Revision of the Ant Genus Crematogaster (Hymenoptera: Formicidae) in North America

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REVISION OF THE ANT GENUS CREMATOGASTER (HYMENOPTERA: FORMICIDAE) IN NORTH AMERICA

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Dean of the Graduate School
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2009
Dedication

To my children Linda, Noah Joshua, and Aaron
Brant, Ethan and Damien
For never giving up on me

In remembrance of Joshua
You will always be with me
REVISION OF THE ANT GENUS CREMATOGASTER (HYMENOPTERA: FORMICIDAE) IN NORTH AMERICA

by

CYNTHIA ELLEN MORGAN, B.S.

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Abstract

The natural history of thirty-eight species of the genus *Crematogaster* in North America has been discussed and distribution of specimens mapped. A dichotomous key to the workers of these species has been developed. I hypothesized that the species richness is not as great as previously thought in North America. A taxonomic review of these species has been made with the following changes:

*Crematogaster cerasi* Fitch 1855 senior synonym of *C. browni* Buren1968.

*C. coarctata* Mayr 1870 senior synonym of *C. Californica* Emery 1895, *C. mormonum* Emery 1895 and *C. colei* Buren1968.

*C. depilis* Wheeler 1919 senior synonym of *C. lareae* Buren1968.

*C. emeryana* Creighton 1950 senior synonym of *C. marioni* Buren1968.

*C. formosa* Mayr 1870 senior synonym of *C. formosa var. aterrima* Wheeler 1909.


*C. vermiculata* Emery 1895 senior synonym of *C. opunitae* Buren 1968 and *C. rossi* Buren 1968.

*C. missouriensis* Emery 1895 is raised to species.

Due to a lack of worker material, the following taxa have not been included in this key to workers: *C. nocturna* Buren1968; *C. quadrispinosa* Roger 1863.
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Introduction

Taxonomy is the basis of much biological scientific inquiry. There is an estimated 2 million species formally described and given Linnaean binomial names (Patterson et al., 2006; Agnarsson and Kuntner, 2007). Unfortunately, the estimates for the number of species on the planet are between 4 to 12 million (Wilson, 2003; Patterson et al., 2006, Agnarsson and Kuntner, 2007). In addition, the planet is currently in its 6th mass extinction (Wilson, 2003), thus many species are being lost before their identities and roles in ecosystems can be defined. Alpha taxonomy plays an important role in identifying new species and reorganizing species already described. Some groups of organisms have had extensive work already completed. Ants have been subjected to little revision; however, recently there has been a push to update and even complete a revision of the family Formicidae (Agosti, 2000, Wilson, 2003). Many genera have already received a great deal of attention (Wilson, 2003). There are several difficult genera, such as *Crematogaster* that have been for the most part ignored.

The ant genus *Crematogaster* (Hymenoptera: Formicidae) is believed to have risen in the mid-Cretaceous (Schultz, 2000, Moreau, 2006, Pie, 2007) and the oldest recorded fossils are in Sicilian amber. There are over 900 species, subspecies, varieties, races, strips and transferred names assigned to this genus making it the 7th largest genus of ant in the world (Bolton, 2006, Wilson, 2003). Wilson (2003) refers to such large genera as hyperdiverse. Other hyperdiverse ant genera are *Camponotus*, *Pheidole*, *Solenopsis*, and *Tetramorium*. Wilson observed several commonalities of hyperdiverse ant genera which include having a small size, generalist diet and the ability to exploit very diverse ecosystems. Another shared feature in hyperdiverse ant genera is the ability to become dominant within an ecosystem and not get displaced by other species in the same guild (Wilson, 2003). Currently patterns of diversity within *Crematogaster* are poorly understood; distribution records for individual species are spread throughout the literature and
localities for many species are only available in type descriptions. Prior to this work, 51 species were known from North America, with highest diversity of type localities in the southwest United States. Species richness appears to be higher in more southern climates as illustrated by the low diversity in Canada. While representatives of the genus *Crematogaster* are known from Canada, none have been assigned to species. There is probably much collecting bias in North America, leaving many areas of all three countries unexplored. Currently diversity is characterized by numbers of species based on morphology with support added by behavior and habitat preference. Thus the potential diversity of North American *Crematogaster* is likely underestimated.

The genus *Crematogaster* has a distinctive morphology. The postpetiole is attached on the dorsal surface of the gaster, which allows this ant to bend its gaster over its mesosoma in a defensive stance enabling the ant to apply venom on an aggressor, hence the common name acrobatic ant. Other interesting morphological characters are the gaster is heart-shaped and the sting is spatulate allowing the ant to dab rather than inject its venom onto an aggressor (Buren, 1958). The species within this genus are often medium size (7 mm) to fairly small (2 mm) and most are continuously polymorphic in size of the worker caste.

Lund described *Crematogaster* in 1831 from specimens he had collected in Brazil. Say (1860) described *C. lineolata* from Massachusetts, and Fitch (1855) described *C. cerasi* from New York, United States, and Roger (1863) described *C. quadrispinosa* from a single queen from Mexico. Later numerous taxa were described by Mayr (1862, 1870a, 1870b, 1886a, and 1886b) and Emery (1895) from around the world. Wheeler (1904a, 1904b, 1912, and 1919) described more species he collected and received from other individuals; and the taxonomic confusion of the genus *Crematogaster* began. In 1918, Santschi described subgenera to aid in the identification of species and made a list of species within those subgenera. As the number of
species of ants increased world wide, Emery (1922) and Wheeler (1922) both developed lists of species within several genera of ants. Several monographs written by students of myrmecology such as Wheeler (1922, 1934a), Creighton (1950), Buren (1968) and Johnson (1988) have attempted to create some order to this complicated genus, but worked without the use of type material so the confusion of the taxonomy of this genus persisted. Only one new species from Florida, United States has been recorded in North America since 1968 when Buren described 14 new species occurring throughout southwestern United States and northern Mexico. Longino (2003a) compiled a survey and key of the Crematogaster of Costa Rica using type and new material and made 22 synonymies, 20 subspecies were raised to species and described 11 new species.

Although current alpha taxonomy of Crematogaster is based on morphology, ecological information is also informative in delineating species and understanding how they partition habitats and their ecological roles. In general, ants are an integral part of nearly every terrestrial ecosystem (Hölldobler and Wilson, 1990) and are among the earth’s most productive organisms (Agosti, 2000; Morin 1999). About 15-20% of the terrestrial animal biomass is composed of ants (Schultz, 2000). Their biomass among animals is second only to termites (Hölldobler and Wilson, 1990). Ants are the custodian of many landscapes, functioning as major decomposers of many ecosystems (Hölldobler and Wilson, 1990). Ants also aerate tremendous amounts of soil, and are often an integral part in nutrient cycling (Hölldobler and Wilson, 1990).

Crematogaster are small generalists that can be found in a wide variety of landscapes. In North America niches occupied can vary greatly in latitude, elevation, and nesting habits. They can be found in desert, riparian, mountainous, savanna, and tropical biomes. In low lying areas, many species such as C. ashmeadi and C. laeviuscula will build carton nests hung in trees, as bees do, to avoid any risk of flooding (Wheeler, 1906; Tschinkel 2002). Species such as C.
sumichrasti and C. isolata build their nests under rocks (personal observations). Some species are vegetative host-specific, as in C. depilis, which nests exclusively in the roots of Larrea tridentata (Mackay et al., 1984) and C. pinicola which nests only in dead branches and under the bark of pine trees, particularly Pinus elliotii and P. palustris (Deyrup and Cover, 2007).

Crematogaster, such as C. vermiculata and C. coarctata, feed on extrafloral nectar produced by Opuntia sp. Food scraps from humans will also attract this genus (Buren, 1968). Some species are very important within the ecosystem they inhabit. Crematogaster ashmeadi and C. pinicola are the primary food source for the endangered red cockaded woodpecker, Picoides borealis (Tschinkel, 2002). Many Crematogaster will cultivate a “herd” of aphids as a food source, rendering some species of Crematogaster and their companions pests. Thus the ecological diversification of Crematogaster is extensive, supporting the hypothesis of Wilson (2003) that members of hyperdiverse genera are typically habitat generalists.

The working hypothesis behind this endeavor is that diversity of Crematogaster in North America is overestimated and based on confused taxonomy. The goals of this research are to accomplish the following. 1) Define species of North American Crematogaster based on morphological characters using type material or specimens identified by authorities in the field (Buren, Longino). 2) Redescribe workers and reproductives from type material. 3) Describe previously undescribed reproductives. 4) Illustrate each species. (In many cases illustrations are lacking for all castes.) 5) Summarize locality data to develop a geographic map for each species. 6) Most importantly, to develop a key to the worker caste for species found in North America.
Methods and Materials

Type material and specimens were borrowed from the following museums and private collections:

COOK: Jerry Cook collection, Sam Houston State University, Texas
STDC: Shawn T. Dash collection, currently maintained at the University of Texas at El Paso
ABRS: Archibald Biological Research Station, Highlands County, Florida
LACM: Los Angeles County Museum of Natural History, Los Angeles, CA, U.S.A.
CWEM: Collection of William and Emma Mackay currently maintained at the University of Texas at El Paso
MCZC: Museum of Comparative Zoology, Cambridge, MA, U.S.A.
NHMW: Naturhistorisches Museum, Vienna, Austria.

Comparisons, observations and measurements were made using a Wild Heerbrugg dissecting microscope with a micrometer at magnifications of 40x or 80x. All measurements are in millimeters (mm). Most type specimens and individual specimens from the different collections were measured to determine the range in size of each morphological feature using the micrometer to the nearest 100th mm. At least two specimens were measured whenever possible.

Specimens in the genus Crematogaster usually cannot be identified by one single character, but need a suite of characters along with the specific character state of each character. Below I give the character states of many of the characters I used to identify and redescribe each species.
Measurements as defined by Longino (2003) were used for consistency except for Head Width which in Longino’s description includes the eyes, but does not include the eyes in this study (Plate 1). Size of anatomical structures or proportions of length/width are often partially diagnostic in identifying species of *Crematogaster*.

**HL:** Head Length is, in full face view the perpendicular distance from the most posterior point on the head to the most anterior point of the clypeus.

**HW:** Head Width is, in full face view the maximum distance between the most lateral points of the head in full face view just above the eyes and excluding the eyes.

**SL:** Scape Length is measured from the basal flange, not including the condyle, to the apex of the scape.

**EL:** Eye Length is measured from the side of the head along the longest axis of the eye, perpendicular to the shortest axis.

**ED:** Eye Diameter is measured from the side of the head along the short axis of the eye, perpendicular to the longest axis.

**CL:** Clypeal Length is, in full face view the perpendicular distance from the vertex of the clypeus to the most anterior points of the clypeus.

**CW:** Clypeal Width is, in full face view the length between the tentorial pits in full face view.

**WL:** Weber’s Length is measured in side view and is the maximum distance from the anterior edge of the pronotal shoulder to the posterior margin of the metapleural lobes.

**SPL:** Propodeal Spine Length is measured in side view from the tip of the spine to the closest point of the outer rim of the propodeal spiracle.

**PL:** Petiole Length viewed dorsally is measured along the greatest length from the anterior margin to posterior margin.
**PW:** Petiole Width viewed dorsally is measured perpendicular to the length at the widest portion of the petiole.

**PPL:** Postpetiole Length viewed dorsally is measured along the greatest length from the anterior margin to posterior margin.

**PPW:** Postpetiole Width viewed dorsally is measured perpendicular to the length at the widest portion of the petiole.

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Physical attributes of the face can also help in the identification of species. The anterior clypeal margin has four typical states slightly convex (Plate 2 Figure A), concave (Plate 2, Figure B) slightly concave with a medial notch (Plate 2, Figure C) or straight with a medial notch (Plate 2, Figure D).
Plate 2. Anterior clypeal margin of workers
(A) C. lineolate; (B) C. coarctata, (C) C. atra and (D) C. patei.

Hairs on the different structures of each species also help identify a specimen. Below is
the definition of each type of hair that can be found on *Crematogaster*. Most species of
*Crematogaster* have more than one type of hair present on each structure.

**Long erect hairs** rise perpendicular to the surface, are > 0.15mm, stiff and straight to the tip
(Plate 3, Figure A).

**Long flexuous hairs** rise perpendicular to the surface, are > 0.15mm, thin and may have a slight
curve (Plate 3, Figure B).

**Short erect hairs** rise perpendicular to the surface, are thick and bristle like. They are < 0.15mm
(Plate 3, Figure C).

**Decumbent hairs** rise from the surface of the integument and curve such that it is parallel to the
surface (Plate 3, Figure D).

**Appressed hairs** lie flat along the surface of the integument (Plate 3, Figure E).

**Erect spatulate hairs** rise perpendicular to the surface and are usually > 0.10mm and each hair
flattens as it rises away from the integument (Plate 3, Figure F).

**Semi-erect hairs** rise from the integument at an angle but are straight like erect hairs
(Plate 3, Figure G).
Plate 3. Hair character states
(A) Long erect hairs; (B) Long flexuous hairs; (C) Short erect hairs; (D) Decumbent hairs; (E) Appressed hairs; (F) Erect spatulate hairs; (G) Semi-erect hairs.

The spines on *Crematogaster* can be shaped and attached very differently from species to species. Variation within species is usually only a matter of size. Spines in species like *C. ashmeadi* are proportionally short or reduced (Plate 4, Figure A). In *C. ashmeadi*, the spines are flattened at the base along the interior margin giving a triangular appearance (Plate 4, Figure A). The dorsal margin of the spines of most species is straight; however, in *C. cerasi* the top margin of the spine is sinuate (Plate 4, Figure B). Some species such as *C. coarctata* have very long and pointed spines (Plate 4, Figure C). The development of the spines can be as small as little more than propodeal teeth as in *C. montizumia* (Plate 4 Figure D).

The size, shape and attachment of the spine can also vary. In most species, the spines are attached at the widest point of the propodeum as in Plate 3, figures A, B C and D; however, in *C. saussrei* the sides of the propodeum extend past the insertions of the spines (Plate 4, Figure E). The inside margins of the spines and the amount of divergence between the points can also vary greatly. The inside margin of the spines can be divergent as in *C. cerasi* (Plate 4, Figures B) or pointed posterior and upturned as in *C. curvispinosa* (Plate 4, Figure F).
The shape of the petiole and postpetiole are usually the first characters used to help separate species of *Crematogaster* into the subgeneric groups described by Santachi (1918). The first character to consider is the shape of the postpetiole. There are two basic character states when viewed from above: bilobed with a median sulcus as in *C. coarctata* (Plate 5, Figure A) and globular as in *C. rochai* (Plate 5, Figure B). The next character to consider is the shape of the petiole. There are at least three distinct character states for this character. The one character state is triangular with two corners anteriorly and one posteriorly as in *C. coarctata* (Plate 5, Figure A). A second character state for petiole shape is subquadrate with the length almost the same as the width as in *C. rochai* (Plate 5, Figure B). A third character state is elongate with posterior edge slightly wider than anterior edge and the length much longer than width as in *C. nigropilosa* (Plate 5, Figure C). Another character that can help in the identification of species is the presence and development of a subpetiolar and / or subpostpetiolar process. Many species do not have any subpetiolar or subpostpetiolar processes such as *C. limata* (Plate 5, Figure D). An anterior subpetiolar process can be small as in *C. coarctata* (Plate 5, Figure A), to well
developed as in *C. rochai* (Plate 5, Figure B). Few species have an anterior postpetiolar process as in *C. acuta* (Plate 5, Figure E).

Plate 5. Dorsal and side view of petiole and postpetiole
(A) C. coarctata; (B) C. rochai; (C) C. nigropilosa; Side view of petiole and postpetiole (D) C. distans; (E) C. acuta.
Key to the workers of *Crematogaster* in North America

1  Postpetiole with two hemilobes, divided by a longitudinal medial sulcus (Plate 5, Figures A and D) ........................................................................................................................................ 2
   - Postpetiole globular, not divided into two hemilobes by a longitudinal medial sulcus (Plate 5, Figure B and C) or slight emargination posteriorly (Plate 5 Figure E) ........... 24
2(1) Petiole approximately as wide as long, triangular, obviously widened anteriorly (Plate 5, Figure A) (subgenus *Crematogaster*) ................................................................. 3
   - Petiole sub-rectangular (Plate 5, Figure D) (subgenus *Eucrema*) ....................... 22
3(2) Spines short, and not inserted at widest portion of propodeum (Plate 4 Figure E) ....... 4
   - Spines inserted at widest portion of propodeum, may be long or reduced (Plate 5, Figures A, B, C, D and F) ........................................................................................... 5
4(3) Head and mesosoma punctate-lineolate, following curvature of head and pronotal shoulder ........................................................................................................ saussurei
   - Head longitudinally striate below eye, mesosoma punctate ......................... isolata

Note: *C. nocturna* described only by queens and males collected at Rainbow Lodge, Navajo Mountains, Arizona, U. S. may likely key here due to similarities to the queens and males of *C. isolata*.

5(3) Spines reduced (Plate 4, Figure A) ................................................................. 6
   - Spines long (Plate 4, Figure B and C) ................................................................. 11
6(5) Head shiny shallowly, areolate ................................................................. 7
   - Head sculptured below eyes, shiny medially .............................................. 8
7(6) Bicolored with head and mesosoma red and dark gaster ......................... *pinocola*
    Concolorous light to dark brown ................................................................. *ashmeadi*
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>8(6)</td>
<td>Pronotal shoulder with none to few long erect hairs</td>
<td>9</td>
</tr>
<tr>
<td>-</td>
<td>Pronotal shoulder with few short erect hair</td>
<td><em>emeryana</em></td>
</tr>
<tr>
<td>9(8)</td>
<td>Mesosoma rugose or shallow costate</td>
<td>10</td>
</tr>
<tr>
<td>-</td>
<td>Mesosoma densely punctate</td>
<td><em>opaca</em></td>
</tr>
<tr>
<td>10(9)</td>
<td>Dorsal edge of propodeal spine sinuous</td>
<td>11</td>
</tr>
<tr>
<td>-</td>
<td>Dorsal edge of propodeal spine straight</td>
<td><em>rifelna</em></td>
</tr>
<tr>
<td>11(5)</td>
<td>Pronotal shoulder with none to 6 erect hairs</td>
<td>12</td>
</tr>
<tr>
<td>-</td>
<td>Pronotal shoulder with more than 6 erect hairs</td>
<td>17</td>
</tr>
<tr>
<td>12(11)</td>
<td>Subpetiolar process small to well developed (Plate 5, Figure B), mesosoma heavily sculptured</td>
<td>13</td>
</tr>
<tr>
<td>-</td>
<td>Subpetiolar process absent to blunt (Plate 5, Figure C), mesosoma shiny</td>
<td><em>laeviuscula</em></td>
</tr>
<tr>
<td>13(12)</td>
<td>Pronotal shoulder with 1 to 6 erect hair</td>
<td>14</td>
</tr>
<tr>
<td>-</td>
<td>Pronotal shoulder void of erect hair</td>
<td><em>depilis</em></td>
</tr>
<tr>
<td>14(13)</td>
<td>Posterior corners of petiole without tooth</td>
<td>15</td>
</tr>
<tr>
<td>-</td>
<td>Posterior corners of petiole with small tooth</td>
<td><em>dentinodis</em></td>
</tr>
<tr>
<td>15(14)</td>
<td>Pronotal shoulder with longitudinal rugae</td>
<td>16</td>
</tr>
<tr>
<td>-</td>
<td>Pronotal shoulder coarsely vermiculae</td>
<td><em>vermiculata</em></td>
</tr>
<tr>
<td>16(15)</td>
<td>Mesosoma of queen wider than head</td>
<td>18</td>
</tr>
<tr>
<td>-</td>
<td>Mesosoma of queen narrower than head</td>
<td><em>mutans</em></td>
</tr>
<tr>
<td>17(11)</td>
<td>Head with many erect hairs, dorsum with many erect hairs (Plate 3, Figures A, B, F and G)</td>
<td>18</td>
</tr>
<tr>
<td>-</td>
<td>Head with less than 10 erect hair, dorsum of mesosoma with 10 to 20 short bristle-like erect hairs (Plate 3, Figure C)</td>
<td><em>lineolata</em></td>
</tr>
</tbody>
</table>
18(17) Head covered with short erect hairs (more than 20 on dorsum of head), appearing like fur; numerous erect hairs on dorsum of mesosoma ................................................................. 19
- Head with long erect hairs ................................................................. 20

19(18) Head punctate .................................................................................. patei
- Head areolate ........................................................................................ pilosa

20(18) Pronotal shoulder vermiculate with punctures, many fine long flexuous hairs ..... navajoa
- Pronotal shoulder lineolate-punctate with less than 12 long stiff hairs .......... punctulata

Eucrema

22(2) Dorsum of head smooth and glossy ....................................................... distans
- Dorsum of head densely, but finely punctate, dull ........................................ 23

23(21) Propodeal spines nearly as long or longer than width of petiole ................. formosa
- Propodeal spine length much less than ½ width of petiole ......................... corvina

Orthocrema and Neocrema

24(1) Petiole egg shape, with posterior margin wider than anterior margin; sometimes a hint of a medial sulcus on postpetiole (subgenus Neocrema) (Plate 5, Figure E) .............. 25
- Petiole subquadrate or rectangular, with sides almost parallel; if not parallel, posterior margin wider than anterior margin (subgenus Orthocrema) (Plate 5, Figures B and C) 26

25(24) Propodeal spines very reduced, thorn like ........................................ montezumia
- Propodeal spines very long ...................................................................... acuta

Note: C. quadrispinosa known only by one female from Mexico, no locality given would key here.

26(24) Petiole about twice as long as wide, slightly wider posteriorly, as seen from above ..... 27
- petiole subquadrate ..............................................................................................30

27(24) Subpetiolar process small to well developed ........................................28
- Subpetiolar process absent ................................................................. \textit{limata}

28(27) Dorsum of mesosoma varicose or longitudinally carinate .........................29
- Dorsum of mesosoma very shiny ....................................................... \textit{sotobosque}

29(28) Dorsum of mesosoma varicose .......................................................... \textit{curvispinosa}
- Dorsum of mesosoma longitudinally carinate ......................................... \textit{nigropilosa}

30(26) Propodeal spines reduced and upturned ..............................................31
- Propodeal spines long, slender and pointed ...........................................35

31(30) Head with none to few short erect hairs, color usually dark red to black ........32
- Head with many long erect hairs, color usually yellow .............................. \textit{minutissima}

32(31) Subpetiolar process absent to poorly developed ..................................33
- Subpetiolar process sharp and well developed .......................................34

33(32) Pronotal shoulder rounded, dorsum of mesosoma with many long erect hairs .... \textit{atra}
- Pronotal shoulder squarish, dorsum of mesosoma with few short erect hairs .... \textit{torosa}

34(32) Gaster sparsely evenly covered with short erect hairs, subpetiolar process small ... \textit{crinosa}
- Gaster without erect hairs except along lateral margins, subpetiolar process well developed and sharp .................................................. \textit{rochais}

35(30) With sharp subpetiolar process ..........................................................36
- With blunt subpetiolar process ......................................................... \textit{sumchrasti}

36(35) With subpostpetiolar process ......................................................... \textit{obscurata}
- Without subpostpetiolar process ....................................................... \textit{missouriensis}
Species Accounts

Crematogaster acuta Fabricius

Plate 5, Figure (D), Plates 6, 7 and 8.


Descriptions:

Worker: This description is based on a worker determined by J. Longino, # 855 Magdalena, Colombia LACM. Mandibles with shallowly longitudinal lineolae; clypeus shiny areolate with long, translucent to white erect flexuous hairs, anterior margin slightly convex, with translucent to white flexuous hairs; scape long, surpassing posterior border of head, with translucent to white erect hairs; head subquadrate, punctate-rugose with shiny area in middle immediately posterior to clypeus, posterior border of head with medial depression.

Mesosoma evenly covered with long, translucent to white erect flexuous hairs; dorsum of mesosoma punctate-rugose, side punctate; pronotal shoulder rounded, humeri poorly developed; mesonotal boss inflated anteriorly; notopropodeal groove furrow wide and deep; dorsal face of propodeum punctate; posterior face shiny and steep, spines shiny, thickened at base, long,
tapering to points, widely diverging (viewed from above) and pointing upward (side view).

Petiole and postpetiole punctate; evenly covered with long, translucent to white, flexuous, erect hairs; petiole longer than wide (viewed from above), rectangular; posterior lateral corners forming small points, anterior subpetiolar process small to absent; postpetiole wider than long, slight medial dorsal depression, not developed into sulcus, anterior subpostpetiolar process well developed, sharp; gaster areolate, evenly covered with long, translucent to white, flexuous, erect hairs.

Concolorous reddish brown to black.

**Worker measurements (mm):** HL 0.86-0.94, HW 0.96-1.02, SL 0.94-1.00, EL 0.18-0.22, ED 0.19-0.20, CL 0.24-0.30, CW 0.31-0.38, WL 1.14-1.21, PSL 0.42-0.46, PL 0.38-0.48, PW 0.34-0.38, PPL 0.24-0.28, PPW 0.32-0.35; Indices: CI 90-92, SI 106-109, CLI 77-79, PI 1.11-126, PPI 75-80.

![Diagram of Crematogaster acuta worker](image)

**Plate 6. Crematogaster acuta worker**
(determined by J. Longino, # 855 Magdalena, Colombia, LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
Queen: Mandibles shiny, with shallowly longitudinally striate; clypeus and head shiny, evenly covered with long, translucent to white erect flexuous hairs; anterior margin of clypeus concave; scape long surpassing posterior border of head, evenly covered with long, translucent to white, erect flexuous hairs, 3–4 segmented club; ocelli typical.

Mesosoma, petiole, postpetiole and gaster very shiny viewed from above, evenly covered with long, translucent to white, flexuous erect hairs, side of mesosoma with many thin short hairs along sutures; mesosoma hump-like viewed from side, propodeal spines very long for Crematogaster queens, diverging, worker-like.

Petiole without anterior subpetiolar process, rectangular when viewed from above; postpetiole globular, without medial depression, anterior subpostpetiolar process well developed and sharp, like the worker.

Concolorous reddish brown.

Plate 7. Crematogaster acuta queen (determined by A Wild, # 0445, Colonia, Canindeyú, Paraguay LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
Queen measurements (mm): HL 1.18-1.30, HW 1.25-1.32, SL 1.23-1.36, EL 0.36-0.48, ED 0.28-0.36, CL 0.46-0.50, CW 0.48-0.60, WL 2.11-2.45, PSL 0.50-0.51, PL 0.60-0.65, PW 0.36-0.43, PPL 0.36-0.42, PPW 0.53-0.55; Indices: CI 94-98, SI 104-105, CLI 83-96, PI 151-167, PPI 68-76.

**Male:** Mandibles covered with semi-erect hairs; clypeus shiny, shallowly punctate; anterior margin concave, protruding from face, with several long flexuous hairs; eyes and ocelli prominently protruding from head; head deeply punctate with shiny light brown medial strip between clypeus and ocelli.

Mesosoma shiny but punctate along lateral margins of scutum, shiny with shallow areolae between shallow striae in middle; scutellum deeply punctate; mesosoma with few erect hairs dorsally; side of mesosoma deeply punctate with few long, white, flexuous hairs restricted to pronotum and katepisternum; pronotum barely visible viewed from above; dorsellum completely obscured by scutellum; propodeum shallowly punctate, long white flexuous hairs evenly distributed.

Petiole and postpetiole deeply punctate with long white flexuous hairs pointed posteriorly; petiole subquadrate; postpetiole globular; gaster areolate with long white flexuous hairs evenly distributed and pointed posteriorly.

Concolorous dark brown except for light brown strip on face and light brown mandibles.

**Male measurements (mm):** HL 0.60, HW 0.52, SL 0.11, EL 0.28, ED 0.24, CL 0.20, CW 0.23, WL 1.40, PL 0.24, PW 0.22, PPL 0.18, PPW 0.24; Indices: CI 115, SI 18, CLI 87, PI 109, PPI 75.
Plate 8. *Crematogaster acuta* male
(Los Sabana, Panama, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution.** Mexico to southern Brazil; Bolivia (Longino, 2003a).

**Type series:** *Crematogaster acuta* holotype worker from Guyana, Essequibo [ZMUC]; *Crematogaster quadriceps* holotype worker Brazil; *Crematogaster acuta* var. *centralis*, syntype worker, queen: Panama [NHMB].

**Other material examined:**

**BRAZIL:** Blumenau (3 wk LACM); **Mato Grosso** (1 wk, CWEM); Rio Madeira (6 wk LACM).

**BRITISH GUYANA:** Karta Bo, (3 wk LACM). **COLOMBIA:** **Chocó,** Itsmina (4 wk CWEM);

**Huila,** Rivera (2 wk CWEM); **Magdalena,** Rio Frio (12 wk LACM); **Meta,** Tinigua Estado Primatologica Bosas Rio Duda (2 wk CWEM); Rio Frio Magdalena (3 wk, LACM). **PANAMA:**

**Panamá,** Barro Colorado Gatun Lake, (3 wk MCZC); Canal Zone, Las Cascadas (10 wk CWEM), Red Tank (4 wk MCZC); Los Sabana (7 wk, 2 qn, 2 ml MCZC); Islas Perlas, Isla del Rey (3 wk LACM). **PARAGUAY:** **Canindeyu** (2 wk, 1 qn LACM); Canindeyu Reserve

**Etymology:** *Acuta* from *acūtus* in Latin meaning sharp or pointed, possibly for the sharp anterior subpostpetiolar process.

**Discussion:** The specimens used for this species account were collected and determined by W. M. Wheeler and J. Longino and compared to the description in Longino (2003a). This species is in the subgenus *Neocrema*. The key characteristics of the *Crematogaster acuta* worker have very long and pointed propodeal spines.

The pronotum of *C. acuta* is punctate-rugose and has abundant erect hairs on all dorsal surfaces. Longino (2003a) compares this species to *C. evallans*. He separates them by the presence of a sharp anterior subpostpetiolar process on *C. acuta* and a blunt lobe on *C. evallans*.

**Biology.** Longino (2003a) states that *Crematogaster acuta* prefer open disturbed habitats. He collected specimens in vegetation along the edges of roadsides and pastures as well as in young second growth for climate preference is wet and seasonally dry. His collections usually occur below 500m; however, 1000m is the highest elevation record. Longino’s observations include few but large polydomous colonies nesting in dead wood.
**Crematogaster ashmeadi Mayr**

Plate 4, Figure (A), 9, 10 and 11; Map 1.


**Descriptions:**

**Worker:** Clypeus areolate, as wide as long, with 8 long erect hairs on surface, anterior margin slightly convex with medial notch and 6 long flexuous hairs; scape failing to reach posterior border of head, with decumbent hairs; head areolate, wider than long, with evenly, sparsely dispersed appressed and 2 short erect hairs; frontal groove apparent, shiny.

Mesosoma, shallowly scabrous, mesosoma with few appressed hairs and 1-2 long flexuous hair on each pronotal shoulder, small medial metanotal carina; humeri small; promesonotal suture apparent from breaks in the sculpturing, notopropodeal groove steep and narrow; notopropodeal groove steep and angular; propodeal spines short and slightly curved inward, thickened at the base.

Petiole and postpetiole shallowly scabrous, with few appressed hairs and one erect hair on each posterior corner; petiole angularly trapezoidal, with anterior lateral flange upraised when
viewed from behind; hemilobes of postpetiole almost round, spreading slightly posteriorly; gaster shallowly areolate, with sparsely distributed appressed hair.

Color variable; concolorous light to dark brown or bicolored with dark head and gaster and light mesosoma.

**Worker measurements (mm):** HL 0.62-0.85, HW 0.74-0.90, SL 0.50-0.65, EL 0.16-0.20, ED 0.11-0.18, CL 0.16-0.20, CW 0.18-0.24, WL 0.66-0.85, PSL 0.10-0.14, PL 0.18-0.26, PW 0.22-0.29, PPL 0.14-0.19, PPW 0.19-0.28; Indices: CI 84-94, SI 76-80, CLI 83-88, PI 82-90, PPI 68-74.

Plate 9. *Crematogaster ashmeadi* worker (Florida NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Clypeus about as long as wide with 2 long and about 12 short erect hairs along anterior margin; scape covered with semi-erect hairs, scape not reaching posterior border of head; head rugose with sparsely distributed short erect hairs, 3-4 long filamentous erect hairs.

Mesosoma shiny shallowly, longitudinally carinate-areolate with many short erect hairs; pronotum typically narrow; posterior margin of scutellum rounded; metanotum visible when
view from above; dorsellum broadly rounded; notopropodeal groove steep and angular; propodeal spines well developed for a queen, divergent, thickening at the base and curving very slightly posteriorly and with 2-3 erect hairs on dorsal edge of each spine.

Petiole and postpetiole shallowly areolate-punctate, each with 8-10 erect hairs, petiole slightly longer than wide, posterior lateral corners flaring upward, dorsal side flat; anterior subpetiolar process present; postpetiole oval with posterior of hemilobes spreading laterally, wider than long, gaster shallowly areolate with many evenly distributed erect hairs.

Concolorous reddish to dark brown.

**Queen measurement (mm):** HL 1.23, HW 1.42, SL 0.82, EL 0.36, ED 0.29, CL 0.31, CW 0.48, WL 2.04, PSL 0.21, PL 0.55, PW 0.50, PPL 0.55, PPW 0.53, Indices: CI 87, SI 67, CLI 65, PI 1.1, PPI 104.
**Male:** Clypeus slightly wider than long with 4 very long flexuous hairs along anterior margin; scape and pedicel with 2-4 flexuous hairs; ocelli protruding slightly from head; small round head with striate below eye and insertion of antennae, very shiny areolate above the eye, with few long erect and semi-erect hairs sparsely dispersed.

Mesosoma shiny areolate from above, with few long and short erect hairs, micro-lineolate on side; pronotum not visible from above; metanotum small, narrow in the middle like a knob; dorsellum broader than the scutellum and the position of the metanotum can be seen dorsally; propodeum is rounded, lacking hair; propodeal spines present as nubs which is unusual for males.

Petiole, postpetiole and gaster areolate, with many long erect hairs; petiole small trapezoidal; postpetiole very small and round (as seen from above), slightly wider than long.

Concolorous pale yellow.

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**Plate 11. Crematogaster ashmeadi male**
(Florida NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
Male measurements (mm): HL 0.47-0.53, HW 0.56-0.62, SL 0.12-0.15, EL 0.19-0.24, ED 0.19-0.22, CL 0.11-0.13, CW 0.17-0.19, WL 1.22-1.25, PL 0.17-0.19, PW 0.19-0.20, PPL 0.14-0.22, PPW 0.22-0.24, Indices: CI 84-85, SI 26-28, CLI 65-68, PI 89-95, PPI 64-92.

**Distribution:** Virginia to the southern tip of Florida, west to Arizona.

Map 1. *Crematogaster ashmeadi*. The diamond indicates where this species was intercepted in Arizona.

**Type series:** Type from Virginia (Pergande 22 workers); Florida (Ashmead 2 workers) [(Pergande 10 workers, 6 males); Georgia (Pergande 2 workers) MNHW; C. ashmeadi var. matura United States MCZC].

**Other material examined:**

**UNITED STATES:** Alabama, Geneva County, Geneva State Forest (2 wk STDC), Tuscaloosa
County, Sipsey River, 2k E Elrod (1 wk CWEM); Arizona, Department of Agriculture Interception From Virginia (43 wk COOK); Arkansans, Clark County, 10k SW Gurdon (2 wk CWEM), Hempstead County, Hope (1 wk CWEM), St. Francis County, 32k NE Brinkley (2 wk CWEM); Florida, (3 wk MCZC), Broward County, Indian River City (2 wk MCZC), Middle Keys (3 wk MCZC), Key Largo, Harry Harris Park (1 wk CWEM); Highlands County, Archibald Biological Station (5 wk CWEM, 1 wk COOK), Lake Placid (3 wk CWEM, 3 wk MCZC), Monroe County, West Summerland Key (11 wk, 5 qn MCZC), just E Big Pine Key (1 wk, 1 qn CWEM), Walton County Eglin AFB (12 wk MCZC); Georgia, McIntosh County, Sapelo Island (20 workers COOK); Louisiana, Wildlife Management Area (1 wk STDC), Baton Rouge Parish, Baton Rouge (1 wk STDC), LSU Burden Research Center (2 wk STDC), Baton Rouge Parish, Baton Rouge (4 wk DASH), Spanish Town (6 wk CWEM); Calcasieu Parish, Sam Houston Jones State Park (7 wk CWEM, 6 wk STDC), Catahoula Parish, Silicy Island (5 wk STDC), East Baton Rouge Parish, Baton Rouge, Spanish Town Boorland Law Office (32 wk STDC), East Feliciana Parish, Tunica hills (1 wk STDC), Crowley Parish (3 wk MCZC), Orleans Parish, New Orleans Audubon Zoo Volunteer House (1 wk STDC), West Feliciana Parish, Feliciana Preserve (30°47’N; 91°15’W) (15 wk STDC), Port Hudson St (1 wk STDC); Mississippi, Lee County, Tupelo (14 wk CWEM), Newton County (31 wk CWEM), Missouri, Ripley County, Doniphan (2 wk MCZC); North Carolina, Cherokee County, 2k E Andrew rest area (8 wk CWEM); Tennessee, Lincoln County, Huntland (1 wk CWEM), McMinn County, Highway 39 8.6k W Junction Road 315 (1 wk CWEM), Wayne County, Clayton (3 wk CWEM); Texas, Brazos County, College Station, Texas A &M University Range Science Area (1 wk COOK), Peach Creek (11 wk CWEM), Foster Lane (4 wk CWEM), 10k N Kurten (17 wk CWEM), Hwy 6, 6mi N of Navasota (1 wk COOK), Comal County, 32.2k SE Blanco (12 wk, 1 qn CWEM), Hardin County, Sandyland National Preserve (3 wk COOK), Hays County, San
Marcos (2 wk CWEM); Houston County, Big Slough Wilderness Area (2 wk CWEM), Jeff Davis County, Fort Davis (2 wk STDC), Lamar County, Camp Maxey, site 1 (N33° 48.683'; W95° 34.234') (1 wk COOK), Tyler County, 5mi. E Spurger (19 wk COOK), Walker County, Huntsville State Park (1 wk CWEM), Dodge, 119 Blythe Ranch Rd. (7 wk COOK); Virginia, Fairfax County, Potomac Bay (2 wk CWEM).

