Discussion. The oldest name for this ant, *placodops*, is based on a single worker major from an unknown Mexican locality. Although Wheeler (1908) clearly intended his name *orbiceps* to apply to this form, that name, due to an unfortunate type series selection, must become a synonym of *mendax*.

Large workers with the characteristic orbiculate head are easily separated from those of the related species *melliger* and *mendax*. Workers of all sizes are further separated from those of *melliger* by the much shorter pilosity. Large workers differ from those of short-haired *mendax* populations by the shorter hairs on the pronotum and second tergum, which are less than 0.5 × MOD. In sympatric or adjacent populations of *mendax* these hairs are 0.75, or more, × MOD. This usually applies to media and minor workers as well.

The wholly allopatric populations of *mendax* are much more similar to *placodops* but seem never to produce large workers with orbiculate heads. The erect hairs on the dorsum of the pronotum and on the second tergum, although short, are still longer than in *placodops*. The punctures of the frontal lobes are usually more regularly distributed and are sharper in *mendax* than in *placodops*. The latter species is somewhat variable and no great reliance may be placed in this character. Minor workers of these allopatric populations are essentially indistinguishable. There are no reliable features by which the sexual forms may be separated, based on the presently available, limited material.

Myrmecocystus (Endiodioctes) semirufus Emery

Figures 61–69, 157, 169, 181, 189

Myrmecocystus melliger var. *semirufa* Emery 1893. Zool. Jahrb. Syst. 7:667. ♀.

Myrmecocystus melliger subsp. *semirufus*, Wheeler 1908. Bull. Amer. Mus. Nat. Hist. 24:355 *(in part);* Mallis 1941. Bull. So. Calif. Acad. Sci. 40:80 *(in part).*

Myrmecocystus semirufa, Creighton 1950. Bull. Mus. Comp. Zool. 104:449–450 *(in part).*

Myrmecocystus semirufus, Cook 1953. The ants of Calif.:345 *(in part);* Snelling 1969. Contr. Sci., L.A. Co. Mus. 170:5–6, 8.

Myrmecocystus placodops, Wheeler and Wheeler 1973. The ants of Deep Canyon:125–126 *(misident.).*

Diagnosis. Worker: Malar area with more than 10 erect hairs visible in frontal view; thorax abundantly hairy, erect hairs of promesonotum uniform in length, none more than 0.5 × MOD; head, thorax and appendages clear ferruginous. *Female:* Malar area, in frontal view with 10+ erect hairs; thorax exceptionally robust, PW 0.71 × WL; parapsis sparsely, coarsely punctate; median area of first two terga sparsely punctate in contrast to remainder of disc; penultimate segment of maxillary palp broader basally than apically. *Male:* Scutum and scutellum uniformly densely tessellate; first three terga uniformly densely pubescent and micropunctate; longest occipital hairs stiff, less than 0.50 × MOD.

WORKER: *Measurements.* HL 1.13–1.73 (1.20); HW 1.00–1.72 (1.12); SL 1.40–2.00 (1.53); WL 1.9–2.9 (2.1); PW 0.7–1.3 (0.85).

Head: Usually distinctly longer than broad, rarely slightly broader than long, CI 86–103 (93), distinctly shorter than scape, SI 110–131 (128); in frontal view, sides straight and only slightly convergent toward mandibular insertions to gently convex in large workers. Occiput, in frontal view, flat or very slightly convex, abruptly rounded onto sides. Eye small, 0.90–0.96 (0.90) × first flagellomere; OMD 1.60–2.10 (1.88) × EL. Mandible with seven teeth.

Thorax: Slender to moderately robust, PW 0.37–0.46 (0.40) × WL. Propodeum, in profile, evenly curved from base to apex, without well defined basal and posterior faces.

Petiole: Thick in profile, not at all cuneate, summit broadly and evenly rounded; crest, from front, flat or slightly concave, without median notch; from above about 1.5 wider than long.

