A REVIEW OF THE GENUS MONIAECERA

(HYMENOPTERA: SPHECIDAE: PEMPHILIDINI)

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(Text-figures)

The genera *Euplilis, Podagritus,* and *Moniaecera* form a compact unit distinguishable from all other Pemphilidine wasps by their slender, attenuate habitus, elongate, petioliform abdomen, three-segmented labial palpi, and five-segmented maxillary palpi. Hitherto all Pemphilidini possessing this distinctive combination of characters have been assigned to the genus *Rhopalum,* now correctly termed *Euplilis.* But as I have recently demonstrated elsewhere,[1] analysis of the morphological, biological, and distributional features displayed by each of these groups indicates the existence of three discrete entities, each worthy of being accorded full generic rank.

The genus *Euplilis* is a cosmopolitan complex of hygrophilous to mesic forms apparently capable of living through a wide range of temperature conditions in contradistinction to the xerophilous, stenothermal *Moniaecera* which is restricted to the Sonoran Region of North and Middle America, and to *Podagritus* which is confined to the Australian and Neogaeic Realms, particularly to the Chilean and adjacent regions of the latter area. Moreover, these last two genera are fossorial, terricolous assemblages whereas *Euplilis* has developed a xylicolous habit. In addition, each complex has congeries of morphological features such as the structure of the mandibles, occipital carina, and prepectus, the shape of the abdomen and hind tibiae, and the wing venation which enable them to be readily distinguished from one another. Consequently, to continue lumping all the species referable to these three groups

[1] Conspectus of the genera of Pemphilidine Wasps. Amer. Midl. Nat., XXXI, pp. 329–384, (1944).

under the generic name *Euplilis* can give no adequate picture of the phylogenetic history of each.

The most distinctive, as well as the most misunderstood, of these three genera is the precinctive North American complex *Moniaecera,* first recognized as a discrete entity by Fox in 1895 and later accorded full generic status by Ashmead in 1899. However, most subsequent investigators have failed to recognize the validity of Ashmead's genus. To resolve this long-standing miscomprehension of one of our most interesting endemic genera of Pemphilidine wasps, I offer here a review of Ashmead's *Moniaecera.*

This study is based on material in the collections of the Academy of Natural Sciences of Philadelphia and Cornell University. To Dr. P. H. Timberlake of the University of California's Citrus Experiment Station at Riverside, California, Dr. R. W. Strandtmann of the Medical School of the University of Texas at Galveston, Texas, and Dr. E. A. Chapin, Curator of Insects at the United States National Museum, Washington, D. C., I wish to express my sincere thanks for their kindness and courtesy in permitting me to study their collections.

MONIAECERA Ashmead

Crabro (20. Group *abdominalis*) Fox, Trans. Amer. Ent. Soc., XXII, p. 198, (1895).

Rhopalum (*Crabro*) Hartman, Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, p. 43, (1905).

Rhopalum (*Moniaecera*) Rohwer, Ent. News, XX, p. 323, (1909).

Euplilis Pate, Mem. Amer. Ent. Soc., no. 9, p. 41, (1937). [In part.]

Moniaecera Ashmead, Canad. Entom., XXXI, p. 220, (1899).—Pate, Amer. Midl. Nat., XXXI, p. 353, (1944).

GENOTYPE: *Crabro abdominalis* Fox, 1895 [= *Moniaecera* (*Moniaccera*) *abdominalis* (Fox)]. (By original designation of Ashmead.)

The superficial habitus of *Moniaecera* is very similar to that of *Euplilis,* but the large, cubical head with the occipital carina well-developed, more or less flanged and a complete circle in extent, the sharply margined prepectus, the simple obterete hind femora, and the peculiar structure of the mandibles which are armed on the inner basal margins with an elongate, acuminate, retrorse tooth distinguish *Moniaecera* from that genus.