**Etymology:** Named for one of the original collector William H. Ashmead.

**Discussion:** *Crematogaster ashmeadi* is a small species with much reduced spines. It is highly variable in color, ranging from concolorous light brown to black and sometimes bicolored with head and gaster darker than mesosoma. The worker of this species is morphologically identical to *C. pinicola* Deyrup & Cover in appearance, except that *C. pinicola* is always bicolored with a red head and mesosoma, and a dark gaster; and the shape of the base of the spine is flattened, where as *C. ashmeadi* has spines that are typically rounded at the base. *Crematogaster pinicola* has only been found nesting in pine trees, preferring *Pinus elliotii* and *P. palustris* (Deyrup & Cover, 2007.) *Crematogaster ashmeadi* has more diverse nesting sites. Leuthold (1968) made a very interesting discovery while experimenting on the trail laying behavior of *C. ashmeadi*. While most ants deposit pheromones from the end of their gaster, *C. ashmeadi* have pheromone glands in their hind legs that allow them to place “footprints” on the substrate for nest mates to follow.

I agree with Creighton (1950) who made *matura* a junior synonym of *C. ashmeadi* commenting that the slight color variation that would separate the two taxa was weak at best. My observations indicate that there is some color variation within series, with some being concolorous to slightly bi-colored, leading me to conclude that color is not a distinguishing feature and one has to look at habitat.
**Biology:** *Crematogaster ashmeadi* is found in a wide variety of habitats (Deyrup & Cover, 2007). This is a primarily arboreal species preferring to nest in trees; however, it has been found under rocks, manure and in logs. Moist habitats are preferred such as pine and magnolia forests. In arid areas of Texas their nests can be found in arroyos and other riparian areas. This species has also been found in mesic areas, nesting in beetle galleries in living oaks and other leaf litter. They have been collected on sand pine, oak, mocker nut, magnolia, laurel, and other hard woods. They have been attracted to baits along with *Pheidole* species. They have also been collected in hardwood hammock that grades into red mangrove and in white mangrove at forest edge. There appears to be a color transition from dark on the east coast to gradually lighter as one moves west (personal observation; Wheeler, 1932). *Crematogaster ashmeadi* has been found from the east coast of the U. S. to as far west as Denton County, Texas and was intercepted in Arizona at an agricultural inspection station (diamond on map).

*Crematogaster atra* Mayr

Plate 3, Figure (C) and Plate 12; Map 2.

*Crematogaster atra* Mayr, 1870b: 994: worker described; Mexico 3 syntype workers NHMW. Emery, 1922: 134: combination in *C. (Orthocrema).*

**Description:**
Worker: Mandibles longitudinal striate, with appressed hair; clypeus slightly wider than long with longitudinal striate, anterior margin slightly concave with medial notch, several long flexuous hairs; scape with appressed hair, failing to reach posterior border of head; head wider than long, shiny with longitudinal striate and evenly covered with appressed hairs pointed toward middle, 2 rows of short erect hairs in middle of face, 2 long flexuous hairs on each frontal lobe.

Mesosoma very round in dorsal view with longitudinal striae following curvature of pronotum and many long flexuous and appressed hairs pointed toward middle; promesonotal suture not apparent when viewed dorsally, but clearly developed when viewed from side; notopropodeal groove steep and narrow; notopropodeal groove steep, propodeal spines very short, slender, almost parallel with tips slightly diverging (viewed from above) turned up viewed from the side with 2 long flexuous hairs; mesopleuron striate at top blending into punctate on lower surface.

Petiole subquadrate, shallowly striate and with appressed hairs along sides, 1 long flexuous hair on each posterior corner; anterior subpetiolar process variable absent to well developed; postpetiole globular, shallowly striate with appressed hair and several long flexuous hairs pointed posteriorly; gaster dull areolate with appressed and erect hairs evenly distributed and pointed toward stinger.

Concolorous dark brown.

Worker measurements (mm): HL 0.71-0.74, HW 0.77-0.84, SL 0.50-0.53, EL 0.14, ED 0.11-0.12, CL 0.23-0.24, CW 0.22-0.25, WL 0.74-0.78, PSL 0.12-0.13, PL 0.24-0.25, PW 0.22-0.23, PPL 0.17-0.24, PPW 0.20-0.23; Indices: CI 88-92, SI 70-72, CLI 96-105, PI 109, PPI 85-104.
Plate 12. *Crematogaster atrata* worker
(Mexico NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Central Mexico to Argentina

Map 2. *Crematogaster atrata*
**Type Locality:** Mexico

**Type series:** 3 syntype workers of *Crematogaster atra* Mayr, Mexico (NHMW).

**Other material examined:**

**BOLIVIA:** *Cochabamba*. Villa Tunari 67.5k E Valle Salta (17° 19’ S, 64° 47’W) (1 wk CWEM). **MEXICO:** *Guerrero*. 74k Acapulco (36 wk CWEM); **Morelos**, (7 wk CWEM) Tepic 1365m (4 wk CWEM); **Quintana Roo**, El Edén Ecological Reserve (21°13’N 87°11’W) (2 wk CWEM); **Veracruz**, (4 wk, 4 qn MCZC).

Other specimens in the literature: California Academy of Sciences, AntWeb (www.gbif.net):

**ARGENTINA:** *Buenos Aires*. Isla Martín Garcia (34.19°S, 58.28°W NHMB). **BRAZIL:** *Rio Grande de Sul*, Porto Alegre (30.03°S, 51.2°W syntype worker *peristericus*, DEIC), Rio Grande (32.03°S, 52.08°W NMW); *São Paulo*, Botucatú (22.87°S, 48.43°W syntype worker *sericea*, MHNG), Cantareira (23.47°S, 46.63°W NHMW). **COLOMBIA:** *César*, San Sebastián de Rabago (10.57°S, 73.6°W JTLC), **Cauca**, Popayán (6 specimens JTLC); Rio Palacé, Totoró, (JTLC); Valle del Cauca, Sevilla (2 specimens JTLC). **PARAGUAY:** *Asuncion*, Villa Morra (25.3°S, 57.57°W NHMB), Reserve Natural del Bosque Mbaracayú, Jejuimi, Canindeyú (24.1°S, 55.47°W JTLC). **URUGUAY:** Nueva Helvecia (34.3°S, 57.23°W syntype worker *uruguayensis*, NHMB). **VENEZUELA:** *Lara*, 5k SE Barbacoas (3 specimens at 9.8°N, 70.02°W JTLC).

**Etymology:** *Atra* in Latin is blacking, or ink and is used as a prefix for nouns with a connotation for mourning or gloomy suggesting the color of the worker.

**Discussion:** *Crematogaster atra* is in the subgenus *Orthocrema*. The key characteristics of the *Crematogaster atra* worker are well defined longitudinal striate on face and the short erect hairs covering most of the dorsal surface of the mesosoma. This species is in the *crinosa* complex with small propodeal spines, head with mostly appressed hair and few (less than 8) short erect hairs.
The subpetiolar process is highly variable from none to well developed as in *C. torosa* and *C. crinosa* respectively. The key character in distinguishing *C. atra* from *C. crinosa* is the sculpturing on the head. *Crematogaster atra* has longitudinal striate following the curvature of the eye and *C. crinosa* has shiny striate head. The dorsal surface of the mesosoma of *C. atra* has more erect hairs than *C. crinosa*.

**Biology:** *Crematogaster atra* is not well collected, therefore little is known about its nesting habits. Two collections have been made by W. Mackay from Popayán, Colombia, one trailing up into a tree and the other a nest with pupae and males, inside a live fence post in a section damaged by insects. This nest was in muddy clay soil with pebbles. R. B. Root and W. L. Brown collected *C. atra* in an oak forest in Totoró, Colombia. A nest series collected by Mackay near Alpuyeca, Mexico was found in an acacia spine.

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*Crematogaster cerasi* Fitch

Plate 4, Figure (B), Plates 13, 14 and 15; Map 3.


Crematogaster browni Buren, 1968: 100-102: worker, queen described; Garden Canyon, Huachuca Mountains, Arizona, United States. NEW SYNONYMY.

**Descriptions:**

There is no type material of C. cerasi available that I am aware; therefore, I used a specimen from Lexington, Massachusetts determined by Buren (MCZC), that is consistent with the descriptions by (Fitch 1855) and comments by Emery (1895), Creighton (1950) and Buren (1968) to define the species.

**Worker:** Mandibles shiny, longitudinal striate, with few erect and appressed hairs; clypeus longer than wide, shiny areolate with longitudinal striate and few appressed hairs, anterior margin slightly concave with small medial notch and 8 long hairs; frontal groove apparent; scape passing posterior border of head, evenly covered with appressed hairs; head with longitudinal striate below eye and shiny areolae above eye, with fewer than 8 erect hairs, but evenly covered with appressed hairs.

Dorsum of mesosoma scabrous-rugose, each pronotal shoulder with 3-5 erect hairs (1-3 very long and flexuous); medial pronotal carina small but sharp, humeri developed and rounded; dorsum of mesosoma scabrous-rugose, side of mesosoma shallowly scabrous-rugose; notopropodeal groove steep, with four erect hairs; propodeal spines slender, thickening at the base, divergent (viewed from above), in profile, top margin sinuate; metapleuron striate-punctate.

Petiole and postpetiole shallowly scabrous with 1 erect hair on each posterior lateral corner, postpetiole has few appressed hairs dorsally; petiole trapezoidal, with anterior lateral
flange upraised when viewed from behind, anterior subpetiolar process blunt; hemilobes of postpetiole slightly longitudinally elongate, spreading anteriorly, petiole wider and longer than postpetiole; gaster shallowly areolate with few erect and appressed hairs evenly distributed.

Concolorous light to dark brown or bicolored with head and mesosoma lighter than gaster.

**Worker measurements (mm):** HL 0.72-1.08, HW 0.77-1.49, SL 0.61-0.98, EL 0.16-0.32, ED 0.13-0.30, CL 0.18-0.28, CW 0.22-0.36, WL 0.78-1.34, PSL 0.13-0.25, PL 0.17-0.38, PW 0.35-0.38, PPL 0.14-0.26, PPW 0.25-0.36; Indices: CI 72-94, SI 85-91, CLI 78-82, PI 49-100, PPI 56-72.

**Plate 13. Crematogaster cerasi worker**
(determined by Buren, from Lexington Massachusetts MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny, shallow longitudinal striate; clypeus smooth with few short erect hairs pointed medially, anterior margin slightly concave with small medial notch and 6 long, flexuous hairs; scape with decumbent hairs, reaching to passing posterior border of head; ocelli almost flush with surface of head; head with 4 long, flexuous and many appressed hairs pointed medially, longitudinal scabrous below eye, shiny, areolate above, striate between eye and
Mesosoma with few long and short flexuous hairs and many appressed hairs, shiny areolate with 3-5 longitudinal striae perpendicular to anterior margin of metapleuron, side of mesosoma areolate developing into striate at edge of metapleural suture; pronotum not visible viewed from above; scutum overlapping pronotum, dorsellum visible under postscutellum as viewed from above, notopropodeal groove steep, propodeal spines well developed for queens.

Petiole and postpetiole shiny areolate dorsally, longitudinal striate viewed from the side, with appressed hairs pointing posteriorly and 2 erect hairs on each posterior corner; petiole angularly trapezoidal; anterior subpetiolar process developed; postpetiole with hemilobes not well defined with medium sulcus, spreading slightly antroventrally; petiole wider and longer than postpetiole; gaster shallowly areolate with few erect hairs and appressed hairs evenly distributed.

Color is concolorous light to dark brown.

Plate 14. *Crematogaster cerasi* queen
(Las Cruces, New Mexico CWEM # 7431); (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
**Queen measurements (mm):** HL 1.34-1.49, HW 1.39-1.61, SL 1.08-1.10, EL 0.30-0.32, ED 0.29-0.31, CL 0.50-0.58, CW 0.35-0.37, WL 2.76-3.24, PSL 0.24-0.30, PL 0.53-0.55, PW 0.70-0.72, PPL 0.41-0.43, PPW 0.67-0.79; Indices: CI 93-96, SI 74-81, CLI 143-147, PI 76, PPI 54-61.

**Male:** Clypeus shiny, anterior margin almost straight with slight convex pleat in middle with 6-8 long hairs; ocelli slightly raised from surface of head; scape typically short, scape and funiculus with short erect hairs giving the appearance of fur; head grainy areolate with 8 erect hairs in two longitudinal rows between lateral ocelli and insertion of antennae, decumbent hair on sides of head.

Mesosoma grainy areolate with sparse appressed hairs; scutum with 1-2 long erect hair on each shoulder and several long semi-erect hairs; pronotum completely hidden by scutum viewed dorsally; few erect hairs on postscutellum; metanotum can be seen under scutellum viewed dorsally; scutellum latitudinally striate with 6-10 long flexuous erect hairs along posterior margin.

Petiole, postpetiole and gaster grainy areolate; petiole and postpetiole about the same size, petiole slightly trapezoidal with long flexuous hairs pointed posteriorly; postpetiole globular with no hint of medium sulcus and appressed hairs; gaster with short erect and appressed hairs; over all size large for this genus.

Concolorous dark brown.
Plate 15. *Crematogaster cerasi* male  
(Las Cruces, New Mexico CWEM # 7431): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole;  
(C) Side view of mesosoma, petiole and postpetiole.

**Male measurements (mm):** HL 0.48-0.49, HW 0.57-0.58, SL 0.11-0.17, EL 0.20-0.22,  
ED 0.20-0.22, CL 0.11-0.13, CW 0.17-0.18, WL 1.37-1.45, PL 0.18-0.20, PW 0.24-0.28,  
PPL 0.17-0.19, PPW 0.29-0.30; Indices: CI 84, SI 23-35, CLI 65-72, PI 71-75, PPI 59-63.

**Distribution.** Southeastern Canada and throughout the United States.
Map 3. *Crematogaster cerasi*

**Type series:** None available. Type from New York, United States.

**Other material examined:**

**CANADA:** *Nova Scotia*, Digby (3 wk MCZC); Halifax County, West Dover (3 wk MCZC);

*Ontario*, Pelee (3 wk MCZC); *Quebec*, Chelsea County, de Gatineau (2 wk, 1 qn, 1 ml CWEM), Dundee, County de Huntingdon (2 wk CWEM), St. Hippolite County, de Terrebonne (1 wk CWEM), Hull (3 wk MCZC), Kingsman (2 qn, 1 ml MCZC). **UNITED STATES:** *Arizona*, Cochise County, Dragoon Mountains (8 wk CWEM), Portal, Chiricahua Mountains (13 wk CWEM), Yavapai County Bradshaw Mountains 8.9mi S. Jct. Rt. 69 on FSR 197 (1 wk, 1 qn CWEM); *California*, Mendocino County, rest area near Longvale (1 wk CWEM), San Bernadino County, Lake Arrowhead (5 wk CWEM), *Connecticut*, Litchfield County, Robbins Swamp (1 wk MCZC); *Delaware*, Kent County, Woodland Beach (6 workers STDC), New Castle County, Summit (3 wk STDC), University of Delaware (1 worker STDC), near woodland
beach (2 wk STDC), Sussex County, Bryan’s Store Rd 435 (5 workers STDC), Trap Pond State Park Raccoon Pond (5 wk STDC), Wilmington Valley Run Apartments (1 wk STDC); **Florida**, Martin County, Stuart mil 106, 1-95 Rest Area (2 wk STDC), Okaloosa County, Eglin AFB, Santa Rosa Island (20 wk CWEM); **Indiana**, Fort Wayne (3 wk MCZC); **Illinois**, M’Henry (3 wk MCZC), Palos (3 wk MCZC); **Kansas**, Riley County, Manhattan (3 wk, 8 ml CWEM); **Maine**, Cumberland County, Harpswell (1 wk, 1 qn CWEM), Hancock County, Acadia National Park (2 wk MCZC), Kennebec County, Wayne (4 wk MCZC); **Maryland**, Allegany County, Little Orleans, 15 mile Creek (2 wk STDC), Baltimore County, Deer Park, Soldier’s Delight (1 wk STDC); **Massachusetts**, Lexington (3 wk MCZC), Sherborn (3 wk MCZC); **Michigan**, Detroit (3 wk MCZC); **Montana**, St. Charles County (3 wk MCZC); **New Mexico**, Catron County Catwalk (6 wk CWEM), Glenwood (15 wk CWEM), (25 wk CWEM), Doña Ana County, 45k NE Las Cruces (34 wk, 27 qn, 30 ml CWEM) (10 wk, 5 qn, 3 ml CWEM), Aguirre Springs Recreation Area (5 wk CWEM), Grant County, Mimbres (12 wk CWEM) (3 workers CWEM), 100k E Silver City (19 wk, 7 qn, 8 ml CWEM), Hidalgo County, Coronado National Park, Clayton Canyon 52.5k (31º30’55”N 109º01’08”W) (4 wk CWEM), Clayton Draw (22 wk CWEM), Los Alamos County, Los Alamos (1wk CWEM), Rio Grande (60 wk, 4 qn, 2 ml CWEM), Rio Grande 1700m (34 wk, 1 qn, 1 ml CWEM), San Miguel County, Villanueva State Park (15 wk CWEM), Socorro County, Magdalena Mountain (15 wk CWEM), 22.7k S Magdalena 1850m (33º54’46.9” 107º16’15.2) (5 workers CWEM), 8mi from HWY 107 on HWY 1452 (3 wk CWEM); **New York**, Tompkins County, Ithaca (3 wk MCZC); **North Carolina**, Raleigh County, Chandler (10 worker COOK), Fishville (2 wk MCZC); **Ohio**, Franklin County, Columbus (3 wk MCZC); **Pennsylvania**, Adams County Gettysburg National Military Park (1 worker CWEM); **South Dakota**, (1 qn, 1 ml MCZC); **Tennessee**, Blount County, Cades Cove (2
wk MCZC), Putnam County, Cookeville (2 wk CWEM); Texas, Brewster County, Pine Canyon Trail (33 wk COOK), El Paso County, Hueco Mountains Red Sands (N31° 49 34.8”; W 106° 07’ 23.10”) (3 wk CWEM), Jeff Davis County, Fort Davis (12 wk CWEM); Utah, Utah County, Santaguin Canyon (3 wk CWEM); Virginia, Patrick County, (1 wk MCZC); Wisconsin, Ozaukee County, Mequon (1 wk CWEM).

**Etymology:** Cerasi from Latin cerasus meaning cherry tree or cherry, “the cherry ant”.

**Discussion:** The suite of characters that separate *Crematogaster cerasi* from other closely related species of *Crematogaster* is the combination of 1-5 long flexuous, erect hairs on each pronotal shoulder and shallow to robust scabrous-lineolate sculpturing on dorsum of mesosoma. Closely related species such as *C. lineolata* Say and *C. coarctata* Mayr differ in one or more of these characters. *Crematogaster lineolata* has many short erect hairs on pronotum, no anterior subpetiolar process; however the sculpturing is similar. *Crematogaster coarctata* has similar pilosity on pronotal shoulder and a variable anterior subpetiolar process; however the sculpturing of *C. coarctata* is much more intense than in *C. cerasi*. *Crematogaster cerasi* has spines that are variable within nest series and can be reduced like that of *C. emeryana*, to typically developed spines like those found in *C. lineolata*; however, in profile, the top margin of the spines of *C. cerasi* are sinuate and the top margin of *C. emeryana* and *C. lineolate* is straight.

It is can be difficult to separate *C. cerasi* from *C. vermiculata*. Most specimens of *C. cerasi* have the pronotum mostly rugose, with some striae confined to the sides. The dorsum of the pronotum of all specimens of *C. vermiculata* has at least wavy striae across the top of the pronotum, but is usually with strong vermiculae.

I obtained paratype specimens of *Crematogaster browni* (LACM) and made comparisons with many specimens of *C. cerasi*. When using Buren’s key, I found that the typical *C. cerasi*
keys to *C. browni* in the key to the west species and the reverse true of *C. browni* keying to *C. cerasi* in the key to the east species. I have found extensive polymorphism in overall size and subpetiolar process development in large single nest series of *C. cerasi*. Some specimens in these large series are small and shallowly sculptured as in *C. browni*. Thus I consider *C. browni* Buren to a junior synonym of *C. cerasi* Fitch.

**Biology:** *Crematogaster cerasi* is a very cosmopolitan species with an extensive range; occurring from Ontario, Nova Scotia and Quebec, Canada in the north, southeast into Florida and west to California, United States. These ants have also been found at sea level and up into the Huachuca Mountains of Arizona. The nesting habits are also varied, arboreal, in logs on the surface of the ground and subterranean. It has been found under rocks, in and under sagebrush in the west and in hardwood hammocks in the south east. *Crematogaster cerasi* has also been listed as an agricultural pest because they tend aphids. They have been found in close proximity of *Camponodis nearcticus*. They readily come to baits of sausage or Keebler Pecan Sandies cookies. In more arid landscapes *C. cerasi* has also been found foraging on *Opuntia imbricata*. 
Crematogaster coarctata Mayr

Plate 2, Figure (B), Plate 4, Figure (C), Plate 5, Figure (A), 16 and 17; Map 4.


**Descriptions.**

**Worker:** Clypeus wider than long, longitudinally striate, few appressed hairs, anterior margin straight with 6-8 long hairs; scape reaching to surpassing posterior border of head, can vary within nest series (Chiricahua Mountains, Arizona CWEM # 6844), with decumbent hairs and funiculus with erect hairs (can have appressed to semi-erect hairs); head shiny punctate in longitudinal rows between and above eyes and punctate between rugae below eyes, evenly, sparsely covered with appressed hairs pointed toward one central point between eyes, 1 long erect hair on each frontal lobe.

Pronotal shoulder rugose, mesonotum areolate to punctate in between rugae (viewed from above), intensity of sculpturing can vary within nest series, (Chiricahua Mountains, Arizona CWEM # 6844); pronotal shoulder rounded with 1-5 long flexuous hairs and few scattered appressed hairs pointed toward middle of mesosoma (viewed from above), side of mesosoma shiny with striae and few costae; promesonotal suture apparent from breaks in sculpturing, notopropodeal groove wide and shallow; notopropodeal groove shiny, steep and angular; propodeal spines costate, long, slender, thickened at base, slightly divergent (seen from above).

Petiole and postpetiole shallowly striate with several appressed hairs and 1 long flexuous hair on each posterior lateral corner, anterior subpetiolar process very small, blunt to well developed, can vary within nest series (Chiricahua Mountains, Arizona CWEM # 6844); petiole angularly trapezoidal, postpetiole hemilobes longitudinally elongate, but overall wider than long; petiole wider and longer than postpetiole; gaster shallowly areolate with few erect hairs in row in middle of each of last 4 terga and appressed hairs sparsely dispersed; tibia with appressed to semi-erect hairs.

Bicolored dark head and gaster, light mesosoma, or concolorous light to dark brown.
Worker measurements (mm): HL 0.82-0.97, HW 0.95-1.10, SL 0.71-0.88, EL 0.23-0.28, ED 0.17-0.22, CL 0.23-0.28, CW 0.26-0.30, WL 0.90-1.15, PSL 0.19-0.28, PL 0.26-0.38, PW 0.30-0.42, PPL 0.18-0.22, PPW 0.28-0.38; Indices: CI 86-88, SI 87-91, CLI 88-93, PI 87-90, PPI 56-64.

Plate 16. Crematogaster coarctata worker (California, United States NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

Queen: Mandibles longitudinal striate with decumbent hair; clypeus longitudinal striate with 4-6 long erect and decumbent hair, anterior margin concave with slight medial notch, and many long flexuous hairs; scape passing posterior border of head, with semi-erect hair; ocelli small, flush with surface of head with 2-4 long flexuous, erect hairs in between; head quadrate, longitudinal striate fading to smooth along frontal groove, with 5-6 long, fine flexuous hairs between frontal lobes to ocelli, and decumbent hair evenly distributed and pointed medially.

Mesosoma slightly wider than width of head, dorsal view of mesosoma shiny areolate with many fine long erect and decumbent hairs pointed toward middle; dorsellum not visible from above; propodeal latitudinal striae coming to points on spines; side view of mesosoma
longitudinal striate with many appressed and decumbent hairs and few scattered long, erect hairs; propodeal spiracle small.

Petiole trapezoidal, areolate with many fine decumbent hairs pointed to the middle of the poster margin and 4-5 erect hairs along each lateral margin; anterior subpetiolar process well developed; postpetiole shallowly bilobed, spreading slightly posteriorly, areolate, covered with fine decumbent hair pointed posteriorly with 2 erect on the dorsum of each hemilobe, and 3 along each side; gaster areolate with many decumbent or appressed hairs and few long erect hairs.

Concolorous brown.

**Queen measurements (mm):** HL 0.71-1.50; HW 1.15-1.68; SL 0.63-1.25; EL 0.22-0.44; ED 0.18-0.36; CL 0.19-0.53; CW 0.28-0.92; WL 1.82-3.27; PSL 0.18-0.49; PL 0.31-0.56; PW 0.45-0.63; PPL 0.30-0.45; PPW 0.41-0.56; Indices: CI 62-89, SI 83-89, CLI 58-68, PI 69-88, PPI 73-80.
Plate 17. *Crematogaster coarctata* queen
(Grant County, New Mexico CWEM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution.** Western United States from west Texas to the Pacific coast, Nevada, and Utah in the north, south to Veracruz, Mexico.

Map 4. *Crematogaster coarctata*

**Type series.** Two workers collected by Dr. Schaufuss from San Mateo and San Francisco, California and maintained at the NHMW (examined); 2 syntype workers, *C. californica*, California, United States, MNHG (examined); 1 possible type worker *C. mormonum* (Pergande), Salt Lake, Utah, United States LACM (examined); 9 topotype workers *C. monomorium*, Salt Lake, Utah, United States [LACM] (examined).

**Other material examined:** MEXICO: Baja California. Guerrero Negro (3 wk MCZC); Chihuahua. Madera (3 wk CWEM), 23k N Madera (3 wk CWEM), Buenaventura, 21k W Las Varas (8 wk, 1 qn CWEM); Sonora, Puerto Peñasco (3 wk CWEM); Veracruz. Chiconquiaco (5 wk CWEM). UNITED STATES: Arizona. Cochise County, Chiricahua Mountains (52 wk
CWEM), Portal (8 wk, 2 ml MCZC), (32 wk CWEM), 3mi N Portal (63 wk CWEM), W Turkey Creek 18.7km WSW Portal 1950m (31°51.3’N 109°19.7’W) (18 wk STDC), Santa Catalina Mountain, Fenner Canyon (3 wk MCZC), Huachuca Mountains, Montezuma Pass (20 wk MCZC), Pima County, A.S.U. lab colony, D. Wheeler lab University of Arizona (26 wk COOK), Santa Cruz County, Pajarito Mountains 8.6mi SW Jct. Rt.289 on FSR39 (31°25.81’N 111°10.78’W elev.3550’) (20 wk MCZC); California, without locality (10 wk NHMW), Alameda County Sierra Heights (3 wk MCZC), Mendocino County rest area near Longvale (38°34’58.2”N, 123°26’37.2”W) (21 worker CWEM), Napa County, Oakville (3 wk MCZC), Orange County Firestone Boy Scout Reservation (1 wk CWEM), Tonner Canyon, (3 wk CWEM), Riverside County, Box Springs (5 wk CWEM), 22mi E. San Juan Capistrano (30 wk CWEM), Rancho Dos Palmas, E of Salton Sea (3 wk MCZC), San Bernardino County, New York Mountains (3 wk CWEM), Running Spring, (6 wk CWEM), San Diego County, Laguna Beach (2 wk MCZC), Old Town (4 wk MCZC), San Ysidro Canyon (4 wk MCZC), San Mateo County (syntype, 2 wk MCZC); Santa Clara County, Palo Alto (23 wk MCZC), Stanford University (6 wk MCZC); New Mexico, Catron County, Glenwood (3 wk MCZC), Doña Ana County (10 wk, 6 qn, 6 ml CWEM), 45k NE Las Cruces (3 wk CWEM), Grant County, 6.03k E Mule Creek (33°07’31.1’’N 108°53’42.2’’W) (2 wk, 1 qn CWEM), Hidalgo County, Coronado National Forest, Clayton Draw (12 wk MCZC); (31°31’22’’N; 108° 56’58’’W) (7 wk CWEM); 53k SW (31°30’36’’N 109°02’14’’W) (1 wk CWEM), Gray Ranch (6 wk CWEM), Los Alamos County, Los Alamos (9 wk CWEM), Luna County, Deming (4 wk CWEM), San Miguel County, Las Vegas Hot Springs (3 wk MCZC), Santa Fe County (3 wk CWEM); Nevada, Nye County, Cactus Range (3 wk LACM); Washoe County, South end Pyramid lake (2 wk MCZC); Texas, Jeff Davis County, Davis Mountains, Madera Canyon Picnic Area (2 wk MCZC); Utah, Beaver County, Milford (3 wk MCZC), Mineral Mountains (5 wk, 1 ml LACM), Wah Wah Mountains.
(3 wk LACM), Salt Lake County (19 wk, 1 qn, 4 ml MCZC), Great Salt Lake, Stanbury Island (5
wk, 1 qn LACM), Salt Lake City (6 wk LACM), Utah County, Provo (1 wk MCZC).

**Etymology.** *Coarctata* in Latin *coartātīō* meaning crowding together.

**Discussion:** Key characteristics of *Crematogaster coarctata* Mayr are the intense striate-punctate
sculpturing over the entire head and the pronotum being rounded with striate and some punctures
following the curvature of the pronotum. *Crematogaster coarctata* also has a highly variable
anterior subpetiolar process. The scape is also of variable length, always at least reaching the
posterior border of head.

The worker of this species is identical to the worker of *Crematogaster mutans* and they
are sympatric in distribution. There is a slight difference in the width of the mesosoma of the
queens; the width of the mesosoma, viewed from above of *C. coarctata* is wider than the width
of its head and in *C. mutans* the width of the mesosoma is narrower than the width of its head. It
is possible that *C. mutans* is a synonym, but more research on habits must be conducted and
more specimens need be collected to be sure.

*Crematogaster coarctata* can easily be confused with *C. cerasi* and *C. vermiculata*. All
three species have 1-5 long flexuous hairs on the pronot al shoulder with similar but not identical
sculpturing. Pronotal shoulder sculpturing differs in that *C. cerasi* is more lineolate, *C.
vermiculata* is vermiculate and *C. coarctata* is striate-shallowly punctate to areolate in
sculpturing. The scape of *C. coarctata* always reaches the posterior border of head and often
surpasses it; and the scape of *C. vermiculata* is shorter but can reach the posterior border of head.
The head of *C. coarctata* is very punctate in neat longitudinal rows, while *C. vermiculata* has a
shiny head. The propodeal spines of *C. coarctata* and *C. vermiculata* are always long and
straight while *C. cerasi* has reduced to medium length spines with the upper edge sinuous when
viewed from the side.

Emery (1895) described C. mormonum as an eastern variety of C. lineolata subspecies coarctata. In his list of Crematogaster, Wheeler (1919) raised C. coarctata to species and listed C. mormonum as a variety. Creighton (1950) did not completely agree with Emery, stating that he had not seen intergrades between C. coarctata and C. mormonum. Buren (1968) raised C. mormonum to species in his key.

Crematogaster lineolata subspecies laeviuscula var. californica was described by Emery in 1895. Wheeler (1919), in his list of North American Crematogaster has C. californica as a variety of C. laeviuscula. Creighton (1950) raised C. californica to species in his key and Buren (1968) maintained this position.

I borrowed type material of C. californica from the MNHG and material labeled “possible type” and topotypes of C. mormonum from Salt Lake, Utah from the LACM. I have compared workers of C. lineolata to the possible types of C. mormonum and observed differences in sculpturing and pilosity. The pronotal sculpturing and pilosity on C. lineolata is lineolate with many short bristle like hairs on the pronotum, C. mormonum differs in sculpturing with longitudinal rugae and 1-5 long flexuous erect hairs on the pronotum. Type workers of C. laeviuscula and C. californica also differ in sculpturing on the pronotal shoulder. Crematogaster laeviuscula is shiny shallowly to deeply areolate and C. californica has longitudinal rugae. In comparing workers of type material of C. coarctata, to C. mormonum and C. californica I find no significant differences. I conclude that C. californica, and C. mormonum are synonyms of C. coarctata.

All three of these taxa share the same sculpturing on the head consisting of deep striate below the eyes fading to shiny punctate medially; and longitudinal striate-shallowly punctate to areolate sculpturing on mesosoma. All have the scape at least reaching the posterior border of
head to variable length past the border. The most interesting feature of these ants is the highly variable anterior subpetiolar process. All have it and within a single nest series the variability can be from a slight nub to well developed and pointed process. Pilosity of the pronotal shoulder of *C. coarctata* is also variable, 1-5 long flexuous hairs, with 1-2 being the most common number. These three taxa are also sympatric giving more credence to their synonymy.

**Biology.** *Crematogaster coarctata* has mostly been collected in western United States. Specimens have been taken from El Paso County, Texas, throughout New Mexico, Arizona and California. This species is usually found in subterranean nests, under rocks or occupying downed logs. Its preferred habit is desert scrub. *Crematogaster coarctata* have been observed tending *Hemiargus isola* and visiting extrafloral nectories on *Opuntiae* sp. throughout the day. This species has also been observed on saltbush, live oak, pine juniper and other desert scrubs. They can be found in cavities in plants and among exposed roots of plants and have been found out in the open foraging.

*Crematogaster corvina* Mayr

Plate 18; Map 5.

**Description:**

**Worker:** Mandibles shiny longitudinal striate with decumbent hair; clypeus slightly longer than wide, longitudinal rugose-striate with 2 erect and several fine appressed hairs, anterior margin convex with medial notch and 4 long erect and several short erect hairs; scape failing to reach posterior border of head, with decumbent hair; head shiny, deeply striate-punctate, with less than 10 long erect and many fine appressed hairs between the eyes.

Mesosoma rugose-punctate with 1 long erect hair on each pronotal shoulder, several around mesonotal boss and 1-3 along lateral propodeal margin to spine, and many appressed hairs; notopropodeal groove very steep and wide with carina along lateral dorsal margin; propodeal spines short and thick at the base, diverging widely.

Petiole rectangular, slightly wider than long, areolate from above, rugose-punctate from the side, with 2 long hairs on each posterior lateral corner; postpetiole wider than long, deeply areolate with 6-8 long erect hairs evenly distributed dorsally, hemilobes round ventrally, posterior spreading slightly, medial sulcus faint; gaster areolate.

Concolorous dark brown.

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**Plate 18. *Crematogaster corvina* worker**
(Mexico NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
Worker measurements (mm): HL 0.62-0.70, HW 0.64-0.78, SL 0.56-0.58, EL 0.13-0.17, ED 0.12-0.13, CL 0.18-0.22, CW 0.18-0.22, WL 0.78-0.85, PSL 0.13-0.17, PL 0.24-0.3, PW 0.24-0.32, PPL 0.13-0.19, PPW 0.28-0.34; Indices: CI 90-97, SI 83-90, CLI 100, PI 94-100, PPI 46-55.

**Distribution:** Southern Texas to Costa Rica.

Map 5. *Crematogaster corvina*

**Type series:** Two specimens collected by Mr. Norton from Mexico, no locality mentioned.

**Other Material examined:**

**MEXICO:** (2 wk NHMW); **Puebla**, 10.5 k N Izúcar Matamoros (5 wk CWEM); **Veracruz**, (3 wk MCZC); Mirador (3 wk MCZC); Tamarindo (3 wk MCZC). **NICARAGUA:** **Grenada**, Volcán Mombacho [Finca Progresso] 700m (4 wk CWEM); **Río San Juan**, Bartola 5.1mi SE El
Castillo 47mi (10°58’22.9”N, 84°20’20.3”W) (5 wk CWEM).

Other specimens in the literature: California Academy of Sciences, AntWeb (www.antweb.org):

COSTA RICA: Braulio Carrillo National Park (JTLC); MEXICO: San Luis Potosi, Chupaderos (1 wk JTLC); Tamaulipas, Linares (LACM); Veracruz (1 wk NHMB); UNITED STATES: Texas, Hidalgo County, Santa Ana National Wildlife Refuge (1 wk JTLC).

Etymology: corvina is Latin from corvus meaning raven, referring to the dark color of this species.

Discussion: Crematogaster corvina is in the subgenus Neocrema. The presence of a medium sulcus on the postpetiole, though faint and the subquadrate petiole are characteristic of the subgenus Neocrema. Key characteristics of C. corvina are an enlarged, bulging mesonotal boss and reduced propodeal spines that curve slightly inward. In very small workers of C. corvina the eye is round, but in larger workers, the eye oval. This species is very punctate everywhere except the gaster. Crematogaster corvina can be confused with C. distans. They can be distinguished by the sculpturing on the head; C. corvina is very striate-punctate and C. distans is shiny areolate.

Biology. This species is not well collected therefore specific nesting habits for C. corvina are not well known. A collection was taken by D. Brenes in the Braulio Carrillo National Park, in Costa Rica, a mosaic of mature wet forest and second growth forest (Longino, www.antweb.org). P. Ward collected C. corvina in the Santa Ana National Wildlife Refuge, Hidalgo County Texas, which is a semi-dry deciduous forest with low vegetation (Longino, www.antweb.org).

Crematogaster crinosa Mayr

Plates 19, 20 and 21; Map 6.

Crematogaster crinosa Mayr, 1862: 767; worker described, Rio de Janeiro, Brazil. Mayr, 1887:

Longino, 2003a: 49-50: queen described.

_Crematogaster brevispinosa_ Mayr, 1870a: 403-404: worker described, S. Fe de Bogotá, Colombia. Santschi, 1918: 182: combination in _C. (Orthocrema)_.


_Crematogaster brevispinosa_ var. _schuppi_ Forel, 1901c: 299-300: worker, queen described, Brazil. Emery, 1922: 134: combination in _C. (Orthocrema) brevispinosa_ var. _schuppi_.


_Crematogaster brevispinosa_ var. _townsendi_ Wheeler, 1925: 25: worker described, Peru.


