TABLE 4

Activity of Reproductives of:

Locality	Date	Activity
M. wheeleri Snelling		
CALIF., 2 mi E San Jacinto	6 Mar. 1967	♂♂ in nest
CALIF., 6 mi SE Pearblossom	16 Mar. 1972	♂♂ in nest
CALIF., Eaton Cyn.	6 June 1963	♂♂ in nest
CALIF., Camp Ozena	8–27 June 1963	deälate ♀ on ground
CALIF., 6 mi SE Pearblossom	15 Aug. 1965	♀♀ in nest
CALIF., 6 mi SE Pearblossom	22 Aug. 1965	♂♂ in nest
M. romainei Cole		
COLO., Trinidad	26 Aug. 1951	♀♀ in nest
COLO., 30 mi E Pueblo	26 Aug. 1951	♀♀ in nest
N.MEX., Albuquerque	May 1905	♀♀ in nest
N.MEX., Jornada Exp. Range	24 Apr. 1973	♂♂ in nest
N.MEX., Jornada Exp. Range	25 July 1973	♂♂, ♀♀ in nest
N.MEX., 2 mi San Juan	3 Sept. 1951	♀♀ in nest

legs and the apical gastric segments may be brownish, especially in minor workers. Such specimens are common in material collected at Little Rock Dam. Since the basal gastric segments may be yellowish in occasional specimens of *flaviceps* and *kennedyi*, and are normally so colored in *kathjuli*, other means of separation must be used. The presence of abundant pubescence on the third tergum will immediately separate *wheeleri* from *kennedyi*. The occipital and pronotal hairs are much shorter in *kennedyi* than in *wheeleri* and the tibial hairs are suberect to erect rather than decumbent.

The resemblance of *flaviceps* to *wheeleri* in pilosity is closer, since both possess abundant pubescence on the third tergum. In *flaviceps*, however, the tibial hairs are suberect to erect, the pronotal hairs do not exceed 0.5 × MOD and the occipital hairs are not equal to EL.

The most closely related species appears to be *kathjuli* and workers of the two species are very similar in most features. The pronotal hairs are a little longer in *wheeleri*, about 0.85–0.90 × MOD, than in *kathjuli*, about 0.60–0.65 × MOD. In the latter species, the sides of the first two terga are brownish and many of the hairs of the tibiae are suberect to erect.

The very broad segments of the maxillary palp and largely ferruginous gaster will immediately separate the female of *wheeleri* from all except *kathjuli*. The frontal lobes are uniformly punctate and the punctures separated by less than a puncture diameter in *wheeleri;* in *kathjuli* the punctures are very irregularly spaced, with many interspaces of 1–2 puncture diameters. The summit of the first tergum and the discs of the second and third, are uniformly closely micropunctate in *wheeleri* females. There are extensive impunctate areas on the first tergum, at least, in the *kathjuli* females seen.

Although male *Myrmecocystus* are a monotonously similar lot, offering few distinguishing characteristics, that of *wheeleri* is the proverbial exception. The ventral lobe of the aedeagus, instead of being strongly convex and finely serrate, as in all other species, is concave and coarsely serrate (Fig. 195). Otherwise, this sex is very similar to that of *kathjuli* but with shorter body hairs.