Generic Characters.—Small, slender forms. Head cubical; eyes naked or very finely and sparsely puberulent under high magnification (generally more noticeably so in females than in males), and more coarsely facetted anteriorly than posteriorly; inner orbits strongly convergent below; malar space reduced to a mere line. Front very narrow, concave but without a marginate scapal sinus; usually armed medially below, just above antennal sockets, with a declivent, spinoid or dentoid process. Vertex flat, usually coarsely punctate; supra-orbital foveae distinct in females, usually rather weak or absent in males; ocelli moderately large, arranged in a low or high triangle. Temples well-developed, ecarinate; occipital carina well-developed, more or less flanged and a complete circle in extent, but on midventral line separated from, and not tangent to, the hypostomal carinule bordering the oral fossa. Antennae situated low on face on dorsal margin of clypeus, the sockets contiguous to each other and to nearest lower inner orbit; thirteen-segmented in males, and twelve-segmented in females; scapes slender, cylindrical, elongate, ecarinate lengthwise; flagellum simple in females but with some of segments often modified in males. Clypeus reduced laterally to a mere line by a deep arcuate excision; medially with a very short, flat to tumid, subhexagonal lobe, the lateral margins of which are double as a result of a deep pocket which accommodates the long, acuminate basal spine of the inner mandibular margin. Maxillary palpi with five, labial palpi with three segments. Mandibles slender, elongate; apices bidentate in both sexes, the lower tooth often strongly divergent from the straight upper one; armed basally on inner margins with an elongate, retrorse, acuminate tooth; lower margins entire, in females frequently with a small tooth at extreme base. Females without a psammophore.

Thorax robust, compact; often more or less coarsely punctate. Pronotum short, transverse; anterior dorsal margin usually rounded, ecarinate, but humeri frequently dentate, angulate, or carinate. Mesonotum often coarsely punctate; axillae small, immarginate laterally; scutellum and postscutellum simple. Mesopleura frequently coarsely punctate; prepectus always sharply margined anteriorly; mesopleural pit and episternal suture distinct and impressed; episternauli, mesopleurauli, and sternauli absent; metapleura finely sculptured. Propodeum usually finely sculptured; dorsal face without, or with only a poorly defined, trigonal enclosure; posterior face with a discal fovea or impression; lateral carinae present or absent.

Wings rather short, generally not reaching beyond caudal margin of second or third abdominal tergite. Fore wings with marginal cell at least three times as long as wide, broadly truncate at apex; transverse cubital vein oblique, inclivous; cubitus with second abscissa as long as, or longer than, first abscissa. Hind wing with anal lobe elongate-oval, distinctly separated, and as long as the short submedian cell.

Legs relatively simple in both sexes. Fore tarsi simple, neither flattened nor distorted; in females with a weak pecten. Middle and hind tibiae simple, obterete, their outer face often strongly spinose in females; middle tibiae with one calcar, hind tibiae with two calcaria in both sexes.

Abdomen slender, elongate, petiolate; impunctate or at most very finely punctate; immaculate black or black and red. First segment elongate-petioliform, weakly subnodose at apex, but not separated from second segment by a very strong constriction; remainder of abdomen fusiform in females, clavate in males. Tergites without basal acarid chambers. Females with a broad, flat, coarsely punctate, trigonal pygidial area. Males generally without a pygidial area on ultimate tergite; seventh sternite flat, broadly, transversely subrectangular; hypopygium flat, ligulate or spatulate, the apex entire, fringed with hair, the apical half of disc setose.

Ethology.—Although relatively highly specialized morphologically, *Moniaecera* has remained terricolous and fossorial in sharp contrast to its close relative, the cosmopolitan *Euplilis* which has developed xylicolous habits. But whereas there is a wealth of data on the biology of the latter genus, the only biological information on any species of *Moniaecera* is the observations made many years ago by Carl Hartman on *Moniaecera abdominalis.*[2]

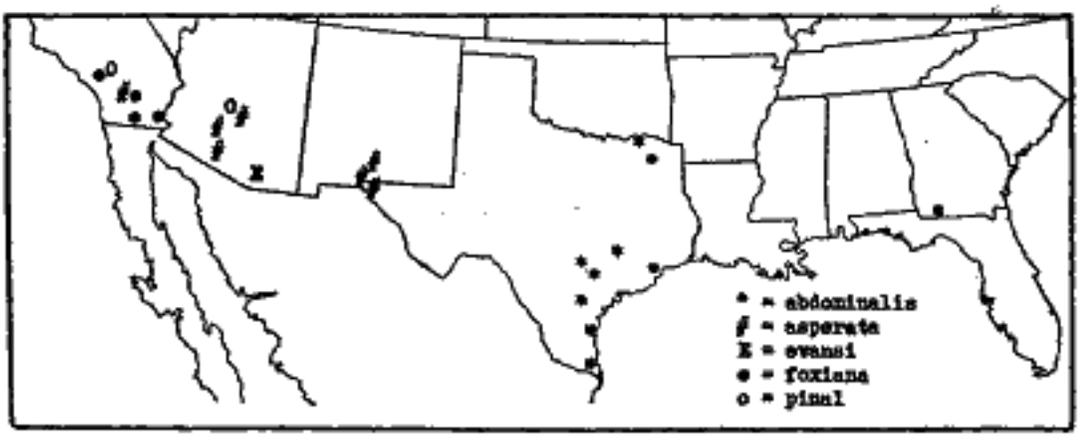
In the sandy woods five miles southeast of Austin, Texas, on the high south bank of the Colorado River, Hartman found *abdominalis* nesting in relative abundance during the months of August and September. The nests were constructed in the middle of a small, flat elevation of sand. The entrance tunnel penetrated the soil nearly horizontally for about two and a half inches and then descended vertically for four inches with a uniform diameter of 2 mm. At the bottom of the tunnel was a small pocket in which were stored a number of leaf-hoppers [*Kolla bifida* (Say)].

