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MARION R. SMITH



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## The Legionary Ants of the United States Belonging to Eciton Subgenus *Neivamyrmex* Borgmeier

Marion R. Smith

### INTRODUCTION

Although this paper is primarily a taxonomic review of the 17 forms of legionary ants comprising the subgenus *Neivamyrmex* of the United States, an effort has been made to include the known facts pertaining to their distribution and biology. Our knowledge is very meager, however, owing to the primitive nature of the ants, their subterranean habits, and secretive disposition. There is no reason to doubt that future collecting will result in the discovery of new forms, especially in the Southwestern States; and probably some names now treated as valid will need to be suppressed as synonyms when the various castes of each species have been correctly associated. It is hoped that this review may result in attracting more attention to these interesting but little-known ants and in stimulating observations on their habits and biology.

The legionary ants are of Neotropical origin, and most of the species occurring in the United States are found in the region from Texas westward through New Mexico and Arizona into the southern half of California. The exact distribution of the various species cannot be accurately outlined at present because of our lack of knowledge of the different forms and their associated castes. Reference to the map (Fig. 1) will show that only four species occur in the area east of the Mississippi River, and apparently only one of these extends as far north along the Atlantic seaboard as Norfolk, Va. *Eciton* (*Neivamyrmex*) *nigrescens* is the most widely distributed legionary ant, ranging northward in the Mississippi Valley region to Sioux City, Iowa, and thence westward through Nebraska and Colorado into the southern half of California. Other species, however, have been found as far north as Palo Alto and Sacramento in California and may occur even farther north.

Some species have been collected at altitudes ranging from sea level to as high as 6,000-8,000 feet. Strictly speaking, these are not mountain forms, however. They seem to prefer to nest at elevations of 2,000 feet or less. Those that occur above this altitude are apparently found only in canyons and valleys or on plateaus and never on the higher and more precipitous mountain slopes.

The nests which I have observed have usually been in rotten logs and stumps or in the soil beneath objects lying on the surface of the ground.

Occasionally the ants are found in buildings, where they seem to be nesting, foraging, or bivouacking in or around basement foundations. The colonies of some species, such as *nigrescens*, may contain many thousands of immature individuals and workers, a single female, and, at certain periods of the year, numerous males. The males of many species apparently do not remain long in the nest. Some are attracted to artificial lights at night and are often captured there by collectors. Male pupae are borne in cocoons; worker pupae, apparently never. No one, so far as I am aware, has ever observed the transformation of a female. Information is lacking as to the number of virgin females simultaneously produced in a colony and also as to whether a virgin female is fertilized by a brother male or by a male from another colony. In May 1932, D. E. Read found a mating pair of *carolinense* in a nest at Spartanburg, S. C. Apparently this is the first record of such an observation on legionary ants in the United States. From the available evidence, which is too meager to be very conclusive, I am inclined to believe that mating often takes place in the same nest between brother and sister. This, of course, does not preclude the mating of sexes of different colonies. Although fertilized females of many primitive ants may establish new colonies unaided by workers, I believe this does not occur with the legionary ants, the female of which seems to be less independent than the females of other primitive ants. A new colony is perhaps formed by a recently fertilized female migrating from the parental

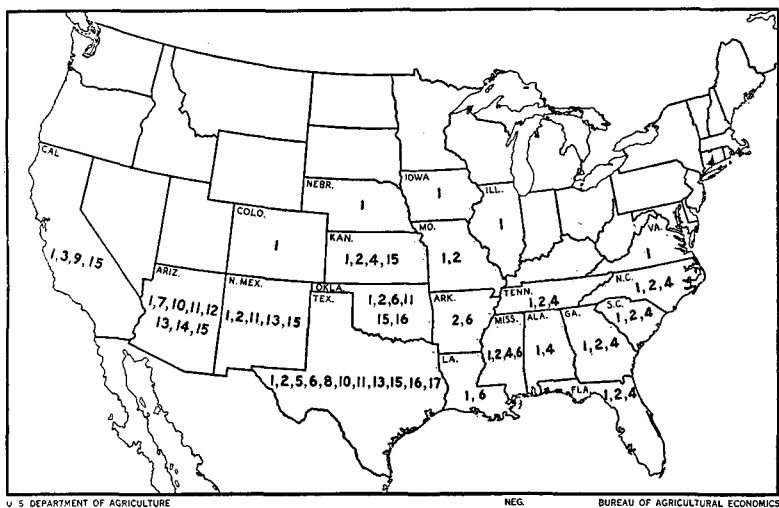


Fig. 1.—Distribution of legionary ants, *Eciton* (*Neivamyrmex*), in the United States. No. 1=*nigrescens* (Cresson); No. 2=*opacithorax* Emery; No. 3=*californicum* Mayr; No. 4=*carolinense* Emery; No. 5=*wheeleri* Emery; No. 6=*pilosum* F. Smith; No. 7=*melanocephalum* Emery; No. 8=*pauillum* Wheeler; No. 9=*leonardi* Wheeler; No. 10=*commutatum* Emery; No. 11=*harrisii* (Haldeman); No. 12=*pilosum mandibulare*, new subspecies; No. 13=*arizonense* Wheeler; No. 14=*oslari* Wheeler; No. 15=*minus* (Cresson); No. 16=*melsheimeri* (Haldeman); No. 17=*fuscipennis* Wheeler.

colony accompanied by a detachment of sister workers. This may take place at night or beneath the surface of the soil.

As far as known, these ants are carnivorous, their food consisting largely, if not entirely, of insects. *E. (N.) nigrescens* has been observed (Smith, 1927) preying on termites, adult ants, and carabid beetles. The brood of other ants seems to be a favorite food.

Although some species are probably entirely subterranean, others, such as *opacithorax*, *pilosum*, and *nigrescens*, are not strictly so. The workers of these species are commonly observed trailing over the ground, even in full sunlight, and are sometimes accompanied by their myrmecophiles, such as staphylinids and phorids. These processions seem to be mostly for foraging purposes. I have never seen a male or a female in any of them and am inclined to believe that when the ants change their nesting site the female must migrate at dusk or at night.

There is a great deal of confusion in regard to the taxonomy of the legionary ants due to the loss of types, incorrect citation of type localities, inadequate descriptions, misdeterminations, and, especially, failure to associate the various castes of certain species. Some species are known only from males, other species only from workers. Until all castes of a given species can be correctly associated by collection from the same nest it will be impossible to determine the synonymy that may be involved. To emphasize the striking dissimilarity between castes of a species it should be mentioned that the male and female have a single-segmented petiole whereas the worker has a two-segmented petiole; the male has large eyes and ocelli, the female and worker small eyes and no ocelli; the male is always winged, the female never. There are also striking differences between the polymorphic workers of a single species, these being so marked that it is sometimes difficult to associate minor workers and major workers correctly. In this paper the keys and descriptions are based on the major workers, as this is the most easily recognized caste of the polymorphic workers.

Anyone who has undertaken an intensive study of the legionary ants must be impressed by the great amount of intraspecific variation. To illustrate, the male of *pilosum* is easily recognized by the shape of its mandibles and body, by its general color, and by the nature of the pilosity. Yet when numerous specimens from various localities are studied, it is noted that some normally good characters are very inconstant. Such characters relate to the degree of development of the protuberance or toothlike angularity on the superior border of the mandible, the size and convexity of the eye, the width of the space between the frontal carinae, the distance between the inner border of the eye and the lateral ocellus, the depth of the body color, and the length of the pilosity. An attempt has therefore been made to point out all the noticeable variation among the different castes of the various species as far as material at hand would permit.

Specimens have been received for study from a number of California

localities, including Los Angeles, Davis, La Verne, and Paraiso Springs. The individuals from each of these localities vary considerably, but all agree in belonging to what may be designated as the *nigrescens* complex, as evidenced by the shape of the mandibles, petiole, and postpetiole, and by the general nature of the sculpturing and pilosity of the worker. The characteristics of the specimens from each locality are too elusive to be satisfactorily described or used in a key, and it appears unwise to attempt to decide on the taxonomic status of these ants until all castes of each form are known or until more intensive collecting has brought to light new or related forms which may aid in clearing up the confusion in this complex.

The specimens were studied under an electric light (alternating current and a 6 CP bulb) with a binocular microscope. The effect of varying light intensities even under these conditions is such that the sculpturing, pilosity, and color of a specimen do not always appear the same. Care was taken in making measurements to select the greatest breadth or the greatest length of the part of the body under consideration. The measurements of the head, however, do not include the mandibles. In citing the distribution of the various species I have purposely listed some localities outside the United States in order to show the wide range of the ants. No effort, however, has been made to study a large number of specimens beyond the borders of the United States.

The illustrations for this article were made by Mrs. Sara H. DeBord.

#### SOURCES OF MATERIAL

This study is based on specimens from the following institutions and individuals:

American Museum of Natural History, Museum of Comparative Zoology, United States National Museum, Los Angeles County Museum of History, Science, and Art, Academy of Natural Sciences of Philadelphia, University of Minnesota, University of Oklahoma, University of Nebraska, University of Texas, University of Arizona, University of Kansas, University of Louisiana, Southwestern University of Louisiana, Emory University, Mississippi State College, Kansas State College, Texas Agricultural and Mechanical College, Pomona College, North Carolina State Department of Agriculture, Illinois State Natural History Survey, Dr. A. C. Cole, Jr., Dr. W. S. Creighton, Dr. W. M. Mann, Dr. Mary Talbot, Mr. Arnold Mallis, Mr. R. H. Baker, Mr. L. G. Wesson, Jr., Mr. Wm. F. Buren, Mr. P. H. Timberlake, Mr. J. E. Gillaspay, Mr. H. H. Keifer, Mr. V. E. Williams, and Mr. R. W. Strandtmann.

#### TERMINOLOGY

With few exceptions, the descriptive terms used in this paper are those commonly employed by formicologists. There are some, however, which should be explained to avoid confusion. For instance, when the mandible is of a triangular shape, the three borders are designated as the inferior, superior, and masticatory. If the masticatory border is absent or ill defined, then the two remaining borders are the inferior and superior borders. In referring to parts at the tip of the gaster of the male I have followed Snodgrass's terminology of the male genitalia of Hymenoptera (Snodgrass, 1941). His terms and their equivalents as generally used by formicologists follow:

Snodgrass	Formicologists
ninth abdominal sternum (seventh gastric)	hypopygium, subgenital plate
eighth abdominal tergum (sixth gastric)	pygidium
paramere	stipes
volsella	volsella
aedeagus	penis

In the female, what formicologists usually call the hypopygium and pygidium would be designated by Snodgrass, respectively, as the seventh abdominal sternum (fifth gastric segment) and seventh abdominal tergum (fifth gastric segment). These latter terms are employed in the present paper.

#### ECITON, subgenus NEIVAMYRMEX Borgmeier

*Labidus* Jurine (part) Shuckard, 1840, Ann. Nat. Hist. 5:196.

*Eciton Latreille* (part) Fred. Smith, 1855, Trans. Ent. Soc. London 3:160.

*Acamatus* Emery, 1894, Bull. Soc. Ent. Ital. 26:181.

*Leptanilla* Holmgren (not Emery), 1908, Zool. Anz. 33:247.

*Neivamyrmex* Borgmeier, 1940, Rev. de Ent. 11:606. Proposed for *Acamatus* Emery, which is preoccupied by *Acamatus Schoenherr*, 1833, Genera et Species Curculionidum, Tom. 1, pars prima, Parisiis, p. 20. Type of subgenus, (*Eciton* (*Acamatus*) *schmitti* Emery) = *Eciton* (*Neivamyrmex*) *nigrescens* (Cresson). (By designation of Wheeler, 1911, N. Y. Acad. Sci. 21:157.)

The legionary ants of the United States belong to the subgenera *Labidus* and *Neivamyrmex* of the genus *Eciton*. The worker and female of *Neivamyrmex* are distinguished from those of *Labidus* by their simple, untoothed claws; the male by having three apical teeth on the seventh gastric sternum instead of two.

The worker can readily be recognized by the following characters: Frontal carinae placed close together and failing to cover insertions of the antennae; the absence of eyes or else the presence of only simple ocelluslike eyes, 12-segmented antennae, 2-segmented petiole, and absence of a constriction between the first and second gastric segments.

The extraordinary female is easily distinguished by her elongate, flattened, somewhat termitiform appearance and simple ocelluslike eyes; by having the frontal carinae placed close together and not covering the antennal insertions; by the single-segmented petiole; by the absence of ocelli, wings, and wing attachments; by the untoothed tarsal claws; by having the base of the fifth gastric sternum provided with a pair of reniform pits which are almost contiguous anteriorly and separated posteriorly by a triangular process; and by the presence of a sting.

The somewhat wasplike male has a single-segmented petiole; the apical portion of the seventh gastric sternum provided with 3 teeth; triangular, sublinear, or sickle-shaped mandibles; large eyes and ocelli; 13-segmented antennae, with the scape never longer than the combined lengths of the first 3 or 4 funicular segments; the anterior wing provided with a stigma, a radial cell, 2 cubital cells, and a discoidal cell; and toothed or simple claws.

Table Showing the Various Species of Eciton (Neivamyrmex) of the United States and the Known Castes of Each.

Species	Worker	Female	Male
<i>arizonense</i> Wheeler .....	..	..	×
<i>californicum</i> Mayr .....	×	..	..
<i>carolinense</i> Emery .....	×	×	×
<i>commutatum</i> Emery .....	×	..	..
<i>fuscipennis</i> Wheeler .....	..	..	×
<i>harrisii</i> (Haldeman) .....	..	..	×
<i>leonardi</i> Wheeler .....	×	..	..
<i>melanocephalum</i> Emery .....	×	..	..
<i>melsheimeri</i> (Haldeman) .....	..	..	×
<i>minus</i> (Cresson) .....	..	..	×
<i>nigrescens</i> (Cresson) .....	×	×	×
<i>opacithorax</i> Emery .....	×	×	×
<i>oslari</i> Wheeler .....	..	..	×
<i>pauillum</i> Wheeler .....	×	..	..
<i>pilosum</i> F. Smith .....	×	..	×
<i>pilosum mandibulare</i> , new subspecies .....	..	..	×
<i>wheeleri</i> Emery .....	×	×	..

## KEY FOR SPECIFIC IDENTIFICATION OF MAJOR WORKERS 1

1. Head and gaster deep brownish black to black, smooth and shining ..... 2  
 Head and gaster not as described above ..... 3
2. All of body shining except mandibles, mesopleura, metapleura, and meso-epinotal constriction; pronotum, in profile, strongly arched; ventral surface of petiolar peduncle with an acute spine directed posteroventrad (Fig. 2.2); Brazil to Louisiana, Mississippi, Oklahoma, Arkansas, and Texas ..... *pilosum* F. Smith  
 Thorax strongly sculptured and opaque throughout and lighter in color than head and gaster; pronotum, in profile, weakly arched; ventral surface of petiolar peduncle with a protuberance which is smaller, less acute, and directed more ventrad; southern Arizona and Mexico ..... *melanocephalum* Emery
3. Petiole, from above, distinctly longer than broad, rather slender, not subquadrate (Fig. 2, 1) ..... 4  
 Petiole, from above, although often longer than broad, robust, subquadrate (Fig. 2, 3) ..... 6
4. Head distinctly shining, never densely sculptured or opaque ..... 5  
 Head, thorax, petiole, and postpetiole densely punctate, opaque, with scattered foveolate impressions (Pl. 1, Fig. 4); (color varying from light reddish brown to very dark brown often approaching blackish); Florida and Virginia westward through Iowa and Nebraska, Colorado, and Arizona, into southern California ..... *nigrescens* (Cresson)
5. Thorax opaque dorsally, propleura and postpetiole shining; Florida and Virginia westward to Kansas and Missouri ..... *opacithorax* Emery  
 Promesonotum distinctly shining; (hairs longer and more erect than with the preceding species); California ..... *californicum* Mayr
6. Eyes apparently absent; small species, 2-3-mm. in length or less ..... 7  
 Eyes present, although sometimes indistinct; larger species ..... 8
7. Head strikingly elongate, approximately one and one-third times as long as broad (Pl. 1, Fig. 8); length of body 1.75-2 mm.; without a broad, distinct flange in front of antennal socket; (gaster, in profile, flattened dorsoventrally); Texas ..... *pauillum* Wheeler<sup>1</sup>

1 The available workers of *pauillum* and *leonardi* are so unusually small that they may not represent the largest workers of the two species.



- Head not strikingly elongate; length of body 2-3 mm.; a distinct, broad, pellucid flange in front of antennal socket; California ..... *leonardi* Wheeler 1
8. Frontal carina forming a broad, pellucid flange in front of antennal socket; funiculus not very strongly incrassated (Pl. 1, Fig. 5); Texas ..... *wheeleri* Emery  
Frontal carina not of the conformation described above; funiculus very strongly incrassated ..... 9
9. Dorsum of the thorax extremely smooth and shining except for the distinct suture separating the meso-epinotum; eyes very small and indistinct; (mandible with a distinct excision on superior border between basal tooth and masticatory border); antennal scape very short; funiculus remarkably incrassated (Pl. 1, Fig. 6); Texas and Arizona ..... *commutatum* Emery
- Sculpturing of thorax, and shape of eyes and mandibles not as described above; antenna of same general shape but not so remarkably short and strongly incrassated; Florida and North Carolina westward to Mississippi and Tennessee.....  
..... *carolinense* Emery

## KEY FOR SPECIFIC IDENTIFICATION OF FEMALES

1. Head, from above, with posterior corners not, or indistinctly, produced ..... 2  
Head, from above, with posterior corners very distinctly produced, angulate or tuberculate ..... 3
2. Thorax more heavily sculptured and opaque than head; thorax elongate, gradually and perceptibly widening anteroposteriorly; prothorax submarginated laterally; posterior corners of head scarcely produced (Pl. 2, Fig. 9) ..... *opacithorax* Emery  
Body smooth and shining, with scattered punctures; thorax proportionally wider, and with the posterior part of epinotum subequal in width to the metanotum; prothorax more convex, and scarcely, if at all, marginate; posterior corners of head not produced, broadly rounded (Pl. 2, Fig. 11) ..... *carolinense* Emery
3. Head with a distinct median impression near the occiput, and an impression on each lateral border, which causes the posterior corners to appear distinctly angulate or tuberculate; prothorax clearly marginated; thorax elongate, gradually widening anteroposteriorly to the metanotum; head and thorax subopaque or opaque, owing to the dense and rather coarse sculpturing (Pl. 2, Fig. 10).....  
..... *nigrescens* (Cresson)
- Head with angular posterior corners but lacking the distinct lateral impressions of *nigrescens*; prothorax not marginated; thorax, although elongate, of almost uniform width from posterior half of mesonotum backward; head, thorax, and remainder of body shining, even though scattered and distinct punctures on the former two (Pl. 2, Fig. 12)..... *wheeleri* Emery

## KEY FOR SPECIFIC IDENTIFICATION OF MALES

1. Epinotum with a clearly defined, median, longitudinal groove where base and declivity meet; dorsum of head behind ocelli smooth, shining, concave, and with distinct, upturned occipital flange ..... 2  
Epinotum without a median longitudinal groove where base and declivity meet or else with a very weakly developed one; occipital flange either absent or vestigial ..... 3
2. Superior border of mandible with an excision near base and apex and between these a somewhat toothlike convexity or protuberance; antennal scape approximately as long as combined length of first 4 funicular segments (Pl. 3, Fig. 13); body and wings of a general yellowish-brown color, with head, legs, and seventh gastric sternum darker..... *pilosum* F. Smith  
With similar characters excepting that the mandible is more robust and the toothlike convexity of the superior border is hardly discernible (Pl. 3, Fig. 14).....  
..... *pilosum mandibulare*, new subspecies
3. Mandible sickle-shaped (Pl. 4, Fig. 15) ..... 4  
Mandible not sickle-shaped (Pl. 6, Fig. 21)..... 8

