measurements (mm) : HW (across eyes) 1.18; HL 1.19; SL 1.25; WL 2.63.

Differs from all other male *Myrmentoma*, except *C. anthrax*, by the presence of numerous appressed hairs on gastral terga that are long enough to overlap and are longer than lateral distance between them; differs from *C. anthrax* male in lacking erect hairs on malar area, fewer than 12 hairs on mesoscutum (more than 20 in *C. anthrax*), and brown, rather than black, color.

Type Material

Holotype major worker and 179 worker, 5 female, 2 male paratypes: 16 mi. E. Cuauhtemoc, 5900 ft. elev., Chihuahua, MEXICO, May 4 , 1953 (W. S. Creighton), ex dead branch of *Quercus* sp. near *oblongifolia.* Holotype and most paratypes in LACM; paratypes also in AMNH, BMNH, MCZ, and USNM.

Etymology

The specific name is that of the last "emperor" of Tenochtitlán; it is here used as a noun in apposition.

Additional Material (not types)

MEXICO, Chihuahua: 34 mi. S. Parral, 5800 ft. elev., May 2, 1953 (W. S. Creighton; LACM), ex dead limb of "fuzzy-leaf deciduous oak". UNITED STATES, Texas: Davis Mts., Jeff Davis Co., July 22, 1966 (A. E. Lewis; LACM); same locality, Aug. 3, 1937 (J. Knull; LACM); Oak Springs, 4000 ft elev., Chisos Mts., Big Bend National Park, Brewster Co., May 24, 1953 (W. S. Creighton; LACM), ex *Quercus* sp.

Discussion

The presence of numerous fine appressed hairs on the gastral terga and to a less extent, on other dorsal surfaces, will readily separate *C. cuauhtemoc* from all other known North American species of subg. *Myrmentoma,* except *C. anthrax.* The mesosomal profile and the uniformly dull, reddish brown color are also distinctive. From *C. anthrax, C. cuauhtemoc* is easily separated since the mandibles of that species are distinctly six-toothed, rather than five-toothed as in all other *Myrmentoma.* Geographically, the two are widely separated since *C. anthrax* is known only from southern California.

Workers of this species fall very discretely into two subcastes. In the majors the head is at most only slightly longer than broad, the scape is shorter than the head width and projects beyond the occipital margin by a distance about equal to its apical width. The occipital margin is basically transverse and passes into the lateral head margins through abrupt occipital corners. The outer margins of the compound eyes, in frontal view, are separated from the head margins by about the minimum width of the scape or more.

In minor workers the head is distinctly longer than broad and the scape is longer than the head width, projecting beyond the occipital

margin by 2-3 times its apical width. The occipital margin is rather evenly convex and evenly and broadly rounded into the lateral margins of the head. The outer margins of the compound eyes are separated from the lateral head margins by less than the minimium width of the scape or may extend slightly beyond the margins in the smallest specimens.

Of the more than 100 specimens examined, only one appears to be intermediate. The HW of this specimen is 1.66 mm, the CI is 96, and the scape is shorter than the HW. Head shape is typical for that of a minor worker except that the occipital corners are a little more pronounced, but not as distinct as in majors.

Whether or not other species of *Myrmentoma* show similar patterns is uncertain, although some appear to do so. This dimorphism in the worker caste is of some interest because we are accustomed to the idea of a nearly continous gradient of worker sizes, so that worker *Camponotus* are more or less arbitrarily divided into major, media, and minor subcastes. Closer study of other species may show that there is little justification for doing so.

Camponotus (Myrmentoma) decipiens Emery
Figures 4, 24, 30

Camponotus marginatus var. *decipiens* Emery, 1893:676; W F.

Camponotus fallax subsp. *rasilis* Wheeler, 1910:227; W F M. NEW SYNONYMY.

Camponotus (Myrmentoma) nearcticus: Creighton, 1950:385,388-389 (in part). Wheeler and Wheeler, 1963:172, 173-174 (in part).

Camponotus (Myrmentoma) rasilis: Creighton, 1950:385, 389. Duffield, 1976:61, 62, 169.

Camponotus (Myrmentoma) sayi: Snelling, 1968:355-358 (in part). Duffield, 1976:61, 62, 169.

I have compared cotypes of *C. decipiens* with those of *C. rasilis* and have no doubt they are conspecific. Creighton (1950) listed *C. decipiens* as a synonym of *C. nearcticus*, but apparently had not seen type material. Presumably, his action was based on the assumption that *C. decipiens* was nothing more than a light colored phase of *C. nearcticus*.