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**Descriptions.**

**Worker:** Mandibles smooth, evenly covered with decumbent hair; clypeus slightly wider than long, shiny shallow striate, anterior margin convex with 12 long hairs; scape failing to reach posterior border of head, with decumbent hairs; head shiny shallow striate, evenly covered with decumbent hairs and none to few erect hairs.

Mesosoma with many short erect and decumbent hairs; pronotum with striae following curve of shoulder; medial metanotal carina small; humeri and promesonotal suture apparent from breaks in sculpturing; notopropodeal groove steep and angular; propodeal spines short, upturned (seen from the side) and divergent (seen from above).

Petiole, postpetiole and gaster rugose; petiole and postpetiole with several erect hairs on anterior margin; petiole subquadrate, slightly longer than wide, anterior subpetiolar process well developed; postpetiole globular; gaster sparsely but evenly covered with erect hairs.

Color ranges from reddish-brown to dark brown.

**Worker measurements (mm):** HL 0.55-0.70, HW 0.62-0.69, SL 0.48-0.50, EL 0.12-0.17, ED 0.10-0.14, CL 0.18-0.26, CW 0.26-0.30, WL 0.68-0.80, PSL 0.10-0.13, PL 0.26-0.30, PW 0.18-0.31, PPL 0.19-0.26, PPW 0.14-0.31, Indices: CI 88-101, SI 71-87, CLI 69-87, PI 97-144, PPI 84-136.
Plate 19. *Crematogaster crinosa* worker
(cotype of *C. brevispinosa var. minutior* Forel, Brazil, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles longitudinally striate, with decumbent and appressed hairs; clypeus striate with appressed hair, anterior margin convex with 10 long flexuous hairs; scape just reaching medial ocelli, with appressed and few erect hairs; ocelli small, flush with top of head; head striate following curvature of eyes, with appressed hairs.

Mesosoma shiny areolate, pilosity much like that of worker; dorsellum prominent under scutellum and metanotum visible viewed dorsally; propodeum punctate; propodeal spines blunt not developed.

Petiole subquadrate, deeply areolate, with 1 long erect hair on each posterior lateral corner; postpetiole globular, very shiny with few short fine erect hairs pointed posterior; gaster shiny areolate, with erect and appressed hairs in rows on each terga.

Color reddish-brown.

**Queen measurements (mm):** HL 1.13-1.26, HW 1.61-1.40, SL 0.66-0.88, EL 0.37-0.47, ED 0.29-0.36, CL 0.37-0.41, CW 0.47-0.48, WL 2.14-2.28, PSL 0.12-0.14, PL 0.71-0.72, PW 0.40-0.55, PPL 0.35-0.41, PPW 0.55-0.64; Indices: CI 70-90, SI 58-70, CLI 79-85,
Plate 20. *Crematogaster crinosa* queen
(Jalisco, Mexico, CWEM # 19216): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus longitudinally striate with few erect hairs, anterior margin straight with 8-10 long hairs; scape typical; ocelli prominently protruding from top of head; head shiny rugose with many short erect hairs.

Mesosoma areolate with sparse short erect hairs evenly distributed; dorsellum visible viewed from above.

Petiole and postpetiole rugose with short erect hairs; gaster areolate with few short erect hairs.

Color light yellow to reddish-brown.

**Male measurements (mm):** HL 0.42-0.74, HW 0.53-0.85, SL 0.12-0.22, EL 0.30-0.43, ED 0.28-0.40, CL 0.11-0.22, CW 0.22-0.41, WL 1.18-2.08, PL 0.36-0.54, PW 0.20-0.35, PPL 0.17-0.26, PPW 0.24-0.38; Indices: CI 79-87, SI 28-30, CLI 49-50, PI 154-180, PPI 68-71.
Plate 21. *Crematogaster crinosa* male
(Jalisco, Mexico, CWEM # 19216): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution.** California to Argentina

Type series: Type from Rio de Janeiro, Brazil. Cotype worker of Crematogaster brevispinosa var. minutior Forel, Brazil; C. brevispinosa subsp. townsendi Wheeler, W.M., Peru.

Other Material examined: BOLIVIA: Santa Cruz. Las Gammas (1 wk, 2 ml MCZC), Pampa Grande (2 wk, 1 qn MCZC). BRAZIL: Amazonas, Benjamin Constant (3 wk LACM); São Paulo, Rio Claro (2 wk CWEM). COLOMBIA: Antioquia, Caucasia (2 wk CWEM), Turbo (3 wk CWEM); Cesá, Aguachica (5 wk CWEM), Valledupar (3 wk CWEM), El Copey (1 wk CWEM); Cundinamarca, Fusagausgá (12 wk CWEM); Guajira, Riohacha (4 wk CWEM); Huila, 8k N Neiva (2 wk CWEM), 14k N Neiva (3 wk CWEM), Rivera (3 wk CWEM); Magdalena, Aracatca (13 wk CWEM); Meta, Puerto Lopez (3 wk CWEM), Porvenir (3 wk CWEM); Norte de Santander, Cúcuta (2 wk, 1 ml CWEM); Sucre, Sincelejo (2 wk CWEM); Tolima, Ibagua (1 wk CWEM); Valle, Sevilla (9 wk, 2 ml CWEM). COSTA RICA: Puntarenas, Cerro Helado 17k NE Rincon (8º45’30”N, 83º25’00”W) (1 wk CWEM); Fundación Neotrópica (28 wk, 2 ml CWEM), Guacimal 4500m (10º13’N 84º51’W) (2 wk LACM); San José, (3 wk MCZC) Pan Alturas, 19k N San Isidro (19 wk CWEM). EL SALVADOR: Libertad, La Libertad, San Andres (4 wk CWEM). MEXICO: Baja California Sur, San Jose del Cabo (21 wk COOK); Chihuahua, Guerrero Estado Terrero (1 wk CWEM); Jalisco, Ameica (2 wk CWEM), Colima (9 wk, 10 qn, 9 ml CWEM), 39k N Colima (19° 28’0.41”N, 103°27’31”W) (1 wk, 1 qn, 1 ml CWEM), 39k N Guadalajara (13 wk, 10 qn, 10 ml CWEM); Morelos, Cocoyotla (1wk CWEM), Cuernavaca, (Cuzrnacava) (2 ml MCZC), La Calera (27 wk CWEM); Nayarit, 12.8k S Acaponeta (1 qn CWEM), Tepic (21°30’0.06”N, 104°55’25”W) (6 wk CWEM); Sinaloa, Escuinapa (22°49’0.58”N, 105°46’ 54”W) (3 wk CWEM), Guasave Park by Rio (25°34’0.37”N, 108°27’18”W) (6 wk CWEM), 132k N Mazatlán 1k N El Avion (24°10’0.16”N, 107°01’02”W) (7 wk CWEM); Tabasco, Tabasco (3 wk CWEM), 13k W Border Chiapas, Rt. 186 (3 wk CWEM); Tamaulipas, Antiguo Morelos (2 wk
CWEM); Veracruz, Magdalena, Aracataca (13 wk CWEM); Tierra Blanca (1 qn CWEM); Jalapa (4 wk CWEM). NICARAGUA: Granada, Domatila, 4.3mi N Pica Pica (8 wk, 1 qn CWEM). PERU: Peru Islands, (3 wk LACM). UNITED STATES: California, San Francisco Coast (4 wk MCZC); New Mexico, Doña Ana County (1 qn CWEM).

**Etymology.** Crinosa from Latin crinis meaning hair.

**Discussion:** The key characteristics of the Crematogaster crinosa worker are the developed anterior subpetiolar process, short upturned propodeal spines, and the dorsum of the head is evenly covered with appressed pubescence and few erect hairs. This species can be confused with C. torosa and C. rochai. One distinguishing character is the anterior subpetiolar process; on C. crinosa it is less developed than that of C. rochai and more developed than that of C. torosa. The gaster of C. crinosa is evenly covered with short erect hairs, C. rochai has few to no erect hairs on gaster and C. torosa has erect hair along a wide margin of the gaster. This is a small continuously polymorphic species that is mostly reddish-brown to dark brown in color.

**Biology:** Crematogaster crinosa is a cosmopolitan species preferring dryer habitats, but can be found in the canopy of wet forests (Longino, 2003a). Colonies are large, polydomous and will occupy live or dead branches, fence posts or any cavity in a tree (Longino, 2003a). This species does not build external carton chambers, but will use carton inside the chambers or to restrict openings (Longino, 2003a). Crematogaster crinosa is omnivorous, feeding on dead insects, extrafloral nectaries, and they tend homopterans. The range of this species is extensive from New Mexico, USA in the north, south through Mexico, Central America and down into Brazil. Specimens have been taken from cloud forest litter, lowland forest litter, ridge forest litter and oak forest litter. Nests have been found in twigs, tree cavities and in the soil.
Crematogaster curvispinosa Mayr

Plate 4, Figure F, Plates 22, 23, and 24; Map 7.


**Descriptions:**

**Worker:** Mandibles shiny, with semi-erect hairs; clypeus slightly longer than wide, longitudinally striate and with appressed hair, anterior margin slightly convex with 6 long hairs; scape failing to reach posterior border of head, with many semi-erector decumbent hairs and a few scattered erect hairs; head shiny, evenly but sparsely covered with erect hair.

Mesosoma shiny varicose with 6 erect and few semi-erect hairs from viewed from above, areolate from the side; humeri developed; notopropodeal groove well developed; propodeal suture proportionally wide for ant size, declivity steep and angular; propodeal spines long, slender, thickening at the base, pointing almost straight back (viewed from above).

Petiole and postpetiole areolate; petiole flat dorsally, almost quadratre, slightly longer than wide with 2 erect hairs on each posterior lateral corner, anterior subpetiolar process well developed; postpetiole almost round (viewed from above) with 6 erect hairs; petiole wider and longer than postpetiole; gaster shiny and shallowly areolate with evenly spaced erect hairs.

Concolorous brown.

**Worker measurements (mm):** HL 0.54-0.62, HW 0.58-0.62, SL 0.47-0.52, EL 0.12-0.16, ED 0.10-0.12, CL 0.17-0.22, CW 0.18-0.24, WL 0.58-0.67, PSL 0.16-0.23, PL 0.16-0.18, PW 0.14-0.17, PPL 0.12-0.13, PPW 0.14-0.17, Indices: CI 93-100, SI 87-84, CLI 92-94, PI 105-141, PPI 76-86.
Plate 22. *Crematogaster curvispinosa* worker
(point second from the top of cotype of *Crematogaster curvispinosa* var. panamana Wheeler, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny, with semi-erect hairs; clypeus shiny with semi-erect hairs, anterior margin slightly concave with 4 long and several short hairs; scape failing to reach posterior border of head, with semi-erect hairs; ocelli typical; head shiny, with shallow lineolae around eye and antennal insertions, evenly but sparsely covered with short semi-erect hairs and less than 10 long erect hairs.

Mesosoma shiny viewed from above, with evenly spaced short erect hairs; dorsellum seen from above, but not mesonotum; propodeal spines simply nubs; mesopleuron with few longitudinal lineolae.

Petiole and postpetiole areolate with appressed hairs; petiole subquadrate, with 2 long hairs on posterior lateral corners; anterior subpetiolar process small; postpetiole globular with several long hairs on dorsal surface; petiole longer but narrower than postpetiole; gaster areolate, evenly covered with short erect and appressed hairs.

Concolorous brown to very dark brown

**Queen measurements (mm):** HL 0.75-0.82, HW 0.86-0.97, SL 0.55-0.61, EL 0.22-0.26,
ED 0.18-0.22, CL 0.25-0.29, CW 0.23-0.30, WL 1.44-1.62, PSL 0.02-0.03, PL 0.36-0.42, PW 0.26-0.35, PPL 0.24-0.30, PPW 0.31-37; Indices: CI 84-87, SI 73-74, CLI 97-109, PI 120-138, PPI 77-81.

Plate 23. *Crematogaster curvispinosa* queen
(C. curvispinosa var. panamana, second point from top, Tumba Muerto, Panama, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Male:** Mandibles creamy white, tiny, covered with semi-erect hairs; clypeus slightly wider than long, anterior margin slightly concave, with 4 long hairs; scape with 2 – 3 erect hairs; ocelli protruding from head; head shiny with few erect hairs.

Entire mesosoma shiny, with few erect hairs; promesonotal suture very well developed; dorsellum hidden by scutellum when viewed dorsally.

Petiole, postpetiole and gaster shiny with few erect hairs; petiole subquadrate; postpetiole almost square.

Concolorous amber.
Male measurements (mm): HL 0.35-0.45, HW 0.44-0.54, SL 0.06-0.08, EL 0.14-0.22, ED 0.12-0.17, CL 0.11-0.17, CW 0.17-0.19, WL 0.89-0.94, PL 0.12-0.17, PW 0.12-0.17, PPL 0.11-0.13, PPW 0.10-0.17; Indices: CI 80-83, SI 17-19, CLI 65-89, PI 100, PPI 76-110.

Plate 24. *Crematogaster curvispinosa* male
(C. curvispinosa var. panamana, third and fourth point from top, Tumba Muerto, Panama, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** North west Coast of Mexico, south into Brazil.
Map 7. *Crematogaster curvispinosa*

**Type series:** Type from Rio Janeiro, Brazil; Paratype worker, queen and male, and paratype of 5 workers, 2 queens and 1 male. Cotype of *Crematogaster curvispinosa* var. *panamana* Wheeler (MCZC).

**Other material examined:** BELIZE: Orange Walk, Lamanai (1 wk CWEM). COLOMBIA: Caqueta, Puerto Rico (2 wk CWEM); Cundinamarca, Anolaima (10 wk, 3 qn CWEM), Bridge Quebrada Blanca (3 wk CWEM); Huila, La Plata (29 wk, 1 qn CWEM), Rivera (13 wk CWEM), Neiva (2 wk CWEM); Meta, El Castillo (23 wk, 1 qn, 5 ml CWEM), Puerto Lopez (11 wk, 3 qn CWEM); Valle, Sevilla (2 wk CWEM); COSTA RICA: Matina, (1 wk MCZC); Osa Peninsula, Corcovado National Park (1 wk MCZC). EQUADOR: Los Rios, Jaunes, Moche (3 wk CWEM); Pichincha, Maquipucuna (4 wk, 1 qn MCZC). MEXICO: Baja California, (2 wk CWEM); Morelos, Cuernavaca (2 wk MCZC); San Luis Potosi, Tamazunchale (10 wk, 4 qn CWEM); Tamaulipas, Los Cedros at Gomez Farias (31 wk COOK); Chiapas, Tapuchula (4 wk
Etymology: Curvispinosa from Latin curvus meaning to bend and spinosus meaning thorny or prickly, referring to curved propodeal spines.

Discussion: A key characteristic of Crematogaster curvispinosa is its long slender spines that curve slightly upwards. This species can be confused with C. longispinosa and C. nigropilosa with their long slender spines; however, closer examination of the sculpturing on the dorsum of the mesosoma can easily distinguish C. curvispinosa as varicose, C. longispinosa is shiny and C. nigropilosa has evenly spaced carina along the pronotal shoulder and the mesonotum is shiny.

Biology: Crematogaster curvispinosa has been collected mostly in Central America and along both coasts of South America. Few have been collected in Mexico. Nesting habits suggest that this species prefers underbrush and disturbed areas (Longino, www.antweb.org). Longino states colonies are small and reproductive structure can vary with ergatogynes present. Nests can be found in dead grass stalks, narrow vine stems and single chambers of ant-plants (Longino, www.antweb.org). Some laboratory observations by Longino (www.antweb.org) are quite interesting. He states he collected a nest consisting of workers, brood and one ergatogyne to maintain in his laboratory. This colony did not receive much attention except for sporadic feedings and observations. After a year the ergatogyne had died; however the colony had recovered, producing workers, queens and males (Longino, www.antweb.org).
Crematogaster dentinodis Forel

Plates 25 and 26; Map 8.


Descriptions:

Worker: Clypeus wider than long, shiny, with shallow longitudinal striae, anterior margin slightly convex with medial notch, and many long erect hairs; scape reaching posterior border of head and evenly covered with decumbent hairs; head punctate-reticulate, evenly covered with appressed hair and sparsely covered with short erect hair.

Mesosoma deeply punctate-areolate, with few appressed hairs, 1-3 erect hairs on each pronotal shoulder; medial mesonotal carina small and well developed humeri; notopropodeal groove angular and narrow; propodeal spines medium length, stout, thickened at base, divergent (viewed from above).

Petiole and postpetiole punctate; petiole angularly trapezoidal, with anterior lateral corners flaring up when viewed from behind, each posterior lateral corners with tiny tooth (tiny teeth often very difficult to see) and one long hair, several erect hairs on anterior margin and appressed hairs on sides; anterior subpetiolar process pointed but variable in development, size and shape in type series; hemilobes of postpetiole slightly longitudinally elongate, spreading slightly posteriorly, with 3 erect hairs on each lobe pointed posteriorly; petiole wider and longer than postpetiole; gaster shallower areolate, with several erect hairs in rows in middle of each of last 4 terga, appressed hairs sparsely covering remainder of gaster.
Concolorous reddish brown.

**Worker measurements (mm):** HL 0.66-0.84, HW 0.68-0.91, SL 0.62-0.70, EL 0.18-0.20, ED 0.14-0.19, CL 0.22-0.24, CW 0.24-0.30, WL 0.73-0.97, PSL 0.13-0.19, PL 0.16-0.22, PW 0.28-0.34, PPL 0.17-0.20, PPW 0.25-0.31; Indices: CI 92-97, SI 88-94, CLI 80-92, PI 57-64, PPI 65-68.

Plate 25. *Crematogaster dentinodis* worker (Queretaro, Mexico MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles latitudinal striate; clypeus wider than long, shallow longitudinal striate, with appressed hair pointed toward middle, anterior margin straight, with 6-8 erect hairs; ocelli typical; scape failing to reach posterior border of head with semi-erect hair; head shiny, longitudinally striate, smooth in middle, with appressed hair directed toward middle.

Mesosoma shiny from above, with few evenly spaced short erect and many appressed hairs on dorsum of mesosoma to propodeal spine tips; propodeum rugose to spine tips; dorsellum slightly visible from above.
Petiole, postpetiole and gaster areolate; petiole saddle shaped with anterior lateral corners slightly flaring up, few appressed hairs and 1 long hair on each posterior lateral corner; postpetiole bilobed with shallow medium sulcus, 2 long hairs on posterior edge of each hemilobe; gaster with appressed hair.

Concolorous light to dark brown.

**Queen measurements (mm):** HL 1.54, HW 1.75, SL 1.18, EL 0.43, ED 0.41, CL 0.46, CW 0.55, WL 3.14, PSL 2.64, PL 0.58, PW 0.98, PPL 0.53, PPW 0.91; Indices: CI 88, SI 77, CLI 84, PI 59, PPI 58.

**Plate 26. Crematogaster dentinodis queen**
(Chiricahua Mountains, Arizona, United States CWEM # 7775): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Central southwest United States to central Mexico.
Map 8. *Crematogaster dentinodis*

**Type series:** Type from Querétaro, Mexico.

Middle card, worker on right designated as lectotype; 3 cards with 2 specimens on each card. Specimen on left of middle card was used for worker illustrations. Type material examined maintained at the MCZC; 2 syntype workers MNHG.

**Other Material Examined:**

**MEXICO:** Chihuahua, Rancho El Kilo (6 wk, CWEM); Buenaventura, 21k W Las Varras (3 wk CWEM), Janos 18k NW Ojo Frio (10 wk CWEM), Ocampo, Basaseachic (4 wk CWEM), Villa Ahumada, 85k S Juarez (4 wk CWEM); Estado, (2 wk, 1 qn LACM); Guanajuato, 12.5k SE Guanajuato (39 wk CWEM); Hidalgo, Huichapan Hwy 45, 17mi NE Huichapan (5 wk STDC); Jalisco, 2mi NW Barranquillas (1 wk LACM), Guadalajara (13 wk MCZC), 12.25k SE of Guadalajara (39 wk CWEM), Sayula, (3 wk LACM); Querétaro, (8 wk MCZC); Sonora, 37mi N Hermosillo 1700’ (3 wk LACM), Puerto Peñasco (3 wk CWEM). **UNITED STATES:** Arizona, Cochise County, Chiricahua Mountains, 24k W Portal (14 wk CWEM), 36k E Portal (5
wk CWEM), NW Portal, Cave Creek Rd, 2mi (1 wk LACM), 4mi N Paradise (14 wk, 9 qn CWEM), Portal (40 wk CWEM) (1 wk, 1 qn MCZC), Cave Creek Rd. (1 wk LACM), Douglas, Perogosa Hills (2 wk LACM), Montezuma Pass (2 wk MCZC), Huachuca (2 wk MCZC), Pima County, Catalina Mountains (3 wk LACM), Molina Basin, Mountains (3 wk LACM), Santa Cruz County, Canelo (3 wk CWEM), 1mi SE Canelo HWY 83 (1 wk CWEM), Pajarito Mountains (32 wk MCZC), San Rafael Valley (11 wk, 1 α qn MCZC), Yavapai County, Bradshaw Mountain (1 wk, 1 qn CWEM), 8.9mi S. Jct. Rt.69 on FSR 197 elevation 6550ft (14 wk, 2 qn MCZC); New Mexico, Grant County, Gila Mountains Wright’s Cabin (3 wk CWEM), Sierra County 6.36mi W Rd. (32°45′34.9″N, 107°40′W) (4 wk CWEM), Socorro County, Bear Mountains, 11.0k NW Magdalena, (1952m 34°12′23″N, 107°17′45″.7″ W) (1 wk CWEM), 3mi from highway 107 (2 wk CWEM); Tennessee, Lincoln County, Stump Shoals (46°28′30.0″N, 35°08′24.9″W) (1 wk CWEM); Texas, El Paso County, El Paso (8 wk CWEM), Hudspeth County, Indio Mountains Research Station (8 wk CWEM).

**Etymology:** *Dentinodis* from the Latin *dent* meaning tooth and *nodis* meaning knob. This species usually has a tiny tooth or knob on each posterior lateral corner of the petiole.

**Discussion:** *Crematogaster dentinodis* has a key character, a small tooth or dent on each posterior lateral corner of the petiole. There is however, a great deal of variability in the development of this tooth, from well defined to almost absent. This species also has two queen sizes (large and small or alpha and beta). I do not know the role within the colony of each of these queens.

This species can be confused with *C. depilis*, *C. opaca*, and *C. punctulata*. All four species have a very punctate head; however *C. opaca* can be separated by the punctures being very ordered in longitudinal lines, *C. punctulata* has longitudinally lineolate-punctate fading to
shiny medially. Also, the dorsum of the pronotum of *C. dentinodis* has fewer than 10 erect hairs, *C. punctulata* has many erect hairs and *C. depilis* is devoid of hair.

**Biology:** *Crematogaster dentinodis* prefers arid habitats between elevations of 1000m to 1700m. Their nests have been found in desert grassland, Emory oak woodland, mimosa and herb dominated landscapes and hill thorn scrub. This species nests on rocky slopes of mountains, often in gravely soil. Nests have been found under rocks, under grass clumps, among the roots of shrubs and in dead, and in hollow twigs. *Crematogaster dentinodis* has been collected foraging on fishhook cactus, *Agave schottii* and loose on the ground. They have also been observed capturing termites from under a rock and tending pseudococcids.

**Crematogaster depilis** Wheeler

Plates 27, 28 and 29; Map 9.


*Crematogaster larreae* Buren, 1968: 117: worker, queen, male, described, El Paso, Texas, United States [LACM (paratypes examined)]. NEW SYNONOMY.
**Descriptions:**

**Worker:** Clypeus areolate with appressed hair, slightly wider than long, anterior margin concave with 7-8 long hairs; scape failing to reach posterior border of head, with many semi-erect hairs; head areolate with appressed hair sparsely distributed.

Dorsum of mesosoma scabrous and deeply punctate, completely without hairs; pronotal humeri developed and rounded; mesonotum with medial carina, notopropodeal groove steep and angular; propodeal spines long, slender, thickening at base, divergent (viewed from above); side of mesosoma deeply punctate rugose; posterior face of propodeum longitudinally striate-punctate.

Petiole angularly trapezoidal with anterior lateral corners upraised when viewed from behind, anterior subpetiolar process absent to well developed, punctate with several semi-erect hairs along posterior margin and 1 erect hair on each posterior lateral corner; postpetiole punctate with no erect hairs, hemilobes longitudinally elongate spreading slightly posteriorly; gaster shallowly areolate with few erect hairs in rows in middle of each of last 4 terga, appressed hairs sparsely distributed over remainder of gaster.

Concolorous dark brown or bi-colored, with dark brown head and gaster, light brown mesosoma.

**Worker measurements (mm):** HL 0.60-1.02, HW 0.84-1.14, SL 0.78-0.82, EL 0.24-0.28, ED 0.18-0.24, CL 0.24-0.26, CW 0.29-0.34, WL 0.86-1.14, PSL 0.18-0.24, PL 0.18-0.30, PW 0.36-0.42, PPL 0.22-0.29, PPW 0.30-0.34; Indices: CI 71-89, SI 80-130, CLI 76-83, PI 50-71, PPI 73-85.
Plate 27. *Crematogaster depilis* worker
(syntype specimen with red dot on top card, Cerro Carrizal, Mexico MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Clypeus longer than wide, worker like, longitudinally striate and few erect and many appressed hairs pointed toward middle, anterior margin with many long hairs; scape failing to reach posterior border of head, with semi-erect hairs; head with longitudinal striae, few erect and many appressed hairs pointed toward middle.

Mesosoma shiny with many fine appressed hairs; metapleuron longitudinally striate; dorsellum visible when viewed from above; propodeal spines well developed for queens of this genus; subpetiolar process small.

Petiole and postpetiole much wider than long, longitudinally costate with punctures and few appressed hairs; postpetiole with poorly developed hemilobes and 1 long hair on each posterior edge of each hemilobe; gaster smooth and shiny with appressed hairs dorsally and erect hairs ventrally.

Concolorous dark brown.

**Queen measurements (mm):** HL 1.54-1.63, HW 1.92-2.11, SL 1.25-1.27, EL 0.55-0.56,
ED 0.46-0.50, CL 0.53-0.55, CW 0.60-0.62, WL 3.00-3.55, PSL 0.21-0.24, PL 0.48-0.53, PW 0.72-0.85, PPL 0.50-0.53, PPW 0.67-0.84; Indices: CI 77-81, SI 78-81, CLI 83-89, PI 62-67, PPI 63-75.

Plate 28. *Crematogaster depilis* queen (Tucson, Arizona, USA CWEM #7290): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Male:** Very large for this genus. Clypeus wider than long, anterior margin with many long erect hairs; scape and funiculus evenly covered with decumbent hair; ocelli slightly raised on head with 3-4 erect hairs between; head shallowly areolate, evenly sparsely covered with appressed hair.

Mesosoma void of erect hair except on propodeum, sparsely covered with appressed hairs; pronotum, mesonotum, dorsal face of propodeum smooth; side of mesosoma areolate-rugose, very punctate, posterior face of propodeum longitudinally striate and punctate; dorsellum hidden by scutellum; propodeum rounded on corners producing nub-like bumps.

Petiole almost rectangular, coarsely carinate with several erect hairs, anterior subpetiolar
process poorly developed; postpetiole areolate, with several erect hairs, hemilobes faintly developed; petiole and postpetiole wider than long; gaster shallowly areolate with many short erect hairs in rows on each tergum.

Concolorous dark brown to black.

**Male measurements (mm):** HL 0.60-0.68, HW 0.84-0.92, SL 0.31-0.36, EL 0.25-0.31, ED 0.29-0.35, CL 0.24-0.28, CW 0.29-0.30, WL 2.40-2.45, PSL 0.20-0.24, PL 0.28-0.36, PW 0.36-0.42, PPL 0.23-0.31, PPW 0.34-0.49; Indices: CI 61-73, SI 52-53, CLI 83-93, PI 78-86, PPI 63-68.

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**Distribution:** Southwest USA and northern Mexico.

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**Plate 29, Crematogaster depilis male**
(Chihuahua, Mexico, CWEM #5202): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
Map 9. *Crematogaster depilis*

**Type series:** Lectotype and 10 paralectotype workers, Type series from Chihuahua, Mexico, Worker on far right of top card designated by red dot and labeled as lectotype, 4 paralectotype specimens on top card and 6 specimens on bottom card [MCZC]. Paratype series of *Crematogaster larreae* mixed [LACM].

**Material examined:**

**MEXICO:** *Baja California*, Sierra San Borja (2 wk CWEM) (3 wk MCZC), Isla San Lorenzo (2 wk CWEM); *Chihuahua*, Buenaventura, Flores Magón (3 qn, 31 ml CWEM), Camargo (1 wk CWEM), 30 k NW Casas Grandes (5 wk CWEM), Juarez (1 wk CWEM), 85 k S Juárez (2 wk CWEM), 210 k SE Juárez (1 ml CWEM), Samalayuca (1 qn, 2 ml CWEM), Janos, 14 k N Janos (25 wk CWEM), Villa Ahumada (50 wk, 8 ml CWEM), Namiquipa (13 wk CWEM), 10k W
Ojinaga (10 wk CWEM), Palomas (1 wk CWEM), Zaragoza (3 wk CWEM), Sonora, Punta Cirios (3 wk MCZC).

**UNITED STATES:** Arizona. Cochise County, Chiricahua Mountains, 4.0km N Portal (31°57′N, 109°08′W 360m) (2 wk CWEM), Sunny Flat, John Hands Park, 1 mi N Paradise (51 wk CWEM) (16 wk MCZC), Maricopa County Gila Bend Mountains (3 wk MCZC), Palmelee County (8 wk MCZC), Pima County, 50k NW Tucson (5 wk, 2 qn CWEM) (3 wk MCZC); New Mexico. Catron County, Horse Springs (3 wk CWEM), Colfax County, Eagle Nest (2 wk CWEM), Doña Ana County, Las Cruces (83 wk, 1 qn, 15 ml CWEM), Jornada Experimental Range (1 wk CWEM); Grant County, Leopold Vista (2 wk CWEM), Hidalgo County, Clayton Draw (2 wk CWEM), Lincoln County, 5mi W Capitan (39 wk CWEM), Lordsburg (2 wk MCZC), Sierra County, Truth or Consequences (4 wk CWEM), Hillsboro (12 wk CWEM); Socorro County, Bear Mountain (14 wk CWEM); Nevada. Nye County, Mercury (2 wk CWEM); Texas. El Paso County, El Paso (3 wk CWEM), Hudspeth County, Van Horn, Indio Mountains Research Station (44 wk CWEM); Squaw Spring (N30° 47.824′, W105° 00.710′) (20 wk COOK).

**Etymology:** *Depilis* from the Latin *de* meaning without and *pilis* meaning hair characterizing this species as being hairless.

**Discussion:** The key characteristic of *C. depilis* is the complete lack of erect hairs on the entire dorsum of the mesosoma. *Crematogaster depilis* is distinctly punctate on both dorsum and sides of mesosoma. The worker of this species has a postpetiole with well defined hemilobes, is relatively large for this genus, and can generally be found nesting in the roots of desert shrubs such as *Opuntia* sp. and *Larreae tridentata*. I have examined the original series of *C. larreae* collected by William Buren from the west slope of Mt. Franklin in El Paso, Texas and found the series to be a mixture of *C. depilis* and *C. larreae*. Some were definitely concolorous dark
brown, some were definitely bicolored with light head, mesosoma, petiole and postpetiole, and
dark gaster. Some, however, could be placed in either group where the distinction between light
head and dark gaster were not very profound. Some specimens had a small subpetiolar tooth, but
it was absent on other specimens. Types of these two taxa are indistinguishable and I have
examined nest series that are mixtures from the Indio Mountains Research Station. These
observations lead me to believe that *Crematogaster larreae* is a junior synonym of
*Crematogaster depilis*.

**Biology:** *Crematogaster depilis* can be found throughout the Chihuahuan, Sonoran and Mohave
deserts. It nests in the lower branches and roots of small desert shrubs and cacti. I have often
found nests with brood in the dead branches and roots of *Larreae tridentata*. This species uses
the larval galleries of the wood boring beetles that tunnel in *L. tridentata* and other woody
shrubs. It has also been found under rocks and in yucca logs with brood. To find this ant, look in
shrubs that have dead branches that come from the base of the plant. It is very common foraging
on *Larreae tridentata* and *Opuntia* sp. in the late afternoon, this ant can be observed on the extra
floral nectarines of *Opuntia* sp. These ants readily come to sausage or cookie baits and are often
found in pitfall traps.

*Crematogaster distans* Mayr

Plate 30; Map 10.


Description:

Worker: Mandibles shiny longitudinally striate with decumbent hair; clypeus slightly longer than wide, areolate with 4 erect and several fine appressed hairs, anterior margin straight with several long erect hairs; scape just passing posterior border of head with decumbent hairs and 3 segmented club; head shiny, areolate, with fewer than 10 long erect and many fine appressed hairs between the eyes.
Mesosoma punctate with 1 long erect hair on each pronotal shoulder, 4-6 long erect hairs around mesonotal boss, 1-3 long erect hairs along each lateral propodeal margin to spine, and many appressed hairs; notopropodeal groove very steep and wide with carina along lateral dorsal margin; propodeal spines short and thick at base, diverging widely dorsal view.

Petiole rectangular, square to slightly wider than long, areolate from above, punctate from the side, with 2 long hairs on each posterior lateral corners; postpetiole wider than long areolate with 4-6 long erect hairs evenly distributed dorsally, hemiilobes round spreading slightly posteriorly, medial sulcus faint; gaster areolate.

Concolorous brown to dark brown.

Worker measurements (mm): HL 0.58-0.68, HW 0.61-0.73, SL 0.49-0.71, EL 0.14-0.17, ED 0.14-0.16, CL 0.19-0.20, CW 0.29-0.30, WL 0.58-0.73, PSL 0.13-0.18, PL 0.29-0.30, PW 0.34-0.35, PPL 0.18-0.19, PPW 0.35-0.38; Indices: CI 93-95, SI 84-104, CLI 66-67, PI 85-86, PPI 50-51.

Plate 30. *Crematogaster distans* worker (determined by J. Longino, Magdalena, Colombia LACM #821): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Mexico to Argentina.
Type series: Type from Colombia.

Material examined:

ARGENTINA: Chaco, Benitez (2 wk, 3 ml MCZC); BRAZIL: São Paulo, Agudos (2 wk MCZC). COSTA RICA (1 wk MCZC); Alajuela (2 wk MCZC) (1 wk CWEM). MEXICO: Morelos, Jantetelco (6 wk CWEM); Puebla, 10.5k N, Izúcar de Matamoros, 1200m (2 wk CWEM).

Etymology: distans comes from Latin distantus meaning full.

Discussion: This species is in the subgenus Neocrema. The key characteristics of the Crematogaster distans worker are the enlarged metanotal boss and reduced propodeal spines. This species can be confused with C. corvina. The distinguishing character is that C. distans has a shiny head, and C. corvina has a very punctate head.
**Biology:** Very little is known about *Crematogaster distans*; however, Longino has made some observations from La Selva Biological Station in Costa Rica. Longino states *C. distans* has large colonies that occur in low density. One colony was in a large, fallen, dead tree trunk. He found two alate queens with workers in a hollow stick but did not find brood or a central nest. In Santa Marta, Colombia, Longino found a nest in a dead stick and another nest tending coccids on *Cnidoscolus*. Longino observed columns of workers coming down a tree and onto an *Inga* sapling to tend scale insects (Longino, 2005).

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*Crematogaster emeryana* Creighton

Plates 31, 32 and 33; Map 11.


*Crematogaster marioni* Buren, 1968: 105-106: worker described, Moreno Lake, San Diego County, California, United States. NEW SYNONOMY.

**Descriptions:**

**Worker:** Mandibles longitudinally striate with many short decumbent hairs; clypeus longitudinal striate with decumbent hairs pointed toward middle, anterior margin convex with many flexuous hairs; scape passing posterior border of head, with decumbent hair; head longitudinally striate along sides fading to shiny, shallow areolate in middle of face, few erect and many decumbent
hairs.

Mesosoma rugose at lateral margins fading to striate-rugose at sharp medial mesonotal carina; breaks in sculpturing at promesonotal suture; many decumbent and few scattered thin erect hairs, and 4-5 short bristle-like erect hairs on each pronotal shoulder; pronotum broad and rounded at shoulder; metanotal suture shallow; propodeum striate-rugose to point on spines; spines short, sinuate, thickened at base; from the side mesosoma striate-punctate, with decumbent hairs.

Petiole and postpetiole shiny areolate with one long hair on each posterior lateral corner, sides punctate; gaster shiny areolate with few scattered erect and many appressed in rows on each tergum pointed posteriorly.

Concolorous light to dark brown.

Plate 31. *Crematogaster emeryana* worker (determined by Creighton, Mesa Verde National Park, Colorado LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Worker measurements (mm):** HL 0.78-0.82, HW 0.84-0.89, SL 0.66-0.78, EL 0.18-0.22, ED 0.14-0.18, CL 0.22-0.30, CW 0.24-0.26, WL 0.84-1.00, PSL 0.12-0.17, PL 0.18-0.26,
PW 0.24-0.34, PPL 0.17-0.18, PPW 0.22-0.25; Indices: CI 92-93, SI 85-95, CLI 92-115, PI 75-76, PPI 72-77.

**Queen:** Mandibles longitudinally striate, evenly covered with decumbent hair; clypeus longitudinally striate with 4-6 long flexuous erect and several decumbent hairs pointed toward middle, anterior margin straight with slight medial notch; scape barely reaching posterior border of head, with decumbent hairs; ocelli small, flush with surface of head; head longitudinally striate fading to shiny in middle, with many decumbent hairs pointed toward middle.

Mesosoma shiny areolate, with scattered long flexuous and many appressed and decumbent hairs pointed toward center of mesosoma; in dorsal view pronotum covered by scutum, and dorsellum visible beneath scutellum; propodeal spines well developed for queens for this genus; from the side mesosoma mostly shiny, mesopleuron shallow striate, few flexuous erect hairs.

Petiole and postpetiole striate-punctate viewed from the side, petiole shallowly punctate dorsally, with several long flexuous erect hairs on sides and many decumbent hairs, pointed posteriorly; postpetiole areolate with 6-8 long flexuous hair along margins and many decumbent hairs pointed posteriorly; gaster shiny shallowly areolate with many erect and appressed hairs in rows along each terga, pointed posteriorly.