4. Head, viewed anteriorly, with strongly projecting posterior corners which are visible between the eyes and the lateral ocelli (Pl. 4, Fig. 15) ..... 5  
 Head, viewed anteriorly, without posterior corners as described above; either the corners are weakly visible, or else not visible (Pl. 4, Fig. 17) ..... 6
5. Wings deeply infumated; mandible extremely long, slender and curved; posterior corners of head remarkably well-developed (Pl. 4, Fig. 15); dorsal surface of gaster with short, appressed hairs ..... *fuscipennis* Wheeler  
 Wings not infumated; mandible, though slender and curved, not extremely long; posterior corners of head less well-developed (Pl. 4, Fig. 16); dorsal surface of gaster with long, non-appressed hairs ..... *melsheimeri* (Haldeman)
6. Large species, length 11-13 mm. .... 7  
 Small, slender species, length 8-9 mm. .... *minus* (Cresson)
7. Antenna with long, filiform funiculus; scape not noticeably wider than base of funiculus (Pl. 5, Fig. 18); head, from above, not remarkably broader than long; tarsal claws indistinctly toothed ..... *oslari* Wheeler  
 Antennal funiculus not long and filiform, distinctly tapering from base to apex; scape robust, distinctly broader than base of funiculus (Pl. 5, Fig. 19); head from above remarkably broader than long; tarsal claws distinctly toothed ..... *arizonense* Wheeler
8. Head with unusually large eyes and ocelli; ocelli placed on a protuberance high above general surface of head (Pl. 6, Fig. 21); body deep brown, with darker head and thorax ..... *harrisii* (Haldeman)  
 Head with small eyes and ocelli; ocelli placed on a low protuberance, which is scarcely elevated above general surface of head (Pl. 6, Fig. 20); color variable, but never as described above ..... 9
9. From above, dorsal surface of head rounding off anteriorly without forming a very perceptible ridge above antennal socket (Pl. 6, Fig. 20); dorsal surface of head and thorax, although sculptured, with a distinct glabrous appearance; (funiculus slender, weakly tapering from base to apex; body bicolored owing to the blackish head and thorax, and the much lighter, reddish-brown gaster) ..... *opacithorax* Emery  
 From above, dorsal surface of head forming distinct ridges above antennal sockets; dorsal surface of thorax with a subopaque or opaque appearance ..... 10
10. Mandible remarkably long and slender, at least five times as long as broad; funiculus slender (Pl. 7, Fig. 22); length 9-9.5 mm. .... *carolinense* Emery  
 Mandible more robust, not so remarkably long and slender; funiculus robust (Pl. 7, Fig. 23); length 11-13 mm.; (dorsal surface of thorax and gaster more coarsely sculptured) ..... *nigrescens* (Cresson)

#### ECITON (NEIVAMYRMEX) PILOSUM F. Smith

- Eciton pilosa* F. Smith, 1858, Cat. Hymen. Brit. Mus. 6: 151, ♀.  
*Labidus mexicanus* F. Smith, 1859, Cat. Hymen. Brit. Mus. 7: 7, ♂; Cresson, 1872, Trans. Amer. Ent. Soc. 4: 194.  
*Eciton clavicornis* Norton, 1868, Trans. Amer. Ent. Soc. 2: 46.  
*Eciton (Labidus) pilosum* (F. Smith), Mayr, 1886, Wien. Ent. Zeit. 5: 120.  
*Eciton (Labidus) subsulcatum* Mayr, 1886, Verh. Zool.-Bot. Ges. Wien 36: 440.  
*Labidus subsulcatum* Mayr, Cresson, 1887, Trans. Amer. Ent. Soc., suppl. vol., p. 259.  
*Eciton mexicanum* (F. Smith), Dalla Torre, 1893, Cat. Hymen. 7: 4; Forel, 1899, Biol. Centr.-Amer., Hymen. 3: 27.  
*Eciton pilosum* F. Smith, Dalla Torre, 1893, Cat. Hymen. 7: 5; Forel, 1899, Biol. Centr.-Amer. 3: 27; Wheeler and Long, 1901, Amer. Nat. 35: 165.  
*Eciton (Acamatus) pilosum* (F. Smith), Emery, 1894, Bull. Soc. Ent. Ital. 26: 183; Emery, 1900, Mem. Real Accad. Sci. Bologna 8: 524; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 412; Emery, 1910, Gen. Insect., Fasc. 102: 25.  
*Eciton (Labidus) mexicanum* (F. Smith), Emery, 1895, Zool. Jahrb. Syst. 8: 260.

*Eciton (Acamatus) mexicanum* (F. Smith), Emery, 1900, Mem. Real. Acad. Sci. Bologna 8: 515, fig. 19, ♂; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 414, pl. 26, fig. 11, ♂; Emery, 1910, Gen. Insect., Fasc. 102: 26; Wheeler, 1921, Proc. Amer. Acad. Arts and Sci. 56: 313; Smith, 1931, Jour. N. Y. Ent. Soc. 39: 295-297.

*Major worker*.—Length 4.6 mm. (Pl. 1, Fig. 7).

Head approximately as broad as long; with convex sides. Posterior border visible only from above, emarginate, forming weakly produced or very feebly angulate posterior corners. Eye ocelluslike, flat, small but distinct. Mandible triangular; superior border without a basal tooth; masticatory border with several small, irregular teeth on the upper half. Antennal scape extending at least its greatest width beyond posterior border of eye; funiculus not noticeably robust; segments 1 to 4 inclusive distinctly longer than broad. Frontal carina not forming a flange in front of antennal socket. Dorsal surface of pronotum, in profile, forming a rather strong, continuous arch which occupies approximately two-thirds length of thorax; greatly elevated above epinotum and meeting epinotum in a distinct but shallow constriction. Basal and declivous surfaces of epinotum subequal in length and meeting in a bluntly rounded, obtuse angle. Pronotum without an apparent transverse carina. Thorax, from above, compressed and narrowest in region immediately posterior to front coxae. Mesothoracic spiracle appearing as a faint depression very slightly above most posterior extension of pronotum over mesonotum; metathoracic spiracle appearing as a somewhat larger depression in meso-epinotal suture and anterior to the very large, slitlike epinotal spiracle. Petiole with a very characteristic, acute, ventral spine directed posteroventrad (Fig. 2, 2). Petiolar node approximately one-eighth longer than broad, with at least one-third of the dorsal surface sloping anteriorly; posterior half slightly wider than anterior half, and with subparallel sides. Postpetiolar node distinctly broader than petiolar node, broader posteriorly than anteriorly, with rounded sides and feebly rounded anterior and posterior ends.

Mandible subopaque, with longitudinal striae and scattered piligerous punctures; pronotal collar with delicate granulate shagreening which causes this area in some lights to appear slightly subopaque; meso- and metapleura, most of sides of epinotum, and meso-epinotal constriction granulate-rugulose, and subopaque; sides of petiole and postpetiole with faint granulate shagreening, sub-

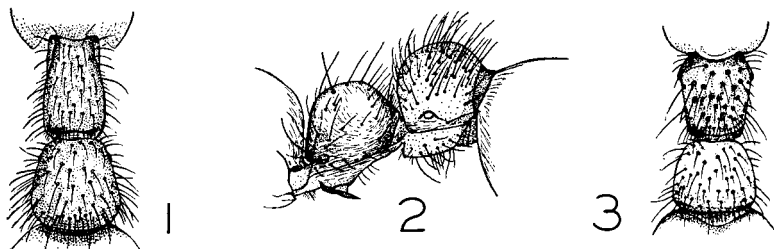


Fig. 2.—Petiole and postpetiole of major worker of (1) *Eciton (Neivamyrmex) nigrescens* (Cresson); (2) *E. (N.) pilosum* F. Smith; (3) *E. (N.) carolinense* Emery.

opaque. Remainder of body and appendages smooth and shining except funiculi and tarsi. Head with small, scattered, sparse, piligerous punctures; dorsum of thorax, petiole, and postpetiole with larger and coarser, but sparser punctures.

Hairs yellowish to grayish, fairly abundant, variable in length.

Color highly variable, ranging from almost uniform brown through brownish black to almost black, with antennal sockets, funiculi, tibiae, tarsi, and tip of gaster lighter. Often there are traces of infuscation on the head and thorax.

Male.—Length 12-13 mm. (Pl. 3, Fig. 13).

Head one and three-fourths to one and nine-tenths times as broad as long. Eye large, convex, protuberant. Ocelli large, placed on prominent protuberance above general surface of head, the summit of protuberance concave. Space between inner border of eye and lateral ocellus less than one-half diameter of lateral ocellus. Frontal carinae converging posteriorly, with sharp lateral borders and a deep median groove. Antenna of variable length; scape not remarkably stout, approximately as long as combined length of first 4 funicular segments; funicular segments 3 to 5 inclusive broader than others, thus causing the funiculus to appear tapering from base toward apex. Clypeus distinctly excised. Mandible slender, median section of inferior border straight or faintly excised; superior border with gently convex to angular protuberance, anterior and posterior to which there is a distinct excision. The large eye occupies all of side of head except a small area between it and base of mandible, and a much larger area posterodorsad of eye. Region of head posterior to ocelli, in profile, smooth, concave, with well-defined, reflexed, occipital flange. Head, from above, with well-rounded posterior corners which merge into eyes without forming perceptible angles or protuberances. Thorax strongly projecting above head. Mesonotum with well-defined anteromedian and parapsidal lines. Epinotum with a distinct, longitudinal, median groove where base and declivity meet; declivity concave. Tarsal claws not toothed or faintly so. Dorsal surface of petiole, in profile, with convexity originating very far posteriorly. Gaster elongate, moderately slender. Intermediate tooth of seventh gastric sternum short and usually blunt. Paramere, in profile, roundly pointed at apex, ventral border angulate, dorsal border with a toothlike lobe and a membranous plate extending between tooth and base of paramere.

Head, legs, and anterior border of each gastric segment smooth and shining; remainder of body somewhat less shining, especially funiculi and thorax.

Hairs yellowish, short, dense, and rather appressed on parts of the body; longer and suberect to erect on head, legs, and venter of petiole.

Head, legs, and seventh gastric sternum darker than remainder of body, which is yellowish brown to brown. Wings distinctly yellowish with light-brown or yellowish-brown veins and stigma.

The above description of the worker is based on specimens collected in a number of the Texas localities. The description of the male is drawn from specimens collected in the various localities mentioned below.

Type in British Museum of Natural History.

Type locality.—Villa Nova, Brazil.

F. Smith described the male of this species as *Labidus mexicanus* from specimens collected in Orizaba, Mexico. Wheeler (1908) synonymized *mexicanus* with *pilosum*.

*Material studied*.—ARKANSAS: Hot Springs, D. E. Read, ♀; Marion County, J. C. Bridwell, ♂. LOUISIANA: Baton Rouge, T. F. McGehee, ♀; Pillette, T. F. McGehee, ♀; Baton Rouge, 6-23-05, R. C. Howell, ♂; Opelousas, Pilate, ♂; Lafayette, 6-14-38, C. Landry, ♂. MISSISSIPPI: Wier, M. R. Smith, ♀; Mathiston, M. R. Smith, ♀; Kilmichael, L. C. Murphree, ♀; Sibley, Andrew Fleming, ♀; Hazelhurst, ♀; Wiggins, 6-27-30, J. P. Kislanko, ♂. OKLAHOMA: LeFlore County, 8-15-31, Costner and Davis, ♂; Strang, 6-18-39, Kaiser and Nailon, ♂; Durant, 7-1-10, in W. D. Hunter collection, ♂; Ardmore, 6-26-05, C. R. Jones, ♂. TEXAS: Austin, W. M. Wheeler, ♀; New Braunfels, W. M. Wheeler, ♀; Ranger, D. E. Read, ♀; Lockhart, D. E. Read, ♀; Cameron, D. E. Read, ♀; Victoria, J. D. Mitchell, ♀; Victoria, 7-6-?, A. McLaughlin, ♂; Pecos, 6-26-?, ♂; Big Bend, Brewster County, R. H. Baker, ♂; Bastrop County, 7-12-37, ♂; Daingerfield, 7-9-37, ♂; Brownsville, 6-?-?, in Cornell University collection, ♂; Wharton, 6-24-17, in Cornell University collection, ♂; Colorado County, 6-24-22, G. O. Wiley, ♂; Llana, 6-10-06, F. C. Pratt, ♂; Columbus, ♂; Comanche, 7-23-04, C. R. Jones, ♂; Cypress Mills, in W. H. Ashmead collection, ♂; Dayton, 7-3-18, E. L. Diven, ♂; Travis County, 7-4-02, M. Holliday, ♂; Sweetwater, 7-10-37, ♂.

MEXICO: Tanque de Malone, La Babia, Coahuila, 6-20-38, ♂; Buena Vista, Sierra del Carmen, Coahuila, 7,000 feet, 7-7-38, ♂; Las Ruscias, Musquiz, Coahuila, 7-3-38, ♂; Rancho Harmova, Vera Cruz, H. Schwartz, ♂; Cordoba, 5-16-08, F. Knab, ♂.

Wheeler (1908) records *mexicanum* from Brownsville and Austin, Tex.; Las Cruces, N. Mex.; and Nogales, Ariz. I have not seen the Las Cruces specimens, but the ones he records from Nogales are what I propose to call a new subspecies of *pilosum*, that is, *mandibulare*. It is also likely that the New Mexican individuals are this new subspecies.

The major worker is characterized by its color and sculpture; feebly produced, almost rounded posterior corners of the head; long, slender scape; strongly convex promesonotum; and the very distinctive ventral spine of the petiole. The male can easily be recognized by the shape of the mandibles and frontal carinae; large eyes and ocelli, the latter placed on a protuberance above the general surface of the head; length and form of the scape; smooth, concave area back of ocelli; pronounced occipital flange; the distinct longitudinal median groove where base and declivity of epinotum meet; the yellowish-brown body with yellowish wings and darker head, legs, and seventh gastric sternum.

Although all the specimens have most of the characters mentioned in the description, a number of the characters are very variable, these being the general robustness and shape of mandibles; length and shape of antennae; size and convexity of eye; width of space between frontal carinae; distance between inner border of eye and lateral ocellus; depth of body color; length of pilosity. The tooth on the superior border of the mandible may vary considerably in size and shape but is always prominent enough to attract immediate attention.

The species ranges from Oklahoma, Texas, Mississippi, and Arkansas southward into Brazil.

In the United States males have been collected from June into August but most commonly during June and July. Although *pilosum* is one of the most common forms of *Eciton*, the female has not yet been recognized and described.

***Eciton* (Neivamyrmex) *pilosum* mandibulare, new subspecies**

*Male*.—Length 13 mm. (Pl. 3, Fig. 14).

Head one and eight-tenths to one and nine-tenths times as broad as long. Ocelli large, placed on protuberance above general surface of head, summit of protuberance concave; space between inner border of eye and lateral ocellus less than half diameter of ocellus. Antenna short; scape robust, slightly shorter than combined length of first 4 funicular segments; funiculus very distinctly tapering from base toward apex, clearly wider through segments 2 to 5 inclusive than elsewhere. Toothlike convexity on superior border of mandible very faint, hardly discernible. Frontal carinae sharply margined but farther apart and more nearly parallel than with *pilosum*, and apparently also more deeply grooved. Clypeus excised. Eye large, convex, strongly protuberant. The large eye, in profile, occupies all of the side of the head except a narrow area above the base of the mandible, and a much larger area posterodorsad of the eye. Region of head posterior to ocelli smooth, concave, with well-defined occipital flange. Head, from above, with well-rounded posterior corners which merge into eyes without forming perceptible angles. Thorax strongly projecting anteriorly over head. Prothorax, from above, more truncate anteriorly, narrower, and with better defined humeri than in *pilosum*. Mesonotum with anteromedian and parapsidal lines. Epinotum with distinct longitudinal median groove where base and declivity meet, declivity concave. Tarsal claws faintly toothed. Dorsal surface of petiole in profile, most convex very far posteriorly; ventral surface with protuberance. Gaster elongate, moderately slender. Intermediate tooth of seventh gastric sternum short but somewhat more acute than that of *pilosum*. Paramere differing from that of *pilosum* in having a more truncate apex, and a more feebly developed tooth on the dorsal border.

Most of the head, the legs, and anterior portion of each gastric segment shining; remainder of body including appendages less shining, especially funiculi. Entire body with coarser punctate-shagreening than in *pilosum*.

Hairs yellowish, dense, and rather appressed on body; longer and more suberect to erect on head, legs, and venter of petiole. Hairs apparently longer and less appressed than those of *pilosum*.

Head, legs, and seventh gastric sternum darker than remainder of body and appendages, which are yellowish brown. Color deeper than that of *pilosum*. Wings distinctly yellowish, with brownish veins and stigma.

A holotype and one paratype in the United States National Museum bear U. S. N. M. No. 55464. The other paratype is in the collection of Cornell University.

*Type locality*.—Thirty miles east of Quijotoa, Pima County, Ariz.

A specimen labeled Nogales, Ariz., Oslar, Cornell University Lot 292, sub. 21, I also consider to be this new subspecies although it bears a handwritten label, apparently W. M. Wheeler, *Eciton mexicanum*. This individual agrees with the cotype of *mandibulare* except that the prothorax does not appear quite so narrow anteriorly, the color is not so deep, and the hairs not so long. Another specimen from the San Rita Mountains, Ariz., 4,000-5,000 feet, August 29, 1924, A. A. Nichol, agrees with the cotypes except for its lighter color, shining body, finer pilosity, and paler wings. Wheeler (1908) mentions having examined specimens of *mexicanum* collected July 18 by Oslar at Nogales, Ariz. I have not seen the specimens, but they may belong to this subspecies.

The difference between *mandibulare* and the typical *pilosum* are clearly stated above. As the shape of the mandible of this new subspecies is one of the easiest and best characters for distinguishing it, I have emphasized this fact by calling the new form *mandibulare*.

Males have been collected from early July to late August.

#### ECITON (NEIVAMYRMEX) MELANOCEPHALUM Emery

*Eciton (Acamatus) melanocephalum* Emery, 1895, Zool. Jahrb. Syst. 8:260, ♀.

*Eciton (Acamatus) melanocephalum* subsp. *xipe* Wheeler, 1914, Jour. N. Y. Ent. Soc. 22: 41, ♀. New synonymy.

*Major worker*.—Length 4.5-5.5 mm.

Head approximately as broad as long; broadest anteriorly; with convex sides and very weakly emarginate posterior border. Eye ocelluslike, very distinct against black background of head. Mandible rather large, subtriangular, with well-defined superior, inferior, and masticatory borders; superior border without any distinct excision or protuberance. Antennal scape large, curved; exceeding posterior border of eye by at least its greatest width; all segments of funiculus distinctly longer than broad. Promesonotum, in profile, very feebly arched; meso-epinotal constriction weakly developed. Thorax without dorsal sutures. Pronotum with very small but distinct transverse carina. Petiole longer than broad, with somewhat abrupt posterior surface and a more gently sloping anterior surface; anterior surface constricted before its termination at the thorax. Legs rather long. Petiolar peduncle with very small anteroventral tooth, which is directed more ventrad than posteriorly. Postpetiole broader than petiole, subtrapezoidal, broader posteriorly than anteriorly, with convex sides and straight anterior end.