In 1968 I synonymized this species, as *C. rasilis*, under *C. sayi*. Having had the opportunity to study many more samples in recent years, I am convinced that I erred in so doing. Creighton (1950) separated *C. sayi* and *C. rasilis* by the longer antennal scape of the latter, said to extend beyond the occipital corners of the head by at least the apical width of the scape. In my 1968 treatment, I argued that this was

not so, since some cotypes of each did not satisfy that criterion. That conclusion is unchanged, although it is fair to note that generally the scape of *C. sayi* is relatively shorter than it is in *C. decipiens*. But, scape length is sufficiently variable in each species that this cannot be relied upon to distinguish between them.

In my preoccupation with an invalid distinction, I managed to overlook other features between the two that will consistently distinguish between them. The profile of the mesonotum is flat in *C. sayi*, as is that of the basal face of the propodeum, so that the two form a nearly flat plane from the anterior margin of the mesoscutum to the summit of the posterior declivity (Fig. 29); sometimes their juncture is very obtusely angled. The juncture of the two faces of the propodeum is either subangulate or angulate.

The mesonotal profile of *C. decipiens* may be either flat or very slightly convex; the propodeal dorsum, however, is distinctly curved down from the metanotal suture to the broadly rounded juncture with the propodeal declivity (Fig. 24). The mesosomal profile is thus substantially less angular in *C. decipiens* than in *C. sayi*.

Finally, the two species differ in the shape of the node of the petiole, as seen from behind. In *C. decipiens* (Fig. 30) the node in all worker sizes is relatively narrower and almost invariably is elevated and narrowly rounded or subangulate across the summit. In contrast, the node of *C. sayi* (Fig. 31) is broader; the crest may be transverse or somewhat convex; sometimes the middle may be elevated and obtusely subangular, thus somewhat similar to that of C. decipiens, but the median angulation is not as sharp as in that species.

From what has been written above, it would seem to be relatively easy to distinsuish between these species and this is usually true. However, within populations of each species it is possible to find individuals that do not conform to the above criteria, often in series of otherwise typical examples of their species. Such specimens tend to be from populations away from the adjacent margins of the ranges of these species. In other words, the westernmost specimens of *C. decipiens* consistently exhibit those characteristics that distinguish between this species and *C. sayi*, as do the easternmost specimens of *C. sayi*. Unfortunately, no specimens are available from any area of sympatry, if such exists, so the possibility of apparent character displacement cannot be verified.

The range of *C. decipiens* extends from Georgia and northern Florida west to western Texas (Jeff Davis and Chisos Mountains); in the central United states, the range extends to North Dakota. Specimens have

also been examined from the Mexican States of Nuevo Leon and Tamaulipas.

Duffield (1976) reported on the male mandibular gland chemistry of this species as *C. rasilis* and as *C. sayi*. The *C. "rasilis"* specimens were from Georgia and those of *C. "sayi"* were from Texas. The results for the two samples differed slightly: the males from Texas lacked n-octanoic acid. So little is known of the glandular chemistry of ants that the significance of this disparity is unclear. But, I would be surprised if ant species failed to exhibit some regional eccentricities.

Camponotus (Myrmentoma) discolor (Buckley)
Figures 15, 26

Formica discolor Buckley, 1866:166; W F.

Camponotus marginatus subsp. *discolor*: Emery, 1893:677; W F M.

Camponotus fallax subsp. *discolor*: Wheeler, 1910:330; W F M.

Camponotus (Myrmentoma) caryae subsp. *discolor*: Creighton, 1950:385, 386. Wheeler and Wheeler, 1963:172.

This is a common species in central Texas; it has been collected as far east as South Carolina and as far north as North Dakota. The westward range extends to the Davis Mountains (Jeff Davis Co.) and Lubbock (Lubbock Co.), Texas. It is most commonly associated with oaks of several species, but has also been taken in hickory, willow, and cottonwood.

It is with some misgivings that I treat this as a species apart from *C. caryae*. The features by which the two are separated are not wholly satisfactory, but they do seem to be consistent. No specimens that I can consider to be intermediate have been seen, but I am willing to admit that this may be due to the paucity of material from States such as Kansas, Nebraska, and Missouri. Since *C. caryae* occurs as far west as Ohio and Iowa, intermediates, if they exist, should be in these states.

Camponotus (Myrmentoma) essigi M. R. Smith
Figures 5, 18, 27

Camponotus caryae subsp. *essigi* M. R. Smith, 1923:306; W F.

Camponotus (Myrmentoma) essigi : Creighton, 1950:385, 387. Wheeler and Wheeler, 1986:61.

Camponotus (Myrmentoma) nevadensis Gregg, 1973 :39-43; W.