While hunting for prey, *abdominalis* leaves the entrance to her burrow open. On her return to the nest, the female hovers briefly in the air about five inches above the nesting hole and then plunges rapidly down into the nest, reappearing again in a few seconds to resume her foraging activities. Rarely is there any locality study made before leaving the nesting site. The activities of *abdominalis* when out hunting are very similar to those of *Trypoxylon:* like many species of that genus, *abdominalis* is almost constantly on the wing and displays her curiosity by touching every stick or blade of grass in her path with her antennae.

The species of *Moniaecera* probably have at least two generations a year. Adults of most species are on the wing during the spring or early summer months, from March to the first week of

[2] Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, pp. 43–44, (1905).

June; many of these apparently have another generation in August, September or early October, just after the late summer or early autumn rains.



Distribution of the species of the subgenus *Moniaecera*.

Distribution.—The genus *Moniaecera* is a precinctive Nearctic complex confined largely to the southern portion of North America and with its epicentre apparently in the southwestern United States. Though probably more widespread in the past, the present limitation of *Moniaecera* to the southern portion of the Sonoran Region is probably the result of Pleistocene glaciation. Moreover, the relative instability of the isthmian link in the Tehuantepec area throughout the Tertiary has presumably been one of the major factors in preventing its expansion further southward in Middle America than southern Mexico.

The species of *Moniaecera* are thermophilous, stenothermal forms which occur mainly in the arid or semiarid areas of the southwestern states and adjacent regions of Mexico. Only one species, *abdominalis*, which ranges from eastern Texas through the Gulf Coastal plain to southern Georgia, has adapted itself in any degree to mesophytic conditions: the remaining forms inhabit the more xeric areas stretching from the Upper Rio Grande Valley to the Colorado Desert in southern California. This xerophilous habit is in sharp contrast to that of its close relative, the eurythermal, mesophilic, ubiquist *Euplilis*.

Within the genus are two very distinct and well-marked groups which give every appearance of being natural entities. Each of

these, I believe, is worthy of being accorded subgeneric rank. The more generalized of the two is undoubtedly the nominate complex. These subgenera are differentiated in the following key and discussed on the ensuing pages.

Key to Subgenera

Mesosternum transversely carinate anteriorly; mesopleura with well-developed hypersternauli, and a posterior epicnemium formed by a vertical carinule descending from the mesopleural pit to the precoxal carina.....**Huavea** new subgenus

Mesosternum rounded anteriorly; mesopleura without distinct hypersternauli and no such posterior epicnemium nor precoxal carina before middle coxae.....**Moniaecera** s. s.

Subgenus **Moniaecera** *sensu stricto*

The more coarsely punctate head and thorax, the ordinary structure of the mesopleura and mesosternum, and the simple pygidium of the males distinguish the nominate complex of *Moniaecera* from the Mexican subgenus *Huavea.*

Subgeneric Characters.—Fulgid forms, with the head and thorax generally more coarsely punctate than in *Huavea.* Head with upper front usually bisected by a furrow running forward from anterior ocellus to facial basin. Ocelli generally arranged in a lower triangle (average ratio: 3.5 : 2.0) than in *Huavea;* ocellocular line at most subequal to, but generally distinctly less than, postocellar distance.

Mesopleura without well-developed hypersternauli and lacking a posterior epicnemium formed by a vertical carinule; no precoxal carina before middle coxae. Mesosternum rounded, ecarinate anteriorly. Propodeum with lateral carinae absent or at most vestigial.

Abdomen with first sternite subequal in length to first tergite, and generally more or less angulate medially in lateral aspect, the apex not abruptly inflexed. Males with last abdominal tergite flat or arcuate in cross section and without a pygidial area, either impressed or otherwise.

Component Species.—The nominate subgenus of *Moniaecera* comprises at present five species, all of which are North American in distribution. However, when the ranges of these forms are more fully known, a number of them will probably be found to occur in northern Mexico.