Head, dorsal surface of petiole and postpetiole, and gaster smooth and shining; mandibles, funiculi, thorax, and tarsi subopaque or opaque. Mandibles longitudinally striated, with scattered piligerous punctures. Head highly polished, bearing very small, scattered, piligerous punctures. Thorax covered with dense, granular punctures, which are interspersed with foveolae; meso- and metapleura more coarsely sculptured, the sculpturing of a rugose-reticulate nature; pronotum longitudinally rugulose.

Body with numerous suberect to erect, yellowish hairs of unequal length, some of which are unusually long.

Head and gaster almost black. Mandibles, anterior border of head, thorax, legs, petiole, and postpetiole of a much lighter reddish brown.

Among the specimens studied were cotypes of *melanocephalum* from the collections of the United States National Museum and also cotypes of the subspecies *xipe* from the collection of W. M. Mann. The description has been drawn largely from specimens of *xipe*.

Cotypes in the United States National Museum.

*Type locality*.—Tepic, Mexico.

*Material studied*.—ARIZONA: Atascosa Mountain, southern Arizona, 10-2-38, 4,000 feet, under stone in shade near stream, rolling terrain, Robert G. Wesson.

MEXICO: San Miguel, Hidalgo, W. M. Mann.

MEXICO: San Miguel, Hidalgo, W. M. Mann.

The major worker of *melanocephalum* can be readily distinguished by the form of the mandibles; size and shape of the scape; conspicuous eyes; rounded posterior corners of the head; the contrast in color and sculpture of head and gaster as compared with thorax; sculpture of pronotum; and the form of the petiole and postpetiole.

The color of the thorax varies considerably, ranging from light yellowish brown through deeper reddish brown to almost blackish; the color seems more variable in smaller workers than in the larger workers. The sculpture of the thorax also varies greatly, being much more rough in some individuals than in others. The head of the smaller worker is uniformly longer and narrower than the head of the major worker.

The major worker is most likely to be confused with that of *pilosum*. It may be distinguished, however, by the different color and sculpture of the thorax; the more weakly arched pronotum; and the weakly developed tooth on the petiolar peduncle; which is never so large or acute, or directed so far posteriorly, as that of *pilosum*.

Wheeler based the subspecies *xipe* mainly on two characters, color of the body and width of petiole with relation to its length. As stated, the color of *melanocephalum* is highly variable. A study of the petiole of all the specimens before me shows no characters that are of any significance.

Apparently *melanocephalum* is a Mexican form which probably reaches its most northern limit in southern Arizona.

#### ECITON (NEIVAMYRMEX) NIGRESCENS (Cresson)

*Labidus nigrescens* Cresson, 1872, Trans. Amer. Ent. Soc. 4: 194, ♂; Cresson, 1887, Trans. Amer. Ent. Soc., suppl. vol., p. 259.

*Eciton sumichrasti* authors (not Norton), Mayr, 1886, Verh. Zool.-Bot. Ges. Wien 36: 440 (part); Mayr, 1886, Wien. Ent. Zeit. 5: 120; Forel, 1899, Biol. Centr.-Amer. 3: 27 (part); Wheeler, 1900, Amer. Nat. 34: 563, figs. 1, 2, 3, ♀, ♀. Descriptions and figures of 2 females from different nests (part).



- Eciton nigrescens* (Cresson), Dalla Torre, 1893, Cat. Hymen. 7: 5.  
*Eciton (Acamatus) schmitti* Emery, 1894, Bull. Soc. Ent. Ital. 26: 183, ♀; Emery, 1895, Zool. Jahrb. Syst. 8: 258; Wheeler and Long, 1901, Amer. Nat. 35: 161, figs. 1, 2b, ♂; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 410, pl. 26, fig. 13, ♂; Emery, 1910, Gen. Insect., Fasc. 102: 25; Smith, 1927, Ann. Ent. Soc. Amer. 20: 401.  
*Eciton (Labidus) nigrescens* (Cresson), Emery, 1895, Zool. Jahrb. Syst. 8: 261.  
*Eciton schmitti* Emery, Forel, 1899, Biol. Centr.-Amer. 3: 28.  
*Eciton (Acamatus) nigrescens* (Cresson), Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 417, pl. 26, figs. 7, 9; Emery, 1910, Gen. Insect., Fasc. 102: 27; Smith, 1938, Proc. Ent. Soc. Wash. 40: 157.

*Major worker*.—Length 4.5 mm. (Pl. 1, Fig. 4).

Head scarcely longer than broad, narrowed posteriorly; posterior border emarginate, forming very distinctly produced, sharp, angular corners which are often somewhat outwardly curved but not so pronouncedly as with *wheeleri*. Eye ocelluslike, convex, usually very distinct because of the opaque appearance given head by sculpturing. Mandible with basal tooth on superior border lacking or very faintly indicated; margin between where his tooth should be and masticatory border convex, instead of straight or excised as in some of the other species; discal area of exterior surface flattened. Scape approximately three and one-half times as long as wide, extending beyond posterior border of eye a distance almost equivalent to greatest width of scape; funiculus with segments 2 to 4 inclusive at most scarcely broader than long. Frontal carina not forming a broad, distinct flange in front of antennal socket as in *wheeleri*. Dorsum of thorax, from above, less convex laterally than in *wheeleri*, thus giving thorax a more compressed appearance. Side of prothorax extending above fore coxae as a prominent, somewhat reflexed lobe. Promesonotum, in profile, appearing as an arch which merges into basal surface of epinotum without forming as abrupt an angular termination as in some species. Basal surface of epinotum meeting declivity in a rather rounded, obtuse angle. Petiole, from above, approximately two-thirds as broad as long; anteroventral surface of peduncle with bluntly rounded tooth. Postpetiole, from above, subtrapezoidal, slightly shorter than petiole, approximately as long as broad; almost anterior half somewhat laterally margined on each side.

Head, thorax, petiole, and postpetiole opaque, covered with dense granulate punctures, interspersed with coarse foveolate impressions; head and thorax most heavily sculptured, petiole and postpetiole least of all; legs subopaque or faintly shining, gaster smooth and shining. Discal surface of mandible bearing fine rugulae and coarse, scattered punctures which give an opaque appearance; borders of mandible more shining.

Hairs yellowish, rather abundant, of various lengths, suberect to erect, many unusually long.

Head, thorax, petiole, and postpetiole usually deep reddish brown, sometimes almost blackish; gaster and legs slightly lighter. Eye yellow or amber.

*Female*.—Length 10-14 mm. (Pl. 2, Fig. 10).

Head approximately as long as broad, broadest anteriorly; posterior border

emarginate. Eye ocelluslike, rather large, much larger and more distinct than that of *opacithorax*. Mandible of somewhat similar shape to that of *opacithorax* but usually more robust. Scape curved, rather robust, approximately one-half length of head. Region adjacent to and also somewhat posterior to frontal area rather angularly produced anteriorly. A conspicuous median groove extending posteriorly from clypeus toward vertex, becoming feebler posteriorly. Dorsal surface of clypeus concave, middle of anterior border broadly but shallowly excised. Dorsal surface of head with deep median impression near occipital border and a groove leading from this toward front of head, also with a distinct impression on each side of head in front of posterior corners; these impressions giving back of head an extended effect and causing posterior corners to have an unusually angulate or tuberculate appearance. Thorax, from above, more than twice as long as wide, gradually increasing in width posteriorly to metanotum; epinotum not so wide as head. Dorsal thoracic sutures distinct. Pronotum approximately as broad as long, marginate anteriorly and laterally. Mesonotum with a somewhat angular anterior border, and a more broadly angular posterior border. Epinotum broader than long, with bluntly angular posterior corners. Mesonotum and epinotum with conspicuous longitudinal, median impression. Petiole, in profile, of approximately same height as epinotum but not so long; peduncle with large, convex protuberance beneath; from above, not one and a half times as broad as long, scarcely broader in front than behind, and with somewhat subparallel sides, and a deep median, longitudinal impression which widens posteriorly.

Head and thorax opaque, owing to the dense granulate shagreening and the scattered, deep punctures. Petiole more finely sculptured than head or thorax.

Hairs fairly abundant on head, thorax, petiole, and appendages; clypeus, gula, mandibles, and scapes with longer hairs of variable length.

Light or deep ferruginous brown.

*Male*.—Length 11.25-13 mm. (Pl. 7, Fig. 23).

Head approximately one and eight-tenths times as broad as long; posterior border rounded. Eye rather small, moderately convex, and protuberant. Ocelli very small, placed on low protuberance which is only slightly elevated above general surface of head; summit of protuberance concave; lateral ocellus far removed from eye, this space often greater than the space between the two lateral ocelli. Frontal carinae converging behind, with distinct but somewhat feeble groove between them leading to anterior ocellus. Ridge over antennal socket remarkably well developed, forming a large, thick welt which tends partly to obscure the posterior border of the head, when the head is viewed anteriorly. Antenna distinctly more robust than that of *opacithorax*; scape slightly shorter than combined length of first 3 funicular segments; segments 2 to 6 inclusive much more broadened than those of *opacithorax*, all segments except first clearly longer than broad. Mandible moderately elongate to rather elongate, with subparallel superior and inferior borders basally, superior border converging with inferior border somewhere between apical half to third of

mandible and forming a rather blunt point. Head, from above, with very prominent frontal carinae and a very strong, protuberant ridge above each antennal socket; a transverse groove behind each ridge. Head not noticeably extended behind eyes, posterior corners well rounded, the curvature blending into that of eyes. Eye, in profile, narrowed above, not occupying all of side of head, there being an area mesad and ventrad of it larger than similar areas of *opacithorax*, and a much larger area posterodorsad than the two areas mentioned; head behind ocelli convex, without occipital flange. Thorax, in profile, approximately one and one-half times as long as high, not extended anteriorly above head. Prothorax anteriorly with a distinct, transverse impression. Epinotum truncate in appearance but really weakly concave. Mesonotum with distinct anteromedian and parapsidal lines. Tarsal claws feebly toothed. Gaster rather robust, more noticeably so than in *opacithorax*; with pronounced constrictions between segments, and a transverse impression near base of sixth gastric tergum. Intermediate tooth of seventh gastric sternum small, often not clearly seen.

Body more opaque than that of *opacithorax*, especially on dorsum of head and thorax, where the coarse punctation and general ground surface of these regions obscure the shining effect. Gaster also more coarsely sculptured than that of *opacithorax*.

Hairs light yellowish or grayish to deeper yellow, sometimes almost golden; rather closely appressed on all parts of body except antennal scapes, head, and ventral surfaces of thorax and petiole, where they are longer and more nearly erect.

Head and thorax almost black; gaster lighter brown; funiculi and tarsi usually lighter. Wings ranging from subhyaline through slightly infuscated to deeply infuscated; veins and stigma brownish to blackish.

The worker has been described from cotype specimens and also from specimens collected in the various localities cited below. The female has been described from the specimens mentioned in the locality list and the male from the holotype and from specimens cited in the same list.

Holotype in Academy of Natural Sciences of Philadelphia.

*Type locality*.—Texas, G. W. Belfrage.

*Material studied*.—ALABAMA: Kushla, A. H. Sturtevant, ♀; Pritchard, L. C. Murphree, ♀; Linville, L. C. Murphree, ♀; Decatur, L. C. Murphree, ♀; Florence, Mrs. F. F. Moore, ♂; Birmingham, 10-21-40, J. M. Robinson, ♂. ARIZONA: Oracle, W. M. Wheeler, ♀; Ramsey Canyon, Huachuca Mountains, W. M. Mann, ♀; Texas Pass, in Cornell University collection, ♀; Pinal Mountains, 8,000 feet, 8-16-32, R. A. Flock, ♂. CALIFORNIA: Riverside, C. M. Zscholske, ♀. COLORADO: Colorado Springs, W. M. Wheeler, ♀; Salida, W. M. Wheeler, ♀ associated with ♀. FLORIDA: Sanford, D. E. Read, ♀; Green Cove Springs, D. E. Read, ♀; Woodville, D. E. Read, ♀; Lessburg, C. C. Goff, ♀. GEORGIA: Mount Vernon, H. T. Vanderford, ♀; Commerce, H. T. Vanderford, ♀. ILLINOIS: Anna, L. C. Murphree, ♀; Quincy, 9-27-37, T. E. Musselman, ♂ associated with ♀. IOWA: Sioux City, C. N. Ainslie, ♀. KANSAS: Manhattan, R. C. Smith, ♀; McPherson, W. Knaus, ♀; Riley County, 9-27-37, J. B. Norton, ♀ associated with ♂; Riley County, 9-27-37, F. Marlatt, ♂. LOUISIANA: Tallulah, T. F. McGehee, ♀; New Roads, T. F. McGehee, ♀; Tangi-

pahoa, T. F. McGehee, ♀; Carencro, T. F. McGehee, ♀; Thibodeaux, E. K. Bynum, ♀; Franklin, E. K. Bynum, ♀; Houma, J. W. Ingram, ♀; New Orleans, 10-15-30, A. K. Pellitt, ♂. MISSISSIPPI: West Point, M. R. Smith, ♀; Starkville, M. R. Smith, ♀ associated with ♀; Starkville, W. W. Love, ♀ associated with ♀; Laurel, M. R. Smith, ♀; Aberdeen, M. R. Smith, ♀; Maben, M. R. Smith, ♀; Columbus, M. R. Smith, ♀; Wiggins, L. C. Murphree, ♀; Bond, L. C. Murphree, ♀; Quitman, L. C. Murphree, ♀; Quitman, L. C. Murphree, ♀; Shaw, L. C. Murphree, ♀; Centerville, W. L. Gray, ♀; Sibley, Andrew Fleming, ♀. MISSOURI: Saint Louis County, Phil Rau, ♀; Cedar City, Donaldson, ♀; Cape Girardeau, D. E. Read, ♀; Poplar Bluff, D. E. Read, ♀; Columbia, Mary Talbot, ♀; Saint Charles, Mary Talbot, ♀; Jefferson City, A. C. Burrill, ♀. NEBRASKA: Lincoln Orlando Bare, ♀; Roac, Orlando Bare, ♀; Clearwater, Orlando Bare, ♀. NORTH CAROLINA: Bat Cave, Henderson County, W. M. Wheeler, ♀; Wilmington, H. T. Vanderford, ♀. NEW MEXICO: Clayton, W. M. Wheeler, ♀; Los Vegas, W. M. Wheeler, ♀. OKLAHOMA: Wichita National Forest, W. Fisher, ♀; Oklahoma City, Bob Siegel, ♀. SOUTH CAROLINA: Clemson College, M. R. Smith, ♀. TENNESSEE: Athens, L. C. Murphree, ♀; Clifton, L. C. Murphree, ♀; Henderson, L. C. Murphree, ♀; Cades Cove, Great Smoky Mountain National Park, A. C. Cole, Jr., ♀; Montvale Springs, C. H. Kennedy, ♀; Nashville, 11-14-39, Mrs. A. R. Laskey, ♂; near Nashville, 11-?-39, L. G. Wesson, Jr., ♂ associated with ♀. TEXAS: Del Rio, W. M. Wheeler, ♀; Dallas, H. T. Vanderford, ♀; Wharton, L. C. Murphree, ♀; Carthage, D. E. Read, ♀; Commerce, D. E. Read, ♀; West Columbia, D. E. Read, ♀; Cleburne, T. F. McGehee, ♀; Palacios, T. F. McGehee, ♀; Juno, in Cornell University collection, ♀; Hightower, E. R. Kalmbach, ♀; Willis, J. C. Bridwell, ♀; Austin, 10-13-89, W. M. Wheeler, ♂ associated with ♀; Sarita, 11-30-11, ♂; Edinburg, S. Mulaik, ♂. VIRGINIA: Norfolk, H. T. Vanderford, ♀.

The shape of the mandibles and petiole of the major worker are highly characteristic, as are also the nature of the body sculpturing and color. Also noteworthy are the long scape, the prominent pronotal carina, and the absence of a broad flange in front of the antennal socket. The major worker varies considerably in sculpture and color. The pilosity may also vary in length, but this is often due to wear. The general color ranges from light reddish brown through dark reddish brown into a deep infuscation that approaches black. The sculpturing on the postpetiole is sometimes so delicate as to give this region a slightly shining appearance. The foveolate impressions may vary from a few scattered ones on some specimens to numerous ones on others. Individuals with only a few shallow impressions resemble *opacithorax*; those with coarser and more numerous impressions approach *sumichrasti* in appearance. There are intergradations in sculpturing between these extremes. The worker is most likely to be confused with that of *opacithorax*, which it closely resembles in structure and pilosity but from which it differs noticeably in shape of mandibles and nature of sculpturing. The head and usually the postpetiole of *nigrescens* are heavily sculptured and opaque. The same regions in *opacithorax* are shining and almost free of conspicuous sculpturing.

The salient characters of the female, and also the means by which this caste can be distinguished from the female of *opacithorax*, are given in the discussion of the latter species and need not be repeated here. There is variation in size of body, shape of mandibles, depth and shape of petiolar impressions, length and abundance of hair, color, and amount of sculpture. The mandibles of some specimens are shaped much like those of *opacithorax* but are broader in proportion to their length. In general, the superior border of

the mandible approaches the inferior border toward the apex, making a longer and somewhat more pronounced curve before forming the apical point. The median longitudinal impression on the petiole of most specimens is rather deep, extending the length of the petiole and somewhat widening posteriorly; the Colorado specimen, though, has a very shallow impression. The hair on the body is generally longer and more abundant than that of *opacithorax*, but this is not always true. The color may range from light ferruginous brown to dark ferruginous brown. The sculpture, though generally similar to that of *opacithorax*, is usually much coarser, the sculpture on the head being especially rougher.

The best characters for distinguishing the male are given in the key. Typical specimens agree very closely with the above description, especially in possessing strongly developed frontal carinae; ridges over antennal sockets; rather robust antennae; heavily sculptured body of which the dorsum of the head and thorax is noticeably subopaque owing to the coarser punctation and general nature of the ground surface; blackish head and thorax with slightly lighter gaster; and light-yellowish or grayish pile covering the body. The males are highly variable, different individuals varying with regard to length and robustness of mandibles; depth of groove between frontal carinae, as well as shape of carinae; amount of development of the longitudinal ridge mesad of each eye, and of the ridge above antennal socket; and length of space between lateral ocellus and eye. The thorax may be higher in proportion to its length and possess a weaker transverse prothoracic impression. The sculpturing may be feebler so that parts of the body are less dull, this being especially true of the sides of the thorax. The color of the pilosity may range from light yellowish or grayish to an almost golden yellow; and that of the wings from subhyaline through slightly infuscated to almost blackish.

*Eciton nigrescens* is apparently the most widely distributed and most common species in the United States. From Texas and Kansas eastward males have been collected from September into November.

#### ECITON (NEIVAMYRMEX) OPACITHORAX

*Eciton (Acamatus) californicum* subsp. *opacithorax* Emery, 1894. Bull. Soc. Ent. Ital. **26**: 184, ♀; Emery, 1895, Zool. Jahrb. Syst. **8**: 259, ♀; Forel, 1899, Biol. Centr.-Amer., Hymen. **3**: 28.