The synonymy of *C. nevadensis* with *C. essigi* was first reported by Wheeler and Wheeler (1986). I have compared paratypes of both names and there are no significant differences. The range of *C. essigi*

extends from Oregon and Idaho to southern California; the species very probably will be found in northern Baja California, Mexico.

Because the mandibles are rather sparsely punctate in the major workers of *C. essigi* this species can be confused with *C. hyatti*, but even in the largest majors, the punctures are mostly separated by less than a puncture diameter. The interspaces may be smooth or lightly roughened. The most conspicuous difference, however, is the presence of a distinct metanotal impression in *C. hyatti* (Fig. 27) so that the basal face of the propodeum is convex; *C. essigi* lacks a distinct metanotal impression and the base of the propodeum is flat or slightly concave (Fig. 26).

This species is highly variable in color. Samples from northern localities or those at high elevations may be largely or entirely black. Most commonly, the head and gaster are dark and the mesosoma reddish. Most samples from southern California are largely yellowish red with only the two or three apical gastral segments blackish or brownish.

Habitats for *C. essigi* range from chaparral and oak woodlands to pine-fir forest. Although primarily associated with oaks (both in dead branches and cynipid galls), *C. essigi* has also been found nesting in pine, cottonwood, cedar, and manzanita. Shields (1973) reported this species (as *C. nearcticus*) tending larvae of the lycaenid *Philotes rita pallescens* on *Eriogonum kearneyi* var. *kearneyi* in Nevada.

Camponotus (Myrmentoma) hyatti Emery
Figures 6, 19, 28

Camponotus hyatti Emery, 1893:680, figs.25, 26; W. Wheeler, 1910:345; W.

Camponotus sayi var. *bicolor* Pergande, 1894:161; W M. Preoccupied. NEW SYNONYMY.

Camponotus sayi var. *californicus* Emery, 1925:118. New name for *C. sayi bicolor* Pergande. NEW SYNONYMY.

Camponotus (Myrmentoma) hyatti Emery: Creighton, 1950:384, 387. Wheeler and Wheeler, 1986:61.

This is an exclusively western species, most abundant in southern California, but ranging north to Oregon and Idaho, east to southern Arizona (Santa Rita and Chiricahua Mountains), and south through Lower California to the Sierra de la Laguna in Baja California Sur.

For reasons set forth in the discussion of *C. sayi*, I now regard *C. sayi californicus* as a synonym of *C. hyatti* rather than of *C. sayi* as I had earlier (1968) supposed. Together with *C. bakeri* and *C. essigi*, *C. hyatti*

is a member of a small complex of western North American species characterized by sparsely punctate five-toothed mandibles and the flattened, shiny, and sparsely punctate clypeus of the major workers and the females. In the major workers also, the entire frontal and malar areas of the head tend to be smooth and shiny, rather than tessellate and somewhat dull as in other species of *Myrmentoma*.

From *C. essigi* this species may be separated by the presence of a distinct metanotal groove (Fig. 28). The basal face of the propodeum thus appears to be convex in profile, rather than flat as in *C. essigi*. Also similar is *C. bakeri*, originally described as a subspecies of *C. hyatti*, but in that species the mesonotum, in profile, is distinctly convex (rather than flat) and the pronotum has 8 or more long erect hairs, at least in the major.

All available records indicate that *C. hyatti* nests in wood. Colonies have been found in several species of oaks, as well as in manzanita, chemise, sagebrush stems and roots, and in *Yucca* stalks.

Camponotus (Myrmentoma) nearcticus Emery
Figures 7, 16, 25

Camponotus marginatus var. *nearcticus* Emery, 1893:675; W F.

Camponotus marginatus var. *minutus* Emery, 1893:676; W F M.

Camponotus fallax var. *tanquaryi* Wheeler, 1910:226; W F M.

Camponotus (Myrmentoma) nearcticus: Creighton, 1950:385, 388-389 (in part). Wheeler and Wheeler, 1963:172, 173-174 (in part) .

The above synonymy omits many references to *C. nearcticus* because many appear to be based on erroneous identifications. Almost every uniformly dark North American *Myrmentoma* (but not excluding some bicolored species) has been misidentified as *C. nearcticus* at least once. This species has never been adequately characterized. Creighton (1950) included as a synonym *C. marginatus decipiens*, evidently unaware that this was conspecific with his interpretation of *C. rasilis*. Also placed in the synonymy was *C. fallax rasilis* var. *pavidus*; this, too, I believe to be a distinct species.