Vestiture: Pubescence moderately dense on vertex and occiput, sparse elsewhere on head; general on thorax, moderately dense, nowhere obscuring surface; dense on first three terga; fourth tergum sparsely pubescent in small workers, moderately pubescent in larger workers.

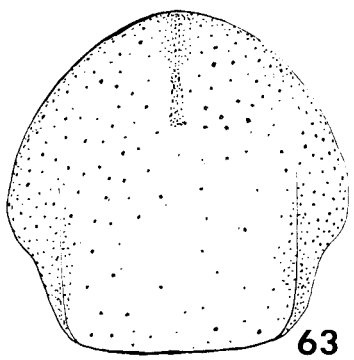
Malar area with more than 10 short, fully erect hairs; occiput with numerous short, straight, stiff, fully erect hairs, longest 0.59–0.64 × MOD; short, stiff erect hairs general elsewhere on head. Promesonotum with numerous uniformly short, stiff erect hairs, longest 0.5 or less × MOD; propodeum with numerous similar hairs on all except posteriorly sloping face. Petiole with numerous short, erect hairs across summit and along sides. First four terga with abundant short, fine hairs, mostly arising from poriform punctures, longest on disc of second about 0.1 mm. Scape, all femoral and tibial surfaces with abundant short, stiff, suberect to erect hairs.

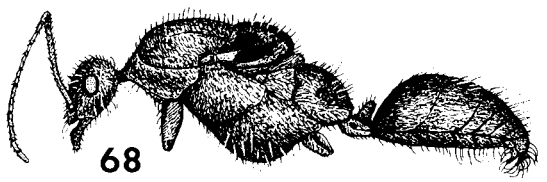
Integument: Head moderately shiny, lightly shagreened; vertex and occiput closely micropunctate and with sparse coarser punctures; frontal lobes with coarse, close punctures; front of head with scattered coarse punctures, sparser on malar area. Thorax dull, densely shagreened and micropunctate. First three terga closely micropunctate and with scattered coarse punctures; fourth tergum similar to third in large workers, shinier, finely shagreened and with scattered coarse punctures in small workers.

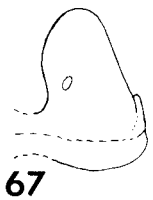
Color: Head, thorax and appendages clear ferruginous, gaster medium to dark brownish; legs sometimes slightly brownish.

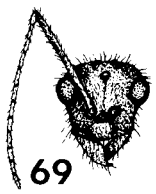
FEMALE. *Measurements.* HL 1.90; HW 2.00; SL 1.97; WL 4.1; PW 2.9.

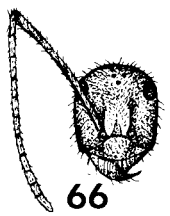
Head: A little broader than long, CI 105, sides straight, slightly convergent below; slightly shorter than scape, SI 103. Occiput, in frontal view, gently