*Eciton (Acamatus) opacithorax* Emery, 1900, Mem. Real. Accad. Sci. Bologna **8**: 524. Wheeler and Long, 1901, Amer. Nat. **35**: 163, 173, fig. 2e ♂, fig. 3, ♀; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. **24**: 411, pl. 26, fig. 4, ♂; Emery, 1910, Gen. Insect., Fasc. **102**: 25.

*Eciton (Acamatus) carolinense* Wheeler (not Emery), 1921, Proc. Amer. Acad. Arts and Sci. **56**: 314-316, figs. 8a, 8b, ♀.

*Major worker*.—Length 4.5 mm.

Head approximately as broad as long, narrowed posteriorly; posterior border emarginate, forming produced, angular corners which are not clearly curved outwardly as in *wheeleri*. Eye ocelluslike, distinct, though usually less perceptible than that of *nigrescens* because of the less opaque background.

Margin on superior border of mandible between basal tooth and masticatory border straight (excised in *commutatum*, convex in *nigrescens*). Antennal scape robust, long, three and three-fourths to four and one-third times as long as broad; when extended backward, noticeably surpassing posterior border of eye; funiculus not noticeably robust, segments 2 to 4 inclusive, approximately as broad as long. Frontal carina not forming a broad, pellucid flange in front of antennal socket as is *wheeleri*. Thorax, from above, with convex dorsum and usually a very distinct transverse pronotal carina; side of prothorax extending above fore coxa as a somewhat reflexed lobe. Promesonotum, in profile, forming a rather long, even, gentle arch, which is slightly elevated above epinotum. Meso-epinotal constriction weakly indicated in some specimens, well defined in others. Base and declivity of epinotum subequal, the two surfaces meeting to form a distinct, obtuse angle. Petiole somewhat slender, clearly longer than broad (approximately five-eighths as broad as long), of same general shape as that of *nigrescens*; with anteroventral tooth. Postpetiole, from above, very slightly shorter but distinctly broader than petiole, subtrapezoidal, almost as long as broad.

Mandible opaque in some lights; bearing longitudinal striae and scattered piligerous punctures. Head smooth and shining or very delicately shagreened, with distinct but scattered punctures; posterior corners often with a few foveolate impressions. Thorax opaque, bearing dense, granulate punctures which are dorsally interspersed with scattered foveolate impressions (foveolate impressions similar to those of *nigrescens* but never so coarse or abundant); propleura, and sometimes the meso- and metapleura, slightly shining. Petiole with sculpturing similar to that of thorax but never so coarse, thus subopaque rather than opaque. Postpetiole usually, and gaster always, smooth and shining.

Hairs grayish or yellowish, rather abundant, suberect to erect, of various lengths, some strikingly long; some of the hair on gaster shorter and more appressed than elsewhere.

Light to dark reddish brown; thorax usually darkest; gaster and legs lighter than head and petiole.

*Female*.—Length 15 mm. (Pl. 2, Fig. 9).

Head approximately as long as broad; broadest anteriorly; with rounded posterior corners and weakly emarginated posterior border. Eye ocelluslike, small and indistinct, slightly closer to posterior border than to anterior border. Mandible elongate, narrow, with somewhat subparallel superior and inferior borders, superior border obliquely descending near apex to form a distinct, sharp-pointed tooth. Scape curved, robust, approximately one-half length of head. Region adjacent to and also somewhat posterior to frontal area with a strong, transverse, angular anterior protuberance. A deep median groove extending from clypeus toward vertex, becoming weaker posteriorly. Dorsal surface of clypeus concave, middle of anterior border broadly, but not deeply excised. Dorsal surface of head with a distinct median impression near occipital border, and a faint groove extending anteriorly. Posterior corners feebly produced, not tuberculate and not sharply angulate. Thorax, from

above, approximately twice as long as wide, gradually increasing in width posteriorly; epinotum not so wide as head. Promesonotal, mesometanotal, and meta-epinotal sutures distinct. Pronotum about as long as broad, marginate anteriorly and submarginate laterally. Mesonotum with somewhat angular anterior border and a more broadly angular posterior border. Epinotum broader than long, with bluntly angular posterior corners. Mesonotum with very feeble, scarcely discernible, longitudinal median impression; epinotum with a much broader and deeper impression. Thorax, in profile, approximately 3 times as long as high. Petiole about as high as epinotum but not so long; with a large, convex protuberance or tooth beneath; from above, one and one-third to one and one-half times as broad as long, with convex sides and a longitudinal median impression, which noticeably widens posteriorly. Gaster elongate.

Thorax opaque owing to the dense granulate shagreening and the numerous coarse, scattered punctures. Head rather shining because of the finer sculpturing. Petiole more feebly sculptured than thorax but scarcely as shining as dorsal surface of head.

Hairs yellowish, short; rather abundant on head, thorax, petiole, and appendages; mandibles, clypeus, gula, and scapes with longer hairs of various lengths.

Ferruginous brown with legs and antennal scapes lighter; frontal groove, borders of mandible, and clypeus darker.

*Male*.—Length 10-11 mm. (Pl. 6, Fig. 20).

Head approximately one and seven-tenths times as broad as long; posterior border well rounded. Eye rather small, moderately convex, protuberant. Ocelli very small, placed on low protuberance, which is scarcely raised above general surface of head; summit of protuberance concave. Frontal carinae converging behind, with distinct median groove between them leading to anterior ocellus. Ridge above antennal socket scarcely perceptible. Middle of anterior border of clypeus straight or feebly excised. Antenna rather slender; scape approximately as long as combined length of first 3 funicular segments; funiculus subfiliform, very slightly broadened through segments 2 to 6 inclusive, all segments except first distinctly longer than wide. Mandible moderately elongate to noticeably elongate, with somewhat subparallel superior and inferior borders basally; superior border sloping obliquely toward inferior border at approximately apical third of mandible to form a rather blunt tip. Head, from above, not noticeably extended behind eyes, with well-rounded corners which blend evenly into eyes; dorsum rather convex, rounding off anteriorly in such a manner that the ridge above the antennal socket is either absent or feebly developed. Lateral ocellus far removed from eye, space between the two almost equivalent to space between the two lateral ocelli. Eye, in profile, narrowed above, not occupying all of side of head, there being a small area ventrad and mesad of it, and a very much larger area posterodorsad. Region of head posterior to ocelli convex, without occipital flange. Thorax not projecting prominently above head. Prothorax with distinct transverse impression anteriorly.

Mesonotum with rather distinct anteromedian and parapsidal lines. Epinotal declivity appearing subtruncate but really concave. Gaster slender to moderately robust; sixth gastric tergum with a transverse impression near base. Seventh gastric sternum with 2 acute lateral teeth and a somewhat blunter intermediate tooth. Paramere, in profile, with a distinct median excision on the ventral border and a prominent basal, ventral angle.

All parts of body and appendages more or less shining in certain lights except the funiculi, and sometimes the dorsal surface of petiole. Head especially shining regardless of the punctures scattered over it. Sides and dorsum of thorax with numerous, distinct punctures; punctures, however, not obscuring the rather shining surface.

Hairs light yellowish to deep yellowish; suberect to erect on scape, head, legs, and venter of thorax and petiole; more appressed on dorsum of thorax and especially on the gaster.

Head, thorax, petiole, legs, and sometimes base of first gastric segment blackish; mandibles, funiculi, tarsi, and gaster light brown or reddish brown. Wings ranging from very feebly infuscated to blackish, the veins and stigma brownish black or black.

Description of worker based on cotypes, and also on specimens from a number of the localities mentioned below. Female described from the Clayton, Ga., specimen. This is the same female which was erroneously described and figured by Wheeler as *carolinense* (Wheeler, 1921). On the pin with it is a worker of *opacithorax*. The male has been described from the specimens listed below.

#### Cotypes in the United States National Museum.

*Material studied.*—ARKANSAS: W. J. Baerg, ♀. FLORIDA: Leesburg, C. C. Goff, ♀; Saint Augustine, C. T. Brues, ♀; Daytona, 11-10-11, G. W. Englehardt, ♂; Lutz, W. R. Vosburgh, ♂. GEORGIA: Clayton, W. T. Davis, ♀ associated with ♀; Lawrenceville, H. T. Vanderford, ♀; Atlanta, 11-4-34, P. W. Fattig, ♂. KANSAS: Manhattan, W. P. Hayes, ♀; Lawrence, 9-?-96, H. W. Menke, ♂. MISSISSIPPI: Sibley, Andrew Fleming, ♀; Vicksburg, W. J. Wallace, ♀; Quitman, L. C. Murphy, ♀; Summit, L. J. Goodgame, ♀; Louisville, M. R. Smith, ♀. MISSOURI: Willard, 10-5-20, ♂. NEW MEXICO: Jemez Springs, 6,400 feet, 9-30-16, John Woodgate, ♂. NORTH CAROLINA: Charlotte, H. T. Vanderford, ♀; Belmont, P. J. Schmitt, ♀ associated with ♀. OKLAHOMA: Payne County, 10-7-36, A. E. Hixson, ♂. SOUTH CAROLINA: Clemson College, M. R. Smith, ♀; Pendleton, M. R. Smith, ♀. TENNESSEE: Greenville, C. A. Dennis, ♀; Graystone Mountain, C. A. Dennis, ♀; Cold Spring Mountain, C. A. Dennis, ♀; Walkerton, C. A. Dennis, ♀; Townsend, C. A. Dennis, ♀; Gatlinburg, Mary Talbot, ♀. TEXAS: Austin, W. M. Wheeler, ♀; Jacksboro, T. F. McGehee, ♀; Eastland, T. F. McGehee, ♀; Austin, 10-27-99, W. H. Long, ♂.

The major worker is most likely to be confused with that of *nigrescens*, which it resembles in structure, especially in the shape of the petiole and postpetiole. From *nigrescens* it can be distinguished, however, by the nature of the sculpturing and the color of body. The head, thorax, petiole, and postpetiole of *nigrescens* are opaque, whereas in *opacithorax* this is true only of the thorax and petiole. The worker of *opacithorax* is generally of a lighter color;



has the eye less distinct; a feeble pronotal carina; a straight instead of a convex margin on the superior border of the mandible between the basal tooth and the masticatory border; and the posterior corners of the head not so noticeably curved outward. There is considerable variation among different individuals in sculpture, pilosity, color, and amount of development of the pronotal carina. Some specimens have such feeble sculpturing that the head and postpetiole are strikingly smooth and shining, whereas other specimens have these regions more heavily sculptured, tending to be subopaque. Although the meso- and metapleura are usually opaque in most individuals, they are somewhat smooth and shining in others. The variation in length of pilosity is often due to wear, as is evidenced by the truncate tips of the hairs. The color may range from a light yellowish brown to a reddish brown, the reddish brown, however, not attaining such a dark shade as in *nigrescens* or the infuscated effect of some individuals of the latter species. The pronotal carina, although usually distinct, is sometimes almost obsolete.

The female very closely resembles that of *nigrescens* and on superficial examination might easily be mistaken for the latter. From *nigrescens* it may be distinguished by the lack of the very prominent tuberculate or angulate posterior corners of the head; the smaller and more indistinct eyes; the less margined prothorax; the somewhat shining head, which is distinctly less heavily sculptured than the thorax; the shorter pilosity; and the fainter longitudinal median groove on the mesonotum. Wheeler and Long (1901) furnish illustrations of the lateral and dorsal aspect of the female of *opacithorax* and also give a very brief but accurate description of the ant. Their description and figures were based on the specimen collected at Belmont, Gaston County, N.C., by P. J. Schmitt. This was the first female of *Neivamyrmex* to have been recognized and described in the United States. A female in the collection of the United States National Museum, bearing only the label "Texas," and which I refer to *opacithorax*, differs from my description in its smaller size, the almost straight anterior border of the clypeus, the lack of distinct sutures on the thorax, and its much deeper color.

The male of *opacithorax* can be distinguished by the following characters: Small eyes and ocelli; wide space between inner border of eye and lateral ocellus; weak ridge above antennal socket; somewhat slender, subfiliform funiculus; shining head and thorax; and bicolored body.

Males from different localities vary in shape of mandibles, color, sculpturing, and pilosity. The mandibles of some individuals are more slender than those of others. The apical slope of the mandible may also vary in length. The sculpturing on the head and thorax of some specimens is more pronounced than in others, thus imparting to these regions a dull cast, which, however, never entirely robs them of a somewhat slightly shining appearance. The color of the body may be dark in some specimens and light in others. The pilosity may range from a light yellowish or almost grayish to a deep golden yellow. The color of the gaster, although it may vary slightly, is always a light brown or reddish brown; whereas the gaster of *nigrescens*, though some-

times a deep blackish brown, is usually black. The male is most likely to be mistaken for that of *nigrescens*, from which it can be distinguished by its more slender, subfiliform funiculus; feebly developed ridge above antennal socket; more shining body, especially that of the head and thorax; bicolored body; smaller size; and more slender form. From the male of *carolinense* it can be distinguished by its larger size; more robust mandibles; larger eyes and ocelli; and less coarse body sculpture, especially that of the dorsum of the thorax and gaster.

In the eastern part of the United States *E. opacithorax* seems to have the same general range as *nigrescens*. My experience in the Gulf States indicates that it is never so abundant as the latter. Males have been collected from September through November.

#### ECITON (NEIVAMYRMEX) CALIFORNICUM Mayr

*Eciton californicum* Mayr, 1870, Verh. Zool.-Bot. Ges. Wien **20**: 969, ♀; Mayr, 1886, Verh. Zool.-Bot. Ges. Wien **36**: 440; Dalla Torre, 1893, Cat. Hymen. **7**: 2; Forel, 1899, Biol. Centr.-Amer., Hymen. **3**: 28.

*Eciton (Labidus) californicum* Mayr, 1886, Wien. Ent. Zeit. **5**: 121, n. 14.

*Eciton (Acamatus) californicum* Emery, 1893, Bull. Soc. Ent. Ital. **26**: 184; Emery, 1895, Zool. Jahrb. Syst. **8**: 259; Emery, 1900, Mem. Real. Accad. Sci. Bologna **8**: 523; Emery, 1910, Gen. Insect., Fasc. **102**: 24.

*Major worker*.—Length 3-4 mm.

Head scarcely longer than broad; narrowed posteriorly; posterior border emarginate, forming produced, but blunt, angular corners. Eye rather small, ocelluslike, not easily discernible. Mandible of same general shape as that of *opacithorax*. Scape moderately robust, approximately three and two-tenths times as long as broad; when fully extended backward noticeably surpassing posterior border of eye; funiculus not especially robust. Frontal carina not forming a distinct flange in front of antennal socket as in *wheeleri* and *leonardi*. Thorax, from above, widest in region between fore coxae; promesonotum rather convex; a weak but distinct transverse carina on anterior part of prothorax. Epinotum clearly lower than mesonotum but not separated from it by a very distinct suture. Petiole, in profile, longer than high, convex above, with a blunt but definite anteroventral tooth. Postpetiole convex above, higher than long, highest posteriorly. Petiole, from above, slender, distinctly longer than broad, broadest posteriorly. Postpetiole subtrapezoidal, shorter but distinctly broader than petiole, and broader posteriorly than anteriorly.

Noticeably shining with the following exceptions: Mandibles, funiculi, meso- and metapleura, epinotum, petiole, and tarsi, which are slightly subopaque.

Mandibles striate-punctate; meso- and metapleura, epinotum, and petiole with granulate shagreening. Head with sparse, scattered punctures. Dorsum of thorax and petiole with scattered, foveolate punctures, best seen only in certain lights.

Pilosity yellowish, moderately abundant, of variable length, suberect to

erect. Antennal scapes, dorsum of body, ventral surface of gaster, and legs with sparse but very long, suberect to erect hairs.

Light to dark reddish brown, with distinctly lighter gaster.

Description based on workers collected at Sacramento by Sowell. The Sacramento specimens are considered typical because they agree very well with Mayr's description. Incidentally they were also collected near the type locality.

Type apparently in the Gustav Mayr collection of the Naturhistorisches Museum in Vienna.

*Type locality*.—San Francisco, Calif., H. Schaufuss.

*Material studied*.—CALIFORNIA: *Sacramento*, from house, Sowell, Calif. Dept. Agr. 36B71; *Palo Alto*, H. Heath.

I have examined specimens from Las Vegas, N. Mex., mentioned by Wheeler (1908). In my opinion these cannot be *californicum*. The broad petiole of the worker, if nothing else, would preclude this possibility. Forel (1914) described a variety *obscura* from specimens collected at *Vista*, southern California, by E. Hindle. I have examined a cotype worker and believe that Forel was incorrect in assigning his specimens to *californicum* because the mandible of the worker has not the characteristic shape of that of *californicum*.

The worker of *californicum* can be distinguished by the slender petiole, which is distinctly longer than broad; the straight margin on the superior border of the mandible, lying between the basal tooth and the masticatory border; the rather small, somewhat indistinct eyes; the frontal carina not forming a distinct flange in front of the antennal socket; the shining head, promesonotum, propleura, postpetiole, and gaster; the reddish brown body with lighter gaster; and by the moderately abundant hairs of variable length, those on the scapes, dorsum of body, legs, and venter being unusually long and suberect to erect.

The worker can be distinguished from that of *opacithorax* by its more feebly sculptured and therefore more shining body, this being especially true of the promesonotum; generally longer and more erect hairs of the body; less distinct eyes; and usually lighter color. *Eciton opacithorax* was formerly considered a subspecies of *californicum* but was later raised to specific rank.

#### ECITON (NEIVAMYRMEX) WHEELERI Emery

*Eciton wheeleri* Emery, 1901, Bull. Soc. Ent. Ital. **33**: 55, fig. 8, ♀.

*Eciton (Acamatus) wheeleri* Emery. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. **24**:412; Emery, 1910, Gen. Insect., Fasc., **102**:25.

*Eciton (Acamatus) wheeleri* subsp. *dubia* Creighton, Creighton, 1932, Psyche **39**: 73, pl. 3, figs. 1, 2, 3, ♀, ♀. New synonymy.

*Major worker*.—Length 4.5 mm. (Pl. 1, Fig. 5).

Head slightly longer than broad, narrowest posteriorly; posterior border emarginate, forming well-produced, angular corners, which are strongly curved outwardly, especially in the smaller workers. Eye ocelluslike, very distinct.

Mandible similar to that of *carolinense* but often with the basal tooth less pronounced; small, irregular teeth on upper half of masticatory border also less distinct. Antennal scape clearly exceeding posterior border of eye; funiculus noticeably more slender than that of *carolinense*, this being especially true of segments 2 to 4 inclusive, which are about as broad as long. Frontal carina forming a broad, pellucid ring in front of antennal socket (this best seen from above). Promesonotum, in profile, convex but not strongly elevated posteriorly above base of epinotum, nor separated from epinotum by a pronounced dorsal constriction or suture. Pronotum with a very distinct transverse carina. Petiolar node robust, subquadrate; peduncle, in profile, with small but distinct antero-ventral tooth. Postpetiole clearly broader than petiole, broader than long, broadest posteriorly.

Head, propleura, legs, and gaster shining; promesonotum and dorsal surface of postpetiole often slightly shining; remainder of body subopaque. Head with scattered but distinct punctures. Dorsum of thorax, excepting the often shining promesonotum, subopaque; with foveolate punctures interspersed with reticulate shagreening. Petiole and postpetiole somewhat similarly but more feebly sculptured.