With the removal to these two as separate species, *C. nearcticus* becomes more homogeneous. Although typically a dark brown or blackish species, some samples of *C. nearcticus* may have the head and mesosoma partially ferruginous (e. g., the types of the var. *tanquaryi*). A few samples from Mississippi have the head, mesosoma, and appendages bright reddish and might be confused with *C. decipiens*. But, the broad clypeus, with numerous erect hairs, and the straight occipital margin are as in *C. nearcticus*.

In some parts of the southeastern United States *C. nearcticus* is replaced by the morphologically similar *C. pavidus*. The differences between the two are slight, but appear to be consistent in the numerous samples I have seen, mostly from Georgia and Florida.

The range of *C. nearcticus* has not been accurately determined. In eastern North America it is present in Quebec and Ontario Provinces of Canada and throughout the northeastern United States; samples have been seen from as far south as Mississippi and Georgia, and *C. nearcticus* is apparently common in Tennessee and the mountains of western North Carolina. Numerous records attest to its presence across the northern Great Plains and in the Rocky Mountains. Western records are few, but I have seen specimens of *C. nearcticus* from British Columbia, Washington, Idaho, Nevada, and Utah. I have no verified records from California, but predict it to be present in the northern counties and south along the Sierra Nevada.

Camponotus (Myrmentoma) pavidus Wheeler
Figure 17

Camponotus fallax rasilis var. *pavidus* Wheeler, 1910:228; W F.

Camponotus (Myrmentoma) nearcticus: Creighton, 1950:385, 388-389.

Camponotus (Myrmentoma) pavidus: Duffield, 1976:58-61,169.

I have removed *C. pavidus* from the synonymy of *C. nearcticus* because I do not agree with Creighton's (1950) conclusions. Admittedly, this species is morphologically very similar to *C. nearcticus*, but throughout its limited range in the southeastern United States it is common and consistently separable from *C. nearcticus*.

The occipital margin of the head of the major is slightly to distinctly concave in frontal view. Although the clypeus is as broad as that of *C. nearcticus*, the surface is not roughened or slightly wrinkled, as in that species. And, while color is a notoriously unreliable character in ants, it does seem to be consistently different between these two species. That of *C. nearcticus* has already been described; *C. pavidus* consistently has the head, mesosoma, and petiole yellowish to yellowish red, with the appendages somewhat darker. The gaster is consistently bicolored, with the first one, two, or three segments yellowish and the remainder dark brown.

The types of *C. pavidus* are from central Texas, which appears to be the western limit of its range. The species is common in Georgia and Florida. I have also seen samples from Mississippi and Tennessee (Nashville).

Camponotus (Myrmentoma) sayi Emery
Figures 8, 29, 31

Camponotus sayi Emery, 1893:679; W.

Camponotus (Myrmentoma) sayi: Creighton, 1950:384, 389-390. Snelling, 1968:355-358 (in part).

It is now clear that my treatment of *C. sayi* in 1968 was wholly unsatisfactory; indeed, I was wrong on nearly every point. The inclusion of *C. sayi californicus* (proposed by Emery to replace the preoccupied *C. sayi bicolor* Pergande) and *C. rasilis* as synonyms of *C. sayi* was incorrect. The removal of these two names from the synonymy of *C. sayi* has the effect of rendering almost useless the entire 1968 discussion of worker morphological variation.

The ant that Pergande (1894) described as *C. sayi bicolor* was based on specimens from the Sierra de la Laguna and San Jose del Cabo, Baja California Sur, Mexico. Since the name was preoccupied, Emery (1925) renamed the ant *C. sayi californicus*. This form is still known only from the type series, most of which is in the USNM. When I examined these specimens in 1968 I was more impressed by their similarities to cotypes of *C. sayi* than by their differences.

Since 1968 I have studied the species of this group in greater detail and it is now clear that *C. sayi californicus* is not conspecific with *C. sayi*. In *C. sayi* the mandibles are coarsely striatopunctate or rugose, with the raised interspaces distinctly sculptured and only slightly shiny; the clypeus is distinctly arched from side to side; the malar area is distinctly sculptured between the scattered, somewhat obscured punctures, in sharp contrast to the nearly polished upper genal area; the tip of the antennal scape, even in the largest workers, attains the occipital corner or falls short of it by less than the apical width of the scape; the head is slightly broader than long in the largest workers.

In all of these characteristics, the cotypes of *C. sayi bicolor* disagree: the mandibles are smooth and shiny between fine, sparse punctures; the clypeus is nearly flat in transverse section; the malar area is shiny, but somewhat tessellate, between distinct punctures and does not contrast with the smooth upper gena; the tip of the scape falls short of the occipital corner by conspicuously more than its apical breadth; the head is as long as broad. In all of these features, as well as in mesosomal shape, these types are in agreement with the characteristics of *C. hyatti*, and I have tentatively placed *C. sayi bicolor/californicus* in synonymy with that name.