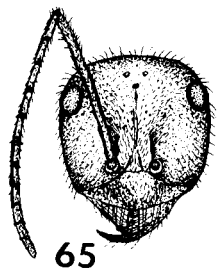


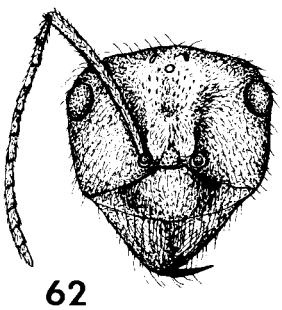


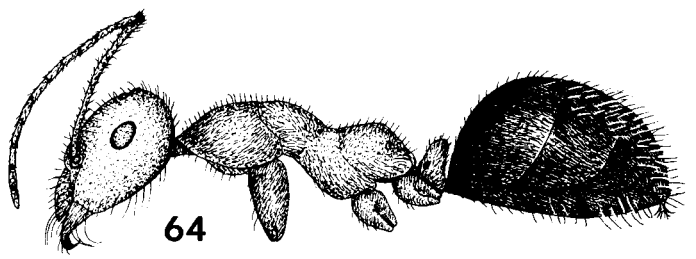


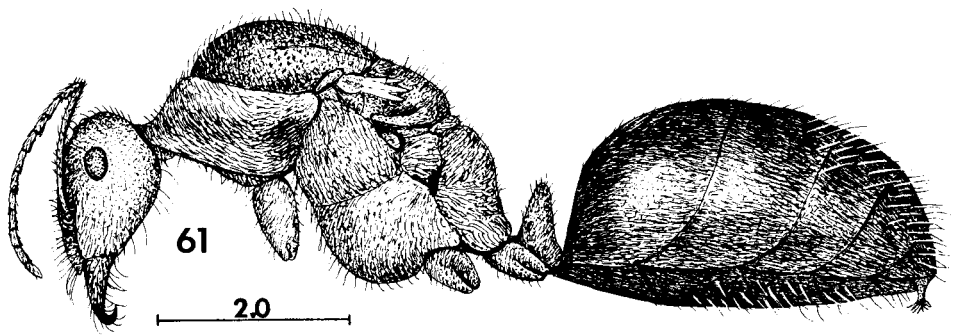












FIGURES 61–69. *M. semirufus*. 61, female, lateral view; 62, head of female, frontal view; 63, mesoscutum of female, distribution of punctures; 64, major worker, lateral view; 65, head of major worker, frontal view; 66, head of minor worker, frontal view; 67, petiole of major worker, lateral view; 68, male, lateral view; 69, head of male, frontal view.

convex, broadly rounded onto lateral head margins. Eye small, 1.08 × first flagellomere; OMD 1.50 × EL. OOD 4.7 × OD; IOD 3.8 × OD. Penultimate segment of maxillary palp broadest a little beyond base, gradually tapering to apex which is a little narrower than base. Mandible apparently octodentate (a small denticle present between basal and first subbasal teeth on the right mandible of the one specimen studied, absent on the left mandible).

Thorax: Unusually robust, PW 0.71 × WL. Mesoscutum flattened behind, but scutum and scutellum not aligned to same plane. Basal face of propodeum narrow and broadly rounded onto posterior face.

Petiole: Cuneate, summit narrow, flat; crest, in front view, shallowly, angularly incised.

Vestiture: Cephalic pubescence sparse, densest on vertex and occiput and near mandibular base. Pubescence sparse on scutum and scutellum, conspicuous but not dense elsewhere on thorax, long on propodeum and pleura, Mediobasal portions of dorsum of first tergum and mediobasal area of second tergum sparsely pubescent, otherwise first four terga moderately pubescent, pubescence not obscuring surface, thinner along broad middle area of each segment.

Erect hairs general on face, about 16 erect and suberect hairs present on malar area; longest occipital hairs less than 0.65 × MOD. Erect hairs numerous on scutum, longest about 0.50 × MOD; some scutellar hairs much longer, nearly equal MOD; long pleural hairs sparse, longest about 0.65 × MOD; propodeum with numerous shorter hairs on sides and across basal face. Petiole with numerous short, erect hairs on sides and across crest. Erect discal hairs less numerous on segments beyond first tergum than on that segment, these hairs arising from coarse punctures and longest about twice minimum thickness of hind tibia. Scapes, femora and tibiae with abundant suberect to erect hairs; inner face of fore femur with hairs shorter, finer and sparser than elsewhere on that segment. Fore and hind wings with fringe hairs on apical and posterior margins.