Concolorous light to dark brown.

**Queen measurements (mm):** HL 1.25-1.37, HW 1.32-1.54, SL 0.90-0.91, EL 0.30-0.41, ED 0.12-0.17, CL 0.43-0.55, CW 0.43-0.48, WL 2.28-2.52, PSL 0.16-0.17, PL 0.30-0.43, PW 0.62-0.67, PPL 0.30-0.34, PPW 0.60-0.62; Indices: CI 89-95, SI 66-72, CLI 100-115, PI 48-64, PPI 50-54.
Plate 32. *Crematogaster emeryana* queen
(determined by Creighton, Mesa Verde National Park, Colorado LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Male:** Mandibles shiny with several erect hairs; clypeus slightly protruding from face, shiny areolate, anterior margin concave with slight medial notch and 4-6 long erect hairs; scape typically short with appressed hairs, ocelli small almost flush with surface of head; head shiny areolate, with 1 long flexuous hair on each frontal lobe, 2-4 around ocelli, appressed hair over rest of face, decumbent hair on occipital margin.

Mesosoma shallowly longitudinally striate-areolate from above; pronotum obscured by scutum dorsal view; dorsellum can be seen from above; propodeum with a tuft of hair where spines should be; mesosoma shiny striate in smooth flowing lines viewed from the side.

Petiole and postpetiole shallow rugose with many long stiff hairs along sides pointed posteriorly; gaster areolate evenly covered with appressed hairs and short stiff hairs becoming

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more numerous posteriorly.

Concolorous light to dark brown.

**Male measurements (mm):** HL 0.52-0.56, HW 0.50-0.64, SL 0.13-0.17, EL 0.22-0.26, ED 0.20-0.22, CL 0.11-0.13, CW 0.19-0.22, WL 1.25-1.54, PL 0.20-0.24, PW 0.23-0.29, PPL 0.17-0.23, PPW 0.23-0.29; Indices: CI 86-104, SI 25-30, CLI 58-59, PI 83-87, PPI 74-79.

Plate 33. *Crematogaster emeryana* male
(Pinal Mountains, Arizona MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Midwest United States to northern Mexico.
Map 11. *Crematogaster emeryana*.

**Type series.** Type from Colorado, U. S.; 1 worker and 1 male, possible type series collected by T. Pergande from Denver, Colorado determined by Snelling; Paratypes *C. marioni* Buren, Huachuca Mountains Arizona (4 wk LACM).

**Material examined:**

MEXICO: Baja California, Tecate, (6 wk LACM); Chihuahua, Morales Ranch Sierra de el Medio (3 wk LACM). UNITED STATES: Arizona, Cochise County, Chiricahua Mountains (15 wk, 1 qn LACM) (104 wk, 16 qn CWEM), 6mi W Portal (3 wk, 1 qn CWEM), Cave Creek Canyon (6 wk CWEM) (12 wk, 1 qn LACM), (31º50’4 109º07’8”W) (6 wk CWEM), Horseshoe Canyon Pass (6 wk CWEM), W Turkey Creek 18.7k (1950m) (9 wk STDC), Gila County, Pinal Mountains (2 wk, 1 qn, 1 ml MCZC), Preacher Canyon Area at jct. near HWY 260 (3 wk STDC), Sierra Ancha (3 wk MCZC), Indian National Monument (3 wk LACM); California, Inyo County, Death Valley National Monument, Grapevine Ranger Station (3 wk MCZC), Los Angeles County, Pasadena, San Rafael Hills (4 wk MCZC), Mendocino County, Orr...
Springs, Ukiah, (3 wk MCZC), San Diego County, Cameron Corners (3 wk LACM) (2 wk, 1 qn MCZC), Canyon City (2 wk, 1 qn LACM), Moreno Lake, (2 wk, 1 qn LACM), Santa Ysabel (3 wk LACM) (4 wk MCZC), Santa Barbara County, Santa Cruz Island (3 wk MCZC); **Colorado,** Denver County, Denver (1 wk, 1 ml LACM), Fremont County, 21.8k NW Canyon City (38°33’03.4N; 105°25’26W) (21 wk, 2 qn, 5 ml CWEM), Montezuma County, Mesa Verde National Park (2 wk, 1 qn LACM); **Nevada,** Lincoln County, Kershaw Canyon (8 wk LACM); **New Mexico,** Catron County, Glenwood (3 wk CWEM); Cimarron County, Cimarron Canyon (8 wk, 1 ml LACM); Grant County, Leopold Vista (3°11’02.0”N, 108°49’42.1”W) (2 wk CWEM); Guadalupe County, Santa Rosa (2 wk CWEM); Hidalgo County, Clayton Draw Gray Ranch (6 wk CWEM), Lincoln County, Cibola National Forest (34°11’26.63”N 105°43’36.94”W) (9 wk CWEM), Sacramento Mountains (6 wk CWEM), San Miguel County, Las Vegas (23 wk CWEM), San Miguel County, 20 km N Las Vegas (3 wk CWEM), Union County, Clayton (2 wk CWEM); **Texas,** Brewster County, Pine Canyon Trail (29 wk COOK), Big Bend National Park Chisos Basin Pass (1 wk CWEM), Burnham’s Ranch (3 wk LACM), Jeff Davis County, 11.3mi NW Fort Davis (9 wk COOK), Davis Mountains, Madera Canyon (30°42’07”N; 104°06’42”W) (3 wk CWEM), (9 wk CWEM), Merrill Roadside Park (2 wk MCZC), M’Ivor Ranch (18 wk CWEM); **Utah,** Utah County, Santauquin (2 wk LACM).

**Etymology:** emeryana after Carlo Emery. *Crematogaster marioni* is named for Buren’s friend and colleague Marion R. Smith.

**Discussion:** This species is in the subgenus *Crematogaster*. The key characteristics of the *Crematogaster emeryana* worker are the combination of rugose sculpturing and short bristle-like hairs on the pronotum and the reduced propodeal spines.

The types of *Crematogaster marioni* cannot be distinguished from specimens of *C.*
Buren describes the sculpturing on the face as weak, scapes as scarcely surpassing hind corners and the propodeal spines of moderate length, all typical character states of *C. emeryana*. The spines in particular are neither reduced as in *C. isolata* or long as in *C. punctulata*, other species found in overlapping geographical areas. I am therefore synonymizing *Crematogaster marioni* Buren as a junior synonym of *Crematogaster emeryana* Creighton.

**Biology:** *Crematogaster emeryana* has only been collected in the southwestern United States and Northwestern Mexico. Nest series have been collected from tree stumps, under rocks and logs, in soil nests and loose on the ground in old forest and pine-oak litter. Several nest series of *C. emeryana* from the South West Research Station in Arizona have 2 or more dealate queens under the same rock with brood and / or pupae.

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**Crematogaster formosa** Mayr

Plate 34; Map 12.

*Crematogaster formosa* Mayr, 1870b: 994, lectotype worker, [here designated (red dot)], Jalapa, Mexico [NHMW]. Emery, 1922c: 135: *Crematogaster (Orthocrema) formosa*.

*Crematogaster formosa* var. *aterrima* Wheeler, 1909: 234: Jalapa, Mexico, worker, male described [LACM]. NEW SYNONOMY.

**Description:**

**Worker:** Mandibles shiny, with semi-erect and appressed hair; clypeus slightly wider than long,
densely punctate in tight longitudinal rows, and with 2 erect hairs, anterior margin slightly convex with many long erect hairs; scape surpassing posterior border of head, with semi-erect hairs; head densely punctate in tight longitudinal rows, 2 erect hairs.

Mesosoma without erect hairs, few appressed hairs along anterior pronotal margin, dorsum of mesosoma densely punctate in tight lateral rows radiating down sides of mesosoma; promesonotal suture developed around large mesonotal boss; humeri well developed and rounded; notopropodeal groove shallow; propodeal spines average length, widely divergent (from above), slender, thickening at base.

Petiole and postpetiole shiny and punctate with 1 erect hair on each posterior corner, appressed hairs on sides of petiole; petiole subquadrate, with posterior lateral corners coming to points, dorsal surface flat, sides slightly expanded out (viewed from above), anterior subpetiolar process pointed and well developed; postpetiole posterior margin slightly emarginated; petiole narrower but longer than postpetiole; gaster shallowly shiny areolate without erect hairs except at sting, appressed hairs sparsely dispersed.

Concolorous light brown.

**Worker measurements (mm):** HL 0.77-0.84, HW 0.88-0.90, SL 0.77-0.82, EL 0.17-0.22, ED 0.14-0.17, CL 0.22-0.24, CW 0.30-0.34, WL 0.92-1.02, PSL 0.19-0.25, PL 0.28-0.32, PW 0.18-0.22, PPL 0.14-0.17, PPW 0.25-0.29, Indices: CI 86-93, SI 98-100, CLI 71-73, PI 145-155, PPI 56-59.
Plate 34. *Crematogaster formosa* worker (Mexico MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Mexico.

Map 12. *Crematogaster formosa.*
**Type series:** Mexico, Jalapa Lectotype worker and 11 paratype workers (MCZC) and 2 paratype workers maintained at the NHMW. *Crematogaster formosa* var. *aterrima* Wheeler, 12 workers maintained at the LACM.

**Material examined:**

MEXICO: **Hidalgo**, Highway 85, k 284, El Alamo (7 wk LACM), Puerto de la Zorra, (2 wk LACM); **San Luis Potosí**, 30mi S Tamazunchale (20.75°N, 98.7833°W) (JTLC 0001451), (1 wk LACM); **Veracruz**, Coatepec (4 wk LACM), Jalapa Enriquez 19.5333°N, 96.9167°W (12 wk LACM), “La Herradura” (2 wk LACM).

Material from the literature (www.antweb.org): GUATEMALA: **Chimaltenango**, Yepocapa (LACM 145023); **Sololá**, 2k SSE San Lucas Tolimán (14.6167°N, 91.15°W) (JTLC 00007576); MEXICO: **Jalapa**, Jalapa (JTLC 055856); **Nuevo Leon**, La Estanzuela Reserve, near Monterrey (25.5833°N, 100.25°W) (LACM 141406); **Veracruz**, Orizaba (JTLC 055953).

**Etymology:** Formosa from Latin fōrmōsus meaning beautiful or handsome referring to the attractiveness of this species.

**Discussion:** The key characteristic of *Crematogaster formosa* is the small mesonotal boss. This species is large for this genus, and concolorous brown to nearly black and very punctate. *Crematogaster formosa* var. *aterrima* Wheeler is considered a junior synonym of *C. formosa* Mayr. As Wheeler (1909) pointed out the only distinguishing character is the color, *C. formosa* is a little darker than *C. formosa* var. *aterrima*. From comparing the type material of both taxa, there is very little difference in color and all other characters are the same. Two of the specimens from the type series of *C. formosa* var. *aterrima* borrowed from the LACM were very light brown, leading me to believe they were callows. The type material of *C. formosa* from the MCZC are all dark brown. Most cabinet specimens were almost black.
**Biology:** Very little is known about the biology of *Crematogaster formosa*. I have not collected it myself, nor have I been able to find information in the literature. What I have found is that it is rarely collected.

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**Crematogaster isolata Buren**

Plates 35, 36 and 37; Map 13.

*Crematogaster isolata* Buren, 1968: 93: in key and 106-107: worker described; Holotype and many paratypes; Davis Mountains (near M‘Donald Observatory), Texas, United States (LACM).

**Descriptions:**

**Worker:** Mandibles longitudinally striate; clypeus wider than long, longitudinally striate with appressed hairs, anterior margin slightly convex with 8 long hairs; scape length variable from just reaching to surpassing posterior border of head, with decumbent hair; head longitudinally striate below eye and areolate above eye, with appressed hairs pointed toward middle.

Mesosoma punctate, promesonotal suture defined by breaks in sculpturing; 0-1 erect hair on each pronotal shoulder, mesosoma to tips of spines sparsely covered with appressed hair; pronotal humeri rounded; notopropodeal grooves shallow and wide; propodeal spines reduced, thickened at base and coming to point, diverging slightly (seen from above); propodeal spiracle not completely flush with curve of spine.
Petiole and postpetiole areolate with sparse semi-erect hairs and a few long flexuous hairs on posterior margin; petiole triangulate, slightly longer than wide, anterior subpetiolar process absent to small and rounded; postpetiole wider than long, hemilobes spreading slightly posteriorly; gaster sparsely but evenly covered with appressed hairs and few erect hairs.

Concolorous light brown to dark brown.

Worker measurements (mm): HL 0.85-0.95, HW 0.84-1.10, SL 0.72-0.82, EL 0.22-0.26, ED 0.19-0.22, CL 0.22-0.24, CW 0.34-0.38, WL 1.06-1.14, PSL 0.16-0.20, PL 0.24-0.26, PW 0.34-0.36, PPL 0.22-0.24, PPW 0.28-0.34; Indices: CI 86-101, SI 85-86, CLI 63-65, PI 71-72, PPI 71-79.

Plate 35. *Crematogaster isolata* worker (Garden Canyon, Huachuca Mountains, Arizona, USA, red dot LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

Queen: Clypeus wider than long, anterior margin straight with 6-8 long flexuous and many short flexuous hairs; ocelli almost flush with surface of head, small for genus; scape not reaching posterior border of head, with appressed hairs; head shiny, longitudinally striate following curves of face around eyes, with very sparse appressed hair, 3-4 long erect hairs between ocelli.
Mesosoma shiny micro-areolate with appressed hairs pointed toward middle and 2-4 short erect hairs on scutellum; metanotum and dorsellum visible under scutellum when viewed from above; propodeum striate, directed toward point of spine; propodeal spines with decumbent hairs pointed toward tips, well developed for queen.

Petiole and postpetiole shiny striate with many short, thin, flexuous hairs; anterior subpetiolar process very small; gaster shiny shallow areolate, with sparse, short, erect and even rows of appressed hairs directed posteriorly.

Concolorous reddish-brown to dark brown.

**Queen measurements (mm):** HL 1.49-1.70, HW 1.68-1.92, SL 0.96-1.20, EL 0.42-0.48, ED 0.36-0.43, Ocelli Length 0.05-0.06, Ocelli Width 0.10-0.11, CL 0.46-0.48, CW 0.55-0.56, WL 2.81-3.10, PSL 0.38-0.40, PL 0.60-0.63, PW 0.70-0.91, PPL 0.43-0.48, PPW 0.60-0.70; Indices: CI 88-89, SI 64-71, CLI 86-87, PI 69-86, PPI 69-72.

**Plate 36. Crematogaster isolata** queen
(Garden Canyon, Huachuca Mountains, Arizona, top point LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.
**Male:** Clypeus snout-like, protruding from face (viewed from above, full face or side), anterior clypeal margin with many long and several short flexuous hairs, much more than on worker clypeus; ocelli protruding from head almost stalk-like; scape typically short; head micro-rugose posterior to clypeus blending to punctures around ocelli, with few long flexuous erect and semi-erect hairs pointed toward middle of face.

Mesosoma shallowly areolate with evenly spaced semi-erect hairs, much more than on worker; mesosoma wide, but short in length (side view); dorsellum can be seen from above; dorsal view of scutellum with semi-erect hairs pointed toward middle; metanotum and dorsellum with long flexuous hairs along posterior margin.

Petiole, postpetiole and gaster shallow areolate with long flexuous hairs pointed posteriorly; petiole and postpetiole small, petiole subquadrate; postpetiole heart shaped with no defined medial sulcus.

Concolorous dark brown.

**Male measurements (mm):** HL 0.54-0.56, HW 0.65-0.91, SL 0.12-0.17, EL 0.24-0.25, ED 0.24-0.26, Ocelli Length 0.05-0.055, Ocelli Width 0.07-0.075, CL 0.12, CW 0.23-0.24, WL 1.45-1.70, PL 0.29-0.34, PW 0.25, PPL 0.19-0.23, PPW 0.30-0.32; Indices: CI 62-83, SI 30-39, CLI 50-52, PI 116-136, PPI 63-72.
Plate 37. *Crematogaster isolata* male
(Garden Canyon, Huachuca Mountains, Arizona, middle point LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Distribution:** Northern New Mexico, United States to southern Chihuahua, Mexico.

Map 13. *Crematogaster isolata.*
**Type series:** Holotype from United States, Davis Mountains, McDonald Observatory, Texas. Paratype material: Madera Canyon, Santa Rita Mountains, Arizona (3 wk, LACM) (examined); Garden Canyon, Huachuca Mountains (5 wk, 1 qn, 1 ml, LACM) (examined); San Luis Pass, Animas, New Mexico; Sweetwater, Santa Rita Mountains Arizona (3 wk, LACM) (examined); Sweetwater, Santa Rita Mountains, Arizona; Canelo Pass, Santa Cruz County; Chiricahua National Monument, Arizona; Limpia Canyon, Davis Mountains, Texas (3 wk, LACM) (examined); Guadalupe Mountains, Arizona

**Other material examined:** MEXICO: Chihuahua, Municipio Buenaventura (4 wk CWEM), Municipio Janos, Ojo Frio (48 wk CWEM), Municipio Madera (76 wk, 12 qn, 20 ml CWEM), Municipio Namiquipa (11 wk CWEM), Municipio Villa Ahumada, 85k S Juarez, Rancho 7 Leguas (3 wk CWEM); Guerrero, Terrero (10 wk CWEM). UNITED STATES: Arizona, Apache County, Santa Rita Mountains, Sweetwater (2 wk MCZC), Madera Canyon (3 wk LACM), Cochise County, Chiricahua Mountains, Portal (83 wk, 1 qn, 4 ml CWEM), Stewart Camp (1 wk LACM), Texas Canyon (2 wk MCZC), 8.6 mi W Jct. Rt. 80 on FSR 74 (31°40.9’N, 109°19.2’W 1615m) (2 wk CWEM), Santa Cruz County, Canelo Pass (3 wk LACM), Huachuca Mountains, Carr Canyon (3 wk LACM), Garden Canyon (5 wk, 1 ml LACM) Miller Canyon (4 wk MCZC) (1 wk LACM), Pajarito Mountains (20 wk MCZC), Ramsey Canyon (3 wk LACM); New Mexico, Catron County, 20.6k N Glenwood (2 wk CWEM), Colfax County, Eagle Nest (7 wk CWEM), Doña Ana County, Aguirre Springs Recreational Area (7 wk, 5 qn, 5 ml CWEM), 45k NE Las Cruces (1 wk CWEM), Organ Mountains campground area (1 wk, 1 qn, 1 ml CWEM), Las Cruces (3 wk CWEM), Grant County, Gila Mountains, Wright’s Cabin (9 wk CWEM), Silver City (4 wk, 4 qn, 4 ml CWEM), Hidalgo County, Animas Mountains, San Luis Pass (6 wk LACM), Clayton Draw Gray (31°31’22”N 108°56’58”W) (15 wk CWEM), Cloverdale Creek Coronado National Forest (31°28’35”N 108°58’29”W) (112 wk, 1 qn CWEM),
Los Alamos County, Rio Grande (3 wk CWEM), Rio Arriba County, Dixon (9 wk CWEM), Santa Fe County, Santa Fe (12 wk CWEM), Socorro County, (7 wk CWEM), Socorro County, Magdalena Mountain, 1946 meters (2 wk CWEM); Texas, Jeff Davis County, Davis Mountains (10 wk CWEM), Davis Mountains State Park (30°42’22.59N 104°6’ 16.72 W) (10 wk CWEM), Limpia Canon (1 wk MCZC), Fort Davis (1 wk LACM) (3 wk MCZC), McKivor Ranch (9 wk CWEM); Utah, Garfield County, Henry Mountains, (3 wk LACM), San Juan County, White Canyon, Natural Bridges National Monument (3 wk LACM).

**Etymology:** *isolata:* *iso* is Greek for same, *lata* is Latin for all over or everywhere.

**Discussion:** This species is in the subgenus *Crematogaster.* The key characteristics of the *Crematogaster isolata* worker are the reduced propodeal spines and the spines are not inserted at the widest point on the propodeum. The *Crematogaster isolata* worker resembles that of *C. saussurei* and *C. depilis.* Distinguishing characters between *C. isolata* and *C. saussurei* are *C. isolata* has 0-1 erect hairs on each pronotal shoulder; *C. saussurei* has 2-3. Another is the sculpturing: *C. isolata* is areolate to punctate while *C. saussurei* is lineolate-rugose with a medial metanotal carina. The queens of these two species resemble their workers, but the queen of *C. isolata* has less developed spines than those of *C. saussurei.* The males are very different. The male *C. isolata* has disproportionately large eyes almost touching the clypeus, the clypeus is snout-like protruding from the face, and the ocelli also protrude from the top of head almost resembling eye stalks. *Crematogaster saussurei* males have a more typical male face with large eyes, clypeus almost flush with face and typical ocelli that are raised slightly above the top of the head. *Crematogaster isolata* and *C. depilis* can also be hard to distinguish because *C. isolata* can be devoid of erect pronotal hair as in *C. depilis*; however, the spines on *C. isolata* are slightly reduced and not inserted at the widest part of the propodeum as in *C. depilis* which also has long
slender spines. The sculpturing on *C. depilis* is very punctate while *C. isolata* is areolate to punctate.

**Biology:** *Crematogaster isolata* prefer ground nests and can be found under logs, rocks or low cavities in trees. This species also seem to prefer higher elevations between 5200 and 6000 feet. Collected east from Jeff Davis county Texas, west to Santa Cruz County, Arizona, north to Los Alamos, New Mexico and south to Chihuahua, Mexico. They have been collected from dead limbs and stumps of *Quercus emoryi*, and foraging on manzanita trees and under bark with brood.

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*Crematogaster laeviuscula* Mayr

Plates 38, 39 and 40; Map14.


Crematogaster hespera Buren 1968: 98: worker, queen described; Phoenix, Arizona, United States. NEW SYNONOMY.

**Descriptions:**

**Worker:** Clypeus wider than long, shallowly areolate with 2 long and 2-4 short flexuous hairs, anterior margin straight, with several long erect hairs; scape reaching posterior border of head, with many decumbent hairs; head shallowly areolate, evenly, sparsely covered with short erect and decumbent hairs.

Mesosoma shiny, shallowly to well developed areolate, less developed in smaller specimens with many short erect and appressed hairs; pronotal shoulder with 2-4 long erect hairs, medial pronotal carina bluntly developed (like a rounded carina); humeri developed; dorsum and side of propodeum longitudinally striate-rugose; notopropodeal groove steep and angular; mesopleuron very punctuate; propodeal spines long, slender, slightly thickening at the base, divergent (viewed from above.)

Petiole and postpetiole shallowly areolate with several appressed hairs and 1 erect hair on each posterior corner; anterior subpetiolar process absent to barely noticeable; petiole angularly trapezoidal, with anterior lateral flange upraised when viewed from behind; hemilobes of postpetiole almost round when viewed from above with wide medium sulcus; petiole longer but narrower than postpetiole; gaster shallowly areolate with sparse evenly covered erect and appressed hairs.

Usually bicolored, with light brown head, mesosoma, petiole, and postpetiole; gaster, dark brown; however, can be concolorous light brown in smaller specimens.

**Worker measurements (mm):** HL 0.73-1.02 HW 0.89-1.14, SL 0.62-0.90, EL 0.18-0.25, ED 0.14-0.18, CL 0.22-0.34, CW 0.24-0.42, WL 0.80-1.46, PSL 0.13-0.18, PL 0.18-0.30,
PW 0.30-0.42, PPL 0.14-0.19, PPW 0.25-0.37; Indices: CI 82-89, SI 85-88, CLI 81-92, PI 60-71, PPI 51-56.

**Plate 38. Crematogaster laeviuscula worker**
(Oklahoma NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny shallowly longitudinally striate, with semi-erect hairs; clypeus shiny, with few fine hairs, anterior clypeal margin straight; scape just reaches posterior border of head, with appressed hairs; ocelli small, almost flush with surface of head; head with deep well defined longitudinally striate with few long fine erect and many semi-erect hairs pointed toward frontal groove.

Mesosoma shiny shallowly areolate with few long and short erect and many short appressed hairs pointed toward medial carina; dorsellum not visible viewed from above; propodeal spines flattened and thickened at base.

Dorsal view of petiole and postpetiole areolate, side of petiole longitudinally striate, petiole with 4 erect and many appressed hairs; postpetiole with 2 erect and many appressed hairs; gaster areolate with scattered short erect hairs.
Bicolored head, mesosoma, petiole and postpetiole dark amber to light brown, gaster darker; or concolorous light brown.

**Queen measurements (mm):** HL 1.27-1.51, HW 1.92-2.14, SL 1.20-1.34, EL 0.41-0.45, ED 0.31-0.36, CL 0.43-0.46, CW 0.48-0.58, WL 2.83-2.88, PSL 0.22-0.36, PL 0.36-0.43, PW 0.58-0.62, PPL 0.38-0.48, PPW 0.53-0.77; Indices: CI 66-71, SI 89-94, CLI 79-90, PI 62-69, PPI 62-72.

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**Plate 39. Crematogaster laeviuscula queen**
(Sandoval Co., New Mexico CWEM # 6291): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus shiny, anterior margin straight; ocelli almost flush with top of head, scapes typically short; head shiny areolate, with 2-4 erect hairs by ocelli and few appressed hairs.

Mesosoma shiny, shallowly areolate with scattered appressed hairs; dorsellum barely seen viewed from above.
Petiole, postpetiole and gaster shiny, shallowly areolate, with fine erect hairs on posterior margin; gaster with few scattered appressed hairs.

Concolorous dark brown.

Male measurements (mm): HL 0.50-0.56, HW 0.64-0.76, SL 0.17-0.22, EL 0.26-0.29, ED 0.21-0.23, CL 0.14-0.20, CW 0.22-0.29, WL 1.51-1.74, PL 0.17-0.19, PW 0.25-0.34, PPL 0.16-0.23, PPW 0.22-0.35; Indices: CI 73-78, SI 34-39, CLI 64-69, PI 56-68, PPI 66-73.

Plate 40. *Crematogaster laeviuscula* male (Sandoval County, New Mexico CWEM # 6291): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of petiole and postpetiole.

**Distribution:** Southeastern Canada west to California, U. S. A. south to Tabasco, Mexico.
Map 14. *Crematogaster laeviuscula*

**Type series:** Type from USA: Oklahoma, Fort Cobb. Texas 3 syntype workers NHMW.

**Material examined:**

**CANADA:** Hemphill County (1 wk CWEM). **MEXICO:** Chihuahua, Buenaventura (19 wk CWEM), Casas Grandes, Galeana (2 wk CWEM), Delicias (28 wk CWEM), Ojo de la Casa (6 wk CWEM), 18k N Flores Magón (16 wk CWEM), 7k S San Lorenzo (1 wk CWEM); **Mexico,** Ciudad de México (2 wk CWEM); **Nuevo León,** Monterrey, Parque Chipinque (31 wk CWEM), 146k N Monterrey (7 wk CWEM); **Colima,** Colima (1 wk, 1 qn, 1 ml CWEM), 39k N Colima (19º28’0.41’N, 103º27’31’W) (1 qn, 1 ml CWEM); **Sonora,** Puerto Penasco (11 wk CWEM); **Tamaulipas,** Matamoros (1 wk, 1 qn CWEM). **UNITED STATES:** **Alabama,** Jefferson County, Warrior (2 wk CWEM), Madison County, Monte Sano Park (3 wk CWEM), Mobile County, Alabama Port (13 wk CWEM); **Arizona,** Arizona Department of Agriculture, Interception from North Carolina (32 wk COOK), Cochise County, Portal (5 wk CWEM),
Maricopa County, Phoenix (3 wk MCZC), Santa Cruz County, Pajarito Mountains (2 wk, 1 qn MCZC); **Arkansas**, Hempstead County, Hope (3 wk CWEM); **California**, Monterey County, Carmel (3 wk MCZC), Pacific Grove, (2 wk CWEM), Riverside County, San Jacinto Mountains, 4mi SW Fulmore Lake (2 wk CWEM), 4mi N Fulmore Lake (12 wk, 10 qn, 34 ml CWEM), 6mi S Buckhorn (2 wk CWEM), Santa Barbara County, (2 wk, 1 ml MCZC), Romero Canyon (4 wk, MCZC), San Bernardino County, Lake Arrowhead (4 wk CWEM), San Diego County, Dulzura at Route 94 (1 wk STDC), San Ysabel (3 wk MCZC); **Colorado**, (1 wk NHMW); **Florida**, (31 wk NHMW), Citrus County, 13mi SW Crystal River (3 wk CWEM), Highlands County, Archibald Research Station (2 wk CWEM), Leon County, Woodville Natural Wells Rd (30°18′51″M 084°14′51″W) (3 wk STDC), Martin County, near Stuart mile marker 106 1-95 Rest Area (1 wk STDC), Monroe County, West Summerland Key (12 wk, 6 qn CWEM); **Kansas**, Cowley County, Rock (2 wk MCZC), Wallace County, Sharon Springs (7 wk CWEM); **Kentucky**, Fulton County, Redfoot Lake (3 wk MCZC); **Louisiana**, Baton Rouge Parish, Baton Rouge (3 wk MCZC), East Carroll Parish, Lake Providence (2 wk, 1 ml MCZC), Madison Parish, Quebec (3 wk MCZC), Plaquemines Parish, Saint Bernard State Park (30 wk, 13 ml CWEM), Saint Landry Parish, Opelousas (3 wk MCZC), Saint Mary Parish, Morgan City (8 wk CWEM), Terrebonne Parish, Gibson (9 wk CWEM); **Mississippi**, Panola County, Batesville (3 wk MCZC), Sharkey County, Rolling Fork (3 wk MCZC), Oktibbeha County, 4k NE Starkville (4 wk MCZC), Washington County, Deerfield Park (10 wk MCZC); **Missouri**, Hancock County, Saint Louis (4 wk MCZC); **Nevada**, Nye County, Mercury (2 wk CWEM); **New Mexico**, Bernalillo County, Bosque Forest (1 wk CWEM), Grant County, Gila Mountains, Wright’s cabin (9 wk CWEM), Otero County, White Sands National Monument (7 wk CWEM), Sandoval County, Coronado State Park (52 wk, 19 qn, 21 ml CWEM), Coronado State Park (1 wk, 1 qn, 1 ml CWEM), Corrales (2 wk CWEM), San Miguel County, Villanueva State Park (1 wk CWEM),
Socorro County, Sevilleta National Wildlife Reserve, Bosque Meadow (1 wk CWEM); **North Carolina**, Brunswick County, Baldhead Island Beach (4 wk STDC), Durham County, Duke University Forest (3 wk MCZC); **Tennessee**, Putnam County, Cookeville (1 wk CWEM); Rhea County, Airport Old Field (2 wk MCZC), Wayne County, Clayton (2 wk CWEM); **Texas**, Anderson County Eagling Wildlife Area (31º 56′53″ N; 95º 53′14″ W) (18 wk COOK), Bastrop County, Camp Swift (22 wk COOK), Blanco County, Blanco (21 wk CWEM), Pedernales State Park (13 wk CWEM), Brazos County Research Park (8 wk CWEM), Deer Lick Creek Park (1 wk CWEM), Brown County, Camp Bowie Lewis Cr. (6 wk COOK), Site 3 (N31º 38.610′; 98º 56.232′) (20 wk COOK), Camp Bowie Pond 71; (N31º 36.614′; W98º 53.744′) (6 wk COOK), Pond 66, 4-1 (1 wk COOK), Pond 65 (N31º 36.566′; W98º 53.875′) (4 wk COOK), Cameron County, Brownsville (2 wk, MCZC), Sugarcane Field (5 wk CWEM), 1.4mi. E Jct. 509 of Hwy106, W of Harlingen (2 wk COOK), N edge of Buena Vista (2 wk COOK), Jct. FM 509 & 106 (14 wk COOK), Comanche County, Bill Haney Orchard (2 wk COOK), Comal County, New Braunfels (3 wk, 3 qn, MCZC), Crockett County, Ranch Rd 2398m 16.6mi W Ozona (1 wk COOK), Dallas County, 4 mi N Seagoville (7 wk CWEM), El Paso County, El Paso (40 wk CWEM), UTEP E of library (1 wk CWEM) (14 wk COOK), Fayette County, La Grange (3 wk CWEM), Hamilton County, 7mi S Hamilton (1 wk MCZC) (23 wk CWEM), Hays County, San Marcos (5 wk CWEM), Hudspeth County, Indio Mountains Research Station (4 wk CWEM), Jim Wells County, 4k N Alice (3 wk CWEM), Kendall County, 2mi NW Nelson City on MM 531 at I-10 (3 wk STDC), Kenedy County, Santa Turcotte Ranch (7 wk COOK), Kimble County, Junction (1 wk CWEM), 9.7k SW Junction (1 wk CWEM), Kleberg County, Padre Island National Seashore (2 wk COOK), Lavaca County, La Orange (3 wk CWEM), Llano County, Enchanted Rock Area (1 wk CWEM) (2 worker COOK), Matagorda County, 8.8mi SSE Sergeant Beach area (9 wk STDC), McLennan County, Tonkawa Park (41 wk CWEM), Palo
Pinto County, Rest Area # 40 (12 wk CWEM), Parker County, Ft. Wolters, Site 2 (N32° 51.242'; W98° 02.881') (9 wk COOK), Rusk County, Nacogdoches (1 wk CWEM), Travis County, Austin, (4 wk, 3 ml MCZC), Val Verde County, Hwy 163, 4.9mi. S. Juno (20 wk COOK), 22mi N Comstock (24 wk COOK), Walker County, Huntsville State Park (5 wk CWEM).

**Etymology:** *Laeviuscula* from the Latin laevē meaning shiny.

**Diagnosis:** Key characteristics of *C. laeviuscula* are the entirely smooth and glossy head; the pronotum is lightly sculptured, and at least partially smooth and shining. The majority of the specimens are bicolored, mostly red with a black gaster. Mayr described two species of ants in 1870 from Ft. Cobb, Oklahoma: *C. laeviuscula* and *C. clara*. These two species differed by size and intensity of sculpturing on the face and mesosoma. The smaller, less intense sculpturing is *Crematogaster laeviuscula* Mayr, and the larger, more intense sculpturing is *C. clara* Mayr. Dalla Torre (1893) and Wheeler (1919) made *C. clara* a variety of *C. laeviuscula*. Since those publications, Wheeler (1908) found 2 nests with series of mixed morphologies of size and sculpture and contained ants that ranged from the largest *C. clara* to the smallest *C. laeviuscula* giving credence to their synonymy. The smaller *C. laeviuscula* have been found in smaller nests, possibly because they are newer colonies that have been recently established. Wheeler concluded that *C. laeviuscula* were merely minims of *C. clara*. Since *C. laeviuscula* had page preference, the species is assigned that name (Johnson, 1988.) *Crematogaster lineolata* var. *cedrosensis* has smaller spines, but the shape of the spines, pilosity and sculpture are consistent with *C. laeviuscula* and it is proposed as a synonym.

*Crematogaster atkinsoni* keys out to *C. laeviuscula* in both Creighton (1950) and Buren (1968) when using type material borrowed from the MCZC. I have also compared type material of *C. atkinsoni* and type material of *C. laeviuscula*. These two species are identical in
morphologies leading me to make *Crematogaster atkinsoni* a junior synonym of *C. laeviuscula*.

There is considerable variation in *C. laeviuscula* in terms of color and sculpturing. Color ranges from the common bicolored individuals, completely reddish yellow, to completely dark brown. The head is mostly smooth and glossy, but the pronotum may be completely smooth and glossy (polished) to lightly sculptured (striated) and weakly shining.

I have compared paratypes of *Crematogaster hespera* Buren to syntypes of *C. clara* (now *C. laeviuscula*) and find no differences. Buren’s description of *C. hespera* could also be applied to *C. clara*. In Buren’s key to eastern species, *C. hespera* keys out to *C. laeviuscula*. I did not find much variation in the Buren paratypes; however I have seen considerable variation within nest series from CWEM leading me to make *Crematogaster hespera* Buren a junior synonym of with *C. laeviuscula* Mayr.

**Biology:** The habits of *Crematogaster laeviuscula* are very diverse and its occurrence is extensive throughout the United States, and has been collected as far south as Tabasco, Mexico. Preferring an arboreal existence, *C. laeviuscula* can usually be found nesting in the cavities of trees, branches and twigs; however, they have been collected from nests under logs and rocks. They have often been taken in oak galls. They will utilize hollow vegetation to camouflage their trails. I have found them at Squaw Spring in the Indio Mountains Research Station where they were traveling almost unseen on cattail stalks. Many eggs and pupae (worker and queen) were found in the hollow stalks that were exposed to the sun.
Crematogaster limata Smith

Plate 5 Figure E; Plate 41; Map 15.


Descriptions:

Worker: Mandibles smooth, with erect hairs; clypeus smooth with 4-6 long flexuous and few appressed hairs, clypeal suture not well defined, blending into head, anterior clypeal margin convex with several long flexuous hairs; scape surpassing posterior border of head with erect hairs; head shiny with as many as 4 hairs on each frontal lobe and as many as 10 on posterior border of head.

Mesosoma very shiny, with few long erect hairs, notopropodeal groove steep and narrow, lateral margin of metanotum bridged by carina; propodeum rounded dorsally between spines,
propodeal spines sharp, slightly diverging seen from above, pointed upward seen from the side; mesopleuron striate; few hairs along margin of mesosoma.

Petiole, postpetiole and gaster shiny; petiole elongate, longer than wide, rectangular with posterior lateral corners coming to points each with one long flexuous hair; postpetiole elongate with no medial sulcus and 2-4 long flexuous hairs; gaster with many long flexuous hair along lateral margins.

Types bicolored with brown head and mesosoma and dark gaster.

**Worker measurements (mm):** HL 0.55-0.61, HW 0.59-0.66, SL 0.66-0.67, EL 0.12-0.14, ED 0.10-0.12, CL 0.17-0.19, CW 0.22-0.25, WL 0.74-0.76, PSL 0.13-0.17, PL 0.22-0.24, PW 0.14-0.18, PPL 0.13-0.16, PPW 0.14-0.18; Indices: CI 92-93, SI 110-120, CLI 76-77, PI 133-157, PPI 89-93.

![Diagram](image)

**Plate 41. Crematogaster limata worker** (specimen to the left with pin at bottom BMNH): (A) Head; (B) Dorsal view of mesosoma; (C) Side view of mesosoma petiole and postpetiole.
**Distribution:** Mexico to Bolivia and southern Brazil (Longino, 2003a).