The five species referable to the subgenus *Moniaecera* are divisible into three groups. The Pinal Group, which includes only the nominate form, lacks a frontal spine, has the oral fossa moderate

in depth, and the males have the hypopygium simple, ligulate, and the genitalia have the parameres thick, terete, tapering sharply to acute apices which do not surpass the apex of the thick, terete aedoeagus; the digiti are slender and uncinate at apex.

The Asperata Group comprehends three species: *asperata, foxiana,* and *evansi.* All of these bear a median frontal process just above the antennal sockets, and the oral fossa is moderate in depth. The males have the hypopygium more or less strongly spatulate, and in the genitalia, the parameres are large, depressed, flattened, and laminate, far surpassing in length the simple tubular aedoeagus, the apex of which may be incrassate; the digiti are slender and acuminate apically.

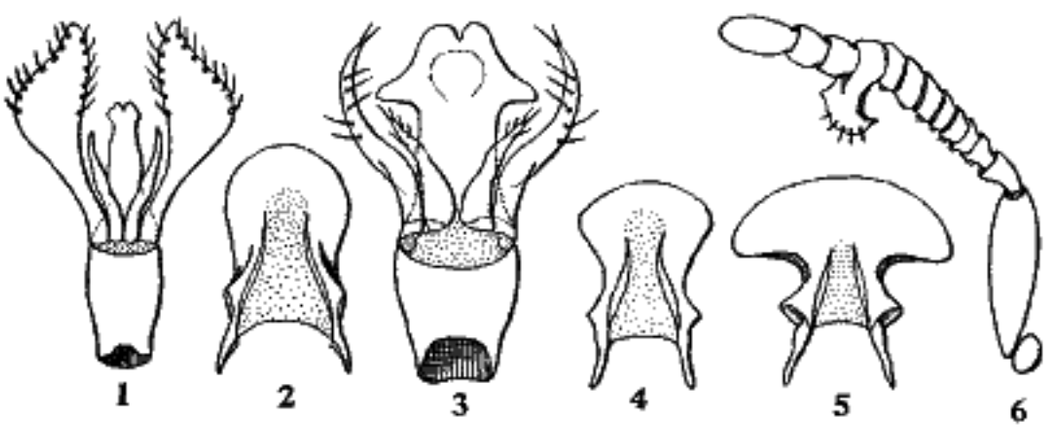
The Abdominalis Group, which comprises only the typical species, bears a median frontal process just above the antennal sockets but the oral fossa is quite deep. The hypopygium of the males resembles that of the Asperata Group but the male genitalia are markedly different; the parameres are very slender, curved and acuminate, and subequal in length to the peculiar aedoeagus which is thick and tubular at base but strongly depressed and flattened at apex where it suddenly becomes subhastate in shape with the apex broadly rounded; the digiti are simple and acuminate.

The subjoined table will serve to separate these five presently known forms.

Key to Species

1. Antennae thirteen-segmented; seven abdominal tergites visible; (males) 2
   Antennae twelve-segmented; six abdominal tergites visible; (females) 6
2. Front without a supra-antennal tooth or process; fore coxae simple, edentate; (Arizona to southern California) ..... **pinal** Pate
   Front armed medially just above antennal sockets with a declivent tooth or spine 3
3. Fore coxae edentate, without an anteromedian tooth or tubercle; antennal pedicel cylindrical or obterete, not obtusely angulate on outer lateral face 4
   Fore coxae armed with a median tooth, tubercle, or ridge anteriorly along median line; antennal pedicel obtusely angulate on outer lateral face 5

4. Antennal flagellum simple, none of the segments modified; middle metatarsi simple, slender, elongate; pronotal humeri sharply dentate or angulate; (Texas to Georgia).....**abdominalis** (Fox)
   Antennal flagellum modified, medially with a laminate, unciform process; middle metatarsi short and thickened; pronotal humeri rounded; (southern Arizona).....**evansi** Pate
5. Antennal flagellum with apex simple; (southern California). **foxiana** new species
   Antennal flagellum with apex strongly compressed and more or less spatulate; (western Texas to southern California)..**asperata** (Fox)
6. Mandibles beneath at base with a distinct tooth; pronotal humeri more or less angulate or dentate.....7
   Mandibles beneath at base simple, edentate; pronotal humeri rounded. **foxiana** new species
7. Head beneath, laterad of oral fossa, with a transverse callus or welt; oral fossa shallow, campanulate, apparently broader anteriorly than deep.....**asperata** (Fox)
   Head simple beneath, quite flat laterad of oral fossa which is deep, apparently narrower anteriorly than deep.....**abdominalis** (Fox)



Moniaecera evansi Pate: Fig. 1.—Male genitalia, ventral aspect. Fig. 5.—Male hypopygium, ventral aspect. Fig. 6.—Antenna of male.