ROMAINEI GROUP

Myrmecocystus (Endiodioctes) koso new species

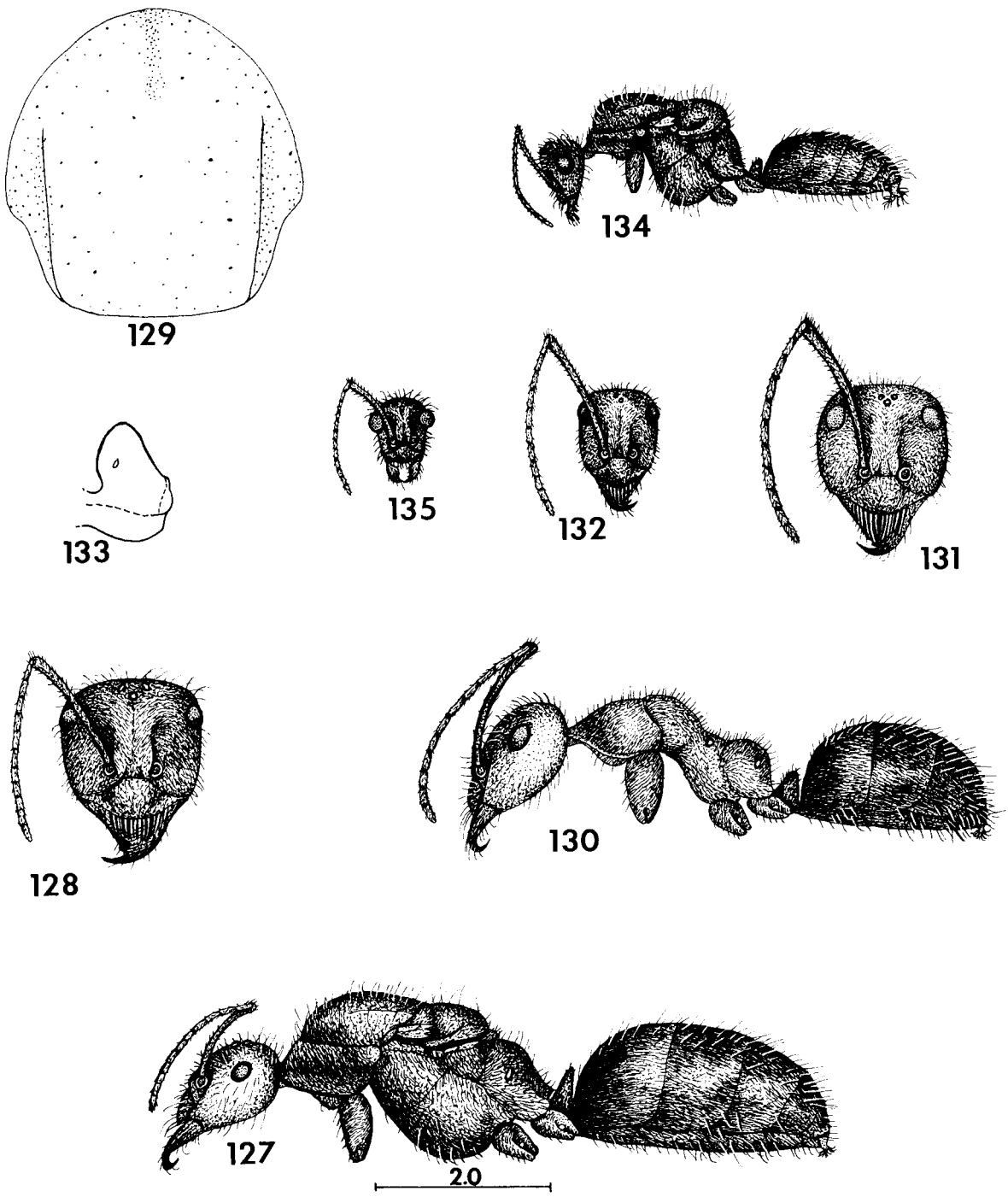
Figures 127–135, 164, 176, 199, 200

Myrmecocystus comatus, Cole 1966. B. Young Univ. Sci. Bull. 7:21 *(misidentification)*.

Diagnosis. Worker: Malar area with 10 or more erect hairs; HW less than 1.7 mm; pronotal hairs uneven in length, longest less than MOD, hairs mostly distinctly longer than on mesonotum; third tergum always, and fourth usually, densely pubescent; face with numerous irregularly spaced coarse, shallow punctures. *Female:* Parapsis with extensive impunctate areas and punctures of two sizes; penultimate segment of maxillary palp slender, nearly parallel-sided; malar area with numerous erect hairs; median area of first two terga largely impunctate; HW 1.8 mm or less. *Male:* ventral lobe of aedeagus convex in profile; mesoscutal disc shiny, very lightly tessellate to smooth, in contrast to parapsis; scutellum lightly tassellate and shiny; first three terga with median areas apubescent or nearly so; hing wing with fringe hairs along basal half of posterior margin; longest occipital and mesoscutal hairs more than 0.5 × MOD; HW less than 0.8 mm.

WORKER. *Measurements.* HL 0.83–1.63 (1.63); HW 0.73–1.67 (1.67); SL 0.97–1.93 (1.93); WL 1.3–2.7 (2.7); PW 0.5–1.2 (1.2).