Map 16. *Crematogaster limata*

**Type Locality:** Type from St. Catarina, (Ega) Brazil;

**Material Examined:**

**BOLIVIA:** Yapacani, Santa Cruz (3 wk LACM). **COLOMBIA:** Meta Villanicencio (2 wk LACM).

**Etymology:** *limata* comes from Latin *līmātulus or līmātius* meaning elegant or refined.

**Discussion:** *Crematogaster limata* is in the subgenus *Orthocrema*. As with many species in the genus *Crematogaster*, *C. limata* needs a suite of characters for positive identification. The *limata* complex consists of several species including: *C. limata*, *C. longispinosa*, *C. nigropilosa*, and *C. sotobosque*. The difficulty in identifying these species is that they all have long spines and long
flexuous hairs on the dorsal surfaces of the mesosoma. The sculpturing on the dorsum of the mesosoma has some variation, but all are shiny to some degree. The presence or absence of either a subpetiolar and/or subpostpetiolar process of some kind and divergence of the long propodeal spines are also identifying character states. The sculpturing on the dorsum of the mesosoma of *C. limata* is fairly smooth and shiny with a poorly developed carina near the lateral margins; it does not have either a subpetiolar or subpostpetiolar process, and the spines are only slightly divergent. The dorsum of the mesosoma of *C. sotobosque* is entirely smooth and shiny with a lateral carina that comes to a point anterior to the notopropodeal groove, and has longer erect hair on the pronotal shoulder, it has an absent to poorly developed subpostpetiolar process, and widely divergent propodeal spines. The suite of characters for *C. longispinosa* varies little from those of *C. limata*, with the dorsal surface of the mesosoma being fairly smooth and shiny, with 2-4 small longitudinal carinae on pronotal shoulder and without lateral carinae, a subpetiolar process is absent, but does have a blunt postpetiolar process and widely divergent propodeal spines. *Crematogaster nigropilosa* has shallow carinulae on the pronotal shoulder with lateral carinae that come to a point anterior to the notopropodeal groove, and has a small subpostpetiolar process.

**Biology:** Longino (antweb.org, 4 March, 2003) describes the biology of *Crematogaster limata* as very generalized. He states that it can be found most often in wet or dry forest, second growth or mature vegetation, between sea level and 1000m elevation. It seems to prefer disturbed areas such as along roadsides or near forest edges. They will nest in small cavities and have been observed in dead twigs, internodes of live *Cecropia* saplings and rotting cacao pods. Nests can be mono- or polygynous, with small nests usually containing one queen. There may be many satellite nests with the central nest containing the queen and brood. One nest in Hitoy Cerere Biological Reserve in Costa Rica was found to contain 21 physogastric queens. Longino also
states that he once observed two foundress queens together suggesting pleometrosis; however, foundress queens are usually found alone. The workers are omnivorous and can be found foraging day or night on extrafloral nectaries or tending Homoptera (Longino, antweb.org, 4 March, 2003).

**Crematogaster lineolata** Say

Plate 2, Figure A, Plates 42, 43 and 44; Map 16.


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**Descriptions:**

**Worker:** There is no type material of Crematogaster lineolata available that I am aware; therefore, I used a worker specimen from Crawford County, Indiana, determined by Buren (MCZC) and that is consistent with the descriptions by Say (1836), and comments by Creighton (1950) and Buren (1968).

Mandibles shiny, longitudinally striate, with erect hairs; clypeus wider than long,
longitudinally striate with appressed hairs, anterior margin convex with 8-10 long hairs; scape reaches posterior border of head, covered with semi-erect hairs; head longitudinally striate from eye to slightly above insertion of antennae and over the cheek, shiny-areolate above eye and antenna insertion, with less than 10 erect hairs and evenly covered with appressed hair.

Mesosoma scabrous-rugose with longitudinal striae along metanotum (viewed from above), punctate viewed from side; pronotal shoulder with 10 to 20 erect bristle-like hairs; promesonotal carinae small, but sharp; humeri developed; notopropodeal groove angular and narrow; propodeum with several erect hairs; metapleuron striate-punctate; notopropodeal groove steep and angular; propodeal spines medium in length, slender, thickening at the base, divergent (viewed from above).

Petiole areolate from above, punctate from the side, with 2 erect hairs on each posterior lateral corner, angularly trapezoidal, with anterior lateral flange upraised when viewed from behind; anterior subpetiolar process well developed; postpetiole punctate with few decumbent and several erect hairs, hemilobes almost round, slightly longitudinally elongate; petiole wider and longer than postpetiole; gaster shallowly areolate with few erect and appressed hairs evenly covering distributed.

Usually concolorous light to dark brown.

*Worker measurements (mm)*: HL 0.71-0.88, HW 0.74-0.94, SL 0.65-0.72, EL 0.16-0.20, ED 0.16-0.18, CL 0.26-0.28, CW 0.24-0.25, WL 0.88-1.04, PSL 0.19-0.22, PL 0.22-0.24, PW 0.30-0.41, PPL 0.20-0.22, PPW 0.29-0.34; Indices: CI 94-96, SI 82-92, CLI 108-112, PI 59-73, PPI 65-69.
Plate 42. *Crematogaster lineolata* worker
(Crawford County, Indiana determined by Buren, red dot, MCZC): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Queen:** Mandibles shiny with semi-erect hairs; clypeus shiny, areolae with few semi-erect hairs, anterior margin straight with 20 long flexuous hairs; scapes not reaching posterior border of head, with decumbent hairs; head striate between eye and insertion of scape over cheek, fading into shallow areolate above eye; few short erect hairs pointed medially, few appressed over cheeks.

Dorsum of mesosoma shiny areolate with few long and short flexuous hairs, and many appressed hairs; viewed from side sculpturing areolate developing into striate at edge of sutures; viewed dorsally, scutum has 3-5 longitudinal depressions medially on the anterior edge; dorsellum barely visible viewed dorsally; propodeal spines typical for a queen in *C. (Crematogaster)*.

Petiole areolate and rounded, heart shaped at anterior edge, covered with appressed hairs all pointing posteriorly; postpetiole areolate, covered with appressed hairs all pointing posteriorly, bilobed spreading slightly posteriorly (toward the back); gaster shiny microareolate, with few erect and many appressed hairs.

Concolorous brown.
**Queen measurements (mm):** HL 1.20-1.25, HW 1.51-1.63, SL 0.96-0.98, EL 0.34-0.36, ED 0.29-0.31, CL 0.38-0.41, CW 0.34-0.36, WL 2.35-2.47, PSL 0.22-0.24, PL 0.36-0.41, PW 0.58-0.60, PPL 0.34-0.41, PPW 0.58-0.70; Indices: CI 77-79, SI 78-80, CLI 112-114, PI 62-68, PPI 59-60.

Plate 43. *Crematogaster lineolata* queen
(Fawnskin Lake, San Bernadino County, CA CWEM # 2142): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Male:** Mandibles typically small, faintly longitudinally striate, with erect hairs; clypeus with faint longitudinally striate, few erect hairs, anterior margin slightly convex; head longitudinally striate and faintly areolate; several long flexuous erect hairs between eyes, erect along margin just above eyes and short erect stubble across middle of face; scape and first segment of funiculus very shiny with 2-4 semi-erect hairs, next 10 segments and one segment club very hairy; eyes very large, protruding from side of head.

Dorsum of mesosoma shiny, shallowly areolate, evenly and lightly covered with short
erect hairs and 4-8 long flexuous hairs; dorsellum coming to a point below scutellum; propodeum short and steeply angular.

Petiole and postpetiole with many long flexuous hairs and punctures between striations; gaster shiny.

Concolorous light brown.

Plate 44. Crematogaster lineolata male
(Fawnskin Lake, San Bernadino County, CA CWEM # 2144): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

Male measurements (mm): HL 0.58-0.64, HW 0.61-0.76, SL 0.14-0.17, EL 0.24-0.28, ED 0.22-0.26, CL 0.16-0.23, CW 0.20-0.22, WL 1.48-1.68, PL 0.22-0.36, PW 0.26-0.35, PPL 0.20-0.23, PPW 0.25-0.35; Indices: CI 85-95, SI 24-27, CLI 80-105, PI 85-103, PPI 66-80.

Distribution: Southern Canada, south to Florida, U.S. and west to Arizona, U.S.

**Type series:** None available Type from U.S.A. Descriptions and drawings were made of a worker determined by Buren (MCZC).

**Material examined:**

**CANADA:** *Nova Scotia*, Halifax County, Upper Tantallon (3 wk MCZC); *Ontario*, (3 wk MCZC). **UNITED STATES:** *Alabama*, Marion County, (6 wk CWEM); Madison County, Huntsville, Monte Sana (3 wk MCZC); *Arizona*, Cochise County, Dragoon Mountains (2 wk CWEM), Pinaleños Mountains, Post Canyon (3 wk MCZC); *Arkansas*, Montgomery County, Ouachita Mountains (2 wk MCZC), Eureka Springs (3 wk MCZC), Pulaski County, Pinnacle Mountain State Park (8 wk CWEM), Union County, 16k W Crossett (3 wk CWEM); *California*, San Bernadino County, Fawnskin Lake (10 wk, 1 qn, 1 ml CWEM); *Connecticut*, New Haven County, Milford (3 wk MCZC); *Delaware*, Sussex County, Trap Pond State Park, Raccoon
Pond (10 wk STDC); **Florida**, Okaloosa County, Eglin AFB (2 wk MCZC), Santa Rosa Island 4.0mi W Destin on Rt. 98 (20 wk MCZC), Putnam County, Melrose (3 wk CWEM), Jacksonville, Choccolocco Mountain (3 wk MCZC), Santa Rosa County, Weaver Creek (2 wk MCZC); **Georgia**, Chatham County, Savannah River (4 wk COOK), Muscogee County, Columbus area site 10 (32° 35.010’N; 84° 44.822’) (5 wk COOK); **Indiana**, Crawford County (17 wk MCZC); **Kansas**, Cowley County, Winfield (2 wk MCZC), Riley County, Manhattan (5 wk, 10 ml CWEM), Wyandotte County (3 wk MCZC); **Louisiana**, Calcasieu Parish, Sam Houston Jones State Park (2 wk CWEM), Catahoula Parish, Catahoula Park, near Sicily Island Hills WMA NE Check Station (2 wk STDC); **Maryland**, Allegany County Little, Orleans Old Town Rd 39 (37°56”N 8º24’27”W~240m) (17 wk, 2 qn STDC), Baltimore County, Baltimore, SW Park (1 wk STDC), Cecil County, Fair Hill NRA (1 wk STDC); **Massachusetts**, Middlesex County, (2 wk MCZC), Woods Hole (3 wk MCZC), Norfolk County, Milton, N. Salem Pond (2 wk MCZC); **Mississippi**, Carroll County, Winina (12 wk CWEM), Oktibbeha County, 4 k NE Starkville (45 wk CWEM); **Missouri**, Barry County, Ozark Mountains (2 wk MCZC), Boone County, Colombia (3 qn, 3 ml CWEM) (1 qn MCZC); **New Jersey**, Atlantic County (3 wk MCZC); Bergen County, Fort Lee (1 wk MCZC), Burlington County, Aston (1 wk, 1 qn MCZC), Newfoundland County (3 wk MCZC), Lake Hurst (13 wk MCZC), Salem County, Deepwater (4 wk STDC); **New Mexico**, Colfax County, 41 k E Eagle Nest (27 wk, 16 qn, 8 ml CWEM), Doña Ana County, Las Cruces (1 wk, 1 qn CWEM), Grant County, Silver City (1 wk, 1 qn, 1 ml CWEM), Los Alamos County, Los Alamos (3 wk CWEM), Socorro County, Grassy Lookout (3 wk CWEM), Luna County, Deming (1 wk CWEM); **New York**, Tompkins County, Lansing Village (1 wk, 1 qn CWEM)(1 wk MCZC), Town of Newfield, Connecticut Hill (2 wk MCZC); **North Carolina**, Buncombe County, Black Mountain (3 wk MCZC), Orange County, Hillsboro, Duke Forest (3 wk MCZC), Polk County, Tryon (3 wk MCZC), Transylvania County,
Belmont (15 wk MCZC), Wake County, Raleigh (3 wk MCZC); **Oklahoma**, Kay County, Ponca City (1 qn, 2 ml MCZC); **Tennessee**, Blount County (6 wk CWEM), Hardin County, 11k E Lutts (6 wk CWEM), Lawrence County (8 wk CWEM), David Crockett State Park, (6 wk CWEM), Madison County, Jackson (3 wk MCZC), Putnam County, Cookeville (36º10’17.4”N 85º35’26.8”W) (5 wk CWEM), Wayne County, 10mi N of Waynesboro (3 wk CWEM); **Texas**, Blanco County, Pedernales Falls (1 wk CWEM), Brazos County, Research Park (1 worker COOK), Brewster County, Chisos Basin Pass, Big Bend National Park (1 wk CWEM), Pine Canyon Trail (15 wk COOK), Houston County, Big Slough Wild area (3 wk CWEM), Jeff Davis County, Davis Mountains (8 wk CWEM), Lamar County, Camp Maxey, site 2 (N33º 48.201’, W95º 34.844’) (10 wk COOK), site 3 (N33º 48.708’; W95º 32.580’) (5 wk COOK), Sabine County, 14k E Hemphill, 14.5 k E Hemphill (21 wk CWEM), Trinity County, Davy Crockett National Forrest (3 wk, 1 qn MCZC), Tyler County, Big Thicket National Preserve (7 wk CWEM); **Virginia**, Dinwiddie County, (3 wk MCZC), Mecklenburg County (1 wk MCZC); **West Virginia**, Monongalia County, West Virginia University Forrest (4 wk CWEM); **Washington, D. C.**, (8 wk MCZC); **Wisconsin**, Washburn County, 9mi W Trego (6 wk CWEM).

**Etymology:** *lineolata* from the Latin *linea* meaning line or string and *lātē* meaning widely or everywhere, possibly referring to the striae on many surfaces.

**Discussion:** Key characteristic of *Crematogaster lineolata* are the longitudinal rugose-lineolae sculpturing along the dorsum of the pronotum. This species can be confused with *C. cerasi*, *C. laeviuscula*, and *C. punctulata*. The sculpturing on *C. cerasi* and *C. lineolata* are the same but can be distinguished by the pronotal pilosity: *C. cerasi* has several long flexuous hairs on the pronotum and *C. lineolata* has many short bristle like hairs on the pronotum. *Crematogaster*
laeviuscula is very shiny and is shallow areolate to deeply areolate, and has both long and short erect hairs on the pronotum. The sculpturing of C. punctulata is also similar to C. lineolata, but can be distinguished by the punctures between the lineolae, and the long bristle like hairs.

The males have an interesting character state; the dorsellum is more pointed than rounded as is the case of most Crematogaster males.

**Biology:** Crematogaster lineolata is a ground dwelling species and can often be found under rocks, downed logs or among the roots of understory plants under the leaf litter. They have been collected from magnolia litter, pine and hardwood litter and in dense forest litter. Crematogaster lineolata can be found throughout the United States, preferring moister environments. In more arid parts of the country, they can be found in riparian areas, near water ways and under dense litter. Crematogaster lineolata has been reported as an exotic in Hawaii (Wheeler, 1934a) at the quarantine station; however it has never become established (Remier, 2000).

**Crematogaster minutissima** Mayr

Plates 45, 46 and 47; Map 17.


Crematogaster minutissima subsp. thoracia Creighton, 1939: 137: worker described, Miller Canyon, Huachuca Mountains, Arizona, United States. Creighton, 1950: 205:
Crematogaster minutissima subsp. smithi, replacement name (preoccupied name).

**Descriptions:**
This species is one of the few that has a monomorphic worker caste, and is always very light in color.

**Worker:** Mandibles with semi-erect hairs; clypeus shallowly areolate with semi-erect hairs, anterior margin straight to slightly convex, with 6-8 long hairs; scapes reach to slightly passing posterior border of head, with semi-erect hairs; head shiny, shallowly areolate with ~ 20 long and short erect and semi-erect flexuous hairs pointed medially.

Pronotum with three rows of long flexuous hairs on dorsum of mesosoma, with longest hairs on the pronotum, mesonotum with long flexuous hairs, shorter than those on the pronotum; lateral margins of propodeum with long flexuous hairs shorter than those on the mesnotum; promesonotal suture apparent from breaks in sculpturing, pronotum rugose, fading into striae along margins and shiny in middle, to entirely shiny across pronotal shoulder viewed from above, shallowly punctate from the side; humeri somewhat square; notopropodeal grooves shallow; propodeal spines reduced, interior margin flattened and thickened at base, pointing upward, widely divergent.

Petiole, postpetiole and gaster shallowly areolate from above, shallowly punctuate from the side; petiole subquadrate, slightly longer than wide, anterior subpetiolar process small to medium; postpetiole wider than long, globular; petiole and postpetiole with few long flexuous hairs near posterior margins; gaster evenly covered with erect hairs; tibia with appressed to decumbent hairs.

Concolorous light yellow.
Worker measurements (mm): HL 0.50-0.54, HW 0.46-0.48, SL 0.42-0.48, EL 0.13-0.16, ED 0.10-0.12, CL 0.17-0.18, CW 0.20-0.22, WL 0.52-0.66, PSL 0.05-0.10, PL 0.19-0.24, PW 0.16-0.17, PPL 0.10-0.12, PPW 0.16-0.18, Indices: CI 109-123, SI 84-89, CLI 81-85, PI 119-141, PPI 63-67.

Plate 45. *Crematogaster minutissima* worker (Austin Texas NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Queen:** Clypeus shiny with many erect hairs, anterior margin straight to slightly concave with 6-8 long hairs; scape not reaching posterior border of head, with semi-erect hairs; head with shiny striae curving around antennal insertion and below eye, head slightly wider than long, hair denser than worker, pointed toward middle.

Mesosoma shiny from above, propodeum and propodeal spines shallowly rugose from side; mesosoma with hair more dense than that of worker, with many very long (0.12-0.36 mm) flexuous hairs over entire mesosoma; pronotum not visible from above; dorsellum visible from above; propodeum broadly rounded; propodeal spines well developed for queens, diverging slightly.

Petiole and postpetiole areolate with many long erect hairs pointed posteriorly; postpetiole with small pointed anterior process; gaster shiny areolate with many erect hairs; tibia with semi-erect hairs.
Color concolorous yellow or amber.

**Queen measurements (mm):** HL 0.74-0.77, HW 0.74-0.86, SL 0.59-0.64, EL 0.24-0.26, ED 0.22-0.23, CL 0.26-0.27, CW 0.29-0.31, WL 1.39-1.50, PSL 0.12-0.14, PL 0.36-0.37, PW 0.29-0.30 PPL 0.18-0.23, PPW 0.35-0.36; Indices: CI 89-100, SI 80-84, CLI 87-90, PI 123-124, PPI 51-64.

Plate 46. *Crematogaster minutissima* queen
(Winina Carroll County, Mississippi CWEM, #9963): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Male:** Clypeus slightly protruding from face, with few short, fine, erect hairs, anterior margin convex with many long, flexuous hairs; ocelli slightly raised; scape longer than most males; head deeply areolate with few erect hairs between ocelli.
Mesosoma short and thick, areolate with many erect hairs evenly distributed; scutum with ventral medial boss; scutellum swelling over dorsellum; propodeum small, longitudinal striate, no propodeal spines.

Petiole quadrate, areolate with 2–4 long erect hairs pointed posterior; postpetiole globular, wider than long, areolate; gaster shiny areolate, with many long, flexuous hairs evenly distributed.

Concolorous pale yellow.

Plate 47. *Crematogaster minutissima* subspecies *smithi* male (Huachuca Mountains, Arizona LACM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Male measurements (mm):** HL 0.31, HW 0.32, SL 0.08, EL 0.22, ED 0.18, CL 0.16, CW 0.17, WL 0.86, PL 0.16, PW 0.16, PPL 0.10, PPW 0.17; Indices: CI 97, SI 26, CLI 94, PI 100, PPI 59.

**Distribution.** Throughout southeastern United States, west to Arizona and south to Venezuela.
Map 17. *Crematogaster minutissima*.

**Type series:** Type from Texas, United States

*Crematogaster smithi* from Miller Canyon, Huachuca Mountains, Arizona, United States.

Type material examined: Syntype worker of *Crematogaster minutissima* Mayr Texas, (1 worker NHMW).

**Material examined:**

**COSTA RICA:** Heredia Providence, La Selva (3 wk LACM); **MEXICO:** Chihuahua, Basaseáchic (7 wk CWEM), Estado Terrero (1 wk CWEM); Veracruz, Rio Metlac, near El Fortin (9 wk CWEM), Tierra Blanco (1 wk, 1 qn, 1 ml CWEM). **UNITED STATES:** Alabama, Mobile County, Mobile, Dog River (3 wk LACM), Tuscaloosa County, Tuscaloosa (33 wk, 13 qn CWEM); Arizona, Portal (3 wk CWEM); Arkansas, Pulaski County, Pinnacle Mountain State Park (18 wk CWEM); Florida, Highlands County, Archibald Biological Station, Lake
Placid (3 wk M. Deyrup), Price Memorial Tract Marion County Rainbow Springs, (1 wk, 1 qn, LACM); **Georgia**, Richmond County, Augusta (2 wk, 1 qn, LACM); **Louisiana**, Baton Rouge Parish, Baton Rouge Place Du Plantier Apts (5 wk STDC); Beauregard Parish, DeRidder (1 qn, 2 ml, LACM); **Mississippi**, Carroll County, Winona (23 wk, 8 qn CWEM), Lee County, Tupelo (6 wk, 1 qn CWEM); **New Mexico**, Eddy County, Sitting Bull Falls (6 wk CWEM); **South Carolina**, (2 wk NHMW); **Texas**, Brazos County, Foster Lane (1 wk CWEM), Porter Lane (1 wk CWEM), Hardin County, Big Thicket National Preserve (9 wk, 1 qn CWEM), Hidalgo County, Anzalduas County Park (7 wk, CWEM), Huntsville State Park (12 wk CWEM), Parker County, Ft. Wolters site 3 (N32º 51.166’;W98º 02.133’) (2 workers COOK), Real County, Leakey (19 wk, 6 qn CWEM), 19.3k N Leakey (4 wk CWEM), Sabine County, Hemphill (10 wk, 1 qn CWEM); Walker County, Huntsville State Park Section 27 (1 wk COOK).

Specimens of *Crematogaster minutissima* subsp. *smithi*: **MEXICO**: **Nuevo León**, El Sulto (9 wk, 1 qn CWEM), **Veracruz**, Tierra Blanca (15 wk, 2 qn CWEM). **UNITED STATES**: **Arizona**, Cochise County, Huachuca Mountains, Miller Canyon (1 qn LACM), Southwest Research Station (3 wk CWEM) Portal (6 wk LACM), Santa Rita Mountains, Madera Canyon (11 wk, 2 ml LACM); **Texas**, Tyler County, Big Thicket National Preserve (11 wk, 2 qn CWEM), Walker County, Huntsville State Park (15 wk CWEM).

**Etymology**: *Minutissima* is Latin *minusculus* meaning smallish.

**Discussion**: This species is in the subgenus *Orthocrema*. The *Crematogaster minutissima* worker is monomorphic within nest series, but can vary slightly within the species and is always very light in color. *Crematogaster minutissima* closely resembles *C. cubaensis* Mann. Variation in the intensity of dorsal mesosoma sculpturing is the key character that will distinguish these taxa.
from one another. The overall size and shape of these two species is identical; however, the sculpturing on the dorsum of the mesosoma of *C. cubaensis* is very shiny with little to no striae along the margins.

*Crematogaster minutissima* can be confused with *C. missouriensis* Emery, *C. steinheili* Forel and *C. sumichrasti*. The latter three taxa however, all have key differences from *C. minutissima*. *Crematogaster missouriensis*, *C. steinheili* and *C. sumichrasti* have short, slender and sharp spines that are larger and have continuous size polymorphism of the worker within nest series. The spines on *C. minutissima* are blunt, thicken at the base and not well developed. The spines of queens are also different with *C. minutissima* queen having a more developed spine than that of the *C. missouriensis*, *C. steinheili* and *C. sumichrasti* queens. Creighton differentiates between *C. minutissima* and *C. minutissima* subsp. *smithi*, from *C. minutissima* subsp. *missouriensis* in his key by the intensity of the mesosoma sculpturing. Buren (1968) does not include any species of the subgenus *Orthocrema* that occur in North America in his key to North American *Crematogaster*.

I find the sculpturing of *Crematogaster minutissima* to be much more intense than the sculpturing of *C. minutissima* subsp. *smithi*; however can find no reason to raise *C. minutissima* subsp. *smithi* to species status at this time. I feel that more field observations in nesting habits are needed to better address the status of *C. minutissima* subsp. *smithi*. I do not have enough *C. minutissima* subsp. *smithi* reproductive material to make any definitive decisions regarding these two taxa. *Crematogaster minutissima* subsp. *smithi* is identical to *C. cubaensis*; however, I have only been able to examine one syntype worker of the latter. I will leave both taxa as they are until I can investigate them further.

**Biology:** *Crematogaster minutissima* has been collected from Florida to Portal, Arizona U. S.; Arkansas to La Selva Costa Rica and in Cuba. This species will exploit a wide range of moist
habitats as well as the more xeric habitats of the Chihuahuan Desert in Texas and Mexico. Nests have been found under rocks, in hollow twigs and in logs. They are attracted to Vienna sausage baits and fire ant formula. They have been extracted from leaf litter and by Berlese Tollgen funnels. *Crematogaster minutissima* have also been found inhabiting dead litter in a Cacao Plantation and at the base of *Nyssa* sp.

*Crematogaster missouriensis* Emery NEW STATUS

Plate 48, 49, 50; Map 18.


**Descriptions:**

**Worker:** Mandibles have semi-erect hair; clypeus shallowly areolate with semi-erect hairs, anterior margin convex, with several long hairs; scape swollen distally, reaching to slightly passing posterior border of head, with semi-erect hairs; head shiny, shallowly areolate with long and short erect and semi-erect flexuous hairs pointed medially.

Pronotum with 1-2 shallow longitudinal costae along lateral margins of pronotal
shoulder, shiny medially, costae along margins developing into carina that bridge metanotal furrow; mesosoma with many long flexuous hairs, with most lateral hairs the longest becoming shorter toward the middle and with pronotum having longest hairs becoming shorter toward propodeum; shallowly punctate viewed from side; humeri somewhat square; notopropodeal groove shallow; propodeal spines short, flattened at base, pointing almost straight up, diverging slightly.

Petiole, postpetiole and gaster shallowly areolate from above, shallowly punctate from side; petiole subquadrate, slightly longer than wide, subpetiolar process well developed; postpetiole wider than long, globular; petiole and postpetiole with few long flexuous hairs near posterior margin; gaster evenly covered with erect hairs; tibia with semi-erect hairs.

Concolorous light yellow to amber.

Plate 48. Crematogaster missouriensis worker (Missouri, United States NHMW): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

Worker measurements (mm): HL 0.50-0.61, HW 0.48-0.54, SL 0.48-0.52, EL 0.13-0.17, ED 0.12-0.14, CL 0.16-0.22, CW 0.19-0.23, WL 0.54-0.69, PSL 0.10-0.13, PL 0.20-0.24, PW 0.18-0.23, PPL 0.13-0.14, PPW 0.19-0.24, Indices: CI 104-113, SI 104-117, CLI 84-96, PI 104-111, PPI 58-68.

Queen: Mandibles shiny, few longitudinal striae; clypeus shiny with many long flexuous hairs,
anterior margin concave with many long hairs; scape reaching posterior border with many long and short erect hairs; ocelli almost flush with surface of head; head shiny, shallowly striate below eyes, with many long and short erect hairs pointed slightly medially.

Mesosoma shiny with many long and short hairs pointed medially; scutellum knob-like, almost obscuring view of dorsellum (viewed from above); propodeal small nubs.

Petiole grainy, subquadrate with several long erect hairs pointed posteriorly, subpetiolar process blunt; postpetiole grainy, globular, slightly flattened dorsally with several long erect hairs pointed posteriorly; gaster shiny with much long, erect hair pointed posteriorly.

Many hairs on dorsum of body are longer than 0.24mm. Color concolorous yellow to dark amber.

Plate 49. Crematogaster missouriensis queen
(Cloud County, Kansas United States CWEM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

Queen measurements (mm): HL 0.88, HW 0.90, SL 0.74, EL 0.36, ED 0.20, CL 0.26, CW 0.22, WL 1.26, PL 0.34, PW 0.36, PPL 0.20, PPW 0.28; Indices: CI 98, SI 84, CLI 1.18, PI 94,
Male: This is an unusual male in *Crematogaster*. On this specimen the mandibles are pincer-like with one tooth, another male had two teeth on the mandibles (from the same series); clypeus shiny snout-like, with 2 long hairs along anterior margin; scape longer but narrower than most males of this genus; ocelli almost flush with surface of head; head shiny, dark amber with less than 10 long erect hairs.

Mesosoma clear with dark amber hue, shiny with several long, flexuous hairs; scutellum flattened anteriorly with shallow longitudinal striae, posterior is bulbous; dorsellum and metanotum visible viewed dorsally.

Petiole, postpetiole and gaster pale yellow, shiny with many long erect hairs pointed posteriorly.

Concolorous pale yellow.

Plate 50. *Crematogaster missouriensis*  male
(Cloud County, Kansas United States CWEM): (A) Head; (B) Dorsal view of mesosoma, petiole and postpetiole; (C) Side view of mesosoma petiole and postpetiole.

**Male measurements (mm):** HL 0.69, HW 0.71, SL 0.12, EL 0.17, ED 0.14, CL 0.10, CW 0.13, WL 1.32, PL 0.34, PW 0.22, PPL 0.24, PPW 0.26; Indices: CI 97, SI 17, CLI 77, PI 154, PPI 92.
**Distribution.** Mid United States south to Nuevo Leon, Mexico

![Map 18. *Crematogaster missouriensis.*](image)

**Type series:** Type from Missouri, United States (2 syntype workers) [MNHG]; Texas (1 syntype worker [NHMW]).

**Material examined:**

**MEXICO:** Chihuahua, Guerrero, Est. Terrero (2 wk CWEM); Basaseáchic (6 wk, CWEM); Nuevo Leon, El Salto (33 wk CWEM); **San Luis Potosí,** Ciudad Valles, (5 wk CWEM);

**UNITED STATES:** **Alabama,** Fayette County Junction (6 wk CWEM); **Kansas,** Cloud County, 6.5 mi W Miltonvale (2 wk, 1 qn, 2 ml CWEM); **New Mexico,** Otero County, Guadalupe Mountains, Sitting Bull Falls (9 wk CWEM), Bates Park (2 wk, CWEM), Bates Park turnoff Naider Rd. 41.4k NW Sitting Bull Falls (13 wk CWEM); **Tennessee,** Blount County, Maryville (16 wk, 1 ml CWEM); **Texas,** Cameron County, Sabal Palm Grove (11 wk CWEM),
Hidalgo County, Anzaiduas County Park (7 wk CWEM), Jeff Davis County, M’Ivor Ranch (4 wk CWEM), King County 11 mi S Guthrie (6 wk CWEM).

**Etymology:** *Crematogaster missouriensis* is named for the state it was originally found.

**Discussion:** *Crematogaster missouriensis* is in the subgenus *Orthocrema* and is similar to *C. sumichrasti* and *C. steinheili*. Typically *C. missouriensis* and *C. steinheili* are light yellow and *C. sumichrasti* is more amber to orange.

Creighton (1950) differentiates between *C. minutissima* and *C. minutissima* subsp. *smithi*, from *C. minutissima* subsp. *missouriensis* in his key by the intensity of the mesosoma sculpturing. Buren (1968) does not include any of the subgenus *Orthocrema* that occur in North America. The differences between *C. missouriensis* and *C. minutissima* are really more profound as *C. missouriensis* more closely resemble *C. sumichrasti* with larger more developed spines. The spines of queens are also different with *C. minutissima* having a more developed spine than that of *C. missouriensis*. I find that *C. minutissima* subsp. *missouriensis* to have enough differences in overall size and sculpturing, as well as pronounced differences in spine development in the queens that I am here raising *C. missouriensis* to species status.

**Biology:** *Crematogaster missouriensis* can be found from Kansas, United States in the north to San Luis Potosí, Mexico in the south. It appears to prefer more arid habitats like those found in the Chihuahuan desert. Nest can usually be found under rocks and has been found in association (not nesting) with *Solenopsis* sp. and *Pheidole vallicola*. *Crematogaster missouriensis* have often been collected in pitfall traps and foraging on vegetation.

*Crematogaster montezumia* Smith

Plates 4, Figure (D), Plates 51 and 52; Map 19


**Descriptions:**

**Worker:** Mandibles longitudinally striate with decumbent hairs; clypeus striate-punctate with 4-6 very long erect and 2-4 short erect hairs, anterior margin concave to straight with long flexuous
hairs; scape reaching to surpassing posterior border of head, with erect hairs; head punctate in longitudinal rows, fading to shiny striate on medial frontal groove, with many long erect hairs evenly distributed.

Mesosoma deeply punctate, grainy looking from above and side, with many very long erect hairs pointed dorsally, notopropodeal groove steep and wide; propodeum swollen past spines; spines very small and acute; pronotal suture well developed from the side, metapleuron swollen past spine, with small propodeal spiracle.

Petiole rectangular, longer than wide, areolate with 3 long erect hairs on each posterior corner; postpetiole bilobed slightly diverging posterior, areolate with many erect hairs evenly dispersed; gaster areolate with many long erect hairs.

Concolorous dark brown.

Plate 51. *Crematogaster montezumia* worker (Mexico, BMNH): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Worker measurements** (mm): HL 0.62, HW 0.65, SL 0.72, EL 0.14, ED 0.13, CL 0.17, CW 0.22, WL 0.82, PSL 0.10, PL 0.28, PW 0.19, PPL 0.18, PPW 0.22; Indices: CI 85, SI 116, CLI 77, PI 147, PPI 82.
**Queen:** Very small compared to worker and not very worker like. Mandibles shiny with decumbent to appressed hairs; clypeus shiny with few long flexuous erect hairs, anterior margin concave with few flexuous long hairs; scape reaching posterior border of head with decumbent and appressed hairs; ocelli almost flush with top of head; head almost round, shiny, shallowly rugose following curvature of face below eyes, with many long erect hairs pointed toward middle.

Mesosoma very shiny with long erect hairs evenly distributed; dorsellum visible from beneath scutellum; propodeum long with well developed spines.

Petiole rectangular, longer than wide, shiny micro-areolate with several long flexuous hairs pointed posterior, clustered around posterior lateral corners, postpetiole bilobed, areolate with many long erect hairs evenly distributed and pointed posteriorly; gaster shiny areolate with many erect hairs.

Concolorous dark brown.

**Queen measurements (mm):** HL 0.78, HW 0.84, SL 0.82, EL 0.22, ED 0.20, CL 0.20, CW 0.31, WL 1.25, PSL 0.23, PL 0.48, PW 0.23, PPL 0.30, PPW 0.37; Indices: CI 93, SI 105, CLI 65, PI 201, PPI 81.
Plate 52. *Crematogaster montezumia* queen
(Mexico, BMNH): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Southern Mexico to Colombia.

Map 19. *Crematogaster montezumia*
**Type series:** Type from Mexico; Cotype worker and queen of *Crematogaster montezumia* Smith BMNH.

**Material examined:**

COMOMBIA: **Magdalena**, Canveral (4 wk LACM); COSTA RICA: **Osa Peninsula**, Corcovado, Laolla (1 wk MCZC); **Santa Clara**, Hamburg Farm (3 wk); GUATEMALA: **Petén**, EL Mirador (3 wk MCZC). **MEXICO**: **Quintana Roo**, Leona Vicario Reserve Ecological “El Eden” (1 wk CWEM); (21°13’N 87°11W) (1 wk STDC).

**Etymology:** *Montezumia*, named for Moctezuma the famous Aztec chief.

**Discussion:** *Crematogaster montezumia* is in the subgenus *Neocrema*. In North America this species is very distinctive. The key characteristics of the worker of this species are the poorly developed, very short and upturned propodeal spines, slightly incurved viewed from above and completely punctate head and mesosoma.

**Biology:** *Crematogaster montezumia* is collected mostly in South America with few specimens from Mexico. Longino (2003) states that *C. montezumia* can be found in a wide range of habitats including wet to dry forests. Most of his observations are from brushy second growth vegetation and forest edges and they occur in low density in Costa Rica but are collected more often in South American countries. Longino has also observed their black carton nests hanging in shrubs over water and in a tree in an open field near a beach. He found workers, brood and alate queens or one single queen inside nests.
Crematogaster mutans Buren

Plates 53, 54, and 55; Map 20.

Crematogaster mutans Buren, 1968b: 115-117: worker, male described: Moreno Lake, California, United States.

Descriptions:

Worker: Clypeus wider than long, longitudinally striate, few appressed hairs, anterior margin straight with several long hairs; 2-3 long erect hairs on each frontal lobe; scape reaching to surpassing posterior border of head, with decumbent hairs; head shiny shallowly punctate in longitudinal rows between and above eyes and punctate between rugae below eyes, evenly, sparsely covered with appressed hairs pointed toward one central point between eyes, 1 long erect hair on each frontal lobe; long hairs on ventral surface of head.

Pronotum rugose with 1-4 long erect hairs, mesosoma rugose with semi-erect hairs intersecting with other hairs and pointed medially (viewed from above), pronotal shoulder rounded, medial carina small, but long; side of mesosoma punctate; metapleuron rugose-punctate; promesonotal suture apparent from breaks in sculpturing, notopropodeal groove wide and steep; notopropodeal groove shiny, steep and angular; propodeal spines long, slender, thickened at base, divergent (viewed from above).

Petiole and postpetiole rugose punctate with several appressed hairs and 1 long flexuous hair on each posterior lateral corner, subpetiolar process well developed; petiole angularly trapezoidal, postpetiole hemilobes longitudinally elongate, but overall wider than long; petiole wider and longer than postpetiole; gaster shallowly areolate with few erect and appressed hairs sparsely dispersed, erect hairs on ventral surface of gaster; tibia with decumbent hairs.
Bicolored, dark head and gaster, light mesosoma, or concolorous light to dark brown.