Moniaecera abdominalis (Fox): Fig. 2.—Male hypopygium, ventral aspect. Fig. 3.—Male genitalia, ventral aspect.

Moniaecera asperata (Fox): Fig. 4.—Male hypopygium, ventral aspect.

Moniaecera (Moniaecera) pinal Pate

Moniaecera pinal Pate, Notulae Naturae, Phila., no. 185, p. 10, (1947); [♂: Arizona].

Type.—♂; Phoenix, Maricopa County, Arizona. Elevation, 1108 feet. April 20. [Academy of Natural Sciences of Philadelphia, Type no. 10591.]

The absence of a supra-antennal spine, the almost impunctate upper front and vertex, and the rather finely punctate thorax easily differentiate this recently described form from all other species of the genus.

The above characteristics coupled with the simple linguiform male hypopygium and the terete parameres and aedoeagus and uncinate digiti of the male genitalia indicate that *pinal* undoubtedly forms a group distinct and apart from the other species of the nominate complex.

Distribution.—This vernal xerophile ranges across the Sonoran and Colorado Deserts of southern Arizona and California and into the piedmont of the Transverse Ranges district of southern California.

Specimens examined: 5 males, as follows:

ARIZONA: Phoenix, Maricopa Co.; elevation, 1108 ft.; April 20: 1 ♂; [*type*, ANSP].

CALIFORNIA: Riverside, Riverside Co.; March 23, 1926; (P. H. Timberlake; flying near *Scrophularia*) : 1 ♂; March 31, 1939; (P. H. Timberlake; on *Cryptantha intermedia*) : 1 ♂; April 2, 1930; (P. H. Timberlake; sunning self on rock) : 1 ♂. Lovejoy Buttes; May 11, 1944; (P. H. Timberlake; on *Stillingia paucidentata*) : 1 ♂. [All PHT.]

Moniaecera (Moniaecera) foxiana[8] new species

This southern Californian species is very closely related to the widely distributed *asperata,* but the simple, unmodified flagellum of the males and the edentate inferior mandibular margins of the females stamp it as a discrete species. In addition, the males of *foxiana* have the head more coarsely punctate than in *asperata,* and the dorsal face of the propodeum finely, obliquely carinulate, while the females lack transverse welts or tori on the post-temporal region of the head.

Type.—♂; Indio, Salton Sink, Riverside County, California. 75 feet below sea level. May, 1910. [Academy of Natural Sciences of Philadelphia, Type no. 10607.]

MALE.—Length 5 mm. Head and thorax cyaneous; abdomen, legs and antennae blackish-brunneous. Following stramineous: mandibles save red apices; fore femora with a spot above at apex; fore tibiae and tarsi entirely; middle and hind tibiae narrowly annulate at base; middle and hind metatarsi

[8] Dedicated to the late William J. Fox, formerly Librarian of the Academy of Natural Sciences of Philadelphia, as a slight tribute to his outstanding work upon these wasps and many other groups of Aculeate Hymenoptera.

and the following tarsal segment (third to last segments brunneous). Tegulae fulvous; axillary sclerites eburneous. Wings clear hyaline, iridescent; fore wings with stigma and veins, except for eburneous subcosta, light fulvous; hind wing veins eburneous.

Head fulgid; clypeus, and inner orbits with appressed silvery sericeous pile; vertex with a very thin clothing of short, suberect hairs; temples with a moderately heavy vestiture of decumbent silvery pubescence. Front very strongly concave between inner orbits but facial basin impunctate and not strigose; just above antennal sockets with a moderate, declivent spine, flattened above; upper front and vertex to behind postocellar line bisected by a strong, deep furrow, and with coarse scattered punctures which become closer and rather coarsely, transversely striatopunctate posteriorly in occipital region; ocelli situated in a low wide triangle, the ocellocular line about three-fourths (0.77) the postocellar distance. Occipital carina moderately flanged, separated below from apex of the broad, subequilaterally trigonal oral fossa. Temples with moderately fine, close punctures; post-temporal region very sparsely punctate. Antennae with scapes subcylindrical, the upper halves shallowly, arcuately excised, six-tenths the vertical eye length; pedicel obterete, with an obtuse angulate production, haired at tip, laterally; flagellum with all segments simple, unmodified; relative lengths: scape 18; pedicel 3; flagellar segment one 4, two 3, three 3, four 3, nine 2.5, ten 2.5, eleven 5. Clypeus short; median length one-sixth the vertical eye length; linear laterally, deeply emarginate on each side of the slightly tumid, truncate median lobe.