Hairs pale yellowish or grayish, long, suberect to erect, abundant, covering body and all appendages excepting funiculi.

Deep reddish brown; gaster and legs lighter.

*Female*.—Length 13.5 mm. (Pl. 2, Fig. 12).

Head subquadrate, with almost straight, subparallel sides, angular posterior corners, and broadly and rather deeply emarginate posterior border. Eye ocellus-like, fairly large and distinct but not so large or distinct as that of *nigrescens*. Mandible linear, superior border descending to meet inferior border in a long, oblique slope, which ends in an apical tooth. Scape curved, strongly enlarging toward apex, approximately one-half as long as head. Region adjacent and somewhat posterior to frontal area weakly protuberant anteriorly. A short, shallow, median groove running posteriorly from clypeus. External surface of clypeus concave, with middle of anterior border broadly and rather deeply excised. Dorsal surface of head, from above, with distinct median impression near occipital border but without a distinct impression on side of head anterior to each posterior corner; sides of head converging behind, giving this region an extended appearance, and forming very angulate posterior corners. Thorax elongate, approximately two and six-tenths times as long as broad, nearly uniform in width throughout, epinotum not distinctly wider than mesonotum as with females of *nigrescens* and *opacithorax*. Pronotum approximately as broad as long, convex above, lacking indications of lateral margins. Median longitudinal impression absent on mesonotum but present as a very shallow impression on epinotum. Posterior corners of epinotum not so broadly angular or distinct as in *nigrescens* and *opacithorax*. Thorax, in profile, approximately three and three-fourths times as long as high; mesonotum flattened; posterior part of epinotum convex, and slightly higher than any other part of thorax. Thoracic sutures absent dorsally. Petiole apparently as high as epinotum but

not so long; according to Creighton (1932) "ventrally the petiole is constricted to form a very thick, short, posterior peduncle and a much longer subtriangular portion which extends forward under the node and is narrowed in front to form the anterior peduncle." Petiole subquadrate, very slightly longer than broad, with rounded anterior angles, subparallel sides, and a shallow, dorsal impression, which is broader posteriorly than anteriorly.

Body and appendages shining except funiculi and tarsi. Head and thorax without the dense granulate shagreening between the numerous and distinct punctures.

Head, thorax, petiole, and appendages covered for most part with moderately abundant hairs; longer and less numerous hairs on mandibles, clypeus, edges of petiole, and appendages.

Rich reddish brown.

Description of worker based on 3 cotypes, and also on specimens from the several localities in Texas listed below. Description of female drawn from that caste of Creighton's *dubia*.

Cotypes in the Museum of Comparative Zoology.

*Type locality*.—Hays County, Tex., W. M. Wheeler.

*Material studied*.—TEXAS: Austin, W. M. Wheeler, ♀; Dallas, C. R. Jones, ♀; Victoria, J. D. Mitchell, ♀; 5 miles west of Fort Worth, Herbert Rückes, ♀ associated with ♀; Hillsboro, H. T. Vanderford, ♀; Port Lavaca, T. F. McGehee, ♀.

MEXICO: Guadalajara, J. F. McClendon, ♀.

The major worker of *wheeleri* is characterized by the strongly produced and often outwardly curved posterior corners of the head; the prominent, pellucid flange in front of the antennal socket; the rather slender antennal funiculus; the robust, subquadrate petiolar node; and the general deep reddish-brown color of body exclusive of gaster and legs. The sculpturing varies greatly on the thorax. Some specimens have the thorax almost entirely subopaque, others less so, and still others have it almost glabrous. There is a tendency for the smaller workers to have a more shining thoracic dorsum. Sometimes the shiny area includes all the dorsal surface. The smaller workers also seem to have more pronounced posterior corners to the head, and these corners have a more noticeable outward curve. The worker is likely to be confused with that of *carolinense* or *opacithorax*. For distinctions see the general discussion under *carolinense*.

The female can be readily identified by the very distinct, angulate, posterior corners of the head, anterior to which there is no impression on the side of the head; the elongate thorax, which is subequal in width throughout; the absence of dorsal sutures on the thorax; the absence of lateral margins on the prothorax, and of a median, longitudinal impression on the mesonotum; the almost square petiole; the shining body surface; and the rich reddish-brown color.

Not being able to detect any stable characters by which *dubia* can be separated from *wheeleri* I have synonymized the name *dubia*. The supposed sub-

species was described from workers and an associated female collected 5 miles west of Fort Worth by Herbert Rückes. The characters by which the workers of *dubia* were supposed to differ from those of *wheeleri* were the proportionally broader head with less-produced posterior corners and the more shining dorsal surfaces of the head and thorax. *Eciton harrisii* may possibly prove to be the male of *wheeleri*. If such should be the case then *wheeleri* would become a synonym. Although to date *wheeleri* has been collected only in Texas and Mexico, it will probably be found later in some of the adjoining States.

#### ECITON (NEIVAMYRMEX) CAROLINENSE Emery

*Eciton (Acamatus) carolinense* Emery, 1894, Bull. Soc. Ent. Ital. **26**: 184, ♀; Emery, 1895, Zool. Jahrb. Syst. **8**: 259, ♀; Emery, 1910, Gen. Insect., Fasc. **122**: 24; Wheeler, 1921, Proc. Amer. Acad. Arts and Sci. **56**: 314-315, fig. 8c, ♂.

*Eciton carolinense* Emery, Forel, 1899, Ann. Soc. Ent. Belg. **43**: 443, 447; ♀.

*Major worker*.—Length 3.4 mm.

Head scarcely longer than broad, narrowed posteriorly. Posterior corners of head, from above, feebly produced, bluntly angular and not outwardly curved as in *wheeleri*. Eye ocelluslike, distinct, but not large. Mandible constricted at base, then abruptly enlarging on its superior border to form an angular tooth, margin between tooth and masticatory border straight or feebly excised; masticatory border oblique, with three or four irregular teeth on its upper half. Scape robust, approximately three and one-third times as long as its greatest width; scarcely surpassing posterior border of eye; funiculus very noticeably incrassate, all segments except first and last clearly broader than long, last segment as long as combined length of two preceding segments. Frontal carina, from above, forming only a very narrow and indistinct flange in front of antennal socket. Pronotum without sharp transverse carina of *wheeleri*, but often with feeble indication of a carina when examined from proper direction. Promesonotum, in profile, forming a gently convex, continuous arch very slightly higher than base of epinotum; meso-epinotal suture shallow but distinct; base and declivity of epinotum subequal, the two surfaces meeting to form a bluntly rounded angle, closely approaching a right angle. Petiolar node robust, subquadrate, scarcely longer than broad (approximately five-sixths as broad as long). Peduncle with anteroventral tooth. Postpetiole shorter than petiole but broader; broader than long, broadest posteriorly.

Head, propleura, legs, dorsum of postpetiole, and gaster smooth and shining. Punctures on head sparse, scattered, distinct. Mandible with longitudinal striae in addition to coarse, scattered punctures. Thoracic dorsum subopaque, reticulately shagreened, reticulations interspersed with coarse, scattered, foveolate punctures; punctures seen better in some lights than in others. Meso- and metapleura subopaque, with coarse punctures. Petiole sculptured somewhat as thorax but more feebly so.

Hairs light yellowish or grayish, moderately abundant, of variable length, suberect to erect.

Yellowish brown to reddish brown, with head and thorax darker. Mandible usually darker than body.

*Female*.—Length 9-13 mm. (Pl. 2, Fig. 11).

Head approximately as long as broad, with gently convex sides, well-rounded posterior corners, and very indistinctly or not emarginate posterior border. Eye extremely small, indistinct, represented by a very pale spot. Mandible long, slender, acute at apex. Scape curved, robust, rather short, slightly less than half the length of the head. Region adjacent and also somewhat posterior to frontal area with a strong, transverse, angular protuberance. A longitudinal, median groove extending posteriorly from clypeus, much broadened above the angular protuberance and extending well back on vertex. External surface of clypeus at most weakly concave, middle of anterior border not deeply but distinctly excised. Dorsal surface of head, from above, lacking median impression anterior to the occipital border, and lateral impression on each side anterior to posterior corner as in *nigrescens*; head thus viewed, although emarginate behind, not having an extended appearance, and the posterior corners broadly and evenly rounded, not produced. Thorax, from above, approximately two and one-fifth times as long as broad; wider in proportion to its length than thorax of *opacithorax*, *wheeleri*, and *nigrescens*. Metanotum and epinotum subequal in width, distinctly wider than other areas of thorax. Promesonotal suture obsolete, mesometanotal and metaepinotal sutures fairly distinct. Pronotum convex, not perceptibly marginate anteriorly or laterally. Mesonotum lacking median, longitudinal impression. Epinotum wider than long, with rather distinct, median impression. Thorax, in profile, less than two and four-tenths times as long as high, highest and most convex dorsally in region of promesonotal suture, lowest or most depressed in vicinity of meta-epinotal suture. Petiole, in profile, higher than epinotum; with a prominent tooth beneath somewhat similar to that of *opacithorax* but smaller; distinctly broader than long, very slightly broader anteriorly than posteriorly, with very shallow and narrow median impression.

Body and appendages, except funiculi and tarsi, shining. Thorax with scattered, fairly distinct to distinct punctures; neither head nor thorax with dense granulate shagreening between punctures as in *opacithorax* and *nigrescens*.

Hairs on head, thorax, and petiole moderately abundant, short; longer on gula, mandibles, clypeus, scape, and legs.

Light yellowish brown to brown; gaster usually darker than head or thorax.

*Male*.—Length 9-9.25 mm. (Pl. 7, Fig. 22).

Head approximately one and eight-tenths times as broad as long; posterior border rounded but almost obscured by large transverse ridge above each antennal socket. Eye small, convex, not strongly protuberant. Ocelli remarkably small, placed on low protuberance, which is only slightly elevated above general surface of head; lateral ocellus far removed from eye, space between them as great as or greater than space between the lateral ocelli. Frontal carinae converging posteriorly, with distinct median groove between them, the groove interrupted above at level of frontal ridge. Scape approximately as long as first 3 funicular segments combined; funiculus subfiliform. Mandible remarkably elongate and slender, at least 5 times as long as broad, apex blunt. Head,

from above, well rounded behind eyes, with posterior corners blending into eyes; no occipital flange. A transverse groove behind the ridge above antennal socket. Eye, in profile, small, narrowed above; failing to occupy all of side of head, there being a small area dorsad and ventrad of eye and a much larger area posterodorsad; head behind ocelli convex. Thorax, in profile, approximately one and one-half times as long as high; slightly projecting anteriorly over head. Prothorax with a very distinct transverse impression anteriorly. Mesonotum with anteromedian and parapsidal lines. Epinotal declivity strongly concave. Legs slender. Tarsal claws weakly toothed. Petiole, from above, approximately one and one-half times as broad as long. Gaster slender, compressed. Paramere not characteristic enough to be clearly described.

Mandible with scattered but distinct punctures. Dorsal surface of head for the most part shining. Thorax with numerous coarse punctures, those of posterior part of mesonotum, scutellum, and sides of thorax largest and most distinct. Punctuation of gaster coarse and dense enough to dull somewhat its luster and give gaster a rather subopaque appearance.

Hairs yellowish, dense, appressed; longest on head, appendages, sides and venter of thorax, petiole, and gaster.

Head, thorax, and petiole black; gaster deep reddish brown. Funiculi and tarsi lighter.

The description of the worker is based on cotypes and specimens from the localities mentioned below; that of the female on specimens from the six localities mentioned; that of the male from the specimen collected at Clayton, Ga., and the two males from Spartanburg, S.C.

Cotypes in collection of United States National Museum.

*Type locality*.—Belmont, Gaston County, N. C., P. J. Schmitt.

*Material studied*.—ALABAMA: Alabama City, L. C. Murphree, ♀; Butler, L. C. Murphree, ♂; Aliceville, L. C. Murphree, ♂; Jemison, L. C. Murphree, ♂. FLORIDA: Tallahassee, B. V. Travis, ♀; Leesburg, C. C. Goff, ♀; Madison, D. E. Read, ♀. GEORGIA: Columbus, H. T. Vanderford, ♀; Clayton, 6-?-09, 2,000-3,000 feet, W. T. Davis, ♂. KANSAS: Manhattan, J. W. McColloch, ♀. MISSISSIPPI: Aberdeen, M. R. Smith, ♀; State College, M. R. Smith, ♀; Meridian, M. L. Grimes, ♀; near Natchez, W. L. Gray, ♀; Columbus, M. R. Smith, ♀ associated with ♀. NORTH CAROLINA: Faison, A. Forel, ♀ associated with ♀; Jacksonville, M. R. Smith, ♀ associated with ♀. SOUTH CAROLINA: Spartanburg, 5-27-32; D. E. Read, ♀, ♀, ♂. TENNESSEE: Gatlinburg, Mary Talbot, ♀; Greenbrier Cove, Great Smoky Mountain National Park, Mary Talbot, ♀; Cades Cove, Great Smoky Mountain National Park, A. C. Cole, Jr., ♀ associated with ♀.

The major worker can be distinguished by its short and strongly incrassated funiculus; feebly produced, posterior corners of the head; subquadrate petiolar node; and by its feebly developed or apparently missing pronotal carina. The major worker is likely to be confused with that of *wheeleri* or *opacithorax*. From the former it may be distinguished by the lack of the strongly produced, sharply angular, outwardly curved posterior corners of the head; the absence of a broad flange in front of the antennal socket, and the absence of a well-defined pronotal carina. In addition to the characters mentioned *carolinense*



is also distinguished by its lighter color and different distribution. *Eciton carolinense* seems to be confined mostly, if not altogether, to the region east of the Mississippi River, especially the Gulf Coast and Southeastern States, whereas *wheeleri* is confined to Texas, Mexico, and possibly some of the other Southwestern States. Although the thorax is distinctly sculptured and sub-opaque in the larger workers, this is not true of the smaller workers, which often have the thorax entirely or in part glabrous. From *opacithorax* the major worker can be distinguished by its robust, subquadrate petiole; short and much incrassated funiculus; and by the blunt, feebly produced posterior corners of the head.

Forel (1899) was the first person to recognize and briefly describe the female. Although females have been collected on numerous occasions, no one has taken the trouble to give a detailed and adequate description of this caste.

The female of *carolinense* can be distinguished by her very small, indistinct eyes; her lack of a median impression on the vertex near the occiput, and a lateral impression on each side of the head anterior to the posterior corner; by having the thorax more robust than that of *opacithorax* and *nigrescens* with the metanotum and epinotum subequal in width, and wider than the rest of the thorax. The female is also characterized by her light yellowish-brown color, shining body, by the absence of definite lateral margins on the prothorax, and by the lack of a median longitudinal impression on the mesonotum. The specimens vary considerably with respect to size, color, sculpture, pilosity, shape of mandible, size and prominence of angular protuberance on the dorsal surface of the head, and the development of the impression above the protuberance, proportions of thorax, and size and shape of petiole. The punctures on the thorax are much coarser and more prominent on some individuals than on others. The pilosity, although generally short, is sometimes fairly long and more erect. The mandible is normally elongate, narrow, with rather acute tooth; but some individuals have a broader and shorter mandible with less acute tooth. The angular protuberance on the dorsal surface of the head is usually very strongly developed. The impression back of this protuberance is usually broad and distinct, but on some specimens it is so shallow and narrow as to be scarcely noticed. The thoracic proportions vary considerably, the length ranging from approximately twice the width to two and four-tenths times the width. The ventral tooth of the petiole ranges from small to large, but is smaller and usually more angular than that of *opacithorax* and *nigrescens*.

The male can be distinguished by its very small eyes and ocelli; remarkably long, slender mandibles; large space between each eye and lateral ocellus; prominent transverse ridge above each antennal socket; somewhat bicolored body; and the densely and coarsely punctured head and thorax, which have an opaque appearance. The male might be mistaken for that of *opacithorax*. For distinctions see the discussion under *opacithorax*.

Males have been collected too infrequently to enable one to determine the months in which they are most abundant.

## ECITON (NEIVAMYRMEX) COMMUTATUM Emery

*Eciton nitens* Mayr (part), Mayr, 1886, Wien. Ent. Zeit. 5: 121.

*Eciton (Acamatus) commutatum* Emery, 1900, Mem. Real Accad. Sci. Bologna 8: 522, ♀; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 413; Emery, 1910, Gen. Insect., Fasc. 122: 24.

*Major worker*.—Length 4.5 mm. (Pl. 1, Fig. 6).

Eye extremely small, indistinct, apparently placed beneath general surface of head, and only observable after careful examination. Superior border of mandible with remarkably large, blunt, angular, basal tooth; margin deeply excised between this tooth and masticatory border; masticatory border usually with a number of small, irregular teeth, which may often be worn off. Antennal scape remarkably robust, short, less than three times as long as its greatest width; funiculus exceedingly short and broad, all segments, except first two and last, very noticeably broader than long. Antennal socket open in front, that is, without a flange (this best seen from above). Posterior border of head, from above, deeply emarginate, forming distinct, blunt, angular posterior corners; posterior corners not outwardly curved as in *wheeleri*. Thorax compressed. Pronotum without transverse carina. Promesonotum approximately two and a half times length of epinotum when measured from the point where the carina should be back to meso-epinotal suture; meso-epinotal suture broad, distinct, but not deep. Anterior half of promesonotum, in profile, convex; posterior half distinctly flattened; posterior part of promesonotum clearly elevated above base of epinotum. Base of epinotum meeting declivity in blunt, obtuse angle, which in some aspects does not appear much greater than a right angle. Petiole robust, subquadrate, approximately seven-eighths as broad as long. Postpetiole scarcely shorter than petiole but very clearly broader, approximately one and one-fourth times as broad as long, broader posteriorly than anteriorly.

Body and appendages unusually smooth and highly polished, with the following exceptions: Mandibles subopaque, coarsely and longitudinally striated, and bearing scattered piligerous punctures near the masticatory border; anterior declivity of pronotum, propleura, and sides of petiole and post-petiole faintly shagreened, subopaque; meso- and metapleura more coarsely granulate-punctate; meso-epinotal suture granulate-punctate, with also longitudinal striae; tarsi and funiculi opaque owing to the abundant pile. Head with small, scattered, but distinct punctures.

Hairs yellowish, moderately abundant, of variable length, apparently sparse or absent on sides of thorax and head: Appressed pubescence more visible on gaster than elsewhere.

Deep yellowish brown to reddish brown, with lighter petiole, post-petiole, gaster, and legs; mandibles and frontal carinae much darker, especially around borders.

Cotypes presumably in collection of C. Emery, which is now under the care of C. Menozzi, of Chiavari, Italy.

*Type locality*.—New Granada.

*Material studied*.—ARIZONA: Phoenix. TEXAS: Victoria, L. C. Murphree; New Braunfels, R. A. Cushman; San Augustine, E. S. Tucker; Austin, W. M. Wheeler.

The major worker of *commutatum* can be distinguished by the shape of the mandibles and petiole; feebly developed, indistinct eyes; short, heavily incrassated antenna; the compressed and somewhat depressed thorax; broad but shallow meso-epinotal suture; obtusely angular epinotum; smooth, highly polished, shining body, with the exception of certain parts; and the absence of a flange in front of the antennal socket. This species is likely to be confused with *carolinense*, as the major workers of the two species have somewhat similarly shaped petioles, postpetioles, and antennae. The major worker of *commutatum* can be distinguished from that of *carolinense* by its compressed, dorsally flattened thorax, the dorsum of which is highly polished, smooth, and shining, and lacking the coarse foveolate punctures of *carolinense*; by its more feebly developed eyes; its distinctly shorter and more incrassated antenna; and less dense pilosity.