Head: Longer than broad to slightly broader than long (largest workers). CI 87–102 (102), usually dis-



FIGURES 127–135. *M. koso*. 127, female, lateral view; 128, head of female, frontal view; 129, mesoscutum of female, distribution of punctures; 130, major worker, lateral view; 131, head of major worker, frontal view; 132, head of minor worker, frontal view; 133, petiole of major worker, lateral view; 134, male, lateral view; 135, head of male, frontal view.

tinctly shorter than scape, SI 105–136 (118); in frontal view sides straight (small workers) to moderately convex, slightly convergent toward base of mandible. Occiput in frontal view flat or slightly convex, broadly rounded laterally. Eye small, EL 1.05–1.10 (1.09) × first flagellomere; OMD 1.50–1.95 (1.92) × EL. Mandible with seven teeth.

Thorax: Slender to moderately robust, PW 0.35–0.48 (0.43) × WL. Basal face of propodeum broadly rounded into posterior face.

Petiole: In profile thick, cuneate, summit broad; crest, in front view, flat or slightly notched in middle; from above, about 1.5 × wider than thick.

Vestiture: Pubescence sparse on head; more abundant, producing a feeble sheen on occiput and around antennal sockets; dense on thorax. First three terga always closely pubescent, and usually fourth as well except in smallest workers.

Erect hairs general on head; malar area with at least ten erect hairs (except a few very small workers), usually 15+; longest occipital hairs usually about 0.8 × MOD. Pronotal hairs very uneven in length, longest hairs 0.6–0.7 × MOD, slender and acuminate; mesonotal hairs more even in length, usually thicker than those on pronotum, longest less than 0.5 × MOD; metanotal hairs uniformly quite short; propodeal hairs short basally, becoming progressively longer caudad, longest less than 0.5 × MOD. Petiole with numerous short, erect hairs on side and crest. Terga with abundant erect hairs, arising from poriform punctures on first three terga, progressively longer caudad; longest discal hairs of second tergum about 0.5 × MOD. Scape, femora (including inner face of fore femur) and tibiae with abundant short, suberect to erect hairs.

Integument. Head moderately shiny, distinctly shagreened; frontal lobes with variably spaced coarse punctures separated by up to 1.5 diameter; sides of face more finely, sparsely punctate, punctures shallow and poorly defined; vertex and occiput immediately behind ocelli closely micropunctate, micropunctures extending laterad only on extreme posterior part of occiput. Thorax slightly shiny, densely shagreened and micropunctate. First three terga slightly shiny, densely shagreened and micropunctate; fourth tergum shinier, less closely micropunctate.

Color: Head, thorax and appendages ferruginous; gaster medium to dark brown; occiput, propodeum and femora often lightly infuscated.

FEMALE: *Measurements.* HL 1.58–1.70; HW 1.63–1.80; SL 1.60–1.73; WL 3.5–4.0; PW 2.1–2.4.

Head: A little broader than long, CI 103–108; slightly shorter to slightly longer than scape, SI 98–102; sides of head, in frontal view, straight or barely convex, slightly convergent toward mandibular bases. Occiput, in frontal view, regularly convex from side to side. Eye small, 1.05–1.20 × first flagellomere; OMD 1.57–1.75 × EL; OOD 4.3–4.7 × OD; IOD 3.0–3.3 × OD. Penultimate segment of maxillary palp very slightly wider subbasally than at apex, sides straight, about seven times longer than wide. Mandible septemdentate, rarely with eight teeth.

Thorax: Robust to very robust, PW 0.55–0.69 × WL. Scutum flattened behind; scutellum slightly and regularly convex in profile. Basal face of propodeum broad, usually sloping in profile, and rounded onto posterior face.

Petiole: In profile, cuneate, strongly narrowed; crest, in frontal view, deeply angularly incised.

Vestiture: Pubescence sparse on all cephalic surfaces. Pubescence abundant on pronotum, thoracic pleura and propodeum. Broad median area of first two terga very sparsely pubescent; third similar but more conspicuously pubescent; fourth more pubescent than third, but still more thinly pubescent in middle than at side; these terga abundantly pubescent at sides.