Thorax fulgid; dorsally with a thin vestiture of short, suberect, silvery hair; the pleura with a heavier vestiture of decumbent silvery pubescence. Pronotum with distinct, moderate puncturation; rounded, ecarinate anteriorly; humeri rounded. Mesonotum with moderately coarse punctures throughout; scutellum tumid, with anterior margin deeply impressed and foveolate, disc punctured like mesonotum, weakly margined laterally; postscutellum granulose, flat. Mesopleura with finer puncturation than mesonotum; episternal suture impressed; metapleura glabrous, horizontally striate. Propodeum without trigonal enclosure; dorsal face with anterior margin edged by a row of foveolae from which diverge backward strong striae or fine oblique carinulae; posterior face obliquely striate above, granulose below, bisected by a deep, immarginate, pyriform impression; lateral carinae absent above, vestigial below; lateral faces subgranulose.

Legs simple. Fore coxae with a small tooth or spine anterio-medially. All tarsi simple unmodified. Longer calcar of hind tibiae two-thirds the length of slender hind metatarsi which are one-half the length of four distal segments combined.

Fore wings with marginal cell three and a third times as long as wide; radius with first abscissa eight-tenths the length of second; third abscissa (truncation) about three-eighths (0.36) the length of second; transverse cubital vein one-third the length of second abscissa of cubitus which is one and a third times the length of first cubital abscissa.

Abdomen fulgid; subglabrous; impunctate; tergites with microscopic transverse aciculation. Last tergite semicircular, flat, without a pygidial area, the disc with scattered, coarse punctures. Fifth and following sternites hirsute apically.

Allotype.—♀; Yuma Indian Reservation, Imperial County, California. May 3–5, 1918. (J. C. Bradley.) [Cornell University.]

FEMALE.—Length 6 mm. Agrees with the male (type) except as follows:

Head, thorax, and first abdominal segment black, remainder of abdomen ferruginous, the second and fifth tergites brunneous discally. Stramineous: mandibles except red apices; fore legs distad of apical third of femora; middle tibiae on outer faces and first two tarsal segments; hind tibiae broadly annulate at base and first two tarsal segments. Antennae brunneous. Tegulae and axillary sclerites fulvous, and also stigma and all veins of fore wings.

Head more cuboidal; vertex more sparsely punctate. Ocellocular line about seven-tenths (0.72) the postocellar distance. Post-temporal region impunctate, without tubercles or welts; oral fossa very broad and shallow. Antennae simple; scape two-thirds the vertical eye length; pedicel not obtusely angulate as in male; flagellum with segments unmodified; relative lengths: scape 20; pedicel 5; flagellar segment one 5, two 4, three 3, four 3, eight 3, nine 3, ten 5. Mandibles edentate beneath at base.

Thorax and propodeum as in male.

Legs simple. Fore coxae without a spine or tooth anteriorly. Fore tarsi with a very weak pecten. Middle and hind tibiae moderately spinose on outer faces.

Fore wings with marginal cell four times as long as wide; radius with first abscissa subequal in length to second, third abscissa three-tenths the length of second; transverse cubital vein one-fourth the length of second cubital abscissa which is one and a half times the length of first abscissa of cubitus.

Abdomen on last tergite with a broad, subequilaterally trigonal pygidial area, the disc with sparse and scattered, coarse punctures.

Distribution.—This species is a late vernal to early aestival xerophile which ranges from the piedmont of the Transverse Ranges district southward throughout the Colorado Desert and the Salton Trough in southern California.

Specimens examined: 16; 13 males, 3 females, as follows:

CALIFORNIA: Claremont, Los Angeles Co.; (C. F. Baker): 2♂; [CU]. Indio, Salton Sink, Riverside Co.; 75 ft. below sea level; May, 1910: 1♂; [*type,* ANSP]; May 1–2, 1918; (J. C. Bradley): 2♂; [CU]. Colorado Desert, five miles south of Palm Springs, Riverside Co.; June 8, 1930; (P. H. Timberlake; in the shade of a leafy plant, *Dicoria canescens*): 1♂; [PHT]. Experiment Farm, Imperial County; May, 1911, May 23, 1912–

June 1, 1912; (J. C. Bridwell; visiting glandular hairs of *Helianthus annuus* [common sunflower]): 2♀, 5♂; [USNM]. Yuma Indian Reservation, Imperial Co.; May 3-5, 1918; (J. C. Bradley): 1♀ (*allotype*), 2♂; [CU].