Integument: Frons, on either side of middle, shiny, subpolished and impunctate, head otherwise slightly shiny and distinctly shagreened; vertex and occiput closely micropunctate and with sparse coarse punctures; frontal lobes coarsely, closely punctate; side of face with abundant, variably spaced (0.5–3.0 × puncture diameter) coarse punctures; malar area with sparse, coarse elongate punctures which become finer and denser below; clypeus sparsely, coarsely punctate. Mesoscutum shiny, lightly shagreened, almost polished posteromedially, with scattered coarse punctures; parapsis with sparse coarse punctures, separated by 1–3 puncture diameters, micropunctures absent. Scutellum shiny, lightly shagreened; finely punctate, punctures in middle separated by 1–2 puncture diameters, sparser laterad; with scattered coarse punctures. Pronotum, metapleura and propodeum slightly shiny, densely shagreened and micropunctate. Mesopleura slightly shinier, anepisternum anteriorly densely shagreened and with scattered coarse punctures, posteriorly more lightly shagreened and similarly punctate; katepisternum duller, closely micropunctate and with sparse coarse punctures. First tergum, at summit of declivity, with irregularly scattered coarse and micropuntures dle are separated by more than a puncture diameter and with sparse coarse punctures; middle of disc shiny, with irregularly scattered coarse and micropunctures which become denser caudad and laterad. Broad median area of disc of second tergum shiny, with sparse coarse and micropunctures which become denser caudad and laterad. Third and fourth terga uniformly closely micropunctate and with scattered coarse punctures.

Color: Head and antennae clear ferruginous; thorax light brownish ferruginous, extensive brown areas on scutum, scutellum and propodeum; legs light brownish ferruginous; gaster medium brown. Wings faintly yellowish, subcostal vein brown, remaining veins and stigma pale yellowish.

MALE. *Measurements.* HL 0.90–1.00; HW 0.83–0.97; SL 1.20–1.23; WL 2.3–2.6; PW 1.4–1.6.

Head: A little longer than wide, CI 93–97, distinctly shorter than scape, SI 123–133; in frontal view sides straight, distinctly convergent toward mandibular bases. Occiput, in frontal view, evenly convex, abruptly rounded onto lateral margins. OMD 0.90–1.00 × EL; OOD 2.0–2.4 × OD; IOD 2.8–3.0 × OD. Mandible without preapical notch or subbasal denticles.

Thorax: Robust, PW 0.57–0.62 × WL. Propodeum, in profile, broadly curved from base to apex, without defined basal face and posterior face.

Petiole: In profile, thick, cuneate, summit broadly rounded; crest, in frontal view, slightly concave in middle; from above, about twice wider than long.

Vestiture: Cephalic pubescence extremely dilute, conspicuous only on occiput. Thoracic pubescence extremely dilute over most surfaces, sparse even on pronotum and propodeum where it is most conspicuous. First three terga with sparse pubescence, fourth with only a few hairs.

Cephalic hairs general, stiff, about 8 on malar area, longest about 0.5 × MOD; longest occipital hairs less than 0.5 × MOD. Thoracic hairs stiff, abundant, longest about 0.5 × MOD, a little shorter across base of propodeum. Hairs of crest of petiole slightly longer, slender and acuminate. Hairs of first three terga short, less than 0.5 × MOD, more slender than those of mesoscutum. Scape, femora and tibiae with numerous suberect to erect hairs. Fore wing without fringe hairs; hind wing with a few hairs on posterior margin in basal half.

Integument: Head slightly shiny, densely shagreened and with sparse coarse punctures, occiput and malar area closely micropunctate. Scutum slightly shiny, densely shagreened, sometimes with traces of shinier area on midline; scutellum similar; pronotum and propodeum barely shiny, densely shagreened and closely micropunctate; pleura similar but without

micropunctures; entire thorax with scattered coarse punctures. Gaster slightly shiny, closely shagreened and micropunctate.

Color: Blackish brown, mandibles, antennae and legs light brown. Wings whitish, subcostal vein brownish, remaining veins nearly transparent apicad, becoming pale ferruginous basad.

Terminalia: Figures 169, 181, 189.

Type Material. Originally described from workers from Calif. (San Jacinto) and Colo. (Denver and Pueblo); Wheeler (1908) restricted the type locality to San Jacinto, Calif. At least one specimen from San Jacinto is in the Museo Civico, Genoa, Italy, but not available for study. Another worker, marked as cotype, is in the AMNH and here selected as Lectotype. Other San Jacinto specimens from the same series, but not originally seen by Emery, are in the USNM.