Malar area with 12–18 long erect hairs visible in frontal view; facial hairs short, sparse between antennal socket and eye; longest occipital hairs subequal to MOD. Mesoscutum with numerous erect hairs, longest subequal to MOD; scutellar hairs longer, some exceeding MOD; pleural hairs numerous, mostly about 0.5–0.7 × MOD. Propodeum with numerous erect hairs at side and across base, similar to those of pleura. Petiole with long, slender hairs on sides and crest. Terga with numerous erect hairs, longest on disc of second segment about 0.78 × MOD, only slightly longer on apical segment. Scape, femora (including inner face of fore femur) and tibiae with abundant suberect to erect hairs. Fore wing without fringe hairs; hind wing with fringe hairs on basal half of posterior margin.

Integument: Head moderately shiny, clypeus and adjacent portion of side of face duller, closely shagreened; frontal lobes densely micropunctate, punctures round, interspaces 0.5–1.0 × puncture diameter, with scattered coarse punctures; face with sparse fine punctures, most abundant at sides and below, punctures less sharply defined than on frontal lobes; malar area with dense, fine, elongate punctures; vertex with close micropunctures in ocellar area extending onto occiput, extending laterad on posterior part of occiput. Mesoscutal disc shiny, with scattered coarse punctures; parapsis with scattered coarse punctures and dense micropunctures adjacent to parapside. Scutellum shiny, sparsely micropunctate and with scattered coarse punctures. Anepisternum slightly shiny, micropunctate, punctures mostly separated by about a puncture diameter, with scattered coarse punctures; katepisternum a little duller, more densely micropunctate and with scattered coarse punctures. Pronotum, metapleura and propodeum dull, densely micropunctate. Dorsum of first tergum and broad median areas of second and third terga moderately shiny, lightly shagreened, with sparse micropunctures and scattered coarse punctures;

fourth tergum similar but less shiny and more abundantly micropunctate; lateral, basal and apical areas of these segments densely micropunctate.

Color: Head and antennae ferruginous; legs brownish ferruginous to light brown; thorax and gaster medium brown, often with lighter areas on scutum and scutellum. Wings slightly whitish, subcostal vein medium brown, stigma and remaining veins pale yellow.

MALE. *Measurements.* HL 0.83–0.90 (0.90); HW 0.77–0.87 (0.87); SL 0.93–1.03 (1.03); WL 2.0–2.3 (2.2); PW 1.1–1.3 (1.).

Head: A little longer than broad, CI 92–97 (97), shorter than scape, SI 112–120 (115); in frontal view, sides straight, moderately convergent toward mandibular bases; occiput, in frontal view, evenly and strongly arched, without perceptible angles. OMD 0.72–0.88 (0.78) × EL; OOD 1.7–3.0 (2.3) × OD: IOD 2.0–3.5 (2.3) × OD. Mandible without preapical cleft or basal teeth.

Thorax: Moderately robust, PW 0.52–0.62 (0.52) × WL. Propodeum, in profile, with weakly defined basal face or evenly sloping.

Petiole: In profile, thick, hardly cuneate and with broadly rounded summit to cuneate with slightly angulate summit; crest, in frontal view, entire or with trace of medium notch.

Vestiture: Head nearly apubescent, a few hairs above eye, on frontal lobe and on lower malar area. Pubescence sparse on pronotum, denser on sides and propodeum; absent from scutum, scutellum and central area of propodeum. First three terga with sparse pubescence at sides, broad median area apubescent; fourth tergum without pubescence.

Malar area with 6–9 long, slender hairs; longest occipital hairs about equal to MOD. Mesoscutum with numerous erect hairs, longest about equal to MOD. Scutellum with sparse, longer hairs, longest about equal to EL. Pleura with shorter hairs, longest about 0.6 × MOD. Propodeum with similar hairs basally and laterally. Gastric segments with sparse long hairs, longest caudad and ventrally. Scape, femora and tibiae with abundant short, suberect to erect hairs. Forewing without fringe hairs; hind wing with fringe hairs on basal half of posterior margin.

Integument: Head shiny, malar area moderately shiny, lightly shagreened and sparsely micropunctate; occiput moderately shiny, lightly shagreened, sparsely micropunctate and with scattered coarse punctures. Mesoscutum shiny, very lightly shagreened to smooth, with scattered coarse punctures; parapsis duller, lightly shagreened, sparsely micropunctate, with scattered coarse punctures. Scutellum duller than disc of scutum, lightly shagreened, with scattered coarse punctures. Pleura slightly shiny, distinctly shagreened, sparsely micropunctate, with scattered coarse punctures. Side of propodeum similar to pleura, more distinctly micropunctate; base and disc shinier, lightly shagreened and sparsely micropunctate. Terga moderately shiny, lightly shagreened, with sparse micropunctures (more abundant laterad) and scattered coarse punctures.