**Worker measurements (mm):** HL 0.81-0.97, HW 0.95-1.10, SL 0.71-0.88, EL 0.23-0.28, ED 0.17-0.22, CL 0.23-0.28, CW 0.26-0.30, WL 0.90-1.15, PSL 0.19-0.28, PL 0.26-0.38, PW 0.30-0.42, PPL 0.18-0.22, PPW 0.28-0.38; Indices: CI 86-88, SI 87-91, CLI 88-93, PI 87-90, PPI 56-64.

![Worker measurements diagram](image)

Plate 53. *Crematogaster mutans* worker
(Moreno Lake California LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles longitudinally striate with decumbent hairs; clypeus longitudinally striate with 4-6 long erect and decumbent hairs, anterior clypeal margin convex and many long flexuous hairs; scape passing posterior border of head, with semi-erect hairs; ocelli small, flush with surface of head with 2-4 long flexuous, erect hairs in between; head quadrate, longitudinally striate fading to smooth along frontal groove, with 5-6 fine, long flexuous hairs between frontal lobes to ocelli, and decumbent hair evenly distributed and pointed toward middle.
Mesosoma same width as head, dorsal view of mesosoma shiny areolate with many fine long erect and decumbent hairs pointed toward middle; dorsellum not visible from above; propodeum latitudinally striate coming to points on spines; side of mesosoma longitudinally striate with many appressed and decumbent hairs and few scattered long, erect hairs; propodeal spiracle small.

Petiole trapezoidal, areolate with many fine decumbent hairs pointed to middle of posterior margin and 4-5 erect hair along each lateral margin and side; anterior subpetiolar process variable from poorly to well developed; postpetiole shallowly bilobed, spreading slightly posteriorly, areolate, covered with fine decumbent hair pointed posteriorly with 2 erect hairs on dorsum of each lobe, and 3 along each side; gaster areolate with many decumbent or appressed and few long erect hairs.

Concolorous brown.

Plate 54. *Crematogaster mutans* queen
(Moreno Lake California LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
**Queen measurements (mm):** HL 0.73-1.48; HW 0.98-1.68; SL 0.66-1.22; EL 0.22-0.44; ED 0.18-0.36; CL 0.22-0.52; CW 0.28-0.92; WL 1.80-3.19; PSL 0.22-0.46; PL 0.30-0.58; PW 0.41-0.64; PPL 0.30-0.41; PPW 0.43-0.58; Indices: CI 74-88, SI 82-90, CLI 57-79, PI 73-90, PI 70-71.

**Male:** Mandibles longitudinally striate with decumbent hair; clypeus shiny with few erect hairs around margins, anterior clypeal margin convex with 4-6 long hairs; scapes typical, with few appressed or decumbent hairs; ocelli almost flush with surface of head; head shiny areolate, with decumbent to semi-erect hairs pointed toward ocelli, eyes smaller than most males.

Mesosoma shiny, areolate on sides, with appressed hairs sparsely distributed; scutellum with few erect hairs and obscuring view of dorsellum; propodeum grainy punctate; propodeal spines just nubs surrounded with cluster of long flexuous hairs.

Petiole and postpetiole costate with 1 long flexuous erect hair on each posterior lateral corner and many appressed hairs pointed posteriorly; gaster shiny areolate with few erect and many appressed hairs.

Concolorous brown.

**Male measurements (mm):** HL 0.55, HW 0.70, SL 0.17, EL 0.31, ED 0.31, CL 0.12, CW 0.43, WL 2.11, PL 0.36, PW 0.43, PPL 0.38, PPW 0.38; Indices: CI 73, SI 31, CLI 28, PI 84, PPI 100.
Plate 55. *Crematogaster mutans* male
(Moreno Lake California LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma.

**Distribution:** Utah, United States south into Chihuahua, Mexico

Map 20. *Crematogaster mutans.*
**Type series:** Type Moreno Lake, California, United States. Paratype worker of *Crematogaster mutans* Buren.

**Material examined:**

MEXICO: Chihuahua, Namiquipa, 18k Juarez (2 wk CWEM). UNITED STATES: New Mexico, Rio Arriba County 2k N Dixon (3 wk CWEM); Utah, Salt Lake County (15 wk, 1 qn, 5 ml MCZC).

**Discussion:** This species is in the subgenus *Crematogaster.* The key characteristic of the *Crematogaster mutans* worker is the highly developed anterior subpetiolar process. The worker of this species is identical to the worker of *Crematogaster coarctata.* They are sympatric in range. There is a slight difference in the width of the mesosoma of the queens. The mesosoma of the queen of *C. mutans* is slightly narrower than the head. The mesosoma of the queen of *C. coarctata* is as wide or wider than the head. Therefore I cannot synonymize this taxon with *C. coarctata.*

As with *Crematogaster coarctata,* this species can easily be confused with *C. cerasi* and *C. vermiculata.* All four species have 1-5 long flexuous hairs on the pronotal shoulder with similar but not identical sculpturing. Pronotal shoulder sculpturing differs as *C. cerasi* is more lineolate, *C. vermiculata* is vermiculate and *C. mutans* has striate-shallowly punctate to areolate sculpturing. The scape of *C. mutans* always reaches at least the posterior border of head and often surpasses it, and the scape of *C. vermiculata* is shorter but can reach the posterior border of head. The head of *C. coarctata* is very punctate in neat longitudinal rows, while *C. vermiculata* has a shiny head. The propodeal spines of *C. mutans,* *C. coarctata* and *C. vermiculata* are always long and straight while *C. cerasi* has reduced to medium length spines with the upper edge sinuous when view from the side.
**Biology:** *Crematogaster mutans* is a subterranean species with nests usually found under rocks or logs. The preferred habit is arid desert scrub. *Crematogaster mutans* has been observed in cavities of plants and visiting extrafloral nectaries on *Opuntia* sp. foraging on saltbush, live oak, pine juniper and other desert shrub. *Crematogaster mutans* have been observed tending *Hemiargus isola* and visiting extrafloral nectories on *Opuntia* sp. throughout the day. This species has also been observed on saltbush, live oak, pine juniper and other desert shrubs. They can be found in cavities on plants and among exposed roots of plants and have been found out in the open foraging.

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**Crematogaster navajoa** Buren

Plates 56, 57, and 58; Map 21.

*Crematogaster navajoa* Buren, 1968b: 102-105: worker, queen described; Seligman, Arizona, United States.

**Descriptions:**

**Worker:** Mandibles longitudinally striate with decumbent hair; clypeus shiny with many long erect hairs, anterior margin convex; scape surpasing posterior border of head, with erect hairs; head shiny punctate in longitudinal rows, fading to shiny medially, with many fine long erect hairs evenly distributed.

Mesosoma punctate, pronotal shoulder vermiculate with punctures, with many fine, very
long flexuous hairs along pronotal shoulder and decumbent hairs pointed medially across rest of mesosoma; mesonotum swollen with deep and wide metanotal furrow; propodeum slightly swollen; spines long, coming to point; pronotal suture well developed (viewed from the side), mesopleuron swollen past spine, with small propodeal spiracle.

Petiole triangular, areolate with 1 long erect hair on each anterior and posterior lateral corner and several along the sides; postpetiole bilobed, diverging posteriorly, areolate with one erect hair on each posterior corner; gaster areolate with few long erect hairs.

Concolorous light to dark brown.

**Worker measurements (mm):** HL 0.9, HW 1.08, SL 0.78, EL 0.23, ED 0.18, CL 0.26, CW 0.34, WL 1.08, PSL 0.17, PL 0.26, PW 0.34, PPL 0.18, PPW 0.36; Indices: CI 83, SI 87, CLI 76, PI 76, PPI 50.

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Plate 56. *Crematogaster navajoa* worker
(Seligman, Arizona, United States top point with queen LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
**Queen:** Mandibles shiny, longitudinally striate with decumbent hair; clypeus shiny with many fine long erect hairs, anterior margin convex with many long hairs; scape failing to reach posterior border of head, with short erect hair; ocelli small and flush with head; head shiny longitudinally striate with many very fine erect hairs.

Mesosoma very shiny with long erect hair evenly distributed; edge of dorsellum visible from beneath scutellum; propodeum long with well developed spines.

Petiole rectangular, shiny micro-areolate with several long flexuous hairs pointed posteriorly; postpetiole shiny micro-areolate with poorly developed lobes spreading posteriorly; gaster shiny areolate with many erect hairs.

Concolorous dark brown.

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**Plate 57. *Crematogaster navajoa* queen**
(Seligman, Arizona, United States LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
**Queen measurements (mm):** HL 1.56, HW 1.73, SL 0.84, EL 0.39, ED 0.48, CL 0.46, CW 0.56, WL 1.88, PSL 0.20, PL 0.48, PW 0.65, PPL 0.36, PPW 0.70; Indices: CI 90, SI 54, CLI 83, PI 74, PPI 55.

**Male:** Mandibles shiny with erect hair; clypeus very shiny, small beak-like, with anterior margin convex coming to point; ocelli flush with head; scape typical; head shiny striate, very worker-like with very fine long erect hair.

Mesosoma shiny, micro-striate-areolate, with many fine erect hairs; scutellum overhangs dorsellum viewed from the side.

Petiole, postpetiole and gaster shiny with many fine long erect hairs; petiole triangular viewed from above; postpetiole heart shaped viewed from above.

Concolorous dark brown.

Plate 58. *Crematogaster navajoa* male
(Seligman, Arizona, United States top point LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
Male measurements (mm): HL 0.54, HW 0.66, SL 0.12, EL 0.24, ED 0.24, CL 0.11, CW 0.18, WL 1.38, PL 0.44, PW 0.49, PPL 0.31, PPW 0.54; Indices: CI 82, SI 22, CLI 60, PI 90, PPI 57.

**Distribution:** Arizona, Colorado and New Mexico, United States.

Map 21. *Crematogaster navajoa*

**Type series:** Type locality is from 8 miles east of Seligman Arizona. Paratype workers, queen and male from the Buren collection maintained at LACM.

**Material examined:**

**UNITED STATES: Arizona.** Coconino County (12 wk, 1 qn CWEM); E. Kaibab National Park (7 wk, 2 qn CWEM), Yavapai County, Kirkland Junction (5 wk CWEM), 0.3mi W Junction Rt5 on FSR (34°49.95’N 112°39.29’W elevation 4800’) (20 wk MCZC), 1.0mi W Junction Rt5 on FSR (34°49.95’N 112°39.91’W elev 4850) (29 wk, 3 qn, 9 ml MCZC), Thirteen mile Rock Butte
10.4mi E Clear Creek on Rt. 260 (elevation 5600’) (4 wk MCZC); **Colorado**, Pueblo County, 6k W Pueblo (30°18’0.37”N, 104°41’52”W) (32 wk CWEM); **New Mexico**, Bernalillo County, Albuquerque (4 wk CWEM), Lincoln County Cibola Nat Forest (3 wk CWEM), Mora County, 2k E Wagon Mound (3 wk CWEM), San Juan County, 4k E Aztec (3 CWEM), Union County, Kiosca National Grasslands (28 wk, 1 qn CWEM).

**Etymology:** *Navajoa* is named for the Navajo Indian Nation, the original home range of the species (Buren, 1968).

**Discussion:** This species is in the subgenus *Crematogaster*. The suite of characteristics of the *Crematogaster navajoa* worker are shallowly rugose mesosoma like that in *C. cerasi*, many erect hairs of varying length on the dorsum of the mesosoma (much more than on *C. cerasi*) and the slightly reduced spines with sinuous upper margin like in *C. cerasi*.

**Biology:** *Crematogaster navajoa* has been collected mostly from under rocks in the southwestern United States. It has also been collected from nests in the soil at the base of a tree. Habitats include juniper-grassland and desert scrub.

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**Crematogaster nigropilosa Mayr**

Plates 5 Figure (C), 59, 60 and 61; Map 22.

**Descriptions:**

**Worker:** Mandibles longitudinally striate with many amber, erect hairs; clypeus shiny, striate developing toward anterior margin, surface with 2 long and several short flexuous hairs, anterior margin convex, with few long and several short stiff erect hairs; head very shiny between eyes, striate below eyes, with many long stiff hairs pointed toward middle; scape passing posterior border of head, with many erect hairs, first funicular segment long and narrow.

Mesosoma shiny, (dorsal view) shallowly areolate, between several longitudinal carina starting at pronotal shoulder developing into lateral tubercles on mesonotum, many long, dark, stiff hairs and several appressed hairs on pronotal shoulder; mesonotum bilaterally inflated with medial depression (appearing like two adjacent bumps); notopropodeal groove deep and wide; carinulate from furrow fading to shallow areolate on dorsal face of propodeum, with 3 long erect hairs, posterior face steep, areolate, spines shiny, shallowly areolate, side view of mesosoma very shiny, shallowly areolate; lower mesopleuron swollen outward, propodeal spiracle small; spines long, slender, coming to point, thickened at base.

Petiole longer than wide, rectangular and shallowly areolate viewed from above, triangular and striate viewed from the side, with 1 very long hair at each posterior corner and 2 long hairs between corners on posterior margin, several short erect hairs at posterior margin and decumbent hairs on sides, anterior subpetiolar process absent to small right angle; first helcium long, punctate; postpetiole globular, wider than petiole and wider than long, shallow longitudinally striate, several long hairs pointed posteriorly; gaster areolate with short stiff dark hairs.

Concolorous brown to black.
Worker measurements (mm): HL 0.74-0.88, HW 0.82-0.96, SL 0.86-0.98, EL 0.18-0.19, ED 0.17-0.18, CL 0.25-0.34, CW 0.26-0.38, WL 1.02-1.15, PSL 0.26-0.35, PL 0.31-0.37, PW 0.18-0.26, PPL 0.24-0.30, PPW 0.24-0.36: Indices: CI 90-92, SI 1.11-1.16, CLI 89-96, PI 142-172, PPI 83-100.


**Queen:** Very worker like, head, clypeus and scape shiny micro-areolate, with abundant long and short dark flexuous erect hairs; anterior clypeal margin convex, with several long and short, stiff erect hairs; scape passing posterior border of head.

Dorsal and side of mesosoma pilosity and sculpture same as worker; dorsal and side view of propodeum longitudinally striate converging on poorly developed spines; propodeal spiracle small.

Dorsal view of petiole subquadrate, longer than wide, side view triangular, shiny areolate, with long erect hairs restricted to margins; postpetiole areolate, with abundant long dark erect
hairs pointed posteriorly; gaster areolate with abundant, evenly distributed long thick dark erect hairs.

Concolorous light to dark brown to black.

**Queen measurements (mm):** HL 1.10, HW 1.15, SL 1.08, EL 0.41, ED 0.29, CL 0.41, CW 0.34, WL 2.35, PSL 0.29, PL 0.46, PW 0.38; PPL 0.38, PPW 0.41: Indices: CI 96, SI 98, CLI 120, PI 121, PPI 93.

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Plate 60. *Crematogaster nigropilosa* queen
(determined by J. Longino, Costa Rica LACM # 870): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

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**Male:** Mandibles small, head and clypeus shiny; head with few long dark erect hairs; clypeus triangular; ocelli slightly protruding from head; scape typically short.

Mesosoma very shiny with fewer hairs than worker, but still long, dark and erect; dorsellum and metanotum can be seen from above;

Petiole and postpetiole very shiny with several long dark erect hairs pointed posteriorly;
gaster areolate with abundant evenly distributed long dark erect hairs.

Concolorous light brown.

**Male measurements (mm):** HL 0.50, HW 0.48, SL 0.11, EL 0.29, ED 0.23, CL 0.22, CW 0.47, WL 1.37, PL 0.32, PW 0.24, PPL 0.17, PPW 0.22; Indices: CI 104, SI 22, CLI 46, PI 133, PI 77.

**Plate 61. Crematogaster nigropilosa male**
(determined by J. Longino, Costa Rica LACM # 870): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Panama, south to Bolivia.
Map 22. *Crematogaster nigropilosa*.

**Type series.** *Crematogaster nigropilosa*, Santa Fé de Bogotá, Colombia. [NHMB].

**Material examined:**

**BOLIVIA:** **Cochabamba**, 67.5k E. Valle Sajta (17º06’19”S 64º46’57”W) (2 wk CWEM);

**Santa Cruz**, 3.7k SSE Buena Vista Hotel (17º29’S63º33’W) (1 wk CWEM).

**COLOMBIA:**

**Cundinamarca**, Guayabetal 909 (13 wk CWEM); **La Primavera**, La Vega (1 wk CWEM), Valle, Bosque de Yotoco (62 wk CWEM); Huila, Concepción Jorge Villamil (Gigante) (12 wk CWEM); Valle, Medio Calima (5 wk CWEM).

**COSTA RICA:** **Puntarenas**, 11k SW Estacion Biológica Las Cruces (8º46’43”N 83º01’50”W) (12 wk CWEM); Estacion Biológica Las Alturas (8º56’56”N 82º50’01”W) (2 wk CWEM); Corcovado National Park, 100m (3 worker MCZC).

**PANAMA:** Chiriqui 20.4k N San Felix, 950m, La Fortuna Finca La Suisse (7 wk CWEM); 2k NE Buquete 1400m (1 wk CWEM); 12k NE Santa Clara, 1850m (2 wk CWEM); Volcán Hartman’s Finca (1 wk CWEM).

**Etymology:** *Nigropilosa* is Latin, *nigro* meaning black and *pilosa* meaning hair referring to the black hairs on the mesosoma.
**Discussion:** *Crematogaster nigropilosa* is in the subgenus *Orthocrema*. *Crematogaster nigropilosa* is similar to *C. limata*, and *C. longispinosa*. All three taxa have long sharp propodeal spines and have similar pilosity. What separates *C. nigropilosa* from *C. limata* is the sculpturing and pilosity on the mesosoma and the divergence of the spines; *C. nigropilosa* has several more longitudinal carina and long flexuous dark erect hairs, and *C. limata* is shinier with white to light amber long flexuous erect hairs on the dorsum of the mesosoma. The spines on *C. nigropilosa* are widely divergent while the spines on *C. limata* are almost parallel. The sculpturing on the dorsum of *C. longispinosa* is very shiny, with white to light amber long flexuous hairs.

**Biology:** *Crematogaster nigropilosa* prefers rainforest habitats and can exploit a wide range of elevations. It is collected mostly while foraging either on the ground or in vegetation. This species will come to sausage baits and has been found in forest litter in montane forests and cloud forests. Nests have been found in low vegetation or in hollow twigs or soft wood in the understory.

_Crematogaster nocturna_ Buren

Plates 62 and 63; Map 23
*Crematogaster nocturna* Buren, 1968b: 112-115: queen and male described; Rainbow Lodge, Navajo Mountains, Arizona, United States.

**Descriptions:**

**Queen:** Clypeus wider than long, anterior margin straight with 6-8 long flexuous and many short flexuous hairs; eyes and ocelli large for this genus, almost flush with surface of head; scape not reaching posterior border of head, with appressed hairs; head shiny, longitudinally striate following curves of face around eyes, with very sparse appressed hair, 2 long, fine erect hairs between ocelli.

Mesosoma shiny micro-areolate with appressed hairs pointed toward middle and 2-4 short erect hairs on scutellum; metanotum and dorsellum visible under scutellum when viewed from above; propodeum shiny; propodeal spines with appressed hairs pointed toward tips, well developed for queen.

Petiole and postpetiole shiny striate with many short, thin flexuous hairs; anterior subpetiolar process very small; gaster shiny shallowly areolate, with sparse, short erect and even rows of appressed hairs directed posteriorly.

Concolorous reddish-brown.

**Queen measurements (mm):** HL 1.56, HW 1.87, SL 1.44, EL 0.57, ED 0.48, Ocelli Length 0.34, Ocelli Width 0.43, CL 0.57, CW 0.62, WL 3.12, PSL 0.43, PL 0.50, PW 0.84, PPL 0.36, PPW 0.77; Indices: CI 83, SI 92, CLI 92, PI 60, PPI 47.
Plate 62: Crematogaster nocturna queen (Rainbow Lodge, Navajo Mountains, Arizona, United States LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus protruding from face (viewed from above, full face or side), anterior clypeal margin with many long flexuous hairs; ocelli large for this genus, raised from surface of head; scape typically short; head shiny micro-areolate, with few long flexuous erect and semi-erect hairs pointed toward middle of face.

Mesosoma shiny, shallowly areolate with very few fine erect hairs; mesosoma wide, but short in length (side view).

Petiole, postpetiole and gaster shallowly areolate; petiole and postpetiole small.

Concolorous light brown.

**Male measurements (mm):** HL 0.61, HW 0.68, SL 0.30, EL 0.36, ED 0.32, Ocelli Length 0.12, Ocelli Width 0.14, CL 0.13, CW 0.25, WL 1.80, PL 0.24, PW 0.24, PPL 0.14, PPW 0.34; Indices: CI 90, SI 49, CLI 52, PI 100, PPI 41.
Plate 63: *Crematogaster nocturna* male
(Rainbow Lodge, Navajo Mountains, Arizona, United States LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Northern Arizona, United States.

Map 23. *Crematogaster nocturna*
**Type series:** Three males and nine females from Rainbow Lodge, Navajo Mountains, Coconino
County, Arizona, U. S. (LACM).

**Etymology:** This species was named for the large eyes and ocelli that may aid in nocturnal nuptial flights (Buren, 1968).

**Discussion:** This species is in the subgenus *Crematogaster*, and closely resembles the queen and male of *C. isolata*. The distinguishing characters are the size of the eyes and ocelli. The eyes and ocelli of *C. nocturna* are large for this genus, while the *C. isolata* queen and male have more typical eyes and ocelli.

**Biology:** This species was collected in northern Arizona close to the border of Colorado in the Navajo Mountains, at an elevation of 6,500 feet (Buren, 1968.)

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*Crematogaster obscurata* Emery

Plates 64 and 65; Map 24.


**Descriptions:**
**Worker:** Mandibles shiny, shallowly longitudinally striate with appressed hair; clypeus shiny with 2-4 erect hairs, anterior margin slightly convex; scape surpassing posterior border of head, evenly covered with semi-erect hairs; head areolate-lineolate along sides becoming very shiny in middle, evenly, sparsely covered with erect hairs.

Dorsum of mesosoma longitudinally striate-punctate with 6-10 erect hairs; side of mesosoma punctate; medial pronotal carina present; pronotal humeri can be seen viewed from above; notopropodeal groove shallow and rounded; propodeal spines short and divergent, pointed but very thick at base and curving very slightly posteriorly and 2 erect hairs on the dorsal edge of each spine.

Petiole areolate, with 8 erect hairs, almost rectangular but slightly longer than wide when viewed from above, with dorsal surface flat; anterior subpetiolar process small and sharp; postpetiole areolate to shallowly punctate with 6 erect hairs and with small subpostpetiolar process; gaster shallowly areolate with many erect hairs over entire surface of gaster (dorsal and ventral).

Concolorous light to dark brown.

**Worker measurements (mm):** HL 0.47-0.55, HW 0.48-0.57, SL 0.36-0.52, EL 0.11-0.14, ED 0.07-0.12, CL 0.14-0.19 CW 0.14-0.20, WL 0.49-0.56, PSL 0.10-0.12, PL 0.18-0.22, PW 0.16-0.17, PPL 0.11-0.12, PPW 0.17-0.18, Indices: CI 98-96, SI 77-95, CLI 100-.95, PI 113-129, PPI 65-67.
Plate 64. *Crematogaster obscurata* worker (Venezuela NHMG): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny with appressed hairs; clypeus shiny with 2-4 long erect hairs, about as long as wide, anterior margin straight with slight medial notch; scape evenly covered with semi-erect hairs, reaching posterior border of head; head rugose along sides getting very shiny in middle, evenly sparsely covered with long and short filamentous erect hairs.

Mesosoma longitudinally carinate-punctate with many short erect hairs, posterior margin of scutum quadrate; scutellum rounded posteriorly; metanotum visible when view from above; dorsellum broadly rounded; notopropodeal groove rounded angular; propodeal spines well developed for a queen, divergent, thickening at base, curving very slightly posteriorly with few erect hairs on the dorsal edge of each spine.

Petiole shallowly areolate to shallowly punctate with 10 or more erect hairs, longer than wide, dorsal surface flat; anterior subpetiolar process well developed; postpetiole shallowly areolate to shallowly punctate with 8 or more erect hairs, oval and wider than long; gaster shallowly areolate with many erect hairs regularly spaced over entire surface of gaster (dorsal and ventral).
Concolorous reddish to dark brown.

**Queen measurements (mm):** HL 0.78-0.84, HW 0.88-0.98, SL 0.64-0.73, EL 0.29-0.34, ED 0.24-0.25, CL 0.14-0.18 CW 0.24-0.26, WL 1.58-1.68, PSL 0.18-0.22, PL 0.35-0.42, PW 0.34-0.36, PPL 0.24-0.28, PPW 0.38-0.41; Indices: CI 89-86, SI 82-87, CLI 58-96, PI 119-151, PPI 63-68.

Plate 65. *Crematogaster obscurata* queen
**Distribution:** South Florida and south Texas, United States south to Venezuela.

Map 24. *Crematogaster obscurata*

**Type series:** *Crematogaster* victima var. *obscurata* Emery Holotype worker, Venezuela [NMHG] *Crematogaster agnita* Wheeler, Syntype worker, queen: Guatemala, Zacapa (examined) [MCZC] and 3 cotype workers of *Crematogaster agnita* from Guatemala (examined) [MCZC].

**Material examined:**

**BRAZIL:** Pará, Paragominas, Cantareira (8 wk NHMW). **GUATEMALA:** Guatemala, La Scala (3 wk MCZC). **NICARAGUA:** León, Volcano Telica (1 worker CWEM). **UNITED STATES:** Florida, Monroe County, West Summerland Key (1 wk, 1 qn MCZC); Texas, Cameron County, 6.5mi N Junction FM 2925 & 106 (4 wk COOK). **VENEZUELA:** (9 wk, 2 qn NHMW); La Cuava (2 wk, 1 qn NHMW).
**Etymology:** obscurata; from Latin obscurē meaning secretly.

**Discussion:** *Crematogaster obscurata* is in the subgenus *Orthocrema* and has small, but continuously polymorphic workers. The queen of this species is proportionally small; however with less variation. The smallest workers could be mistaken for *C. crinosa*, because they have few to no erect hairs on their heads and their heads are very shiny. These very small workers have the typical *C. obscurata* sculpturing and small spines. The distinguishing character is *C. obscurata* has an anterior subpostpetiolar process that is absent on *C. crinosa*.

**Biology:** *Crematogaster obscurata* prefers dry forest habitats and has been found nesting in dead stems or small knots of live trees. They have been intercepted at U. S. quarantine stations on *Oncidium* orchids from Guatemala (Longino, 2003).

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*Crematogaster opaca* Mayr

Plates 66, 67 and 68; Map 25.


**Descriptions:**

**Worker:** mandibles deeply rugose with semi-erect hair; clypeus slightly wider than long, punctate-rugose with appressed hairs, anterior margin straight; scape failing to reach posterior border of head with semi-erect hairs; head punctate-rugose with appressed hair.

Entire mesosoma punctate with rugae, sparsely covered with appressed hair and none to 6 long flexuous hairs on each pronotal shoulder; humeri somewhat square; promesonotal suture developed; notopropodeal groove very steep, shaped like a V; propodeal spines usually short, but can vary in length, robust and slightly divergent (seen from above.)

Petiole and postpetiole punctate-rugose with sparse appressed hairs and one long flexuous hair on each posterior corner and each hemilobe; petiole triangulate (as seen from above), slightly longer than wide, anterior subpetiolar process absent to well developed; postpetiole wider than long, hemilobes spreading slightly posteriorly; gaster punctate with rugae, sparsely but evenly covered with appressed hair, and with 0-20 short erect hairs.

Color highly variable, from concolorous light brown to dark brown or bi-colored.

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**Plate 66. Crematogaster opaca worker**
(Mexico NHMW): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
Worker measurements (mm): HL 0.97-1.01, HW 1.06-1.28, SL 0.82-0.90, EL 0.22-0.24, ED 0.18-0.22, CL 0.22-0.29, CW 0.25-0.35, WL 0.98-1.08, PSL 0.11-0.18, PL 0.36-0.40, PW 0.37-0.41, PPL 0.20-0.23, PPW 0.18-0.30, Indices: CI 79-92, SI 85-89, CLI 83-88, PI 97-98, PPI 77-111.

Queen: mandibles shiny, but shallowly longitudinally striate; clypeus much wider than long; clypeus and head shiny, but shallowly punctate with few rugae, and many long flexuous hairs; scape surpassing posterior border of head with decumbent hairs; ocelli flush with surface of face.

Mesosoma shiny areolate to shallowly rugose with shallow punctures between, pilosity more dense than that of worker, with many long flexuous hairs on mesosoma; metanotum not visible under scutellum when viewed dorsally, posterior border of propodeum rounded; propodeal spines well developed (for a queen).

Petiole and postpetiole shiny, rugose with shallow punctures between rugae and many very thin long flexuous and appressed hairs; anterior subpetiolar process absent to slightly developed; gaster with shallow sculpture, very shiny with decumbent and long flexuous hairs.

Color reddish-brown to dark brown.

Queen measurements (mm): HL 1.44-1.87, HW 1.73-1.87, SL 1.08-1.20, CL 0.41-0.48, CW 0.48-0.62, EL 0.38-0.43, ED 0.34-0.43 WL 3.00-3.12, PSL 0.31-0.34, PL 0.47-0.49, PW 0.48-0.84, PPL 0.41-0.48, PPW 0.36-0.48; Indices: CI 82-100, SI 64-75, CLI 77-85, PI 58-98, PPI 100-114.
**Plate 67. Crematogaster opaca** queen
(Michoacán Parque Nacional Charro Mexico CWEM #10354): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** mandibles typically small; clypeus snout-like, slightly protruding from head; ocelli slightly protruding from head, scape typically short; head punctate-rugose with short flexuous hairs pointed toward middle.

Sculpturing on rest of body same as worker, punctate-rugose, very grainy looking with many long (some as long as 0.3 mm, most are 0.12-0.18mm), very thin flexuous hairs; metanotum not visible under scutellum when viewed dorsally.

Petiole quadrate; postpetiole with hint of medium sulcus; gaster areolate.

Concolorous dark brown.

**Male measurements (mm):** HL 0.62-0.65, HW 0.77-0.84, SL 0.18-0.22, CL 0.14-0.17, CW 0.23-0.25, EL 0.30-0.31, ED 0.26-0.29, WL 1.68-1.74, PL 0.27-0.38, PW 0.33-0.34, PPL 0.21-0.23, PPW 0.37-0.38; Indices: CI 77-81, SI 29-34, CLI 61-74, PI 82-112, PPI 57-61.
Plate 68. *Crematogaster opaca* male
(Michoacán Parque Nacional Charro Mexico CWEM #10354): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Arizona, United States, south to Bolivia.

Map 25. *Crematogaster opaca.*
**Type series:** Type collected by Professor Bilimek and Dr. Sichel in Mexico, NHMW (#402) in the Mayr collection, syntype worker of *Crematogaster opaca* Mayr.

**Material examined:**

**BOLIVIA:** Sao Paulo, Cárnica (27 wk, 16 qn, 27 ml CWEM). **MEXICO:** Durango, La Cañada (5 wk CWEM); Guanajuato, Dolores Hidalgo (3 wk CWEM); San Miguel (3 wk, 1 ml MCZC); **Guerrero,** 29k NE Fila de Caballo (2 wk CWEM); Jalisco, 10mi W Jiquilpan (7 wk CWEM); **México,** Ciudad de México (1 wk CWEM); Michoacán, Parque Nacional Cerro Garnica (15 wk, 1 qn, 1 ml CWEM), 10k N Parque Nacional Garnica (4 wk, 1 qn CWEM); Nayarit, San Blas, Tres Marias Island, Maria Madre (1 wk MCZC), 60k SW Tepic (1 worker CWEM); (1 worker CWEM), Tepic (4 wk CWEM); **Nuevo León,** Doctor Arroyo (6 wk CWEM), 30.5k E Doctor Arroyo (3 wk CWEM), El Salto, (Zaragosa) (3 wk CWEM); Oaxaca, 116k NE Oaxaca Rt. 175 (3 wk CWEM), 116k NE Oaxaca Rt. 175 (3 wk CWEM), Ocotlan (10 wk CWEM), 14.5K S Ocotlan (5 wk CWEM), 13k S San José Pacífico (6 wk CWEM); **Puebla,** Teziutlán (8 wk CWEM); Quintana Roo, Leona Vicario Reserve Ecological “El Eden” (2 wk CWEM), 21°13’N, 87°11’ W (1 worker CWEM); **San Luis Potosí,** Ruta 57 (3 wk CWEM), Matchuala (2 workers CWEM), Santo Domingo (30 wk, 3 qn, 2 ml CWEM), 60k NW Santo Domingo (8 wk, 1 qn, 3 ml CWEM); Sinaloa, Palmito (1 wk CWEM); Tamaulipas, Municipio Tula 1k W de San Pablo (3 wk CWEM); **Veracruz,** Jalapa (13 wk, 6 qn, 10 ml CWEM), 22.5k W Jalapa (8 wk, 2 qn, 2 ml CWEM). **UNITED STATES:** Arizona, Santa Cruz County, Nogales (1 wk MCZC).

**Etymology:** Opaca from Latin opācō meaning to shade or opācus shady or dark referring to the color of this species.

**Discussion:** This species is in the subgenus *Crematogaster.* Key characteristics of the species *Crematogaster opaca* worker are the punctures in-between the rugae, giving nearly all surfaces a
grainy appearance, and the reduced propodeal spines. This species closely resembles *Crematogaster ashmeadi* in size and shape; however, *C. ashmeadi* is shallowly sculptured and shiny, and *C. opaca* is very sculptured and dull. *Crematogaster opaca* is variable in color, size and pilosity. There is extreme variability in the shininess or dullness of this species, as well as the amount of development of the anterior subpetiolar process in the worker. The queen looks very much like the worker; the noticeable difference is the shininess of the queen and the dullness of the worker. The male has the same sculpturing as the worker and is larger than most other males of this genus. A very noticeable difference between the male and the worker is the pilosity. The male has many long flexuous hairs over his entire body; however, the worker has few erect hairs.

**Biology:** *Crematogaster opaca* exploits many landscapes and can be found throughout central Mexico. It has been collected in grasslands, temperate forest, sandy beaches and dry desert. Usually this species is collected foraging loose on vegetation, but also comes to baited traps and pitfall traps. Nests have been found in trees or tree stumps.

*Crematogaster patei* Buren

Plates 66; Map 26

*Crematogaster patei* Buren, 1968: 108: worker described, Tampico, Tamaulipas, Mexico (examined) [LACM].

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Description:

Worker: Mandibles longitudinally striate; clypeus punctate with few thin, flexuous hairs pointed toward middle, anterior margin slightly concave with many long, thin flexuous hairs; head deeply punctate in lines following curvature of face and with many short fine erect hairs evenly distributed and pointed toward middle of face; eyes not completely on sides of face in full face view; scapes not reaching posterior border of head, with semi-erect hairs.

Mesosoma deeply punctate with some longitudinal costae on pronotal shoulder and side of mesonotum; many long and short, fine flexuous erect hairs pointed toward medial carina on mesonotum and pointed posteriorly on propodeum and spines; humeri dropping sharply on sides; medial mesonotal carina short and sharp, notopropodeal groove dropping sharply, wide and leveling off on dorsum of propodeum; dorsum of propodeum gently sloping between spines; propodeal spines long, slender, diverging widely posteriorly.

Petiole and postpetiole punctate with many long and short, fine flexuous erect hairs pointed posteriorly; petiole triangular with anterior corners slightly flaring upward; postpetiole with wide median sulcus and hemilobes spreading posteriorly; gaster areolate, with many short stiff erect hairs evenly distributed.

Concolorous brown.

Worker measurements (mm): HL 0.91-0.94, HW 1.01-1.07, SL 0.78-0.88, EL 0.22-0.23, ED 0.18-0.19, CL 0.26-0.29, CW 0.34-0.36, WL 1.07-1.10, PSL 0.18-0.23, PL 0.29-0.34, PW 0.34-0.38, PPL 0.19-0.29, PPW 0.29-0.31; Indices: CI 88-90, SI 86-94, CLI 76-81, PI 85-89, PPI 66-94.
Plate 69. *Crematogaster patei* worker
(Tampico, Tamaulipas, Mexico LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution.** Central Mexico

Map 26. *Crematogaster patei*. 
**Type series:** Types from Tampico, Tamaulipas, Mexico. 1 paratype worker examined from the LACM.

**Material examined:**

**MEXICO:** *Tamaulipas*, 32.2k SE Cuidad Victoria (289m, 23°29’29.8”N, 98°58’39.9”W) (4 wk, CWEM); *Zacatecas*, Calabazal, 7500m (6 wk LACM) (3 wk MCZC).

**Etymology:** Buren named *patei* to honor Dr. V. S. L. Pate whom he admired greatly.

**Discussion:** This species is in the subgenus *Crematogaster*. The key characteristics of the *Crematogaster patei* worker are the close set eyes that are not completely on the sides of the face in full face view, head and body almost entirely covered with punctures and the fine long flexuous hair distributed over most of the head and body.

*C. patei* can be confused with *C. pilosa* because both species have short erect hair evenly distributed over head, several (8-10) long flexuous hairs on each pronotal shoulder and short erect hairs evenly distributed over the rest of mesosoma; *C. patei* has finer hairs, and on the gaster the hairs are completely erect, *C. pilosa* has coarser hairs, and gaster has a combination of erect and decumbent hairs pointed toward the sting. Their sculpturing is also different. *Crematogaster patei* is deeply punctate from the head to the postpetiole, *C. pilosa* is rugose on the mesosoma and shiny, shallowly areolate on head and gaster.

**Biology:** In his original description, Buren (1968) states the type series of *C. patei* was collected in Tampico, Mexico and was on loan from the collection of Dr. W. M. Mann in the National Museum. He gives no other details on habitat or nesting habits. This species is rarely collected.
**Crematogaster pilosa** Wheeler

Plates 70, 71 and 72; Map 27.


**Descriptions:**

**Worker:** Clypeus wider than long, areolate with few erect hairs, anterior margin slightly convex with many long hairs; scape passing posterior border of head, with many erect hairs; head areolate, evenly covered with erect hairs.