Distribution. Tulare and Inyo Counties, California south to northern Baja California. Desert mountain ranges (Fig. 360).

Localities. UNITED STATES. California: Tulare Co.: Porterville, 12 Sept. 1958 (R. P. Allen; CDA); Alta Meadow, Aug. 1917 (Cornell Univ. Exped.; CU). *Inyo Co.:* 7.6 mi S Big Pine, 4100′, 17 June 1969 (R. R. Snelling, No. 69–225; LACM); Independence, 3925′, 7 June 1939 (R. M. Bohart; LACM); 4 mi W Lone Pine, 18 Mar. 1968 (G. C. & J. Wheeler, No. Calif. 373; GCW). *Kern Co.:* Hwy. 58, 10 mi E Tehachapi, 3 Apr. 1970 (J. L. Johnson, CDA); Red Rock Cyn., 2800′, 22 Aug. 1954 (R. R. Snelling; LACM); 1 mi E Pyramid Hill, 13 June 1970 (R. J. Hamton; RJH); Last Chance Cyn., El Paso Mts., 15 Apr. 1964 (R. R. Snelling; LACM); 10 mi SE Mojave, 23 Mar. 1967 (R. J. Hamton; LACM, RJH). *Los Angeles Co.:* Palmdale, 20 Apr 1965 (R. H. Crandall; LACM); Little Rock, 2900′, 12 Apr. 1952 (W. S. Creighton; LACM); 23 mi NE Pearblossom, 3500′, 12 Sept. 1965 (R. R. Snelling; LACM); 2 mi S Pearblossom, 3500′, various dates (C. Henne, R. R. Snelling; LACM); Llano, 3300′, 11 Apr. 1952 (W. S. Creighton; LACM). *San Bernardino Co.:* Victorville, 28 May 1938 (C. M. Dammers; LACM); 5 mi E Boron, 4 Apr. 1967 (A. Mintzer; LACM); Morongo Valley, 8 Apr. 1952 (G. I. Stage; LACM). *Riverside Co.:* Jumbo Rocks, Joshua Tree Natl. Mon., 20 Mar. 1967 (R. J. Hamton; LACM, RJH); San Jacinto, 27 Nov. (T. Pergande Colln., No. 322; original series of *semirufa,* incl. 1 cotype; AMNH, USNM); Boyd Desert Res. Center, 4 mi S Palm Desert, 10 Apr. 1963 (G. Tamski; CIS); Deep Canyon, 800′–3600′, various dates (G. C. & J. Wheeler; GCW, LACM). *San Diego Co.:* Split Mtn., 500′, Anza-Borrego Desert State Park, 22 Apr. 1952 (W. S. Creighton; LACM). *MEXICO. Baja California:* 6 mi W Las Arrastras de Arriola, 8 June 1967 (E. L. Sleeper & E. M. Fisher; LACM); 10 mi S Cataviña, 29 July 1938 (E. S. Ross & A. E. Michelbacher; CAS).

Ecology. Habitats for this ant include California Oakwoods, Piñon-Juniper Woodland, Great Basin Sagebrush Shrub, Creosote bush-Bur sage Shrub and Creosote bush Shrub. Elevation ranges from 400 feet to about 5000 ft. The majority of the records are from the Piñon-Juniper Woodland to Creosote bush-Shrub ecotone. This is approximately equivalent, in the western Mojave Desert, to the Joshua Tree Woodland of Munz (1974).

Wheeler and Wheeler (1973) reported on this species (as *placodops*) in Deep Canyon. Within the Desert Biome in Deep Canyon, they found colonies distributed as follows: Larrea-Palo Verde Community, 800′ (3); Cholla-Palo Verde Community, 900–1200′ (14); Agave-Ocotillo Community, 2500′ (1). One colony was located at 3600′ in the ecotone between the Desert and Chaparral Biomes. A crateriform tumulus was observed to be about 25 cm external diam., inner rim about 15 cm diameter, the entrance 20–25 mm diam.