Just as I erred in treating *C. sayi californicus* as a synonym, so, too, did I err in the case of *C. rasilis*. However, *C. rasilis* is, I believe, a junior

synonym of *C. decipiens*; refer to the discussion under that name for the characters that separate *C. sayi* from *C. decipiens*.

The types of *C. sayi* are from Phoenix, Arizona. I have seen samples of this species from numerous localities in Arizona. In addition, I have seen specimens from southern California, Nevada, New Mexico, and Utah. On the Mexican mainland, *C. sayi* has been collected in Sonora, Chihuahua, and Durango.

Camponotus (Myrmentoma) subbarbatus Emery
Figure 9

Camponotus marginatus subsp. *subbarbatus* Emery, 1893:676; W F M.

Camponotus marginatus subsp. *subbarbatus* var. *paucipilis* Emery, 1893:677;W M.

Camponotus fallax subsp. *subbarbatus*: Wheeler, 1910:229; W F M.

Camponotus (Myrmentoma) subbarbatus: Creighton, 1950:385, 390.

Creighton (1950), although he had seen no type specimens, correctly surmised that the var. *paucipilis* should be treated as a synonym of *C. subbarbatus*. The cotypes that I have seen, although more extensively brownish than is usually true of this species, match very well with other specimens of *C. subbarbatus* from the Washington, D. C., area. Some specimens of this species, especially minor workers, may have the hairs of the malar area greatly reduced in number. And, while most specimens have no erect hairs across the disc of the clypeus, such hairs may be present, usually no more than 2 or 3, in a few specimens.

This is a common species along the Atlantic coastal states from New England as far south as Georgia and Mississippi. I have seen specimens from as far west as Ohio and Tennessee and it seems likely that *C. subbarbatus* will be found in northern Florida.

Acknowledgments

For the loan of material examined for this study, I am very much indebted to P. H. Arnaud, Jr. (CAS), S. I. Frommer (UCR), J. T. Longino, J. G. Rozen, Jr. (AMNH), S. Shattuck, D. R. Smith (USNM), J. C. Trager, P. S. Ward (UCD), M. S. Wasbauer (CDFA) , and E. O. Wilson (MCZ) . Especially important has been type material in the collections of the AMNH, LACM, MCZ, and USNM.

Special acknowledgment must be made of my gratitude to D. R. Smith, for his unending (?) patience, good humor, and prompt responses to many frantic telephone calls for assistance.

To my colleagues C. L. Hogue and J. T. Longino, special thanks for reviewing the manuscript in record time.

Literature Cited

Buckley, S. B.
1866 Descriptions of new species of North American Formicidae. I. Proc. Entomol. Soc. Phila., 6:152-172.

Creighton, W. S.
1950 The ants of North America. Bull. Mus. Comp. Zool., 104:1-585.

Duffield, R. M.
1976 A comparative study of the mandibular gland chemistry of formicine and ponerine ant species. Ph. D. Thesis, Univ. Georgia, Athens, Ga., 171 pp.

Emery, C.
1B93 Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna. Zool. Jahrb. f. Syst., 7:257-360.
1925 Subf. Formicinae. In P. Wytsman, Genera Insectorum, fasc. 183, 302 pp.

Fitch, A.
1854 Infesting indigenous fruit trees. The Hickory. Trans. N. Y. State Agric. Soc., 14:850-859.

Gregg, R. E.
1973 A new species of *Camponotus* from Nevada. Southw. Nat., 18:39-43.

Kempf, W. W.
1972 Catálogo abreviado das Formigas da Região Neotropical. (Hym. Formicidae). Studia Entomol., 15:3-344.

Pergande, T.
1894 Formicidae of Lower california, Mexico. Proc. Calif. Acad. Sci., (ser. 2) 4:161-165.