Mesosoma rugose, evenly and completely covered with short erect hairs; pronotum with medial carina, humeri developed, rounded (viewed from above); side of mesosoma areolate-rugose, promesonotal suture apparent by breaks in sculpturing; notopropodeal groove steep and narrow; propodeal spines long, slender, thickening at the base, divergent (seen from above).

Petiole angularly trapezoidal, with anterior lateral corners upraised when viewed from behind, shallowly rugose with several erect hairs on margin of petiole, anterior subpetiolar process well developed; petiole wider and longer than postpetiole; postpetiole rugose with erect hairs on posterior margin, hemilobes longitudinally elongate, spreading slightly posteriorly; gaster areolate with many erect and decumbent hairs.
Concolorous medium to dark brown.

**Worker measurements (mm):** HL 0.74-0.95, HW 0.82-1.14, SL 0.68-0.94, EL 0.19-0.24, ED 0.16-0.23, CL 0.25-0.30, CW 0.30-0.40, WL 0.85-1.18, PSL 0.22-0.31, PL 0.20-0.30, PW 0.29-0.42, PPL 0.14-0.23, PPW 0.16-0.38; Indices: CI 83-90, SI 92-99, CLI 75-83, PI 69-71, PPI 61-88.

![Diagram of Crematogaster pilosa worker](Plate 70. *Crematogaster pilosa* worker (New Jersey, United States NHMG). A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.)

**Queen:** This species has alpha and beta queen forms that are dimorphic polymorphic in size. The $\alpha$ queen is distinctly larger than the $\beta$ queen. These two forms are identical except where mentioned, description is based primarily of $\alpha$ queen.

Mandibles shiny, longitudinal striate, with erect hairs; clypeus wider than long, longitudinally striate and short erect hairs pointed toward middle, anterior margin slightly concave with approximately 10 long flexuous hairs ($\beta$ queen: anterior clypeal margin very concave); scape just reaches posterior border of head ($\beta$ queen: slightly passes posterior border
of head), with erect hairs, funiculus with semi-erect hairs; ocelli typical; head wider than long, shiny striae below insertions of antennae and eye, with many erect and semi-erect hairs.

Dorsum of mesosoma shiny with many fine, long erect hairs; side of mesosoma with fine erect hairs; dorsellum barely visible from above.

Petiole, postpetiole and gaster shiny shallowly areolate, with few erect and semi-erect hairs (fewer than worker); petiole wider than long, small anterior subpetiolar process.

Concolorous brown to dark brown.

Plate 71. *Crematogaster pilosa* α queen (Waynesboro, Tennessee, United States, CWEM #18361) A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

α Queen measurements (mm): HL 1.24-1.30, HW 1.56-1.80, SL 1.01-1.05, EL 0.36-0.39,
ED 0.29-0.32, CL 0.36-0.43, CW 0.48-0.52, WL 2.42-2.59, PSL 0.07-0.17, PL 0.36-0.41, PW 0.54-0.84, PPL 0.34-0.43, PPW 0.62-0.82; Indices: CI 72-79, SI 81-81, CLI 75-83, PI 49-67, PPI 52-55.

\[\text{β Queen measurements (mm): HL 0.96-1.13, HW 1.23-1.42, SL 0.84-0.96, EL 0.28-0.36, ED 0.24-0.29, CL 0.29-0.38, CW 0.36-0.41, WL 1.75-2.45, PSL 0.22-0.24, PL 0.29-0.46, PW 0.44-0.67, PPL 0.28-0.34, PPW 0.47-0.67, Indices: CI 78-80, SI 85-86, CLI 81-93, PI 66-69, PPI 51-59.}\]

\[\text{Male: Mandibles with many long erect hairs; clypeus shiny shallowly areolate, wider than long, with 4-6 long erect hairs, anterior margin straight with long and short erect hairs; ocelli almost flush with surface of head; scape typically short, with erect hairs, funiculus covered with semi-erect hairs (looks like fur); head wider than long, shiny shallowly areolate with erect hair around ocelli.}\]

\[\text{Mesosoma longitudinally striate with shallow areolae between, many short erect hairs on dorsum and fine erect hairs on side; scutellum shiny, knob-like, with few fine erect hairs; dorsellum visible from above; propodeal spines are present as nubs.}\]

\[\text{Petiole, postpetiole and gaster areolate; petiole and postpetiole with long flexuous erect and appressed hairs; gaster with many erect hairs on dorsal and ventral surfaces; petiole wider than long; postpetiole wider than long.}\]

\[\text{Concolorous dark brown.}\]

\[\text{Male measurements (mm): HL 0.52-0.58, HW 0.66-0.71, SL 0.16-0.18, EL 0.22-0.26, ED 0.22-0.24, CL 0.11-0.14, CW 0.22-0.23, WL 1.48-1.62, PSL 0.01-0.04, PL 0.13-0.14, PPI 51-59.}\]
PW 0.18-0.26, PPL 0.15-0.18, PPW 0.14-0.26; Indices: CI 79-82, SI 31-31, CLI 50-60, PI 53-72, PPI 69-107.

Plate 72. *Crematogaster pilosa* male
(Waynesboro, Tennessee, United States CWEM #18361): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** This species is not wide spread; collected only from New Jersey to Georgia in the east, west to west Tennessee and Louisiana.
Map 27. *Crematogaster pilosa*

**Type series:** Type from New Jersey, United States; 19 syntype workers MNHG, 3 workers MCZC.

**Material examined:**

**UNITED STATES:** *Alabama*, Jefferson County, Warrior (33°48’28.8N, 86°48’35.8W) (1 wk CWEM); Madison County, Monte Sano Park (2 wk CWEM); *Delaware*, Kent County, Woodland Beach (4 wk STDC), New Castle County, Kirkwood (1 wk STDC), Sussex County, Bryans Store Rd. 435 (5 wk STDC); *Louisiana*, Natchitoches Parish, Kisatchie National Forest, Red Dirt Area, Kisatchie Bayou Camp (1 wk STDC), Plaquemines Parish, St. Bernard State Park (3 wk CWEM), Pointe Coupee Parish, Sherburne Wildlife Management Area (N 30°32’ W 110°42’) (6 wk STDC), Rapides Parish, Woodworth, Alexander State Forest (1 wk STDC); *Mississippi*, Kemper County, 3.9mi E Preston (9 wk STDC); *New Jersey*, (1 wk MCZC); *Tennessee*, McMinn County, Athens (5 wk, 3 qn, 3 ml CWEM), Obion County, Clayton (11 wk,
6 qn, 6 ml CWEM), Lawrence County, David Crockett State Park (1 wk CWEM), Franklin County, Huntland, (2 wk CWEM), Giles County, Pulaski (8 wk, 1 qn, 1 ml CWEM), Wayne County, 10mi N of Waynesboro (35°24’45”N 87°48’ 32.7”W) (1 wk, 2 qn, 2 ml CWEM).

**Etymology:** *Pilosa* is Latin *pilis* meaning hair.

**Discussion:** This species is in the subgenus *Crematogaster*. Key characteristic of *C. pilosa* is its pilosity. The head is evenly covered with short bristle-like erect hairs and long and short bristle-like hairs are evenly distributed over mesosoma. This species can easily be confused with *C. patei* because both species have short erect hair evenly distributed over head, several 8-10 long flexuous hairs on each pronotal shoulder and short erect hair evenly distributed over the rest of the mesosoma; *C. patei* has finer hair, and on the gaster the hairs are completely erect, *C. pilosa* has coarser hair, and gaster has a combination of erect and decumbent hair pointed toward the sting. Their sculpturing is also different. *Crematogaster patei* is deeply punctate from the head to the postpetiole, *C. pilosa* is rugose on the mesosoma and shiny, shallowly areolate on head and gaster.

**Biology:** *Crematogaster pilosa* is a ground dwelling species, usually found under rocks or in grass litter. It has been found inhabiting dead stems of grass, which may be a day chamber for incubation of brood..

*Crematogaster pinicola* **Deyrup & Cover**

The worker of *C. pinicola* is morphologically identical to *C. ashmeadi*, except for color. *Crematogaster pinicola* is always bicolored with a red head and mesosoma, and a dark gaster, where as *C. ashmeadi* is usually concolorous light brown to black, but can be bicolored. The nesting habits are different in that *C. pinicola* has only been found nesting in pine trees, preferring *Pinus elliotii* and *P. palustris* (Deyrup & Cover, 2007). *Crematogaster ashmeadi* has a much wider range of nesting habits, usually arboreal in moist habitats, but have been found in more arid areas, nesting in the ground or downed logs.

*Crematogaster punctulata* Emery

Plates 73, 74 and 75; Map 28.


**Descriptions:**

**Worker:** Mandibles longitudinally striate; head and clypeus longitudinally lineolate-punctate
(curving around posterior edge eye) with few erect and many appressed hairs pointed toward middle; clypeus slightly longer than wide, anterior clypeal margin slightly convex with small medial notch and several long flexuous hairs; scapes with semi-erect hairs and just reaching posterior border of head; posterior border of head rounded.

Mesosoma lineolate-punctate; pronotal humeri present, not well developed with up to 12 long, stiff hairs; 2-3 stiff hairs along lateral mesonotal margins and top of notopropodeal groove; promesonotal suture apparent from breaks in sculpture, short medial mesonotal carina; notopropodeal groove steep and narrow; propodeal spines long, curving slightly inward (seen from above) with long stiff erect hairs.

Petiole, and postpetiole lineolate-punctate, petiole with 1 long hair on each anterior and posterior lateral corners directed posteriorly, anterior subpetiolar process small to absent; postpetiole with several short erect hairs and 1 long erect hair on each posterior lateral corner; gaster areolate, evenly covered with short erect and many appressed hairs in rows along each terga.

Concolorous light to dark brown or bi-colored, light brown head and mesosoma and dark brown gaster.

Worker measurements (mm): HL 0.71-0.94, HW 0.74-1.10, SL 0.53-0.74, EL 0.18-0.22, ED 0.13-0.24, CL 0.26-0.30, CW 0.25-0.38, WL 0.96-1.12, PSL 0.13-0.22, PL 0.29-0.30, PW 0.30-0.36, PPL 0.19-0.22, PPW 0.29-0.41; Indices: CI 85-96, SI 75-79, CLI 79-104, PI 83-97, PPI 54-66.
Plate 73. *Crematogaster punctulata* worker
(Colorado, United States top point with pink dot MNHG): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Clypeus areolate between longitudinal striae with short, fine erect hairs pointed toward middle, anterior margin convex, with 10-12 long flexuous hairs; head areolate between longitudinal striae; ocelli typical, slightly raised with long flexuous hairs in between; scape failing to reach posterior border of head with fine appressed hairs.

Promesonotal suture more posterior than on most queens in this genus, (pronotum wider seen from the side); dorsellum seen from above; pronotum punctate with several hairs on each shoulder; remainder of mesosoma shiny areolate viewed from above, longitudinally striate-punctate viewed from the side, with short erect and appressed hairs pointed toward middle, propodeum and propodeal spines punctate-striate, with 2 erect hairs directed toward spine tips.

Petiole punctate, with 2-3 erect hairs on sides and many appressed (fur-like) hairs directed posteriorly; postpetiole punctate, with 2-3 erect hairs on sides and few appressed hairs directed posteriorly, with shallow but obvious medial sulcus, hemilobes diverging posteriorly; gaster shiny shallowly areolate, with many appressed hairs pointed posterior.

Concolorous dark brown.
Queen measurements (mm): HL 1.32-1.39, HW 1.58-1.92, SL 1.03-1.23, EL 0.31-0.36, ED 0.34-0.36, CL 0.42-0.46, CW 0.48-0.62, WL 2.88-2.90, PSL 0.29-0.36, PL 0.53-0.58, PW 0.82-0.91, PPL 0.41-0.48, PPW 0.84-0.96; Indices: CI 72-84, SI 78-88, CLI 74-88, PI 64-65, PPI 49-50.

Plate 74. *Crematogaster punctulata* queen
(Torrance County, New Mexico, United States CWEM #8270): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus coarsely punctate, with 6-8 long flexuous hairs along anterior clypeal margin convex, protruding from head, snout-like (best seen in side view), anterior clypeal margin straight with many short hairs; ocelli raised; scapes with erect hairs, relatively elongated compared to other males; head slightly wider than long, punctate, with semi-erect hairs pointing toward middle.

Pronotum punctate; scutum, scutellum, dorsellum and propodeum areolate from above with many long flexuous hairs; side of scutellum areolate; side of propodeum punctate.
Petiole, postpetiole and gaster with many long flexuous hairs; petiole and postpetiole punctate from above; petiole subquadrate; postpetiole without medial sulcus; gaster and side of postpetiole areolate.

Concolorous black.

**Male measurements (mm):** HL 0.52-0.58, HW 0.62-0.66, SL 0.12-0.19, EL 0.14-0.20, ED 0.12-0.18, CL 0.12-0.13, CW 0.22-0.24, WL 1.68-1.76, PL 0.22-0.26, PW 0.22-0.26, PPL 0.20-0.23, PPW 0.30-0.31; Indices: CI 84-88, SI 23-33, CLI 54-55, PI 100, PPI 67-74.

Plate 75. *Crematogaster punctulata* male
(Cimarron County, New Mexico, United States, CWEM # 6491): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
**Distribution:** Northeastern United States, south to Florida, west to southern California and south into central Mexico.

Map 28. *Crematogaster punctulata*

**Type locality:** Colorado, United States. 30 syntype workers MNHG.

**Other Material examined:** MEXICO: Coahuila, Arteago, Cañon San Lorenzo (6 wk CWEM); 8 k S Saltillo (39 wk CWEM); México, HWY 57, 127k (2 wk, 1 qn, LACM). UNITED STATES: Alabama, Tallapoosa County, Alexander City (1 wk MCZC); California, San Diego County, near Jamul Junction 94 & Vista Sage Lane (3 wk STDC), Point Loma (32°44'9"N117°13'5"W) (9 wk CWEM); Colorado, El Paso County, (2 wk MCZC); Delaware, Sussex County, Woodenhawk Marshy Hope WA (N38 46.12’; W75 42.69’) (5 wk STDC); Florida, Highlands County, near Lake Placid, Archibald Research Station (1 wk STDC),
Okaloosa County Eglin FB 2.2mi W Jct. Rt. 85 on Rd 211 at Gopher Creek elevation <200’ (14 wk MCZC), Polk County, Lakeland (25° 57.2’N 81°; 59’9’W) (1 wk STDC); Kansas, Cheyenne County, Arikaree River Bluffs (9 wk CWEM), Douglas County, (4 wk MCZC), Riley County, Manhattan (4 wk MCZC), Sherman County, 9mi S Goodland (17 wk CWEM), Whitfield (3 wk MCZC), Wallace County, Sharon Springs (2 wk CWEM); Louisiana, Calcasieu Parish, Moss Bluff, Sam Houston, Jones State Park (3 wk STDC), East Baton Rouge Parish, Baton Rouge, Spanish Town (6 wk STDC), La Salle Parish, Tullos (3 wk MCZC), Pointe Coupee Parish, Sherburne Wildlife Management Area (N 30°32’W 110°42’) (1 worker STDC); Maryland, Allegany County, Little Orleans, Lot 4 (4 wk STDC), Baltimore County, Baltimore SW park (3 wk STDC); New Mexico, Bernalillo County, Albuquerque (1 wk MCZC), Cimarron County, (65 wk, 6 ml CWEM), 8mi NE Felt (54 wk, 3 ml CWEM), Colfax County, Jeffers Ranch (3 wk CWEM), Curry County, Clovis (1 wk CWEM), De Baca County, 4 mi N Taiban (9 wk CWEM), Doña Ana County, 45k E Las Cruces (19 wk CWEM), Mesilla Park (3 wk MCZC), Eddy County, Los Medanos (6 wk CWEM), Lincoln County, Road Runner Ranch (6 wk CWEM), 5 mi E Red Cloud Campground (32 wk CWEM), 25mi SE Vaughn (12 wk, 4 qn, 1 ml CWEM), Mora County, 2k E Wagon, 12k Wagon Mound (30 wk, 10 ml CWEM), Quay County, 6mi SW Nara Visa, 7mi S Quay (83 wk, 3 qn, 16 ml & 3 homoptera larvae (#6504) CWEM), San Juan County, 4k E Aztec, (3 wk CWEM), San Miguel County, Las Vegas (6 wk MCZC), Santa Fe County, Galisteo (9 wk CWEM), 34mi S Santa Fe (1 wk CWEM), Socorro County, Los Alamos State Park (1 wk CWEM), Torrance County, 5mi NE Corona (3 wk CWEM), 13k NW Mountain Air, 24k S Mountain Air (15 wk, 4 qn CWEM), Union County, 15mi SW Clayton (11 wk CWEM), Sharon Springs (2 wk CWEM); North Carolina, Ashe County, 1mi west Clifton (4 wk STDC), Buncombe County, Black Mountains (3 wk MCZC), Polk County Tryon (3 wk MCZC); Oklahoma, Oklahoma, Bliss (6 wk MCZC), Choctaw County (4 wk MCZC); Tennessee,
Lincoln County, at Alabama border (8 wk CWEM), McMinn County Athens rest area (12 wk CWEM); **Texas.** Bexar County, San Antonio, Greenway neighborhood (12 wk COOK), Cameron County, 6.5mi N Jct. FM 2925 & 106 (11 wk COOK), Collin County, Plano Lone Star Park, (33º03’ 40N 96º 45 40”W) (10 wk STDC), Crockett County, 2mi E Iraan (30º 55.972’ N; 101º 52.602W) (23 workers COOK), Ranch Rd. (5 workers COOK), Floyd County, Floydada (3wk CWEM), Foard County (4 wk CWEM), Gaines County, Seminole (3 wk CWEM), Jeff Davis County, Davis Mountains, 23mi S Kent (11 wk CWEM), Jim Wells County, Alice (18 wk, 1 qn MCZC), Lamar County, Camp Maxey site 1 (N33º 48.683’; W95º 34.234’) (1 wk COOK), site 2 (N33º 48.201’; W95º 34.844’) (1 wk COOK), site 3 (N33º 48.708’; W95º 32.580’) (4 wk COOK), Paris (3 wk MCZC), Presidio County, Marfa (6 wk CWEM), Randall County picnic area along old US Hwy 87, 3.3mi N Junction with FM Rd 1714 (34º27.557’N,101º55.211, elevation 3491ft) (9 wk CWEM), San Jacinto County, Big Creek Scenic Area (2 wk COOK), Tarrant County, 45mi W Forth Worth (9 wk CWEM), Travis County, Austin (9 wk MCZC), Val Verde County, Langtry (7 wk CWEM), Hwy 163 4mi N. Juno (12 wk COOK), Hwy 163 4.9mi S. Juno (17 wk COOK), Wood County, Mineola 3mi NW at Godwin farm (1 wk COOK).

**Etymology:** *punctulata* comes from Latin *punctum* for point or dot, and *lata* meaning all over or everywhere.

**Discussion:** *Crematogaster punctulata* is in the subgenus *Crematogaster.* I am restoring *C. punctulata* to species status because there are definite differences in morphology from *C. lineolata.* The sculpturing on dorsum of the mesosoma of *C. lineolata* is scabrous-rugose with longitudinal striate while that of *C. punctulata* is very punctate. Another difference is in the pilosity. *Crematogaster punctulata* has medium length bristly hairs evenly distributed over dorsum of mesosoma while *C. lineolata* has short bristly hairs along pronotal shoulder.
Crematogaster punctulata can also be confused with C. opaca, C. depilis and C. dentinodis. Head sculpturing is punctate on all four species; however, C. opaca always has punctures in longitudinal rows. Pilosity on the pronotal shoulder can separate C. depilis from the other species because it is void of erect hair. It is very difficult to separate C. punctulata from C. dentinodis. Much of the central part of the head of C. punctulata is generally smooth and shiny, whereas most of the head of C. dentinodis is sculptured. The pronotum of C. punctulata usually has more than a dozen erect hairs, whereas there are fewer than 10 erect hairs on the pronotum of C. dentinodis. Finally, the petiole of C. punctulata never has the tiny teeth on the posterior lateral corners, which are often present in C. dentinodis.

**Biology:** The habits of Crematogaster punctulata are not as varied as others in the genus and are usually found in the mid-western states of the United States. They prefer to nest in the ground, often under a flat rock, downed stem, or even tires and bottles. They are often collected foraging on vegetation and tending membrids. They have also been found foraging under manure and nesting nearby in grassy patches. When in deserts, they can often be found in mesquite scrublands.
Crematogaster quadrispinosa Roger


Crematogaster quadrispinosa is not well known and there is no type material available.

Julius Roger (1863) described Crematogaster quadrispinosa as follows: 6mm long; Mandibles shiny, individual strong punctures; clypeus shiny, smooth with individual striae; the club is three segmented; head square, thickly longitudinal striate.

Body shiny black with few erect and many yellowish hairs; Scutum glossy, front with strong striated punctures becoming coarse dimpled almost rugose posteriorly (almost tile like); Scutellum very coarsely punctate; propodeum longitudinally rugose, with 2 short, sharp, almost horizontal spines.

Petiole elongated rectangular, as wide anteriorly as posteriorly, with rounded corners, with distinct short triangular thorns posteriorly that are easily recognized; postpetiole wider than long, rounded without medial sulcus; gaster glossy with scattered appressed hairs; legs dark brown with appressed hairs.

Mexico, a single female.
**Crematogaster rifelna Buren**

Plates 76, 77 and 78; Map 29.

_Crematogaster rifelna_ Buren, 1968: 96-98: worker, queen, male; Riviera, Texas, United States.

**Descriptions:**

**Worker:** mandibles shiny, shallowly longitudinally striate with decumbent hairs; clypeus wider than long, striate with decumbent hairs, anterior margin slightly convex with a small medial notch; scape reaching to surpassing posterior border of head, with many semi-erect hairs; head costate anteriorly fading to areolate, with appressed hairs and 4-6 long flexuous hairs along shiny medial margin.

Mesosoma with shallowly to moderately developed costae that follow curvature of pronotal shoulder and longitudinally medially, with several erect hairs on pronotal shoulders and evenly covered with decumbent hairs across mesosoma directed to medial carina; promesonotal carina very well developed; humeri well developed; promesonotal suture well developed; notopropodeal groove steep and angular; propodeal spines relatively short and very divergent, thickened at base.

Petiole punctate with several erect hairs on posterior margin, almost triangular with dorsal surface flat, anterior subpetiolar process well developed; postpetiole areolate with 1 erect hair on each posterior corner, hemilobes longitudinally elongate spreading slightly posteriorly; gaster shallow areolate with many erect and decumbent hairs.

This species is usually concolorous light to dark brown.
Worker measurements (mm): HL 0.73-1.02, HW 0.84-1.18, SL 0.66-0.78, EL 0.17-0.22, ED 0.14-0.17, CL 0.22-0.26, CW 0.22-0.25, WL 0.84-1.18, PSL 0.22-0.24, PL 0.23-0.25, PW 0.28-0.37, PPL 0.16-0.22, PPW 0.26-0.34; Indices: CI 86-87, SI 74-90, CLI 100-104, PI 68-82, PPI 62-65.

Plate 76. *Crematogaster rifelna* worker (Rivera, Texas, United States MCZC): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny shallowly striate; clypeus striate with appressed hairs, anterior margin straight; scape not reaching posterior border of head, with semi-erect hair; ocelli flush with head; head shiny lineolate around insertions of antennae, with fine appressed hairs,

Mesosoma shiny, shallowly rugose with 10 or fewer fine erect hairs; dorsellum hidden by scutellum when viewed dorsally.

Petiole and postpetiole shallowly rugose with few fine erect hairs; gaster shallow areolate with few fine erect hairs.

Concolorous reddish brown.
**Queen measurements (mm):** HL 1.15-1.25, HW 1.39-1.73, SL 0.91-1.03, EL 0.30-0.32, ED 0.24-0.28, CL 0.24-0.26, CW 0.36-0.38, WL 2.04-2.09, PSL 0.17-0.24, PL 0.29-0.36, PW 0.50-0.60, PPL 0.34-0.38, PPW 0.55-0.62; Indices: CI 72-83, SI 79-82, CLI 67-68, PI 58-60, PPI 61-62.

Plate 77. *Crematogaster rifelna* queen (Rivera, Texas, United States MCZC): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus wider than long, anterior margin shiny with fine flexuous hairs; scape typically short with 2-3 erect hairs, funiculus covered fur-like semi-erect hairs; ocelli slightly protruding from top of head; head shiny, with long, fine flexuous hairs, mostly around ocelli.

Mesosoma shiny shallowly areolate with few fine, erect hairs; dorsellum can be seen from above.

Petiole, postpetiole and gaster shiny shallowly areolate with few erect hairs.

Concolorous, dark brown.

**Male measurements (mm):** HL 0.48, HW 0.54, SL 0.13, EL 0.18, ED 0.20, CL 0.12, CW 0.22, WL 1.44, PL 0.26, PW 0.18, PPL 0.18, PPW 0.26, Indices: CI 89, SI 27, CLI 55, PI 144, PPI 69.
Plate 78. *Crematogaster rifelna* male
(Rivera, Texas, United States MCZC): A. Head; B. Dorsal view of mesosoma; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Southeastern Texas, United States, south along the east Mexican coast.

Map 29. *Crematogaster rifelna*. 
Type series: Paratypes: 1 wk, 1qn, 1ml on one pin (MCZC), paratype pin with 3 workers from Riviera, Texas, Kleberg County, United States; paratypes (1 qn, 2 ml LACM) from Barroso, Texas.

Material examined:

MEXICO: Nuevo Leon, Montemorelos, El Pastor, elevation 2200’ (9 wk LACM); San Luis Potosí, 6mi south of Vanes (2 wk, 1 qn MCZC), Valles, (2 wk, 1 qn MCZC), 4mi N Valles elevation 300’ (4 wk, 1 qn, 1 ml LACM); Tamaulipas, 10mi North of Ciudad Victoria (3 wk LACM); Veracruz, Mirador (3 wk, MCZC). UNITED STATES: Texas, Gamble Creek HWY 22 (4 wk, 2 qn, 2 ml, LACM), Cameron County, Brownsville (1 wk MCZC), Kelberg County, Kingsville (3 wk CWEM), Riveria (3 wk LACM), San Patricio County, Welder Wildlife Area, found near Sinton NE M Kasztarab (3 wk LACM), Victoria County, Victoria (3 wk LACM), Willacy County, King Ranch 30mi NE of Raymondville (5 wk, 1 ml LACM).

Etymology: Rifelna is derived from old German “rifeln” meaning to furrow (Buren 1968).

Discussion: Crematogaster rifelna is in the subgenus Crematogaster. This species is morphologically similar to C. ashmeadi. It has one distinguishing character, a shallow longitudinal furrow on the dorsum of the mesosoma.

Biology: This species is not well collected and little is know of its habits. It has been collected mostly in southern Texas, and is arboreal, found in Quercus virginiana, in Disholcaspis galls and cynipid oak galls.
Crematogaster rochai Forel

Plates 5 Figure (B), 79, 80 and 81; Map 30.


Descriptions:

Worker: Mandibles with longitudinally striate; clypeus rugose with appressed hair, anterior margin slightly convex with medial notch; scape failing to reach posterior border of head with many semi-erect hairs; head shallowly rugose, evenly covered with appressed hair.

Pronotum and mesonotum rugose, with few erect hairs and many appressed hairs; medial longitudinal pronotal carina developed; humeri developed; propodeum punctate; promesonotal suture developed; notopropodeal groove steep and angular; propodeal spines short and upturned divergent (seen from above).

Petiole and postpetiole shallow areolate-punctate to punctate dorsally; petiole with 1 erect hair on each posterior corner; postpetiole with 2 erect hairs on each posterior corner; petiole subquadrate, slightly longer than wide, anterior subpetiolar process very well developed; postpetiole globular, almost round; gaster very shallow areolate without erect hair except at very edge of the margin.

Concolorous reddish-brown to dark brown.
Worker measurements (mm): HL 0.65-0.77, HW 0.66-0.88, SL 0.49-0.59, EL 0.23-0.24, ED 0.13-0.14, CL 0.17-0.23, CW 0.22-0.30, WL 0.70-0.86, PSL 0.13-0.17, PL 0.22, PW 0.19-0.22, PPL 0.18-0.22, PPW 0.14-0.23; Indices: CI 88-98, SI 75-77, CLI 74-77, PI 100-116, PPI 96-129.

Plate 79. *Crematogaster rochai* worker (Ceará, Brazil MCZC) A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shallowly striated; clypeus lineolo-rugose; anterior margin straight, same width as perpendicular height; scapes short, not reaching posterior border of head with few erect and many appressed hairs; ocelli typical; head lineolate-rugose with few erect and appressed hairs.

Mesosoma with scattered short erect and appressed hairs, dorsal surface areolate, side shiny areolate; propodeal spines absent.
Petiole and postpetiole shiny shallow areolate, with scattered short erect and appressed hairs, 1-2 erect hairs pointed posteriorly; postpetiole globular, wider than petiole, gaster shiny shallowly areolate with rows of appressed and few erect hairs.

Concolorous reddish-brown to dark brown.

**Queen measurements (mm):** HL 1.25-1.27, HW 1.58-1.63, SL 0.79-0.80, EL 0.43-0.48, ED 0.36-0.41, CL 0.36-0.41, CW 0.41-0.43, WL 2.66-2.83, PL 0.46, PW 0.50, PPL 0.38, PPW 0.62, Indices: CI 78-79, SI 63-64, CLI 88-95, PI 92, PPI 61.

**Plate 80. Crematogaster rochai queen** (Sinaloa, Mexico CWEM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Head small, clypeus longitudinally striate, wider than long, anterior margin straight; scapes very short without hair; eyes very large, covering most of face; ocelli typical; head shiny areolate with short erect hairs directed medially.
Dorsellum of mesosoma shiny areolate; side of mesosoma shallow longitudinally striate, with few short erect hairs; dorsellum can be seen when viewed from above.

Petiole and postpetiole areolate with few semi-erect hairs; petiole subquadrate, without subpetiolar process, postpetiole round; gaster areolate with semi-erect hairs in rows.

Concolorous light brown.

**Male measurements (mm):** HL 0.48, HW 0.77, SL 0.08, EL 0.30, ED 0.22, CL 0.14, CW 0.18, WL 1.38, PL 0.18, PW 0.14, PPL 0.17, PPW 0.17; Indices: CI 62, SI 17, CLI 78, PI 129, PPI 100.

*Plate 81. Crematogaster rochai male (Sinaloa, Mexico CWEM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.*
**Distribution:** Mid Pacific coast of Mexico south to Colombia.

![Map 30. Crematogaster rochai](image)

**Type Locality:** Ceará, Brazil

**Material examined:**

**COLOMBIA:** Valle del Cauca, Sevilla, (3 wk CWEM); **COSTA RICA:** Guanacaste, Lomas de Barbudal (1 wk CWEM); **MEXICO:** Colima, Colima (7 wk CWEM); Jalisco, Tamazula (5 wk CWEM); **Nayarit,** 12.8k S. Caponata (22º23’0.57”N, 105º20’09”W) (6 wk CWEM); **Sinaloa,** Escuinapa (18 wk, 9 qn CWEM), (24º49’0.56”N, 105º46’54”W) (3 wk, 2 qn CWEM).

**Etymology:** Named for the original collector M.F. Diaz da Rocha.

**Discussion:** The key characteristic of *C. rochai* is the highly developed anterior subpetiolar process, short upturned propodeal spines and face evenly covered with appressed pubescence and few erect hairs. This species can be confused with *C. torosa* and *C. crinosa*. One
distinguishing character is the anterior subpetiolar process on *C. rochai* is much more highly developed than in *C. crinosa* or *C. torosa*. The gaster of *C. rochai* has few to no erect hairs while the gaster of *C. crinosa* is evenly covered with short erect hairs and *C. torosa* has a wide margin of erect hair. The males have very small heads with the eyes almost touching the clypeus.

**Biology:** *Crematogaster rochai* is not well collected north of Guatemala, but is occasionally collected in Mexico. This species prefers dry habitats and have been collected foraging on the ground, in vegetation and will come to baits and pitfall traps. It has been found nesting in cavities of plants and are polydomous (Longino, 2003.)

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*Crematogaster saussurei* Forel

Plates 4 Figure (E), 82, 83 and 84; Map 31.

*Crematogaster saussurei* Forel, 1899: 86: Lectotype [here designated], paralectotype: 1 worker (top pin), 1 queen, 1 male and 4 workers), Moyoapan, Veracruz, Mexico [NHMG].

Emery, 1922: 140: *Crematogaster (Acrocoelia)*.

**Descriptions:**

**Worker:** Mandibles longitudinally striate; clypeus lineolate-rugose with many semi-erect hairs, anterior margin convex with many long flexuous hairs; scape short, not reaching posterior border of head, with semi-erect hairs; head punctate-lineolate following curvature of eye, fading to
shiny toward posterior border of head with 2-4 long flexuous hairs and many appressed and
decumbent hairs pointing toward middle of face.

Dorsal view of mesosoma punctate-lineolate following curvature of dorsum, breaking
slightly at prometanotal suture with appressed hair evenly scattered and directed toward medial
carina, medial metanotal carina poorly developed; pronotal shoulder rounded with 2-3 long erect
hairs on each pronotal shoulder; notopropodeal groove shallow; propodeum with appressed hair
pointed and curving around spines propodeal spines short, not inserted at widest point, diverging
posteriorly, curving outward viewed from side.

Petiole triangular with anterior lateral corners flaring up slightly, areolate with 2-4 long
erect hairs on each posterior margin and appressed hairs on dorsal surface; postpetiole areolate
with wide median sulcus, hemilobes diverging posteriorly, with 2-4 long erect hairs on each
posterior margin and appressed hairs on dorsal surface; gaster areolate with few erect and many
appressed in rows pointed posteriorly.

Concolorous brown to black.

Plate 82. *Crematogaster saussurei* worker
(Moyoapan, Veracruz, Mexico MNHG): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C.
Side view of mesosoma, petiole and postpetiole.
**Worker measurements (mm):** HL 0.98-1.08, HW 0.98-1.14, SL 0.78-0.97, EL 0.24-0.25, ED 0.19-0.20, CL 0.26-0.32, CW 0.30-0.40, WL 1.22-1.22, PSL 0.14-0.20, PL 0.24-0.29, PW 0.37-0.42, PPL 0.22-0.29, PPW 0.34-0.35; Indices: CI 95-100, SI 80-90, CLI 80-87, PI 65-69, PPI 65-83.

**Queen:** Mandibles shiny, covered with semi-erect hairs directed toward teeth; clypeus shiny, lineolate, with few thin erect hairs, anterior margin slightly convex; scape short, failing to reach posterior border of head with decumbent hairs; ocelli very small for queens in this genus; head shiny lineolate-rugose (worker like) with few long flexuous hairs.

Mesosoma areolate, with few short erect hairs, viewed from above; latitudinally lineolate with hairs intersecting with other hairs on sides; metanotum cannot be seen from above, dorsellum can be seen from above.

Petiole areolate with few erect hairs, rounded triangulate; postpetiole areolate, few erect hairs, and with shallow medium sulcus; gaster areolate with about 6-10 scattered short erect hairs and evenly spaced appressed hairs in rows pointed posteriorly.

Concolorous dark brown to black.

**Queen measurements (mm):** HL 1.49, HW 1.58, SL 1.15, EL 0.43, ED 0.38, CL 0.55, CW 0.50, WL 2.95, PSL 0.34, PL 0.67, PW 0.70, PPL 0.53, PPW 0.62; Indices: CI 94, SI 77, CLI 110, PI 96, PPI 85.
Male: Mandibles rugose-punctate; clypeus somewhat snout-like, protruding from face, shiny rugose with few long flexuous hairs, anterior margin slightly convex with many long flexuous hairs; scape typically short, without hair; ocelli small, almost flush with top of head; head heavily punctate with several long flexuous hairs pointed toward middle and many long decumbent hairs along margins of head, with cluster of long flexuous hairs around and in-between ocelli.

Mesosoma shallowly areolate with many long flexuous erect hairs (viewed from above), hairs intersecting with other hairs on sides; pronotal side longitudinally striate-punctate; katepisternum latitudinally striate-punctate; long flexuous hairs directed posteriorly on scutellum, dorsellum and metanotum when viewed from side.

Petiole and postpetiole punctate with long flexuous hairs along posterior margin; gaster
areolate with many erect hairs ventrally and dorsally (bristle-like appearance).

Concolorous black.

**Male measurements (mm):** HL 0.66, HW 0.85, SL 0.17, EL 0.31, ED 0.25, CL 0.10, CW 0.29, WL 1.98; Indices: CI 78, SI 26, CLI 34.

Plate 84. *Crematogaster saussurei* male type
(Moyoapan, Veracruz, Mexico MNHG): A. Head; B. Dorsal view of mesosoma; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Central Mexico.
Map 31. *Crematogaster saussurei*

**Type series:** Type from Moyoapan, Veracruz, Mexico; Lectotype worker, queen and male and 4 paratype workers of *Crematogaster saussurei* Forel.

**Material examined:**
MEXICO: Chihuahua, Cuauhtémoc, Cuauhtémoc (15 wk, 3 ml CWEM); Nayarit, Ermitaño (2 wk CWEM); Querétaro, Querétaro, La Barreta (3 wk CWEM), Cadereyta (1 wk CWEM), La Cañada (2 wk CWEM), La Cimatario (6 wk CWEM).

**Etymology:** Named for the original collector Henri Saussure.

**Discussion:** This species is in the subgenus *Crematogaster*. The key characteristics of the *Crematogaster saussurei* worker are the reduced propodeal spines and the spines are not inserted at the widest point on the propodeum. The *C. saussurei* worker resembles that of *C. isolata* in
these two characters; however, *C. saussurei* has more erect pronotal hairs and the pronotal sculpturing is different. The dorsum of the mesosoma of *C. saussurei* is lineolate-rugose with a medial pronotal carina, while *C. isolata* is areolate. The queens of these two species resemble the workers, but the queen of *C. saussurei* has more developed spines than that of *C. isolata*. The males are very different. *Crematogaster saussrei* has a more typical face with large eyes, the clypeus is almost flush with the face and it has typical ocelli. *Crematogaster isolata* has disproportionately large eyes, the clypeus is snout-like protruding from the face, and the ocelli also protrude from top of head almost like eye stalks.