Nests studied near Pearblossom were all situated in deep, but well-packed sand at the edge of a wash, as was the one located south of Big Pine. The one found in Last Chance Canyon was sited at the edge of a road, about 20 feet above the bed of Last Chance Creek. The nests were surmounted by low, broad crateriform tumuli composed of sand particles and fine soil.

As with other species of *Endiodioctes, semirufus* is a diurnal forager and is a scavenger. It is also an effective predator; at Pearblossom, returning foragers were bringing in many recently dead insects, mostly leafhoppers (Cicadellidae) and grass bugs (Miridae), but including a few termites, beetles, flies and small wasps and bees. The quantity of recently dead insects strongly suggests active predation.

During the rainy spring and autumn seasons foragers are also active on flowers. At Pearblossom I have seen them on *Malacothrix* (Asteraceae), *Phacelia* (Hydrophyllaceae), *Salvia* (Lamiaceae), *Oenothera* and *Camissonia* (Onagraceae), *Mentzelia* (Loasaceae) and *Cryptantha* (Boraginaceae) during March–May; in September and October the workers are found at the flowers of *Eriogonum* (Polygonaceae) and *Haplopappus* (Asteraceae). The specimens collected near Tehachapi were noted to be on *Isomeris arborea* Nutt. (Capparaceae).

Activity of sexual forms is noted in Table 2.

Discussion. This name has been the subject of considerable confusion, briefly reviewed by Snelling (1969). The original description was based on specimens from San Jacinto, Calif. and Denver and Pueblo, Colo. Wheeler (1908) correctly recognized that two species were represented in Emery's material and restricted the true *semirufus* to the California sample; the Colorado specimens were assigned to his *mendax.* Thus, the type locality was restricted to San Jacinto, Calif. and has priority over the designation of Denver, Colo. by Creighton (1950), repeated by Gregg (1963). Cook (1953) cited both as the type locality.

Unfortunately, Wheeler (1908) then incorrectly applied the name to a very different, wide ranging ant which only superficially resembles *semirufus.* The correct name for "*semirufus*" of Wheeler and subsequent authors is *kennedyi,* except for those misidentifications which apply to still other species. The true *semirufus* is an uncommon species known only from southern California and adjacent Baja California.

Although the females are very different, the workers of this species most closely resemble those of *placodops* and are separable only with difficulty. The records

from Deep Canyon by Wheeler and Wheeler (1973) as *placodops* are based on specimens which I misidentified as that species. In my paper (Snelling 1969) on the *melliger* group I attempted to separate the two by the broader head and more obscurely punctate frontal lobes of *placodops*. The result is far from satisfactory, for some workers of *semirufus* do have the head wider than long, though the percentage of such individuals is much lower in *semirufus* than in *placodops*. That character, at least, is not to be relied upon.

The sculpturation of the frontal lobes is another matter, and I am forced to rely upon it, even though it is not wholly satisfactory.

In most workers of *semirufus* the frontal lobes are shiny and the surface is beset with numerous sharply defined, round punctures, the largest of which are about one-third greater than the smallest. The interspaces vary from as little as one-fourth a puncture diameter to slightly more than a puncture diameter. Similar, but more widely spaced, punctures are usually present on the face between the frontal lobe and the eye; these punctures are less sharp than those of the frontal lobes and the interspaces are distinctly tessellate and less shiny. From these facial punctures emerge short (about 0.06 mm long) stiff, erect hairs. The malar area has scattered coarse punctures which are clearly several times greater in diameter than the hairs arising from them. This is, in fact, generally true: the cephalic hairs arise from punctures conspicuously greater in diameter than the hairs. Between the ocelli of *semirufus* the surface is closely micropunctate; these punctures extend up onto the occiput, continuing back nearly to the foramen. On the occipital summit they occupy the middle one-third or more of the dorsum.