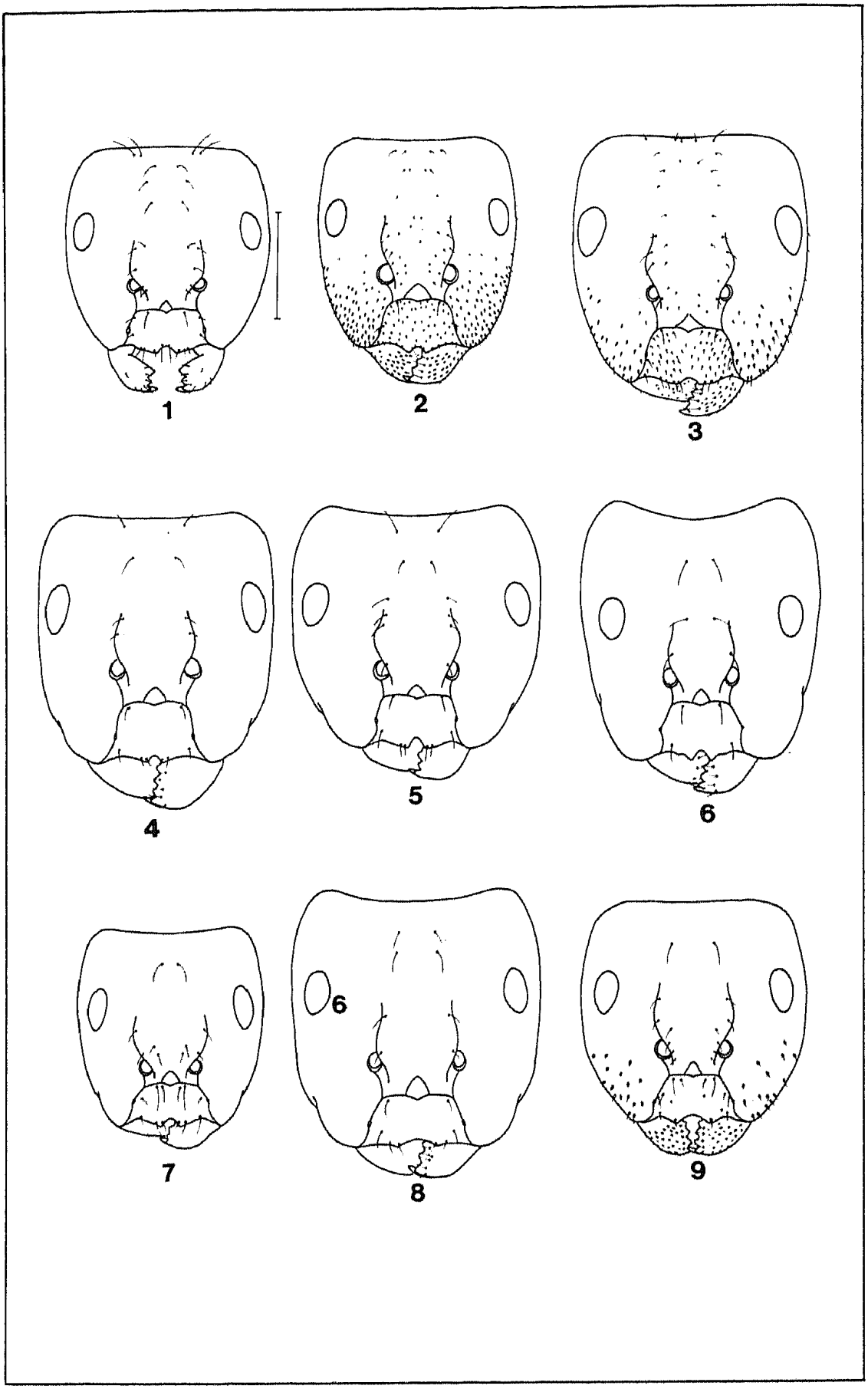
Shields, O.
1973 Studies on North American *Philotes* (Lycaenidae). I. Roosting behavior, tending ants, parasites, and predators. Bull. Allyn Mus., no. 10, 5 pp.

Smith, M. R.
1923 Two new varieties of ants (Hymen.: Formicidae). Entomol. News, 34:306-308.
1940 The identity of the ant *Camponotus (Myrmentoma) caryae* (Fitch). Proc. Entomol. Soc. Wash., 42:137-141.