**Biology:** *Crematogaster saussrei* is rarely collected so biological information such as preferred habitat and nesting habits is unavailable.

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**Crematogaster sotobosque Longino**

Plates 85 and 86; Map 32.


**Descriptions:**

**Worker:** Mandibles shiny, yellow with semi-erect hairs; anterior margin straight turning up
slightly at ends; clypeus and head very shiny, 4-6 very long erect hairs (longest are 0.18 mm) and many long erect hairs evenly spaced across head; scape passing posterior border of head with long semi-erect hair.

Dorsum of mesosoma very shiny with 2 very long erect hairs (0.22mm) on each pronotal shoulder, 2 long erect hairs on mesonotum and other shorter erect hairs; lateral margins of mesonotum with a short raised carina, anterior portions tooth like; propodeal spines long, sharp and almost parallel; legs yellow, front femur with decumbent hair and back 2 femurs with erect hairs.

Petiole, postpetiole and gaster very shiny; petiole with 1 long erect hair on each posterior corner, postpetiole with 1 long erect hair on each anterior and posterior corner; gaster with many long erect hairs evenly spaced.

Body concolorous light to dark brown, legs and mandibles yellow.

Plate 85. Crematogaster sotobosque worker (La Selva Biological Station, Costa Rica LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Worker measurements (mm):** HL 0.50-0.54, HW 0.46-0.50, SL 0.48-0.54, EL 0.13-0.16, ED 0.10-0.12, CL 0.17-0.22, CW 0.20-0.24, WL 0.52-0.66, PSL 0.16-0.19, PL 0.19-0.24, PW 0.16-0.17, PPL 0.10-0.12, PPW 0.08-0.12, Indices: CI 108-109, SI 96-100, CLI 85-92,
Queen: Mandibles lighter in color from rest of head, shiny; clypeus, head and rest of body very shiny worker like with many erect hairs; anterior clypeal margin straight with ends slightly curved up as in the worker; scape reaching to slightly surpassing occipital margin, with erect-hair; ocelli flush with top of head.

Mesosoma shiny with large punctures and many long erect hairs viewed from above, metapleuron heavy rugose; dorsellum not visible viewed from above; propodeal spines very well developed (0.18mm) for queens in this genus.

Petiole scabrous with few long erect hairs; petiole shiny, shallowly areolate with several long erect hairs; gaster shiny with many long erect hairs.

Concolorous light to medium brown with legs and mandibles a little lighter.

Queen measurements (mm): HL 0.77, HW 0.82, SL 0.60, EL 0.28, ED 0.18, CL0.26, CW 0.34, WL 1.81, PSL 0.19, PL 0.53, PW 0.34 PPL 0.35, PPW 0.41; Indices: CI 94, SI 78, CLI 76, PI 156, PPI 85.
Plate 86. *Crematogaster sotobosque* queen (La Selva Biological Station, Costa Rica LACM): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution.** Arizona, United States and Costa Rica, south to Bolivia.

Map 32. *Crematogaster sotobosque.*
**Type examined:** Paratype worker and queen from La Selva Biological Station, Prov. Heredia, Costa Rica.

**Other material examined:** BOLIVIA: **Cochabamba.** 109k E Cochabamba at Lagunitas (17°06′22″S 85°40′57″ W) (1 wk LACM). COSTA RICA: **Puntarenas** 6km WNW Las Alturas (8°58′N 82°53′W 1650m) (3 wk MCZC), Toro Amarillo Guápiles, (1 wk MCZC). PANAMA: **Chiriqui** 20.4k North San Felix 950m (1 wk LACM). UNITED STATES: **Arizona:** Pima County, Tucson Mount Lennon (32°26′25″N 11°47′14″W) (2 wk STDC).

**Etymology:** Sotobosque in Spanish means “understory” which is the favored habitat of this species (Longino, 2003.)

**Discussion:** *Crematogaster sotobosque* is in the subgenus *Orthocrema*. Distinguishing characters of this species are the long pointed spines that are almost parallel and the dorsum of the entire body being very shiny. This species resembles *C. limata*, *C. longispinosa*, and *C. nigropilosa* in having very long spines, however all of these species are sculptured in various ways and their spines are divergent rather than parallel. All of these species including *C. sotobosque* have long flexuous hairs on the dorsum of the mesosoma and a varying amount on the head.

**Biology:** In Longino’s original description (2003) he says this species prefers mature wet forest habitats in Costa Rica. Longino states that *C. sotobosque* will build carton shelters, he has not found workers in association with a queen but found a queen in a hollow twig with brood a few centimeters from a carton shelter.

Two workers were found on top of Mount Lemmon, in Tucson Arizona, United States the summer of 2002. This would be a tremendous range extension; however a better explanation is that it was an exotic, accidently imported into the area. This specimen was in the Shawn T. Dash
Collection. In the spring of 2009, Mr. Shawn Dash and Dr. William Mackay went back to the Arizona site, on Mt. Lemmon, but did not find a nest.

**Crematogaster sumichrasti** Mayr

Plates 87, 88 and 89; Map 33.


*Crematogaster (Apterocrema) atitlantica* Wheeler, 1936: 47: fig. 1: queen, male; Guatemala.


Longino, 2003: 2, 114: junior synonym of *C. sumichrasti*.

**Descriptions:**
Worker: Mandibles shiny longitudinally striate with decumbent hairs; clypeus longitudinally striate with semi-erect hairs, anterior margin slightly concave with 6 very long (0.24-0.36 mm) hairs; scape reaching posterior border of head, scape and funiculus with many long erect and sub erect hairs; head shiny longitudinally striate, and evenly, sparsely covered with long, flexuous erect and semi-erect hairs pointed toward middle.

Mesosoma shallowly striate with long and short erect hairs; pronotal humeri well developed; single longitudinal carina present along each dorsal lateral edge of pronotum and mesonotum, ending in point (nearly a spine) at metanotal furrow, longitudinal depression along medial dorsal surface of pronotum and metanotum, continuing past mesonotal suture onto propodeum; propodeal spines short to medium length and very slender, but thickened at base, slightly divergent (viewed from above); viewed from the side pronotum shallowly striate, mesopleuron striate, propodeum rugose; posterior face of propodeum shiny, shallowly areolate.

Petiole and postpetiole and gaster shallowly areolate with many long erect hairs; petiole striate on side; petiole almost rectangular (viewed from above), longer than wide; anterior subpetiolar process blunt; postpetiole round (viewed from above), slightly wider than long; tibia with 2-4 long erect hairs and many decumbent hairs.

This species is usually concolorous golden yellow to dark brown.

**Worker measurements (mm):** HL 0.46-0.55, HW 0.38-0.58, SL 0.34-0.50, EL 0.08-0.17, ED 0.07-0.13, CL 0.12-0.20, CW 0.17-0.29, WL 0.50-0.66, PSL 0.10-0.14, PL 0.16-0.22, PW 0.11-0.18, PPL 0.11-0.17, PPW 0.16-0.28, Indices: CI 95-121, SI 74-91, CLI 69-71, PI 122-145, PPI 145-161.
Plate 87. *Crematogaster sumichrasti* worker
(Mexico MCZC): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny, longitudinally striate, with long erect hairs; clypeus varies from slightly wider than long to slightly longer than wide, shiny striate, with long and short erect hairs, anterior margin straight with 10 long erect hairs; scape reaching posterior border of head, evenly covered with long erect hairs; ocelli typical, flush with top of head; head shiny striate with evenly, sparsely covered with long and short erect hairs, frontal groove apparent.

Mesosoma shiny, very rugose with long and short erect hairs; dorsellum barely visible when viewed from above; posterior face of propodeum shiny, shallowly areolate; side of pronotum longitudinally striate; side of mesopleuron longitudinally striate; propodeal spines relatively long, slightly divergent (viewed from above); wing scars or buds were present; however all specimens were without wings.

Petiole and postpetiole areolate, sides shallowly punctate with many long erect hairs; petiole subquadrate (viewed from above), longer than wide; anterior subpetiolar process very small; postpetiole globular (viewed from above), wider than long; gaster shiny gaster with many long erect hairs.
Queen usually concolorous golden yellow to dark brown, but may be bicolored with light head and mesosoma and dark gaster.

**Queen measurements (mm):** HL 0.73-0.94, HW 0.74-0.95, SL 0.58-0.64, EL 0.25-0.32, ED 0.18-0.25, CL 0.26-0.30, CW 0.26-0.32, WL 1.46-2.10, PSL 0.18-0.20, PL 0.34-0.48, PW 0.32-0.42, PPL 0.17-0.36, PPW 0.37-0.46; Indices: CI 99-99, SI 79-68, CLI 94-100, PI 106-114, PPI 46-277.

**Plate 88. Crematogaster sumichrasti** queen (syntype C. atitlanica Tsanjuyo, Guatemala MCZC): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus shiny, slightly wider than long, anterior margin straight with 4 very long erect flexuous hairs; ocelli slightly protruding from head; scape and pedicel with medium erect flexuous hairs, head shiny with few long erect hair.

Mesosoma very shiny, with few long and short erect hairs, propodeum lacking hair;
pronotum not visible from above; scutellum small, narrow in middle knob-like; dorsellum broader than scutellum and position of metanotum can be seen dorsally; propodeum rounded with no propodeal spines; wing scars or buds were present, and all specimens were without wings.

Petiole, postpetiole and gaster shiny with many long erect hairs; petiole quadrate; postpetiole very small and round (seen from above), slightly wider than long.

Male usually concolorous pale yellow.

Male measurements (mm): HL 0.37-0.38, HW 0.41-0.48, SL 0.12-0.13, EL 0.19-0.20, ED 0.18-0.18, CL 0.12-0.17, CW 0.14-0.20, WL 0.82-1.07, PL 0.18-0.23, PW 0.18-0.18, PPL 0.12-0.14, PPW 0.20-0.24, Indices: CI 79-90, SI 32-34, CLI 60-121, PI 100-127, PPI 58-60.

Plate 89. *Crematogaster sumichrasti* male
(syntype C. atitlancia Tsanjuyo, Guatemala MCZC) specimen on the top point: A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Mexico to Argentina.
Map 33. Crematogaster sumichrasti

**Type series:** Type from Mexico collected by Sumichrast and Norton. *Crematogaster sumichrasti* Mayr (1 worker) maintained at NHMW; *C. atitlantica Wheeler* (1 queen and 3 males); workers of *Crematogaster sumichrasti* subsp. *maya* Wheeler (3 workers); *Crematogaster sumichrasti* st. *surdior* Forel (1 worker).

**Material examined:**

**ARGENTINA:** Cordoba (3 wk MCZC), Quebrada de Huahuaca (3 wk) (MCZC).

**COLOMBIA:** *Meta,* (12 wk CWEM), San Martin (5 wk CWEM); *Amazonas,* Cerro La Pedrera (3 wk CWEM). **COSTA RICA:** (6 workers MCZC), Biolley (3 wk NHMW); *Alajuela,* San Ramón (1 wk CWEM); *San Francisco,* (5 wk, 1qn MCZC); *Osa Peninsula,* Corcovado (2 wk MCZC); *Guanacaste,* Provincia Rincón de la Vieja, Las Pailas (1wk CWEM). San Ramon de Alajuela (1 wk CWEM). **FRENCH GUIANA:** Sinneinery (61 wk, 4 qn CWEM); (39 wk, 4 qn CWEM). **GUATEMALA:** Tsanjuyo (1 qn, 3 ml MCZC). **MEXICO:** (6 wk NHMW);
Nayarit, Rosamorada (16 wk, 8 qn, 2 ml CWEM), 19.3k S Rosamorada (2 wk, 1 queen, 1 male CWEM); Chiapas, Palenque (6 wk CWEM); Veracruz, Mirador (16 wk MCZC), Orizaba (12 wk, 4 qn, 1 ml CWEM), 2K NE Orizaba (3 wk, 2 qn, 1 ml CWEM). NICARAGUA: Granada, Mombacho Volcano Finca Progreso (700m 11°50’21.1’N 85°59’36.2’W) (6 wk CWEM). VENEZULA: Bolivar, Canaima Orchid Island (16 wk CWEM).

**Etymology:** C. sumichrasti is named for Frances Sumichrast one of the original collectors.

**Discussion:** Crematogaster sumichrasti closely resembles C. minutissima. A distinguishing character between these two species is the shape of the spines; C. sumichrasti has small pointy spines and C. minutissima has short reduced blunt spines. Crematogaster sumichrasti is more continuously polymorphic in size and the workers have 1-3 long erect hairs on the middle and hind tibiae; the C. minutissima worker is monomorphic within nest series and insignificantly varies between nests. A key characteristic of these two species is abundant very long flexuous erect hairs on most of its body. Crematogaster sumichrasti has very well developed humeri. The dorsal surface is longitudinally concave between longitudinal carinae on both sides of the mesosoma that ends at the metanotal suture in a small spine. The queen is not continuous polymorphic; it is either large or small. An interesting character is that the small queen has a wider clypeus than the large queen, but the length is proportionally shorter in the smaller queen. The male has a uniquely developed scutellum that looks like a knob. The mesonotum can be seen dorsally due to the narrow scutellum.

**Biology:** Crematogaster sumichrasti will inhabit many different landscapes, but preferring wetter environments. The CWEM has specimens from Costa Rica, French Guiana, Mexico, and Venezuela. Longino (2003a) mentions that this species can be found in residential, urban or other disturbed areas. Longino describes nesting habits as “nesting in any kind of cavity of plants dead
or alive.” The collection of nest series shows that nests can be polygynous and very large with workers numbering in the hundreds.

_Crematogaster torosa_ Mayr

Plates 90, 91 and 92; Map 34.

*Crematogaster torosa* Mayr 1870a: 402-405: worker described; Santa Fe de Bogotá, Colombia.


**Descriptions:**
**Worker**: mandibles shiny with appressed hair; clypeus slightly longer than wide, shiny, shallowly striate-areolate with fine appressed hairs, anterior margin slightly convex; scape failing to reach posterior border of head, with many decumbent hairs; head striate between antennal insertions and eyes and areolate above eyes, evenly covered with appressed hair, frontal groove apparent.

Mesosoma striate with faint areolate and few erect hairs and many appressed hairs, side of mesonotum striate with punctures; medial pronotal carina apparent; humeri developed; promesonotal suture apparent; notopropodeal groove steep and angular; propodeal spines reduced, short and thick, tapering abruptly forming point, almost parallel from base to points.

Petiole areolate with erect hairs on each posterior corner, almost square viewed from above, with posterior corners coming to points almost like spine, anterior subpetiolar process absent to very small nub; postpetiole without hemilobes, in the shape of a heart areolate with 2 erect hairs; gaster shallow areolate sparsely covered with erect and appressed hairs in latitudinal rows.

This species is usually concolorous reddish-brown to dark brown to black.

**Worker measurements (mm)**: HL 0.65-0.70, HW 0.67-0.70, SL 0.48-0.54, EL 0.14-0.16, ED 0.11-0.13, CL 0.18-0.25, CW 0.19-0.31, WL 0.66-0.94, PSL 0.06-0.10, PL 0.23-0.24, PW 0.20-0.30, PPL 0.18-0.22, PPW 0.20-0.30, Indices: CI 97-100, SI 74-77, CLI 81-95, PI 80-115, PPI 73-90.
Plate 90. *Crematogaster torosa* worker (syntype C. arizonsis Arizona, United States MCZC): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Queen:** Mandibles shiny, shallowly longitudinally striate, few fine appressed hairs; clypeus wider than long, shiny, shallow longitudinally striate-areolate, with few fine appressed hairs, anterior margin slightly convex; scape not reaching posterior border of head, with appressed hairs; ocelli almost flush with top of head; head longer than wide, shallow lineolate with few long erect hairs around frontal lobes and ocelli and appressed hairs pointed toward middle.

Mesosoma shiny; propodeum areolate with few short erect and appressed hairs; dorsellum clearly visible when viewed from above; propodeal spines developed for a queen.

Petiole and postpetiole areolate dorsally and punctuate from the side with few long hairs on posterior border; gaster areolate; with evenly spaced short erect hairs.

Concolorous reddish-brown.

**Queen measurements** (mm): HL 1.20, HW 1.08, SL 0.77, EL 0.36, ED 0.36, CL 0.31, CW 0.41, WL 2.64, PSL 0.05, PL 0.46, PW 0.31, PPL 0.34, PPW 0.43, Indices: CI 111, SI 64, CLI 76, PI 148, PPI 79.
Plate 91. *Crematogaster torosa* queen
(Sao Paula, Brazil CWEM # 12334): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Clypeus shiny, anterior margin convex; scape typically short with few short erect hairs; ocelli protruding from head; eyes very large compared to size of head; head shiny, with erect hair pointed toward middle.

Mesosoma shiny with very short erect hairs; dorsellum completely hidden by scutellum when viewed from above.

Petiole, postpetiole and gaster areolate with semi-erect hairs.

Color ranges from reddish-brown to dark brown.

**Male measurements (mm):** HL 0.38-0.49, HW 0.43-0.60, SL 0.06-0.10, EL 0.18-0.28, ED 0.13-0.22, CL 0.08-0.14, CW 0.18-0.22, WL 0.94-1.19, PL 0.13-0.18, PW 0.11-0.18, PPL 0.14-0.20, PPW 0.10-0.18, Indices: CI 80-82, SI 16-20, CLI 44-64, PI 100-118, PPI 111-140.
Plate 92. *Crematogaster torosa* male
(Sao Paula, Brazil CWEM # 12334): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Southwestern United States to Brazil.
**Type Material Examined:** Cotyope worker of *Crematogaster arizoinsis* Wheeler, *C. brevispinosa* subsp. *townsendi* Wheeler.

**Material examined:**

**BRAZIL:** Sao Paulo, Corumbatal (18 wk CWEM). **COLOMBIA:** Cundinamarca, Fusagasugá (1 wk, 1 ml CWEM), 20k N. Honda (2 wk CWEM); **Hulia,** Colombia (9 wk, 9 ml CWEM) (1 wk, 1 ml, LACM), Hobo (2 wk CWEM), Neiva (8 wk CWEM), Villavieja (4 wk CWEM), Magdalena Santa Marta (2 wk CWEM); **Meta,** Acacias (2 wk CWEM), Cumarucl Valle Cali (2 wk CWEM). **COSTA RICA:** **Guanacaste,** Palo Verde (1 wk MCZC), (1 wk MCZC), San Jose (7 wk MCZC), Zapotal (1 wk MCZC); **Osa Penninsula,** (1 wk CWEM). **GUATEMALA:** **Solola,** San Lucas Tolimán, Lake Atitlan (14°38’28.0’’N, 91°08’06.7’’W) (1 wk CWEM); **Suchitepéquez,** Cocales, San Antonio (242m 14°23’31.4’’N, 91°1108’36.5’’W) (3 wk CWEM); **Zacapa,** Teculután 183m (14°59’43.5’’N, 89°42’10.7’’W) (4 wk CWEM). **MEXICO:** **Chihuahua,** Morelos, Xochitepec (3 wk, 1 ml CWEM); **Michoacán,** Coyotes (18° 60’56”N 102° 16’58”W) (3 wk CWEM); **Nayarit,** 54k S. Rosamorada (21°39’0.58”N, 105°01’22”W) (20 wk CWEM); **Nuevo León,** Monterrey Chipinque Park (4 wk CWEM); **Quintana Roo,** Leona Vicario Reserve Ecological “El Eden” (21°13’N, 87°11’W) (1 wk CWEM) (4 wk CWEM); **Sinaloa,** Guasave Park by Rio (25°34’0.37”N, 108°27’18”W) (4 wk CWEM); **Tamaulipas,** Gómez Farías (4 wk CWEM), Ciudad Madero (5 wk CWEM), Ciudad Victoria (2 wk CWEM), 28 K S Ciudad Victoria (16 wk CWEM); **Veracruz,** 1k S Acayucan (79 wk, 11 qn, 13 ml CWEM), Tontoyuca (11 wk CWEM); **Yucatán,** Merida Sisal (1 wk CWEM). **NICARAGUA:** **Granada,** Rio San Juan, Bartola (1 wk CWEM), San Jorge (6 wk CWEM), 4.3mi SW San Jorge, Canopy (88m 11°24’36.6”N, 85°50’28.9”W) (32 wk CWEM). **UNITED STATES:** **Arizona,** Cochise County (15 wk CWEM), Guadalupe Canyon (2 wk LACM) (29 wk CWEM), Maricopa County (3 wk MCZC), Pima county (3 wk CWEM), Sabino Canyon, South Catalina Mountains
(3 wk MCZC); **New Mexico**, Hidalgo County Guadalupe Canyon (9 wk CWEM); **Texas**, Cameron County 6.5 mi N Jct. FM 2925 & 106 (22 wk COOK). **VENSZUELA**: Bolivar Canal Orchid Island (2 wk CWEM).

**Etymology**: *torosa*; from Latin *torosus* meaning muscle or full of muscle.

**Discussion**: *Crematogaster torosa* is in the subgenus *Orthocrema* and can be confused with *C. rochai* and *C. crinosa*. *Crematogaster torosa* can be distinguished from *C. rochai* and *C. crinosa* by the absence of a highly developed anterior subpetiolar process. If the process is present, it is little more than a nub. Another distinguishing characteristic is the pilosity of the gaster. *Crematogaster torosa* has a wide margin of short erect hairs on the gaster, while the gaster of *C. rochai* is almost void of erect hair and *C. crinosa* is evenly covered with short erect hair. This species is a small polymorphic ant that is mostly reddish-brown to dark brown.

**Biology**: *Crematogaster torosa* can be found throughout the Chihuahuan Desert, south to Brazil, north into Arizona and New Mexico, United States. It is often been found in dead tree limbs and in rotten logs. Preferring more arid climates *C. torosa* has been found foraging on desert shrub such as Palo Verde, mesquite and *Opuntiae* sp. and can often be found nesting in oat trees.
Crematogaster vermiculata Emery

Plates 93, 94 and 95; Map 35.


Crematogaster colei Buren, 1968: 108: worker, queen described, 18 paratype workers (examined) Wooten, Sacramento Mountains, New Mexico, United States [LACM]. NEW SYNONOMY.

Crematogaster opuntiae Buren, 1968: 120: worker described, 12 paratype workers (examined) Santa Rita Experimental Range Arizona United States [LACM]. NEW SYNONOMY.

Crematogaster rossi Buren, 1968: 111-112: worker, queen described, San Jose del Cabo, Baja California, Mexico [LACM] (examined). NEW SYNONOMY.

Descriptions:

Worker: Mandibles longitudinally striate; clypeus shallowly striate-areolate, slightly wider than long, with 2-3 long flexuous hairs, anterior margin slightly convex with 8 long flexuous hairs; scape length variable from failing to reach to slightly surpassing posterior border of head with semi-erect hairs; head very shiny, shallowly striate-areolate between antennal insertions and eyes, areolate above eyes and evenly covered with appressed hairs pointed toward middle of face.
Mesosoma coarsely vermiculate, propodeum areolate viewed from above; side of mesonotum lineolate-punctate; pronotal shoulders each with 2-3 long erect hairs, rest of mesosoma with appressed hairs pointed toward metanotal carina; mesopleuron latitudinally lineolate; pronotal humeri small; medial mesonotal carina small, notopropodeal groove angular with 2 erect hairs; propodeal spines long, slender, tapering abruptly forming point, slightly diverging from base to points; propodeal spiracle protruding slightly from base of spine.

Petiole trapezoidal, anterior corners flaring slightly upward viewed from above; postpetiole with deep medial sulcus and well developed hemilobes, much wider than long; petiole and postpetiole shallowly punctate; petiole with 1 erect hair on each posterior corner, several long decumbent hairs on sides; postpetiole with 4-6 erect hairs; gaster shallowly areolate with few erect and many appressed hairs.

Concolorous brown to dark brown.

Plate 93. *Crematogaster vermiculata* worker (green dot Los Angeles, California, United States MNHG) A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.
Worker measurements (mm): HL 0.70-0.90, HW 0.70-0.90, SL 0.60-0.72 EL 0.14-0.18, ED 0.12-0.17, CL 0.18-0.22, CW 0.20-0.30, WL 0.76-0.90, PSL 0.13-0.18, PL 0.18-0.30, PW 0.25-0.35, PPL 0.14-0.22, PPW 0.25-0.30, Indices: CI 100, SI 80-86, CLI 73-90, PI 72-86, PPI 56-73.

Queen: Mandibles longitudinally striate with decumbent hair; clypeus triangular, shiny, longitudinally striate, with 2 flexuous hairs and many decumbent hairs pointed medially, anterior margin straight with 6-8 long hairs; ocelli slightly raised; scape short with appressed hairs, last 3-4 segments of funiculus swollen to form club; head shiny longitudinally striate curving around antennal insertion and eyes, with 2-4 long flexuous hairs between ocelli and 2-4 on each frontal lobe, remainder of head with appressed or decumbent hairs.

Mesonotum very different from worker, dorsum shiny areolate with few short erect and many fine appressed hairs; propodeum shiny longitudinally striate coming to point on spines, with short fine erect hairs pointed posterior; scutellum over-hangs dorsellum viewed from above and the side, several short erect hairs on that suture between scutellum and dorsellum.

Petiole and postpetiole areolate with many appressed and 1 erect hair on each posterior corner viewed from above, longitudinally striate viewed from the side, postpetiole without medial sulcus; gaster shiny, shallowly areolate with many appressed and few scattered erect hairs.

Concolorous light to dark brown.

Queen measurements (mm): HL 1.39, HW 1.58, SL 1.56, EL 0.53, ED 0.43, CL 0.50, CW 0.43, WL 3.46, PSL 0.34, PL 0.50, PW 0.77, PPL 0.48, PPW 0.65; Indices: CI 88, SI 112, CLI 116, PI 65, PPI 74.
Plate 94. Crematogaster vermiculata queen
(Silver City, Grant County, New Mexico, United States CWEM # 8325): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Male:** Mandibles shiny with decumbent hair; clypeus shiny, with few long erect hairs, anterior margin, slightly concave with 4-6 long flexuous hairs; scape long in proportion to head for males of this genus with appressed hairs and 3 segmented club; ocelli almost flush with top of head, eyes small for males; head shiny areolate and few long fine hairs sparsely scattered.

Mesosoma shiny shallowly striate that follows curvature of mesosoma (viewed from above), with few long and short erect hairs mostly on lateral margins; faintly striate-areolate with few erect hairs (viewed from the side); scutellum rounded posteriorly, very shiny; dorsellum barely visible from above; propodeum deeply punctate, propodeal spines tiny, presence unusual for males of this genus.

Petiole and postpetiole punctate, with few short erect hairs; gaster shiny areolate with few short erect hairs evenly dispersed over dorsum of gaster pointed posterior.
Concolorous dark brown.

**Male measurements (mm):** HL 0.49, HW 0.58, SL 0.16, EL 0.20, ED 0.18, CL 0.11, CW 0.18, WL 1.26, PL 0.23, PW 0.22, PPL 0.12, PPW 0.26; Indices: CI 84, SI 39, CLI 61, PI 105, PPI 46.

Plate 95. *Crematogaster vermiculata* male
(Silver City, Grant County, New Mexico, United States CWEM # 8325): A. Head; B. Dorsal view of mesosoma, petiole and postpetiole; C. Side view of mesosoma, petiole and postpetiole.

**Distribution:** Western United States to central Mexico.
Type locality: Los Angeles, California, United States. Type locality of *C. rossi*: San Jose Del Cabo, Baja California, Mexico.

Type series: 2 syntype workers *C. vermiculata*, California, United States MNHG; *C. colei* 1 worker paratype Tepic, Mexico, LACM, 1 paratype worker, 1 paratype queen San Jose, Baja California, LACM, 6 paratype workers LACM; *C. opuntia* 3 paratype workers Ajo Mountains, Arizona LACM, Santa Rita Experimental Range, Arizona LACM, 3 paratype workers Benson, Arizona LACM; *C. rossi paratype workers* San Jose del Cabo, Baja California, Mexico, LACM.

Material examined:

MEXICO: **Baja California**, Sonora, (1 wk LACM); **Chihuahua**, Buenaventura, Las Vantas (7 wk CWEM), Guerrero, Terrera (10 wk CWEM), Janos, Ojo Frio (52 wk CWEM), Madera (109 wk LACM).
Sonora. Libertad (3 wk MCZC), Magdalena (3 wk LACM); Puerto Penasco (5 wk CWEM), Santo Tomas (3 wk LACM). UNITED STATES: Arizona, Cochise County, Chiricahua Mountains (15 wk, 1 qn, 1 ml MCZC), Chiricahua National Monument (6 wk LACM), Herb Martyr (46 wk CWEM), Paradise (10 wk CWEM), Portal (26 wk, 1 qn CWEM) (2 wk MCZC), 3 mi N Portal (3 wk CWEM), Rucker (2 wk CWEM); Sunny Flat (5 wk CWEM), Gila County, Roosevelt Lake Grapevine Site 0.1mi N Jct. Rt. 88 on FSR 84 (33°37.24’N, 111°03.08’W elevation 2350’) (18 wk MCZC), Tucson (11 wk MCZC), Oracle (3 wk MCZC), Oracle Junction (3 wk MCZC), Benson (4 wk MCZC); California, San Bernardino County, New York Mountains, Drum Peak (3 wk MCZC), Los Angeles (2 wk MNHG syntype), Pasadena (4 wk MCZC), Los Angeles County, San Gabriel Mountains (4 wk LACM), Juniper Hills (3 wk LACM), Riverside County, San Jacinto Mountains, Turkey Creek Camp (3 wk LACM), San Diego County, Torrey Pines State Reserve (3 wk MCZC), Santa Barbara County, Figueroa Station, Los Padres (3 wk MCZC); Florida, Leon County Tall timbers Research Station, Anders Branch (3 wk LACM); Idaho, Twin Falls County, Twin Falls (3 wk MCZC); Louisiana, Lafourche Parish, Bayou Boeuf (3 wk, LACM); Mississippi, Bolivar County, Skene (4 wk, 1 qn, 1 ml LACM); Nevada, Esmeralda County, Fish Lake Valley (3 wk LACM), Goldfield (6 wk LACM), Lincoln County, Oak Spring Summit (4 wk LACM), Lovelock (4 wk LACM), Lyon County, Churchill Butte (3 wk MCZC), Nye County, Shoshone Mountains, Ione (6 wk LACM), Washoe County, Wadsworth (3 wk LACM); New Mexico, Bernalillo County, Bosque Forest (1 wk CWEM), Catron County, Luna (9 wk LACM), Colfax County, Eagle Nest, (13 wk CWEM), Doña Ana County, Las Cruces, (3 wk CWEM), Aguirre Springs Relational Area, Organ Mountains campground (10 wk, 6 qn, 6 ml CWEM), NNE Hallelujah Jct. (39°54’N 120°00’W 1400m) (3 wk MCZC), Grant County 77k E Silver City (1 wk, 1qn, 1 ml CWEM), Hidalgo
County, Jct. Rt. 9 on Rt. 80 (31°55.20’N 109°02.16W elevation 4500’) (8 wk MCZC), Clayton Draw (2 wk CWEM), Coronado National Forest (25 wk CWEM), Peloncillo Mountains at Granite Gap (3 wk LACM), Los Alamos County, Rio Grande (12 wk CWEM), Luna County, Deming (3 wk CWEM), Otero County Wooten, Sacramento Mountains (2 wk, 1 ml LACM), Rio Arriba County, Dixon (9 wk CWEM), Santa Fe County, Santa Fe (10 wk CWEM), Socorro County (3 wk CWEM), 2185 m elevation (2 workers, 1 male CWEM); **Texas**, Wood County, Hawkins; (5 wk CWEM).

**Etymology:** *vermiculata* from Latin *vermiculātus* meaning inlaid with wavy lines.

**Discussion:** *Crematogaster vermiculata* Emery is as its name implies very vermiculate on the dorsal surface of the mesosoma. Creighton, (1950) made *C. vermiculata* a subspecies of *C. coarctata* Mayr, but indicated that more research was needed to confirm that change in taxonomic status. Buren, (1968) raised *C. vermiculata* to species in his key of North American *Crematogaster*. I concur that *C. vermiculata* is a valid species. Creighton’s placement of *C. vermiculata* as a subspecies of *C. coarctata* is understandable because they are very much alike. They can be distinguished by a couple of characters. The head of *C. vermiculata* is very shiny with faint areolate between the eyes above the clypeus all the way back and around the posterior border of head while *C. coarctata* is striate-punctate all over the face to the back of the posterior border of head. The pronotal sculpturing is somewhat variable, blending with punctures on both species making the pronotal sculpturing not a great character to use for distinguishing these two species.

I am here designating *C. vermiculata* as senior synonym of *C. colei* Buren, *C. opuntiae*
Buren, and *C. rossi* Buren. Some of the *C. colei* and *C. opuntiae* paratypes and syntypes of *C. californica* are less sculptured but still have the shiny head and the pronotum drops straightly on the sides like in *C. vermiculata*. Other paratype specimens of *C. opuntiae* are identical to the type material I have examined of *C. vermiculata* having the intense vermiculate with punctures and the pronotum that drops flatly along the sides, and the very shiny head. Buren compares *C. colei* to *C. californica* in having the same characters; however, *C. californica* is less vermiculae and more punctate on the pronotal shoulder and has a punctate head. Buren’s description of *C. opuntiae* describes the humeri as “not strongly developed, but nearly always distinct,” giving *C. opuntiae* the same general build as *C. vermiculata*. *Crematogaster rossi* Buren is also identical to *C. vermiculata*, and I believe if there had not been some confusion as to the type locality of *C. vermiculata*, *C. rossi* would not have been described.

**Biology:** *Crematogaster vermiculata* is found along the Pacific coast of California, United States, down through Baja California, Mexico, and east to Northern New Mexico and down into Texas. This species prefers to nest in wood and leaf litter, under rocks and in dead tree limbs. It has been collected foraging on the desert floor, on *Opuntia* sp. and on a variety of desert substrates such as halophytic soil, clay and sandy beaches.

**Conclusion**

Much of the taxonomic confusion in North American *Crematogaster* species has been clarified through this work. In this region 51 taxa had been described, through taxonomic
revisions here several species and subspecies have been synonomized, and one subspecies has been raised to species. From the availability of type materials I have been able to compare type specimens of species and have determined that my hypothesis has been supported. For those lacking type material or when type material was unavailable, material identified by either Buren or Longino was used that also supported my hypothesis. As mentioned above, there were 51 recognized taxa at the onset of this research. I have reduced this to 38 species and one unresolved subspecies (see below). The ranges of almost all species have been extended through the integration of information found in species descriptions, associated with specimens and in the literature. Finally a working key to the species of North America was developed with support from Santschi’s (1918) description of the major subgenera.

I have found disjointed distributions of some species. One species, *Crematogaster laeviuscula*, occurs in riparian areas surrounded by arid environments. It has been mostly collected north of Mexico; however, one colleague, Israel Del Toro, collected this species in Tamaulipas, Mexico. I do not believe this collection is an outlier, just collecting bias between the southern border of the United States and central and southern Mexico. Another species, *C. sotobosque*, is found in tropical Costa Rica; however, 2 individual workers were found loose on the ground on top of Mt. Lemmon in Arizona, United States. Several species have a poorly known distribution such as *C. patei* and *C. formosa* both found in central Mexico. I do not know if these species are rare or if this is also collecting bias. Some species are widely collected, such as *C. cerasi* and *C. depilis* because they have a wide distribution in cities, rural and unpopulated habitats. Other species such as *C. pinocola* are more specialized or prefer undisturbed habitats.

There are some species/subspecies that do not have enough cabinet material or field observations to make concrete taxonomic determinations. *Crematogaster coarctata* and *C. mutans* are one such case where the workers are identical but the queens of one species is
slightly different than the other, and male specimens are not available for *C. coarctata*. I do not know if this is just variation of the queens within a species or the basis of two species. The same problem occurs with *C. minutissima* and *C. minutissima* subsp. *smithi*. The workers of these two taxa very closely resemble each other and variation may just be typical of the genus *Crematogaster*. However, there is little to no variation within nest series and not enough reproductive material to make a definitive distinction between the two taxa. Therefore, I choose to leave these four taxa as they are until more research can be conducted.

Some specimens of type material were mounted poorly and many identifying structures were obscured by glue or missing. This is particularly true of older specimens. Therefore, some of my descriptions, illustrations and measurements were completed using cabinet material. When available I have examined many specimens from different nest series so that I could best understand and describe the species.

A very important aspect of a taxonomic review is the knowledge of nesting habits and obligate resources. This has been a deficiency in this work because not much has been written on this genus as a whole. Some species as mentioned before are well known; however, more reclusive species need to be observed in the field. Most collections are associated with a city or along a highway, but species that prefer less disturbed ecosystems are usually collected as foragers and not with a nest series. Future work would include more field expeditions that allow scientists to spend more time in unpopulated areas.

Despite these obstacles, much progress has been made in resolving the taxonomy of North American *Crematogaster*. However, it would be naïve to conclude that the species richness of the genus *Crematogaster* in North America has been fully described and taxonomic relationships fully resolved.


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**Curriculum Vita**

Cynthia E. Morgan was born in Washington D. C. and grew up in Northern Virginia. She graduated from McLean High School in Virginia and started her college career at the University of Arizona. She then took a sabbatical to raise four children and returned to UTEP to finish her Baccalaureate. Cynthia graduated *cum laude* from UTEP with a Bachelor’s in Science as a biology major and a minor in mathematics, May of 2001.
Cynthia was accepted into the Graduate program for the fall of 2001 and in the spring of 2002 she changed her major to the Pathobiological Doctoral Program in the Department of Biological Sciences. While earning her degree, Cynthia attended the Ant Course of 2002, studied at Harvard on the Ernst Mayr Myrmecological Grant, presented posters at SACNAS and lectured at SWAN. She was also an Assistant Instructor for several different Biology Laboratory courses, assisted in restructuring a general biology laboratory course, rewriting the curriculum for the lecture and companion laboratory courses in General Biology for Non-Majors.

After graduation, Cynthia plans to relocate closer to her parents, children and grandchildren. She most enjoys teaching biology to college freshmen and outdoor skills to Boy Scouts and Environmental Science students. This dissertation was typed by Cynthia E. Morgan.