The paratypic specimens agree with the types in all essential features of livery and structural detail.

Moniaecera (Moniaecera) asperata (Fox) (Fig. 4.)

Crabro asperatus Fox, Trans. Amer. Ent. Soc., XXII, p. 199, (1895); [♂; Las Cruces, New Mexico.]
Moniaecera asperatus Ashmead, Canad. Entom., XXXI, p. 220, (1895).
Rhopalum (*Moniaecera*) *asperatus* Rohwer, Ent. News, XX, p. 323, (1909).

The dentate fore coxae and the compressed subspatulate terminal flagellar article of the male and the callate post-temporal region of the female readily differentiate *asperata* from all other species of *Moniaecera*.

Type.—♂; Las Cruces, Dona Ana County, New Mexico. Elevation, 3883 feet. August. (T. D. A. Cockerell.) [Academy of Natural Sciences of Philadelphia, Type no. 4699.]

MALE. Length 5 mm. Black; head and thorax with greenish, and propodeum with bluish, reflections; legs exclusive of maculation, and second and third abdominal segments, strongly tinged with fuliginous. The following stramineous: mandibles except red apices; fore and middle femora narrowly annulate at apex; fore tibiae entirely save for a dark brown medial spot on inner side; middle and hind tibiae broadly annulate at base; fore tarsi completely; middle and hind metatarsi entirely, and following two segments annulate at base. Light brunneous: antennae; tegulae; spot on axillary sclerites. Last abdominal segment testaceous. Wings clear hyaline, iridescent: fore wing with veins and stigma very light fulvous, the costa and other veins lacteous at base. Hind wing with veins lacteous.

Head fulgid; clypeus, and inner orbits with a broad band of silvery sericeous pile; vertex posteriorly, and temples thinly clad with erect to decumbent silvery hair. Front strongly concave between inner orbits, not transversely strigose, medially just above antennal sockets with a large, slender, declivent spine, flattened above; upper front bisected by a strong furrow from median ocellus, and with scattered coarse punctures; vertex with coarse, rather close though scattered punctures which are closer and finer posteriorly; postocellar line bisected by a fine furrow; ocellocular line seven-ninths (0.77) the postocellar distance. Temples finely punctate; occipital carina weakly flanged, a complete circle in extent and not tangent below but distinctly separated from the hypostomal carinule bordering the subequilateral subtrigonal oral fossa and connected to apex of latter by a short longitudinal carinule. Antennal scapes three-fifths the vertical eye length,

ecarinate, slender, elongate—subfusiform with apical half broadly, shallowly concave; pedicel obterete; flagellum with all segments simple except last which is strongly compressed, flattened, and acinacicate; relative lengths: scape 17; pedicel 4; flagellar segment one 3, two 2.5, three 2.5, nine 2.5, ten 3, eleven 6. Clypeus short; median length about one-fifth (0.214) the vertical eye length, linear laterally and deeply emarginate on each side of the flat, truncate median lobe.

Thorax fulgid; dorsally with a moderate vestiture of short, erect, silvery hair; pleura and sterna more heavily clad with decumbent silvery pubescence. Pronotum distinctly punctate; dorsal face flat, not notched medially, the anterior margin rounded to subangulate but not transversely carinate, the humeri rounded, edentate. Mesonotum with rather coarse, close, evenly disposed punctures throughout; scutellum more sparingly punctate; postscutellum finely, closely punctate. Mesopleura with close, even puncturation throughout, finer than that of mesonotum; episternal suture impressed, foveolate; prepectus sharply margined anteriorly; metapleura glabrous, horizontally costulate. Propodeum glabrous; with fine favose sculpture throughout; dorsal face without a trigonal area, anterior margin with a row of foveolae from which radiate fine striae curving out and down onto posterior face which is bisected by a strong and deep, immarginate, lenticular impression; lateral carinae vestigial.

Legs relatively simple. Fore coxae sharply dentate medio-anteriorly; femora subfusiform; tibiae obterete, the hind pair rather strongly spinose on outer faces. Middle metatarsi elongate, slender-arcuate. Longer hind tibial calcar two-thirds length of hind metatarsi which are four-fifths length of four distal segments combined.

Fore wings with marginal cell four times as long as wide and squarely truncate at apex. Radius with first abscissa seven-twelfths (0.581) the length of second abscissa; third abscissa (truncation) one-third length of second abscissa; transverse cubital vein oblique, inclivous, about two-fifths (0.415) the length of second abscissa of cubitus; first cubital abscissa two-thirds length of second.