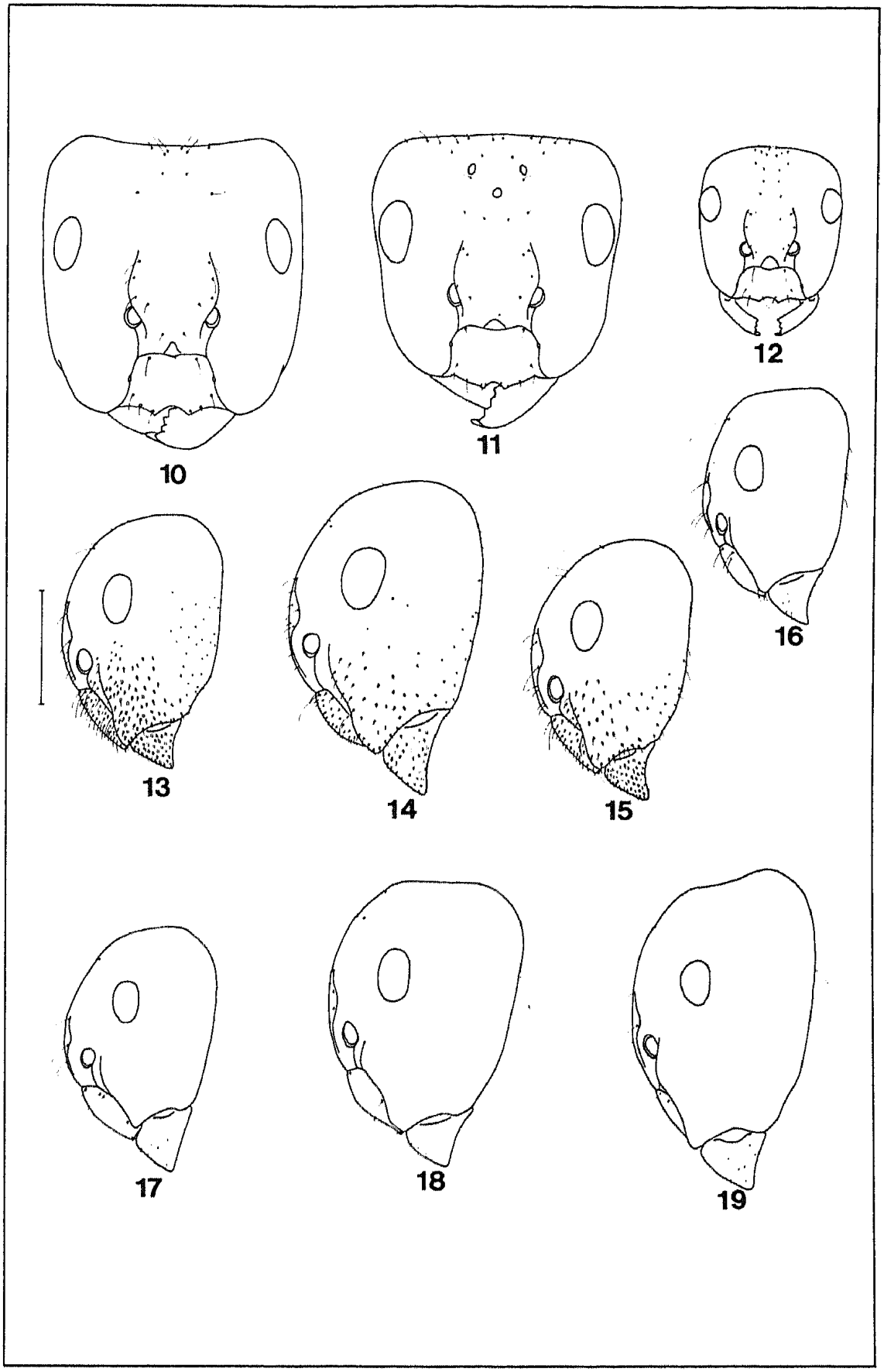
Snelling, R. R.
1968 Studies on California ants. 4. Two species of *Camponotus* (Hymenoptera: Formicidae). Proc. Entomol. Soc. Wash., 70:350-358.

Wheeler, G. C., and J. N. Wheeler.
1963 The ants of North Dakota. Univ. N. Dak. Press, 326 pp.
1986 The ants of Nevada. Nat. Hist. Mus. Los Angeles Co., Los Angeles, 138 pp.