Our present knowledge seems to indicate that *carolinense* is a Gulf coast and Southeastern form, ranging from Florida into North Carolina and westward into Mississippi, Tennessee, and Kansas. *Eciton commutatum*, on the other hand, is apparently a Southwestern ant. The range of neither species, especially of *commutatum*, is as well known as it should be.

#### ECITON (NEIVAMYRMEX) PAUXILLUM Wheeler

*Eciton (Acamatus) pauxillum* Wheeler, Wheeler, 1903, *Psyche* **10**: 93, fig. 1, ♀; Wheeler, 1908, *Bull. Amer. Mus. Nat. Hist.* **24**: 412. Emery, 1910, *Gen. Insect.*, Fasc. **102**: 25.

*Worker*.—Length 1.75-2 mm. (Pl. 1, Fig. 8).

Head approximately one and one-third times as long as broad, widest anteriorly; with feebly convex, but pronounced, posteriorly converging sides. Eyes apparently absent. Mandible with a prominent, acute tooth on superior border, approximately two-thirds distance between base and masticatory border. Antenna very short, robust; scape approximately three times as long as its greatest width, extending posteriorly about one-half length of head; funiculus heavily incrassated, all segments except first and last as broad as long, or broader than long. Frontal carina not forming a distinct flange in front of antennal socket as with *wheeleri*; the apparent flange narrow, not noticeably upturned (best seen from above). Posterior border of head, from above, emarginate, forming feebly produced, blunt corners. Thorax compressed. Pronotum without any evidence of transverse carina. Dorsum of thorax, in profile, rather flat, meso-epinotal suture so feebly defined that the posterior part of the mesonotum and the base of the epinotum appear as an almost continuous surface in about the same plane; base of epinotum meeting declivity in a fairly pronounced, obtuse angle. Petiole, from above, rather robust, subquadrate, approximately one-fifth longer than broad. Postpetiole shorter but

broader than petiole, ellipsoidal, distinctly broader than long. Peduncle of petiole with rounded and very blunt, anteroventral protuberance. Gaster strikingly elongate elliptical, distinctly depressed.

Body and appendages polished and shining, with the following exceptions: Mandibles, funiculi, the faintly shagreened meso- and metapleura, ventral surfaces of petiole and postpetiole, and tarsi. Mandibles, head, and thorax with scattered piligerous punctures.

Body and appendages with moderately abundant, rather long, yellowish, suberect to erect hairs.

Light yellowish brown with edges of clypeus, mandibles, articulations of legs, petiole, and postpetiole darker.

Description drawn from four cotype workers, three from the American Museum of Natural History and one from the Museum of Comparative Zoology.

Cotypes in the Museum of Comparative Zoology and the American Museum of Natural History.

*Type locality*.—Austin, Tex., W. M. Wheeler.

Also recorded by Wheeler (1908) from Paisano Pass near Alpine, Tex. I have not seen these specimens.

The worker of *pauxillum* can be readily identified by the form of the head and the shape of the mandible; by its very short, robust antenna; by its subquadrate petiole; by its elongate, elliptical, depressed gaster; by its very small size; and by its lack of a pronotal carina.

I cannot agree with the statement in Wheeler's original description that the head of the worker, including the mandibles, is "fully twice as long as broad," nor can I agree with another statement that the "petiole and postpetiole whether seen from above or in profile are of similar size and form."

This is the smallest known species of *Eciton* in the United States. The very slight difference in the size of the workers is noteworthy, however. It is possible that Wheeler failed to secure major workers. All species of *Eciton* (*Neivamyrmex*), as far as I am aware, are noted for the pronounced polymorphism of their workers.

The specimens collected by Wheeler at Austin, Tex., were taken from the soil beneath a stone. The species is probably more hypogaecic than some of the other members of the subgenus.

#### ECITON (NEIVAMYRMEX) LEONARDI Wheeler

*Eciton* (*Acamatus*) *leonardi* Wheeler, 1915, Bull. Amer. Mus. Nat. Hist. 34: 392. ♀.  
*Worker*.—Length 2.3 mm.

Head slightly longer than broad; a little broader anteriorly than posteriorly, with emarginate posterior border and moderately convex sides. Eye apparently absent. Superior border of mandible with basal tooth and an excised margin between this tooth and masticatory border, the excised margin sometimes with

a few very small, irregular denticulae; masticatory border with a long apical and two shorter teeth. Antennal scape fairly robust, short, attaining approximately one-half length of head; all segments of funiculus except first and last as broad as or broader than long. Frontal carina forming a broad, pellucid flange in front of antennal socket. Posterior corners of head, from above, feebly produced, bluntly angular. Thorax, from above, with a distinct constriction on each side of meso-epinotal region. Pronotum without any evident transverse carina. Dorsum of thorax weakly convex; promesonotum feebly elevated above epinotum, meso-epinotal suture feebly developed. Petiole and postpetiole each with a ventral toothlike projection. Petiole subquadrate, approximately one and one-fourth times as long as broad. Postpetiole slightly shorter, but distinctly broader, than petiole; approximately two-thirds as long as broad, subtrapezoidal. Gaster oval.

Body and appendages smooth and shining with the following exceptions: Mandibles, funiculi, meso- and matapleura, meso-epinotal constriction, tarsi, and ventral surfaces and sides of petiole and postpetiole, subopaque; mandibles coarsely striate-punctate; all areas faintly shagreened except funiculi and tarsi. Head with sparse but definite punctures.

Hairs pale yellowish, moderately long, and moderately abundant, suberect to erect.

Light yellowish brown with darker clypeal region and mandibles.

The description is based on a single cotype specimen from the Museum of Comparative Zoology.

Cotypes in Museum of Comparative Zoology.

*Type locality*.—Point Loma, near San Diego, Calif., Percy Leonard.

The worker of *leonardi* can be distinguished by the short scape; broad flange in front of antennal socket; shape of mandible; subrectangular petiole; smooth and shining body with the exception of certain parts; and its light yellowish-brown color. It is also characterized by the apparent absence of eyes, and by the lack of a pronotal carina.

The worker of this very small species is most closely related to that of *pauxillum*, from which it can be distinguished by its shorter and more robust head, the posterior region of which is not so noticeably constricted as that of *pauxillum*; by the presence of a broad, distinct flange in front of the antennal socket; its larger size; and by the lack of a distinctly flattened gaster. Furthermore, *leonardi* has been collected only in the southern part of California whereas *pauxillum* has been found only in central and southwestern Texas.

Mann's *peninsulare* is very close to if not identical with *leonardi*, but with only one specimen of *leonardi* to compare with Mann's series of specimens it is difficult to determine whether the two species are identical. Wheeler described *leonardi* from only three workers. There is the possibility that *leonardi* has larger (major) workers, which were overlooked at the time of collection.

## ECITON (NEIVAMYRMEX) HARRISII (Haldeman)

*Labidus harrisii* Haldeman, 1852, Stansbury's Expedt. Great Salt Lake. Lippincott, Grambo and Co. Publ., p. 367, pl. 9, figs. 4, 5, 6, ♂; Cresson, 1872, Trans. Amer. Ent. Soc. 4: 194.

*Eciton (Labidus) harrisii* (Haldeman), Mayr, 1886, Verh. Zool.-Bot. Ges. Wien 36: 441; Emery, 1895, Zool. Jahrb. Syst. 8: 261; Wheeler and Long, 1901, Amer. Nat. 35: 165, fig. 2a.

*Eciton harrisii* (Haldeman), Dalla Torre, 1893, Cat. Hymen. 7: 3.

*Eciton harrisii* (Haldeman), Forel, 1899, Biol. Centr.-Amer., Hymen. 3: 28.

*Eciton (Acamatus) harrisii* (Haldeman), Emery, 1900, Mem. Real. Accad. Sci. Bologna 8: 515, fig. 18; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 413, pl. 26, fig. 10; Emery, 1910, Gen. Insect., Fasc. 102: 26.

*Male*.—Length 10.5 mm. (Pl. 6, Fig. 21).

Head approximately one and three-fourths times as broad as long. Eye remarkably large, convex, protuberant. Ocelli large, placed on protuberance well elevated above general surface of head. Frontal carinae subparallel medianally, usually with a weak groove between them. Ridge above antennal socket prominent, most distinct from above. Antennal scape approximately as long as combined length of first 3 funicular segments; funiculus broadest near base, gradually narrowing toward apex. Mandible robust, with convex inferior and somewhat straight superior border, the two borders subparallel in basal half and tapering in apical half to form a blunt point. The large, protuberant eye, in profile, occupies all of the side of the head except a very narrow area above the base of the mandible, and a larger space posterodorsad of the eye. Thorax slender. Anterior surface of prothorax, in profile, with a transverse impression. Epinotum subtruncate or weakly concave. Tarsal claws feebly or nontoothed. Petiole small; about one and one-half times as broad as long, with rounded, weakly defined posterior corners. Gaster slender, with distinct but not very strong constrictions between segments. Intermediate tooth of seventh gastric sternum short but distinct. A weak transverse impression near base of sixth gastric tergum. Lower part of aedeagus terminating in a pair of processes, which when viewed from a posterior direction resemble very much a hand with only the index finger extended.

Mandibles, head, and thorax with small but distinct punctures, well scattered on side of thorax, more dense on dorsum. Anterior border of each gastric segment smooth. Body and appendages, except funiculi, shining in some lights.

Pilosity yellowish, rather abundant; longest on mandibles, antennal scapes, head, legs, sides and venter of thorax, venter of petiole, and gaster; more appressed elsewhere. Seventh gastric sternum rather densely pilose.

Light to dark brown, with dorsal surfaces of head, thorax, and petiole darker. Wings pale, with weak grayish or yellowish cast; veins and stigma light brown to dark brown.

Description drawn from numerous specimens from the localities listed below.

Type apparently lost.

*Type locality*.—Fort Gates, Coryell County, Tex., Lieut. Horace Halde-  
man. For remarks concerning the correct type locality see discussion under  
*melsheimeri*.

*Material studied*.—ARIZONA: Nogales, 6-13-03, 6-25-03, 6-31-03, 7-18-03, E. J. Os-  
lar; Fort Grant, 7-19-?, 7-22-?, 7-23-?, in Hubbard collection. NEW MEXICO:  
Mesilla, 7-30-?, T. D. A. Cockerell; Pyramid Peak, Dona Anna County, 7-23-30,  
F. R. Fosberg. OKLAHOMA: Stillwater, 9-18-37, F. D. Miner. TEXAS: Wharton,  
6-24-17, in Cornell University collection; Columbus 8-?-17; Dallas, 8-20-07, W. W.  
Yothers; Dallas, 7-21-06, W. A. Hooker; Plano, 8-?-?, E. S. Tucker; Cypress Mills,  
in W. H. Ashmead collection; Kerrville, 8-14-06, 8-26-06, F. C. Pratt; Burleson,  
8-24-03, in Texas Agricultural and Mechanical College collection; Winter Haven,  
7-17-35; S. E. Jones; Rock Island, 6-29-22, G. O. Wiley; Trinity, 8-30-06, F. C.  
Bishopp; Bryan, 7-10-37, in Texas Agricultural and Mechanical College; College  
Station, 9-1-35, 9-9-35, 9-11-35, 10-6-28, 10-7-28, 10-30-28, in Texas Agricultural and  
Mechanical College collection; Taylor, 7-26-33, J. E. Gillaspay; Colorado County,  
7-25-22, G. O. Wiley; Eastland County, 8-6-21, G. O. Wiley; Port Lavaca, F. D.  
Miner; Temple, C. F. Maxwell; Bastrop County, 7-20-37; Richmond, 6-22-17;  
Bastrop, Heiligbrodt; Victoria, 7-21-16, 7-31-16, 8-22-12, 9-6-15, J. D. Mitchell;  
Brownsville, 7-27-?, 8-1-?, 8-2-?, 8-15-?, in Brooklyn Museum collection; Browns-  
ville, 6-?-04, H. S. Barber; Brownsville, 7-16-16, R. A. Vickery; Brownsville,  
7-30-?, 6-19-08, 6-21-08, D. K. McMillan; Brownsville, 9-30-06, J. C. Crawford;  
South Texas Gardens, 6-21-08, 6-22-08, 6-23-08.

MEXICO: Tlahualilo, 7-?-05, A. W. Morrill; Buena Vista, Sierra del Carmen,  
Coahuila, 7,000 feet, R. H. Baker; Colima, L. Conrad.

Wheeler (1908) lists *harrisii* from Austin, Waco, and Brownsville, Tex.;  
Mesilla, N. Mex.; Palmerlee and Nogales, Ariz.; and Sinaloa, Mexico.

The male of *harrisii* is distinguished from those of other species by its  
form and color; very large eyes and ocelli; prominent ridge above antennal  
socket; shape of mandible; transverse impression on prothorax and also on  
base of sixth gastric tergum; shape of aedeagus; and nature of punctation.

Although this species is very easy to distinguish by the characters mentioned  
above, I have found considerable variation among different individuals. Such  
variation includes depth of color; length and abundance of hairs; size of eyes;  
amount of development of transverse ridge above antennal socket; width  
between frontal carinae; shape of mandibles; and coarseness of punctures.

Males of *nigrescens* and *opacithorax* have mandibles which considerably  
resemble those of *harrisii* but these species can easily be distinguished from  
*harrisii* by their much smaller eyes and ocelli; different body color, and other  
characters. I am not aware of any species of *Eciton* in the United States the  
male of which has a more distinctive appearance than *harrisii*.

Although this species has been collected in Arizona, New Mexico, Okla-  
homa, and Mexico, it seems to be most common in Texas, especially in the  
eastern half of the State. The color of the body of the male, the nature of  
the sculpturing and pilosity, and the distribution of the ant in Texas strongly  
suggest that this may be the male of *wheeleri*.

Males have been collected from June to October inclusive; however, they seem to be most common during June and July.

ECITON (NEIVAMYRMEX) MINUS (Cresson)

- Labidus minor* Cresson, 1872, Trans. Amer. Ent. Soc. 4:195, ♂; Cresson, 1887, Trans. Amer. Ent. Soc. suppl. vol., p. 259.  
*Eciton (Labidus) minor* (Cresson), Mayr, 1886, Verh. Zool.-Bot. Ges. Wien 36:441.  
*Eciton (Labidus) minus* (Cresson), Emery, 1895, Zool. Jahrb. Syst. 8:261; Wheeler and Long, 1901, Amer. Nat. 35: 165.  
*Eciton minus* (Cresson), Dalla Torre, 1893, Cat. Hymen. 7: 4; Forel, 1899, Biol. Centr.-Amer., Hymen. 3: 29.  
*Eciton (Acamatus) minus* (Cresson), Emery, 1900, Mem. Real Accad. Sci. Bologna 8: 516; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 418, pl. 26, fig. 6; Emery, 1910, Gen. Insect., Fasc. 102: 27.

*Male*.—Length 8.75 mm. (Pl. 4, Fig. 17).

Head approximately one and seven-tenths times as broad as long. Eye large, convex, protuberant. Ocelli rather large, placed on protuberance above general surface of head; summit of protuberance concave; lateral ocellus usually about one-half its greatest diameter from inner border of eye. Frontal carinae subparallel or faintly divergent posteriorly, with groove between them extending to anterior ocellus. Antennal scape robust, longer than combined length of first 3 funicular segments, but not so long as combined length of first 4 segments; segments 1 and 2 distinctly broader than long, segments 3 to 5 inclusive feebly enlarged, segments 4 to 12 inclusive clearly longer than broad. Posterior corners of head not angularly protuberant as in *fuscipennis* and *melsheimeri*. Mandible moderately long, curved, gradually tapering from base toward apex, where it ends in an extremely acute, incurved point; shorter and more robust than in the two species mentioned above. Head, from above, weakly projecting behind eyes, more rounded immediately behind and adjacent to eyes than in *fuscipennis* and *melsheimeri*. Eye occupying approximately all of side of head except the produced and feebly ridged corner posterodorsad of eye. Region of head behind ocelli, in profile, flattened or feebly concave. Occipital flange lacking. Thorax longer than high, proportionally higher than in *melsheimeri*; somewhat projecting above head. Mesonotum convex, with anteromedian and parapsidal lines, these distinct in some specimens, less distinct in others. Epinotum, in profile, subtruncate or feebly concave. Legs remarkably small. Sides sharply margined through anterior half of petiole. Tarsal claws feebly toothed. Gaster slender, compressed, with distinct constrictions between segments. Sixth gastric tergum with a transverse impression near base. Seventh gastric sternum with two acute lateral teeth, and a less acute intermediate tooth. Paramere short, but abruptly enlarged apically to form a blunt, somewhat spear-shaped structure.

Head shining; thorax and gaster more subopaque owing to the dense, short, and closely appressed hairs; thorax more subopaque than gaster. Punctuation more or less concealed by the pubescence, coarsest on posterior part of mesonotum and pleura.



Hairs yellowish, short, dense, much appressed on all parts of body; longer and suberect to erect on head, scapes, and ventral surface of body; hairs on head less dense than on appendages.

Brown; head darkest, thorax less dark, and gaster least dark of all. Wings very pale, semitransparent, with extremely light veins and distinct brown stigma.

The foregoing description is based on the lectotype in the Academy of Natural Sciences of Philadelphia and the six paratypes in the United States National Museum.

*Type locality*.—Bosque County, Tex., G. W. Belfrage.

*Material studied*.—ARIZONA: Fort Grant, 7-19-?, 7-23-?, 7-22-?, Hubbard; Globe, 8-8-35, F. H. Parker. CALIFORNIA: Ramona, 8-15-14, J. C. Bradley; Claremont, C. F. Baker; Riverside, 8-5-24, 8-6-24, 8-10-24, P. H. Timberlake; Monrovia, 8-?-?, Jack Schwartz; Alhambra, 7-?-38, Jack Schwartz; San Diego, Ricksecker; Pasadena, 8-10-08, F. Grinnell, Jr.; San Gabriel, 4-1-10, H. J. Quayle; San Jacinto, 6-?-?-; Boquet Canyon, Los Angeles County, 8-17-37, N. Westerland. KANSAS: Northeast corner of Barber County, 7-25-33. NEW MEXICO: Mesilla Park, 7-12-17. OKLAHOMA: Stillwater, 8-3-38, R. W. Kaiser. TEXAS: Plano, 7-?-?, E. S. Tucker; Brewster County, Chisos Mountains, 6-10-08, 6-12-08, J. D. Mitchell and R. A. Cushman; Nolan County, 7-4-37; Daingerfield, 7-9-37; Edinburg, ?-?-35, S. Mulaik; Limpia Canyon, Davis Mountains, 7-17-17, in Cornell University collection.

MEXICO: Five miles south of Miraflores, 7-10-38; San Miguel, 7-3-38; 15 miles west of La Paz, 7-5-38; 12 miles south of Santa Rosalia, 6-27-38; Buena Vista, Sierra del Carmen, Coahuila, 6,000 feet, 7-7-38, R. H. Baker; 3 miles north of San Pedro, 7-6-38; San Domingo, 7-19-38; Coyote Canyon, Concepcion Bay, 6-29-38. All the Mexican collections were made by Michelbacher and Ross except as noted.