Color. Medium to dark brownish; flagellum and tarsi yellowish; mandibles yellowish brown. Wings slightly whitish, subcostal vein brown, stigma and remaining veins pale yellowish.

Terminalia: Figures 176, 199, 200.

Type Material. Holotype and 266 paratype workers: Panamint City, 6600′, Panamint Range, Inyo Co., CALIF., 3 Nov. 1967 (R. R. Snelling, No. 67–274). Allotype male; 584 worker, 18 female, 36 male paratypes: Wildrose Cyn., 6000′, Panamint Range, Inyo Co., CALIF., 4 Nov. 1967 (R. R. Snelling, No. 67–275). Holotype, allotype and most paratypes in LACM; paratypes in AMNH, GCW, MCZ, USNM.

Etymology. Named for the Koso Amerindian tribe, a Piute-Shoshonean group who formerly inhabited the Panamint Range. The word *koso* in Shoshoni means "Land of Fire", appropriately descriptive of the regions where this species occurs.

Distribution. Mountain ranges of northern Mojave Desert in California and Nevada (Fig. 367).

Additional Localities. UNITED STATES. Nevada: Nye Co.: Nevada Test Site, near Mercury, various dates and collectors (AMNH, LACM, MCZ, USNM); Rock Valley, Nevada Test Site, 31 Mar. 1972, 8, 9 June 1972 (R. Chew; REC, LACM); Rhyolite, 18 Mar. 1931 (A. H. Sturtevant; USNM).

Ecology. The type locality is in an area of Piñon-Juniper Woodland; the allotype nest from an area of Shadscale Scrub. Cole (1966) recorded this ant, as *comatus,* from the Nevada Test Site. He found it to be ". . . well represented in the *Grayia-Lycium, Larrea-Franseria, Atriplex-Kochia* and mixed communities; scarce in the *Coleogyne* and *Salsola* communities; rare in Piñon-Juniper areas."

Nests are in open areas and are usually surmounted by a low, circular crater. A crater may be absent, but this may be due to wind and/or rain action. Cole observed that most colonies were very populous, which accords with my observations in the Panamint Range.

Nothing is known of the mating flights. Alates of both sexes were taken in the allotype colony in early November. These were mostly callows and many sexual pupae were present. The season was already approaching winter at that altitude and I do not believe a mating flight would occur so late in the season, but that the sexual forms would overwinter and fly in warm vernal weather.

Discussion. Workers of this ant look like diminutive *placodops.* The conspicuously smaller size of the major workers (HW > 1.7 mm) and the presence of numerous punctures on the face will easily separate *koso* from *placodops.*

This ant is much more difficult to separate from *romainei,* to which it appears to be closely related. In the workers of *koso* the punctures of the side of the face are sparser, coarser, and less well defined than in *romainei;* this part of the face is conspicuously shagreened. The pronotal hairs are longer and more slender than the mesonotal hairs in *koso,* about equally long and thick in *romainei.* In both species the third tergum is pubescent, but the fourth is bare in *romainei,* usually pubescent in *koso,* except in the smallest workers.

The female of *koso* is easily separated from that of *romainei* by the sparsely punctate basal terga. Males of both species are similar, but that of *romainei* has much shorter erect hairs on the occiput and mesoscutum.

Myrmecocystus (Endiodioctes) romainei Cole

Figures 136–145, 165, 177, 197, 198

Myrmecocystus melliger subsp. *mimicus* Wheeler 1908. Bull. Amer. Mus. Nat. Hist. 24:353–354. ♀♀ *(in part); Wheeler 1912. Psyche 19:176 (in part).*

Myrmecocystus melliger semirufus, Wheeler 1908, *Op. cit.* 355 *(in part).*

Myrmecocystus melliger semirufus var. *romainei* Cole 1936. Entomol. News 47:120. ♀.