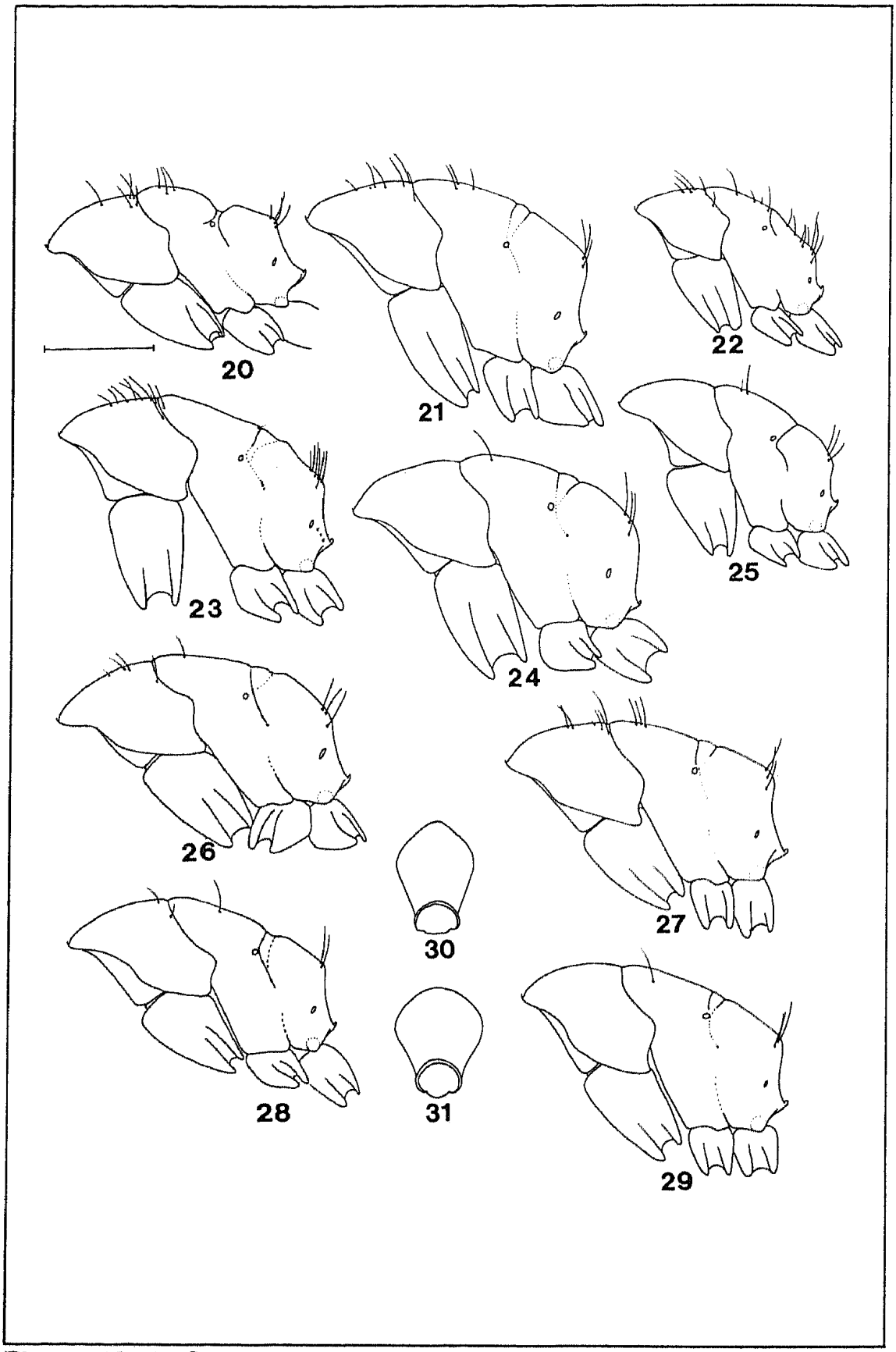
Wheeler, W. M.
1904 Ants from Catalina Island, California. Bull. Amer. Mus. Nat. Hist., 20:269-271.
1910 The North American forms of *Camponotus fallax* Nylander. Jour. N. Y. Entomol. Soc., 18:216-232.
1911 A new *Camponotus* from California. Jour. N. Y. Entomol. Soc., 19:96-98.



Figures 1 - 9. *Camponotus (Myrmentoma)* spp., frontal view of head of major worker: 1, *C. bakeri*; 2, *C. caryae*; 3, *C. clarithorax*; 4, *C. decipiens*; 5, *C. essigi*; 6, *C. hyatti*; 7, *C. nearcticus*; 8, *C. sayi*; 9, *C. subbarbatus*. Scale line = 1.0 mm.



Figures 10 - 19.*Camponotus (Myrmentoma)* spp. 10 - 12, frontal view of head of major worker, female, and minor worker, *C. cuauhtemoc*. 13 - 19, lateral view of head of major worker: 13, *C. caryae*; 14; *C. clarithorax*; 15, *C. discolor*; 16, *C. nearcticus*; 17, *C. pavidus*; 18, *C. essigi*; 19, *C. hyatti*. Scale line = 1.0 mm.



Figures 20 - 31.*Camponotus (Myrmentoma)* spp. 20 - 29, lateral view of mesosoma of major worker: 20, *C. bakeri*; 21, *C. clarithorax*; 22, *C. cuauhtemoc* (minor); 23, *C. cuauhtemoc* (major); 24, *C. decipiens*; 25, *C. nearcticus*; 26, *C. discolor*; 27, *C. essigi*; 28: *C. hyatti*; 29, *C. sayi*.30 - 31, posterior view of petiole of major worker: 30, *C. decipiens*; 31, *C. sayi*. Scale line = 1.0 mm.