The male of *minus* can be distinguished from those of other species by its small size and slender form; by the shape of the mandibles; by the posterior corner of the head not being strongly protuberant between the eye and the lateral ocellus; by the shape and length of the antennal scapes; by the flat or feebly concave area of the head back of the ocelli; by the lack of an occipital flange; by the nature of the pilosity; and by the color of the body and wings.

The male is more variable than that of *melsheimeri*. Such variation includes width of space between eye and lateral ocellus; production of head behind eyes; distinctness of lines on mesonotum; color (light brown to deep brown with the head black on some individuals and scarcely darkened on others); length of pilosity; and coarseness of punctuation. Specimens from Mexico are much more robust, deeply colored, and coarsely punctured than are the specimens from Texas northward.

The male of *minus* is most likely to be confused with that of *melsheimeri* and *fuscipennis*. It differs from both these species in lacking the prominent posterior corners of the head. It can be distinguished from the former by the absence of long, suberect to erect hairs on the thorax and gaster; and from the latter by its much paler, semitransparent wings.

The species has a wide range in the southwestern part of the United States and extends southward into at least Mexico. Males have been collected from April through August, but more commonly during July and August.

## ECITON (NEIVAMYRMEX) MELSHEIMERI (Haldeman)

- Labidus melshaemeri* Haldeman, 1852, Stansbury's Expedt. Great Salt Lake. Lippincott Grambo and Co., Publ., p. 368, pl. 9, figs. 7, 8, 9, ♂; Cresson, 1887, Trans. Amer. Ent. Soc. suppl. vol., p. 259.
- Eciton (Labidus) melshaemeri* (Haldeman), Mayr, 1886, Verh. Zool.-Bot. Ges. Wien 36: 442; Emery, 1895, Zool. Jahrb. Syst. 8: 261; Wheeler and Long, 1901, Amer. Nat. 35: 165.
- Eciton melshaemeri* (Haldeman), 1893, Dalla Torre, Cat. Hymen. 7: 4; Emery, 1900, Mem. Real Accad. Sci. Bologna 8: 516.
- Eciton melsheimeri* (Haldeman), Forel, 1899, Biol. Centr.-Amer., Hymen. 3: 28.
- Eciton (Acamatus) melsheimeri* (Haldeman), Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 418, pl. 26, fig. 9.
- Eciton (Acamatus) melshaemeri* (Haldeman), Emery, 1910, Gen. Insect., Fasc. 102: 26.

*Male*.—Length 7 mm. (Pl. 4, Fig. 16).

Head approximately one and six-tenths times as broad as long. Eye prominent, convex, protuberant. Ocelli large; ocellar protuberance concave at summit, inner border of eye and lateral ocellus almost touching each other. Frontal carinae sharply margined, subparallel, with distinct groove between them up to point where each converges outwardly toward eye, thus forming a prominent ridge above each antennal socket. Antennal scape robust, short, approximately as long as combined length of first 3 funicular segments; second funicular segment unusually short, third through fifth distinctly broader than any succeeding segments. A pair of short, stubby, toothlike projections posterior to clypeus, these not evident on all individuals. Mandible rather long, slender, curved, tapering from base toward apex, where it ends in a very acute point. Posterior corner of head strongly projecting between lateral ocellus and inner border of eye, but not so well developed as in *fuscipennis*. From above, posterior corners of head projecting behind and also dorsolaterad of eye, thus giving head an extended appearance. In profile, vertex and posterior corner of head well extended dorsally above superior border of eye. Eye nearly touching base of mandible, occupying all of side of head except for large, protuberant, ridge-shaped corner posterodorsad of eye. Region of head posterior to ocelli, in profile, flattened or feebly concave; occiput without a perceptible flange. Thorax, in profile, distinctly longer than high, not projecting perceptibly above head. Anterior median and parapsidal lines often indistinct or missing, the former most easily seen. Epinotum, in profile, subtruncate. Tarsal claws faintly toothed. Petiole, in profile, flattened or feebly convex beneath. Gaster elongate, slender, compressed, with distinct constrictions between segments. Intermediate tooth on apex of seventh gastric sternum small and indistinct, the lateral teeth acute. In profile, apex of paramere truncate, ventral border of apex convex, and dorsal border of apex excised.

Body rather shining in spite of the unusually long and fairly dense hairs covering it. Punctures on side of thorax sparse, but visible in some lights.

Hairs yellowish, long, suberect; less appressed on head, thorax, petiole, and ventral surface of gaster; unusually long near apex of gaster.

Yellowish brown to darker brown with the head usually, and the thorax occasionally, darker than remainder of body. Wings dusky grayish or dusky yellowish, with light-brown veins and distinct dark stigma.

The description is based on numerous specimens from the localities cited below.

Type apparently lost.

Type locality.—Fort Gates, Coryell County, Tex., Lieut. Horace Haldeman.

The type locality of this species has been incorrectly cited by many formicologists as Fort Gates, Utah, because *melsheimeri* was described by Prof. S. S. Haldeman in the report of Stansbury's Expedition to the Great Salt Lake (Haldeman, 1852). Since not all the insects mentioned or described in this report were collected in Utah, and as *melsheimeri* is common in Texas (no one has ever reported it from Utah), I believe the Fort Gates referred to is unquestionably that in Coryell County, Tex. What applies to the type locality of *melsheimeri* also applies to the type locality of *harrisii*.

*Material studied.*—OKLAHOMA: Latimer County, W. Fisher. TEXAS: Brownsville, 5-21-04, 6-2-04, 6-5-04, H. S. Barber; Brownsville, 5-2-2, 6-2-2, in Brooklyn Museum collection; Brownsville, 4-28-11, 5-19-11, R. A. Vickery; Brownsville, 6-2-2, in Cornell University collection; Wharton, 6-24-17, in Cornell University collection; Victoria, 6-24-17, in Cornell University collection; New Braunfels, 6-26-17, in Cornell University collection; Winter Haven, 5-15-36, 5-23-36, S. E. Jones; Mexia, 6-23-37, Texas State Park Survey; Daingerfield, 7-6-37, in Texas Agricultural Experiment Station collection; Morris County, 6-23-37, in Texas Agricultural Experiment Station collection; Plano, 8-2-2, E. S. Tucker; Richmond, 6-22-17, in Cornell University collection; Columbus; College Station, 6-11-33, H. J. Reinhard; Dallas, 7-8-06, J. C. Crawford; Wellborn, 6-29-37, R. W. Strandmann.

MEXICO: Paso de Talaya, Vera Cruz, C. H. T. Townsend.

Wheeler (1908) cites *melsheimeri* from Austin, Brownsville, Plano, and Dallas, Tex., and from Paso de Telaya, Vera Cruz, Mexico. He states, "This species is common at Austin about the electric lights during the spring and summer months. It ranges as far south as Guatemala and Costa Rica."

The male can be distinguished from males of other species by its small size and slender form; shape of mandibles; strongly protuberant posterior corner of head; very narrow space between eye and lateral ocellus; flattened or faintly concave surface of head back of ocelli; absence of any perceptible occipital flange; and nature of pilosity and color.

There seems to be less variation in the males of *melsheimeri* than in the males of some of the other species of *Eciton* discussed in this article. The characters observed to vary most are the length of the pilosity and its degree of erectness; the color of the body; the distinctness of the anteromedian and parapsidal lines on the mesonotum; the development of the concavity at the summit of the ocellar protuberance; the depth of the groove between the frontal carinae; and the development of the tooth on the tarsal claws.

The male of *melsheimeri* might be confused with that of *minus*. It can be readily distinguished, however, by the presence of the prominent, protuberant

posterior corners of the head, and the longer and more erect body hairs, especially those of the gaster.

Males have been collected from April to August inclusive, most of them having been taken during June. They are apparently among the earliest males of *Eciton* to appear.

ECITON (NEIVAMYRMEX) FUSCIPENNIS Wheeler

*Eciton (Acamatus) spoliator* Wheeler (not Forel), 1908, Bull. Amer. Mus. Nat. Hist. 24: 416, pl. 26, fig. 12, ♂.

*Acamatus fuscipennis* Cresson, Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24: 417, pl. 26, fig. 12, ♂.

*Male*.—Length 10 mm. (Pl. 4, Fig. 15).

Head one and six-tenths to one and seven-tenths times as broad as long; posterior corners strongly protruding and easily visible between lateral ocellus and eye. Ocelli large, but not placed on high protuberance above general surface of head as in *minus*, summit of protuberance concave. Antennal scape approximately as long as the combined length of the first 3 funicular segments; funiculus of approximately same width throughout, except through segments 2 to 5 inclusive, where it is feebly broader; segments 3 to 12 distinctly longer than broad. Mandible remarkably long, slender, curved, tapering from base toward apex and ending in a very acute point. Frontal carinae rather far apart, with moderately shallow but broad groove between them. Eye rather large, convex, protuberant. In profile, eye occupying all of side of head except small area above base of mandible and a large ridgelike area posterodorsad of eye. In profile, region of head posterior to ocelli flattened or feebly concave, lacking occipital flange. From above, posterior corners projecting noticeably behind eyes. Space between ocellus and eye approximately equal to one-half or less greatest diameter of ocellus. In profile, thorax not noticeably protruding above head as in *minus*. Prothorax without distinct transverse impression anteriorly. In profile, thorax about three-fifths as high as long. Epinotum subtruncate, with vertical or feebly concave declivity. From above, thorax truncate anteriorly; mesonotum with distinct anteromedian and parapsidal lines. Legs rather small, slender. Petiole slightly broader than long, with rounded anterior angles, produced and distinct posterior angles, and very weakly concave sides; lacking the extremely sharp anterolateral margins of *minus*. Gaster slender, compressed, with distinct constrictions between segments. Apex of seventh gastric sternum with short median and two acute lateral teeth.

Punctures on head, and especially on thorax, abundant, coarse, distinct. Head and gaster apparently more shining than other parts of body although these are also shining in certain lights.

Hairs yellowish, dense, rather closely appressed on all parts of body except head, legs, ventral surfaces of body, and tip of gaster, where they are longer and more suberect to erect.

Light brown or yellowish brown, with darker head. Wings hairy, deeply and uniformly infuscated, bearing brown veins and stigma, stigma prominent.

The description is drawn from 17 specimens in the collection of the United States National Museum, all of which appear to belong to the same series, although 8 of this number bear the label "Texas, Belfrage," and the other 9 only the label "Texas." Two of the latter, however, have in addition handwritten label "*Labidus fuscipennis* Cr." One of the handwritten labels seems to be that of Belfrage. From the available information it appears that *Labidus fuscipennis* is a manuscript name assigned by Cresson to specimens collected by Belfrage.

Two specimens in the National Museum collection are presumably the males described and figured by Wheeler (see paragraph below).

*Type locality*.—Texas, G. W. Belfrage.

Wheeler (1908) received for study from the National Museum two specimens under the manuscript name "*Acamatus fuscipennis* Cresson." After checking the specimens with Forel's description of *spoliator*, Wheeler stated that they "agree so closely with the above description that I do not hesitate to assign them to Forel's species." Forel described *spoliator* from a specimen taken in Costa Rica by Alfaro (Forel, 1899-1900).

I have not been fortunate enough to see the type of *spoliator*, but I have had an opportunity to examine two specimens collected at light at San Jose, Costa Rica, by C. F. Nevermann, one on June 10, 1938, and the other on June 20, 1937. Both specimens agree more closely with Forel's description of *spoliator* than the Texas specimens. Belfrage's specimens differ from those of Nevermann in their larger size; larger mandible with broader and more flattened base; larger eyes and ocelli; more feebly developed ridge above antennal socket; less strongly protuberant posterior corner of head; darker wings; and more abundant but finer punctures of the thorax. The paramere is also less truncate apically and more rounded on its ventral border. These differences, in my opinion, warrant considering Belfrage's specimens a distinct species, namely *fuscipennis*, for which name Wheeler should be credited as the author.

The male of *fuscipennis* can be distinguished by its rather small size; slender form; long, curved, very acutely tapering mandible; strongly projecting posterior corner of the head; subfiliform antennal funiculus; faintly toothed tarsal claws; deeply infuscated wings; and yellowish-brown body with blackish head.

This species might be confused with *melsheimeri*, to which it bears a resemblance in size, form, protuberant posterior corners of the head, and the shape of the mandibles. It can be very easily distinguished from *melsheimeri*, however, by its larger size, longer mandibles, deeply infuscated wings, and much shorter pilosity.

#### ECITON (NEIVAMYRMEX) OSLARI Wheeler

*Eciton (Acamatus) oslari* Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. **24**: 415, pl. 26, fig. 8, ♂; Emery, 1910, Gen. Insect., Fasc. **102**:27.

*Male*.—Length 10.11 mm. (Pl. 5, Fig. 18).

Head approximately one and seven-tenths times as broad as long. Eye very large, convex, protuberant. Ocelli large, placed on protuberance well elevated above general surface of head, summit of protuberance concave; lateral ocellus less than its greatest diameter from inner margin of eye. Frontal carinae well developed, rather sharply edged, with a distinct groove between them extending to anterior ocellus. Antennal scape not much wider than base of funiculus, approximately as long as combined length of first 3 funicular segments; funiculus very long, subfiliform, of almost same width throughout; all segments except first distinctly longer than broad. A rather pronounced ridge above each antennal socket. Posterior corner of head not angularly protuberant between lateral ocellus and inner border of eye. Mandible moderately long, sickle shaped, more or less gradually curved and tapering toward the pointed apex. Head, from above, distinctly projecting behind eyes. Eye, in profile, large but not occupying all of side of head, there being a rather large area postero-dorsad. Region of head back of ocelli, in profile, flattened or slightly convex; occipital flange lacking. Thorax slender. Prothorax, in profile, with strong, transverse impression; slightly projecting above head. Mesonotum with antero-medial and parapsidal lines. Epinotum, in profile, concave or subtruncate, its base approximately one-half length of declivity. Legs small, especially anterior pair; metatarsus of middle leg approximately one-half length of tibia; tarsal claws usually toothed, but weakly so. Petiole one and two-thirds times as broad as long. Gaster slender. Base of seventh gastric sternum with a thick, blunt, somewhat emarginate, transverse ridge; apex of sternum with 3 teeth, the 2 lateral teeth acute, the intermediate tooth short and blunt, most clearly seen in profile. Paramere, in profile, strongly bifurcate at apex, the upper branch forming an elongated, curved, fingerlike process, and the lower branch a structure that resembles the mold board of a plow.

All parts of body and appendages shining in some lights except funiculi. Dorsal surface of head especially shining. Head and mandibles with small, scattered punctures; thorax covered with numerous but rather fine punctures, those on side of thorax and posterior part of mesonotum largest, most distinct.

Hairs yellowish gray, short, appressed; rather dense on all parts of body; longer and more suberect on head, legs, mesopleura, and venter. Seventh gastric sternum with an unusually dense and rather long group of hairs.

Reddish brown, with upper surfaces of head and thorax usually darker. On some specimens mesonotum with 3 dark, longitudinal fasciae. Wings grayish, with brownish-black veins and stigma.

Described from a specimen belonging to the Museum of Comparative Zoology and erroneously labeled cotype and from 6 specimens from the localities listed below.

Holotype in American Museum of Natural History.

*Type locality*.—Nogales, Arizona, July 15, 1908, E. J. Osler.

*Material studied*.—ARIZONA: Catalina Mountains, 5,500 feet, 1917; Rincon Moun-

tains, 7,500 feet, A. A. Nichol; Fort Grant, Hubbard; Globe, 8-8-35, H. Parker; Nogale, 7-9-03, E. J. Oslar.

The male of *oslari* is distinguished from those of other species by its slender form; by the shape of antennae and mandibles; by its large eyes and ocelli; its small legs; the transverse ridge at the base of the seventh gastric sternum; the color of the body and wings, and the nature of the pilosity.

The specimens studied showed very little variation. However, the head and thorax of some individuals are darker than those of others. The abundance and size of the punctures on the head vary as well as the distance between the inner border of the eye and the lateral ocellus. In no instance is the space between the eye and the lateral ocellus greater than the greatest diameter of the lateral ocellus. Wheeler's description states that the subgenital plate (seventh gastric sternum) of the male is bifurcated, but this was not found to be true of the specimen examined by me. It is possible that he overlooked the small, median tooth, which is clearly seen only in profile.

The range of *oslari* is no doubt greater than that indicated by the records above. Males have been collected during July and August.

#### ECITON (NEIVAMYRMEX) ARIZONENSE Wheeler

*Eciton (Acamatus) arizonense* Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. **24**: 414 pl. 26, fig. 5, ♂.

*Eciton (Acamatus) arizonensis* Wheeler, Emery, 1910, Gen. Insect., Fasc. **102**: 25.

*Male*.—Length 12-13 mm. (Pl. 5, Fig. 19).

Head approximately twice as broad as long. Eye large, strongly convex, protuberant. Ocelli large, placed on high protuberance above general surface of head; from above, appearing as if on a distinctly elevated, transverse ridge; lateral ocellus less than its greatest diameter from inner margin of eye. Frontal carinae elevated, sharply margined, slightly converging posteriorly, with deep groove between them. Antenna short; scape robust, very noticeably wider than base of funiculus, but slightly shorter than combined length of first 4 funicular segments; funiculus distinctly tapering from base to apex. Clypeus excised. Mandible flattened dorsoventrally, very long, strongly curved, especially toward apex, and tapering to form an extremely acute point. Head, from above, remarkably broad and short, not prolonged behind eyes. Thorax very robust, strongly protruding above dorsal surface of head. Mesonotum with distinct anteromedian and parapsidal lines. Epinotum, in profile, concave. Tarsal claws toothed. Petiole with a protuberance beneath. Apex of seventh gastric sternum with 3 teeth; a short, somewhat blunt, median tooth, and 2 rather acute lateral teeth. Paramere, in profile, abruptly enlarged toward apex, and with a dorsal emargination which varies considerably with regard to depth and breadth.

Head and anterior border of each gastric segment smooth and shining; remainder of body more opaque. In some lights, various parts of the body have a glabrous appearance in spite of the dense hairs covering the surface. Thorax, petiole, and gaster very finely punctulate.

Hairs yellowish, rather dense and somewhat appressed; usually longer on lower surface of body, epinotum, petiole, and tip of gaster.

Yellowish brown to reddish brown, with darker head and seventh gastric sternum. Wings distinctly yellowish, pilose, with light-brown or yellowish-brown veins and stigma.

The description is drawn from a cotype male in the Museum of Comparative Zoology bearing the label Nogales, Ariz., 8-5-03, E. J. Oslar, and from males from the various localities mentioned below.

Male cotypes in Museum of Comparative Zoology.

*Type locality*.—Nogales, Ariz.; E. J. Oslar.

*Material studied*.—ARIZONA: Tucson, 7-10-30, 7-5-34, E. D. Ball; Fort Grant, Pinaleno Mountains, 7-5-17, 7-17-17, in Cornell University collection; Highley, 7-?-17; Nogales, 7-9-03, 7-15-13, 8-5-03, 6-21-03, 6-23-03, E. J. Oslar. NEW MEXICO: Deming, 7-12-17, W. M. Wheeler; Mesilla Park, 7-12-17; Pyramid Peak, Dona Anna County, 7-21-30, F. R. Fosberg. TEXAS: Cypress Mills, in W. H. Ashmead and F. H. Chittenden collections; Brownsville, 6-?-04, H. S. Barber; Brownsville, 5-?-?, 6-?-?, in Brooklyn Museum collection; Helotes, 7-1-17, in Cornell University collection; Weslaco, 6-2-30, S. W. Clark; Hidalgo County, 6-5-30, J. C. Gaines; New Braunfels, 6-26-17, in Cornell University collection; Fort Davis, 7-7-35, W. L. Owen, Jr.; Bastrop County, 7-20-37; Dimmitt County, 6-24-34, S. E. Jones; Victoria, 8-28-03, 7-29-03, A. W. Morrill; Travis County, 6-27-02, M. Holliday.