From the above conditions *placodops* differs. The surface of the frontal lobes is dull, often very closely tessellate. When punctures are sharp, their presence is greatly obscured by dense tessellation. Often, however, the punctures are shallow and not well defined. The face, between the eye and the frontal lobe is dull, finely tessellate; as a rule, the only punctures present are the micropunctures from which the pubescence emerges. A few coarse punctures may be present near the inner eye margin and in an arc laterad from the top of the frontal lobe.

The erect hairs of the malar area often arise from poriform punctures. Some of the hairs may emerge from punctures which hardly exceed the diameter of the hairs. In large workers the erect cephalic hairs, except those of the clypeus and frontal lobes, may all arise from such poriform punctures. In small workers these punctures may be present on the occiput.

The area between the ocelli is often not micropunctate in *placodops*. When micropunctures are present, as in *semirufus*, they usually are limited to the ocellar area. Seldom do they extend back to the summit of the occiput and seldom, or never, approach the foramen. When they are present they usually are found only immediately behind the ocelli, not extending laterad as in *semirufus*.

The most common variations of *semirufus* include more tessellate frontal lobes, a sporadic nest variant, weakening of facial punctures (Morongo Valley and some Deep Canyon samples) and weakening of occipital micropunctures (Morongo Valley and sporadic nido-variants elsewhere). In general these cephalic characters, even though they must be studied with care, seem to be the only effective means of separating workers. In color the two are similar, but *semirufus* often lacks dark areas on the thorax. Some samples, especially those from Deep Canyon and Independence, are fully as dark as *placodops*.

The distribution of *semirufus* appears to lie wholly to the west of that of *placodops*. They may become sympatric in the mountain ranges of the central Mojave Desert.

Mimicus Group

Myrmecocystus (Endiodioctes) depilis Forel

Figures 73–82, 158, 170, 182, 190

Myrmecocystus melliger var. *depilis* Forel 1901. Ann. Soc. Entomol. Belg. 45:135. ♀; Cole 1934. Ann. Entomol. Soc. Amer. 27:402.

Myrmecocystus melliger subsp. *mimicus* var. *depilis*, Wheeler 1908. Bull. Amer. Mus. Nat. Hist. 24:354. ♀ *(in part)*; Wheeler 1913. Psyche 19:173; Cook. 1953. The ants of California 342–343 *(in part)*.

Myrmecocystus mimicus, Creighton 1950. Bull. Mus. Comp. Zool. 104:446–448 *(in part)*; Cazier and Statham 1962. Jour. N.Y. Entomol. Soc. 70:125–149 *(in part)*; Cazier and Mortenson 1965. Jour. Kans. Entomol. Soc. 38:19–44 *(in part)*.

Diagnosis. Worker: Malar area with few or no erect hairs in frontal view; gaster blackish, head and thorax extensively infuscated; some pronotal hairs longer than EL in large workers; large workers with abundant, medias and minors with scattered, pubescence on disc of third tergum. *Female:* OMD 1.6 or more × EL; longest occipital hairs about equal MOD, longest scutal hairs about 0.5 × MOD; parapsis closely, uniformly punctate; malar area with fewer than eight erect hairs. *Male:* Posterior half of mesoscutum very superficially tessellate; gastric pubescence very sparse; longest occipital hairs about 0.75 × MOD; longest scutal hairs less than 0.75 × MOD; OMD 1.13–1.54 × EL.

WORKER. *Measurements.* HL 0.90–1.53; HW 0.77–1.50; SL 1.10–1.67; WL 1.3–2.3; PW 0.6–1.0.

Head: Distinctly to slightly longer than broad, CI 80–98 (89), shorter than scape, SI 105–128 (120); sides of head, in frontal view, straight in small workers, slightly convex in large workers, slightly convergent toward mandibular base. Occiput, in frontal view, gently and evenly convex in small, medially flattened in large workers. Eye small, 0.89–1.36 × first flagellomere; OMD 1.45–2.00 × EL. Mandible with seven teeth.