Myrmecocystus semirufa, Creighton 1950. Bull. Mus. Comp. Zool. 104:449 *(in part);* Buren 1968. Jour. Georgia Entomol. Soc. 3:119 *(misidentification).*

Myrmecocystus melliger, Cole 1954. Jour. Tenn. Acad. Sci. 29:285 *(in part).*

Myrmecocystus semirufa Forel !, Cole 1954. Jour. Tenn. Acad. Sci. 29:285 *(misidentification).*

Myrmecocystus semirufus, Gregg 1963. Ants of Colorado, 653–655 *(in part).*

Diagnosis. Worker: In frontal view, malar area with 5–17 hairs extending beyond margin; HW not exceeding 1.55 mm; frons and vertex finely and closely punctate; longest occipital hairs less than 0.5 × MOD. *Female:* malar area with numerous erect hairs; parapsis finely and closely punctate; first three terga uniformly, densely micropunctate; frons abundantly punctate. *Male:* ventral lobe of aedeagus convex; mesoscutum and scutellum faintly tessellate, shiny; summit of petiolar scale distinctly incised; first two terga without obvious pubescence except at sides, discs smooth and polished; mesoscutal and occipital hairs less than half minimum eye diameter.

WORKER. *Measurements.* HL 0.90–1.53 (1.17); HW 0.75–1.47 (1.03); SL 1.00–1.67 (1.37); WL 1.3–2.4 (1.7); PW 0.6–1.0 (0.7).

Head: Distinctly longer than broad to as broad as long, CI 80–100 (89), as long as to a little longer than scape, SI 100–121 (117). In frontal view, side straight in small workers, distinctly convex and abruptly convergent below in largest; occiput, in frontal view, with margin evenly convex (smallest workers) to flattened (largest), without lateral angle. Eye small, 1.00–1.25 × first flagellomere; OMD 1.45–2.00 (1.67) × EL. Mandible septemdentate.

Thorax: Moderately robust, PW 0.40–0.47 (0.42) × WL. Basal face of propodeum broadly rounded onto posterior face, distinctly shorter than posterior face.

Petiole: Usually about as thick as high, but in largest individuals may be higher than thick; crest rounded or flattened in frontal view, notched in largest workers; in dorsal view, about 1.4 × wider than long, in largest workers over twice wider than long and with distinctly projecting spiracles.

Vestiture: Pubescence sparse on clypeus, malar area and gula, conspicuously more abundant on frons and occiput; dense on thorax; dense and conspicuous on first three terga, sparse on following segments.

Erect hairs abundant on head, with ten or more present on malar area; longest occipital hairs 0.5, or less, × MOD: pronotal hairs all shorter than EL, longest hairs on disc about one-third longer than shorter hairs and distinctly longer than those of hind tibia; mesonotum and propodeum with numerous fully erect hairs; petiolar scale with a few erect hairs; terga with abundant erect hairs, progressively a little longer on succeeding segments, those of first segment about as long as those of hind tibia. Appendages abundantly hairy; scape with erect hairs on all faces; femora and tibiae with erect hairs on all faces.

Integument: Clypeus polished, with scattered coarse punctures; frontal lobes, frons and occiput moderately shiny, lightly shagreened, frontal lobes finely and closely punctate, frons more coarsely and sparsely punctate and with abundant micropunctures; occiput more finely and sparsely punctate than frons; malar area moderately shiny and sparsely punctate, the punctures coarser and somewhat elongate near eyes, closely shagreened near mandibles and less shiny. Thorax slightly shiny and closely shagreened, without evident punctures. First three terga slightly shiny, densely shagreened, with scattered fine punctures and a few small poriform punctures.

Color: Head, alitrunk and appendages ferruginous, gaster blackish brown (see DISCUSSION).

FEMALE. *Measurements.* HL 1.58–1.80; HW 1.67–1.88; SL 1.43–1.67; WL 3.8–4.3; PW 2.2–2.5.

Head: Sides straight, slightly convergent toward mandibular insertions; head as broad as, to broader than, long, CI 100–107; longer than scape, SI 88–94. Occiput, in frontal view, evenly convex from side to side, with broadly rounded lateral angles. Eye small, 1.09–1.20 × first flagellomere; OMD 1.54–1.75 × EL; OOD 3.3–5.5 × OD; IOD 2.0–3.3 × OD. Penultimate segment of maxillary palp slender, approximately parallel-sided. Mandible septemdentate.

Thorax: Moderately to very robust, PW 0.55–0.61 × WL. Scutum and scutellum moderately flattened. Basal face of propodeum ill-defined, broadly rounded into posterior face.

Petiole: Strongly compressed, crest angulate; in frontal view, crest deeply incised.