MEXICO: La Buena Vista, Sierra de la Encontada, 5,000 feet, 7-7-38, R. H. Baker; Tlahualilo, 7-?-05, A. W. Morrill.

COSTA RICA: 5-5-38, C. F. Nevermann.

Wheeler (1908) records the species from Brownsville and Austin, Tex.; Las Cruces, N. Mex.; and Nogales, Ariz.

The male of *arizonense* is distinguished by the form of the mandibles; its short antenna with strongly tapering funiculus; large eyes and ocelli; stout thorax which projects forward prominently above the head; concave epinotum; toothed claws; the nature of the pilosity; and the coloring of the body.

Variation was noted in size, length of antenna, length of body hairs, width of space between eye and lateral ocellus, convexity of eye, acuteness of teeth on seventh gastric sternum, shape of emargination on dorsal border of paramere, and opaqueness of body.

The male should not be confused with that of any other species of *Neivamyrmex* in the United States. Superficially, it strongly resembles in size and color the male of *pilosum* but can be immediately distinguished from it by the shape of the mandibles, the lack of a distinct median groove on the epinotum where the base and declivity meet, and the lack of an occipital flange on the posterior part of the head. The male of *pilosum* also has the thorax more protruding anteriorly; darker head, legs, and seventh gastric sternum; and it usually has shorter pilosity.

This species seems to be confined in the United States to the extreme Southwest but extends southward at least as far as Costa Rica. Specimens have been collected from May through August but most commonly during June and July.



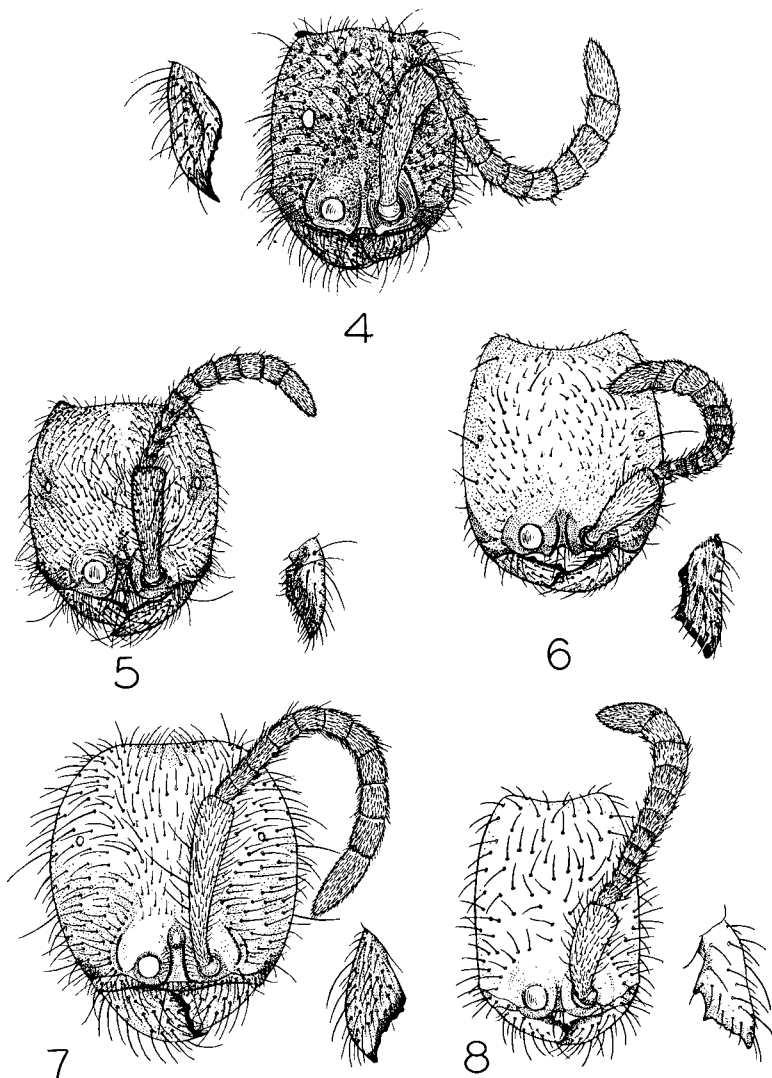


PLATE 1.—Head and mandible of major worker of (4) *Eciton* (*Neivamyrmex*) *nigrescens* (Cresson); (5) *wheeleri* Emery; (6) *commutatum* Emery; (7) *pilosum* F. Smith; (8) *pauxillum* Wheeler.

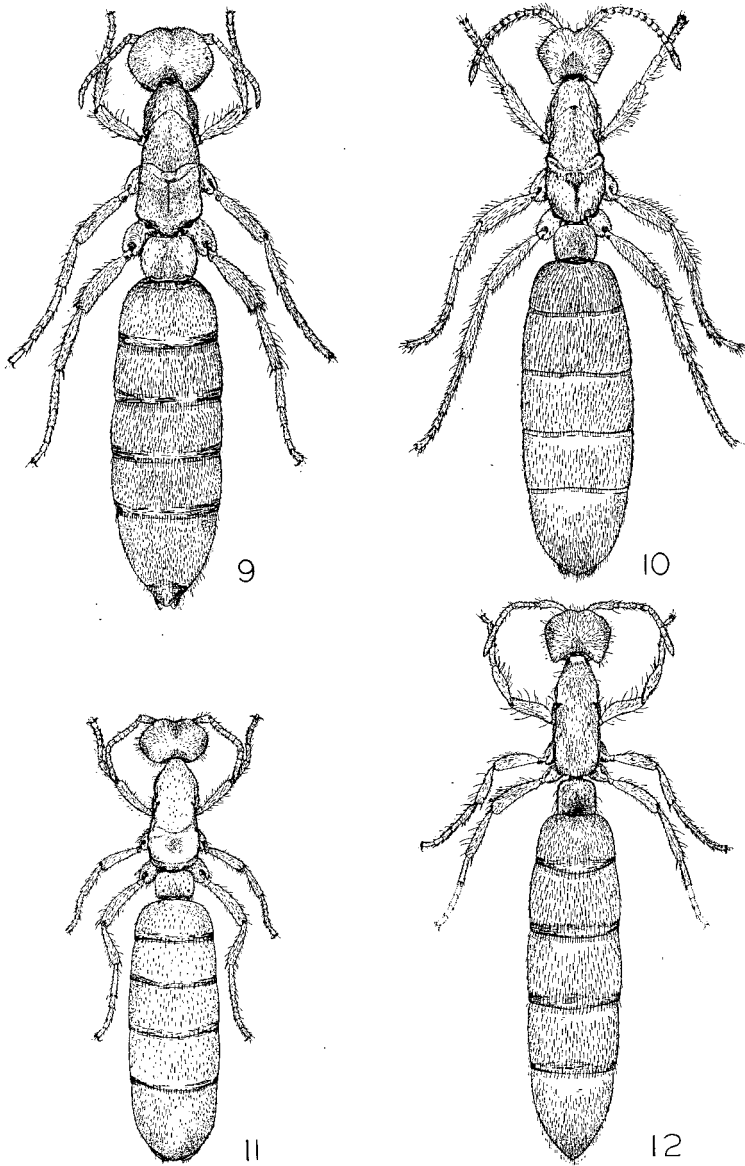
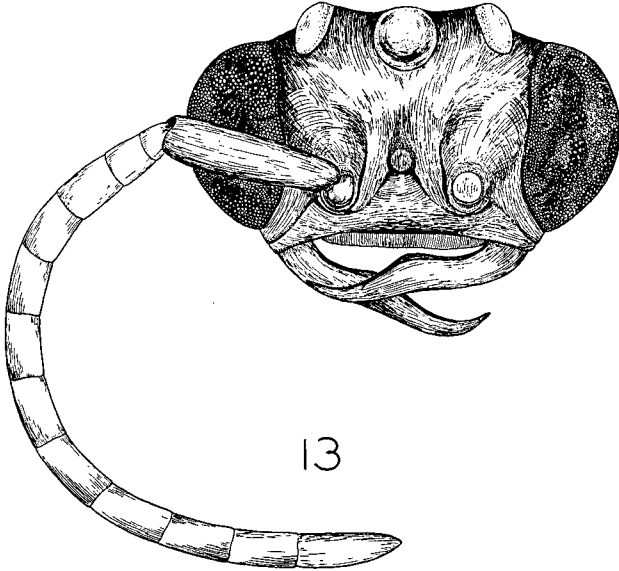
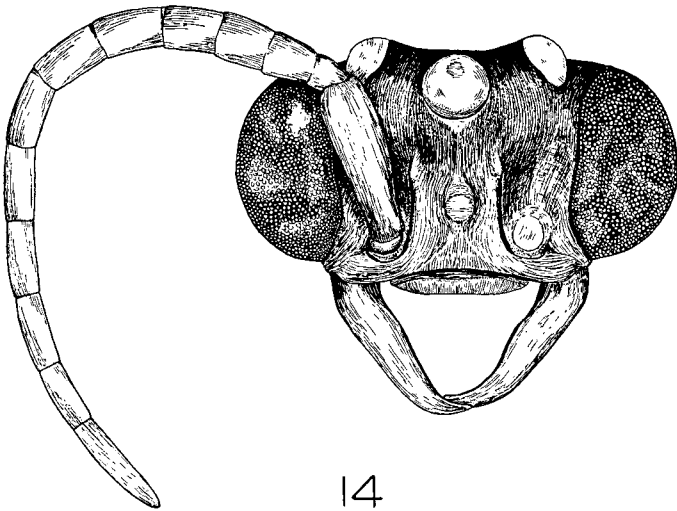


PLATE 2.—Female of (9) *Eciton* (*Neivamyrmex*) *opacithorax* Emery; (10) *nigrescens* (Cresson); (11) *carolinense* Emery; (12) *wheeleri* Emery.



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PLATE 3.—Head of the male of (13) *Eciton (Neivamyrmex) pilosum* F. Smith;  
(14) *pilosum mandibulare*, new subspecies.

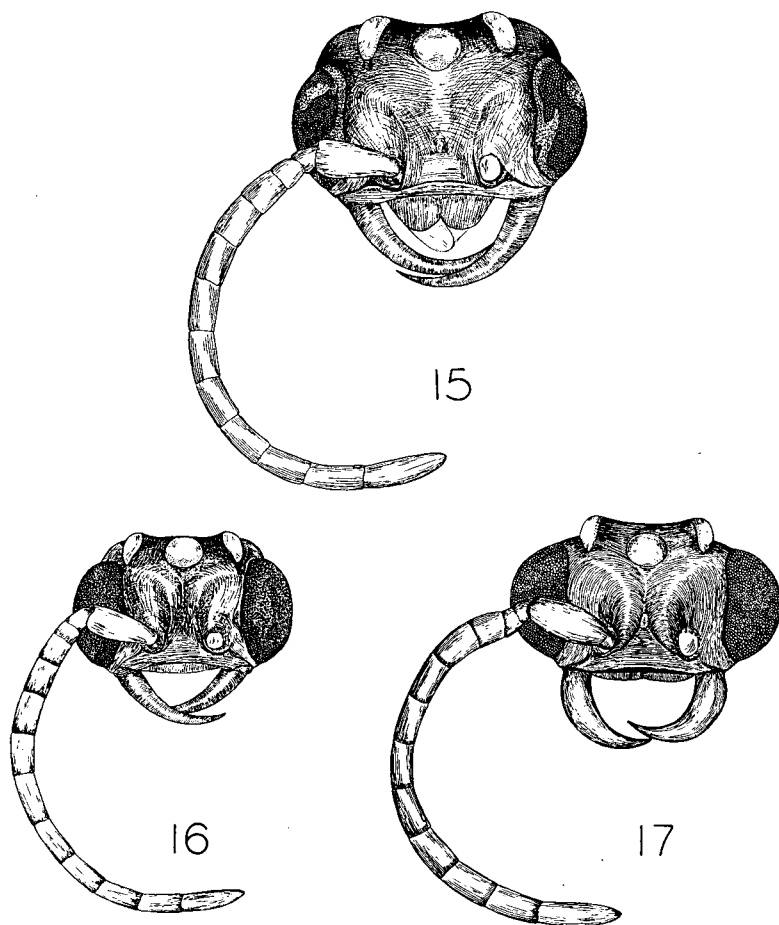


PLATE 4.—Head of the male of (15) *Eciton* (*Neivamyrmex*) *fuscipennis* Wheeler; (16) *melsheimeri* (Haldeman); (17) *minus* (Cresson).

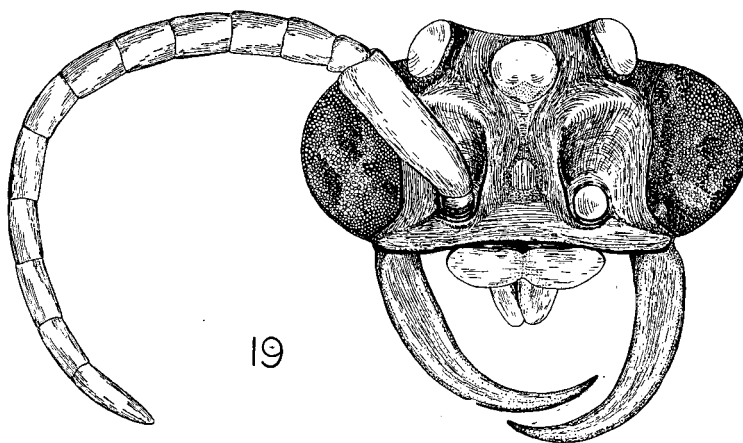
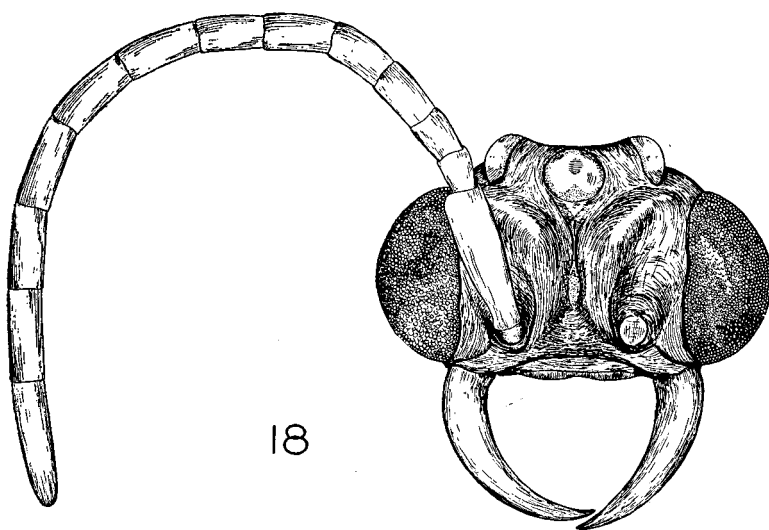


PLATE 5.—Head of the male of (18) *Eciton (Neivamyrmex) oslari* Wheeler; (19) *arizonense* Wheeler.

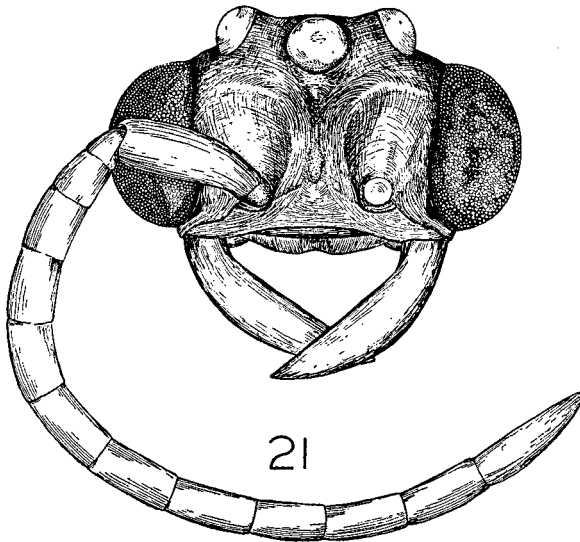
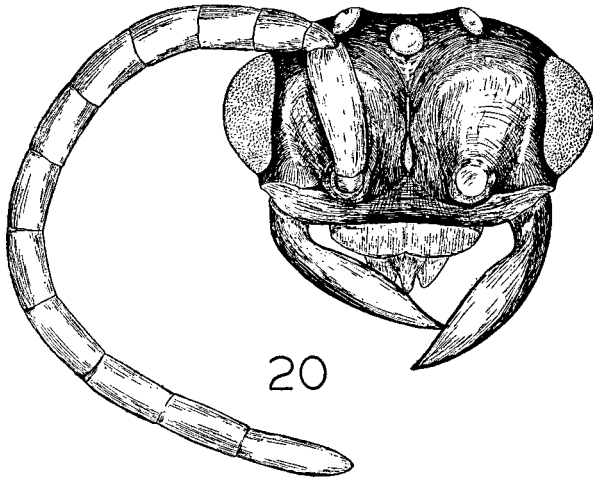


Plate 6.—Head of the male of (20) *Ecton* (*Neivamyrmex*) *opacithorax* Emery;  
(21) *harrisi* (Haldeman).

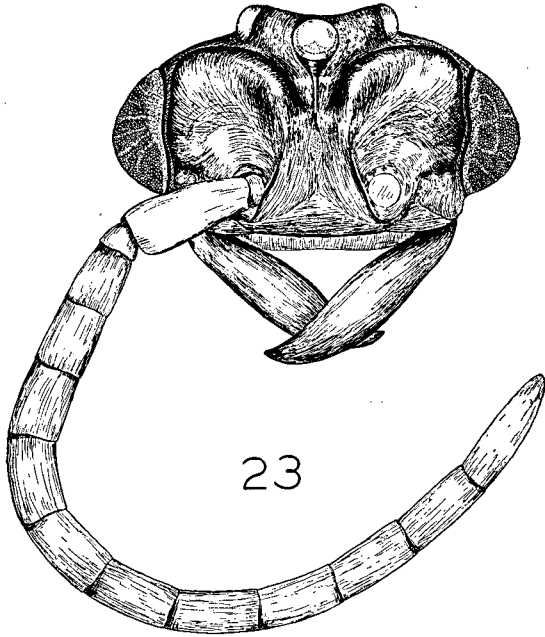
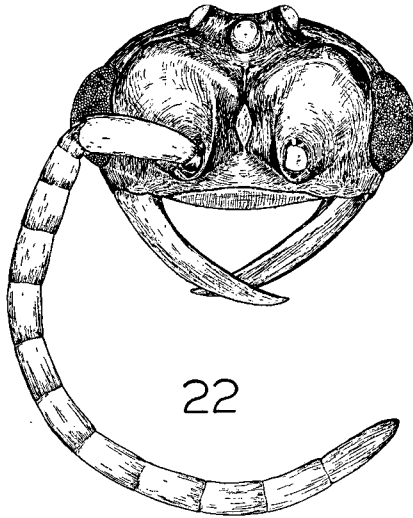


PLATE 7.—Head of the male of (22) *Eciton* (*Neivamyrmex*) *carolinense* Emery;  
(23) *nigrescens* (Cresson).

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