Abdomen subfulgid, subglabrous, impunctate. Tergites with very fine transverse aciculation; last tergite subsemicircular, coarsely punctate, without a pygidial area. Apical sternites fringed with hair. Hypopygium subsemicircular, the apex entire.

Allodigm.—♀; Mesilla Park, Dona Ana County, New Mexico. Elevation, 3865 feet. June 9, 1898. (T. D. A. Cockerell; at flowers of *Chilopsis linearis* [Desert willow].)

Female. Length 6 mm. Agrees with the type (male) except as follows:

Livery generally the same but second, third, fourth, and sixth abdominal tergites and all of abdominal venter ferruginous.

Head larger and more cuboidal. Upper inner orbits with distinct, deeply impressed, linear supraorbital foveae; ocellocular distance almost three-fifths (0.581) the postocellar line. Occipital carina distinctly flanged and well

separated medioventrally from apex of the broad and shallow oral fossa which is four times as wide anteriorly as its depth medially; post-temporal region laterad of oral fossa subpolite and with a transverse welt or low tubercle on each side. Antennal scapes slender, elongate, subcylindric throughout, ecarinate, seven-tenths the vertical eye length; pedicel obterete; flagellum with all segments simple; relative lengths: scape 19; pedicel 5; flagellar article one 3.5, two 3, three 3, eight 4, nine 4, ten 5. Clypeus short; one-seventh vertical eye length; the disc tumid medially; apical margin broadly, shallowly excised and subbevelate. Mandibles with lower apical tooth smaller and divergent from upper; lower margin with a large strong tooth beneath at base.

Thorax punctured as in male. Pronotum with a short furrow just behind the subangulate to subdentate humeri. Propodeum with striae of dorsal face stronger and more noticeable; no trace of lateral carinae.

Legs as in male but with middle and hind tibiae more strongly spinose. Fore coxae edentate; fore tarsi with a very weak pecten; middle metatarsi straight to barely arcuate. Longer hind tibial calcar six-tenths the length of slender elongate hind metatarsi.

Fore wings with marginal cell three times as long as wide and broadly, squarely truncate at apex. Radius with first abscissa five-sixths (0.83) the length of second abscissa; third abscissa (truncation) one-third length of second; transverse cubital vein one-fourth the length of second cubital abscissa which is one and a half times the length of first abscissa of cubitus.

Abdomen subglabrous, impunctate. Last tergite with a broad, flat, trigonal pygidial area, the disc with scattered, coarse punctures.

Distribution.—The range of *asperata* extends from the Upper Rio Grande Valley in New Mexico, across the Mexican Highlands and Sonoran Desert of southern Arizona and California, and into the Salton Trough. The dates when the following material was taken indicate that *asperata* has at least two generations a year: one in early or middle spring, and another late in the summer.

Specimens examined: 26; 11 females, 15 males, as follows:

TEXAS: El Paso, El Paso Co.; elevation, 3698 ft.; July 11, 1917: 1♀; [CU].

NEW MEXICO: Mesilla Park, Dona Ana Co.; elevation, 3865 ft.; June 9, 1898; (T. D. A. Cockerell; at flowers of *Chilopsis linearis* [Desert willow]): 1♀; (C. N. Ainslie): 2♀; [USNM]. Mesilla; August 5; (T. D. A. Cockerell; at flowers of *Solanum elaeagnifolium* [white horse-nettle]): 1♂; [USNM]. Las Cruces, Dona Ana Co.; elevation, 3883 ft.; August; (T. D. A. Cockerell): 2♂ [*type* and *paratype*, ANSP], 1♀; [USNM].

ARIZONA: Tempe, Maricopa Co.; elevation, 1159 ft.; August 3, 1917: 1♀; [CU]. Maricopa Mts., Maricopa Co.; April 13, 1947; (H. K. & M. Townes): 12♂, 4♀. Quijotoa, Pima Co.; August 28, 1927: 1♀; [CU].

CALIFORNIA: Palm Springs, Riverside Co.; August 11, 1935; (P. H. Timberlake; on flowers of *Euphorbia polycarpa*) : 1♀; [PHT].

Moniaecera (Moniaecera) evansi Pate (Figs. 1, 5, 6.)

Moniaecera evansi Pate, Ent. News, LVII, p. 239, (1947); [♂; Arizona].

Type.—♂; banks of the Santa Cruz River, Tucson, Pima County, Arizona. Elevation, 2350 feet. August 2, 1946. (Howard E. Evans.) [Academy of Natural Sciences of Philadelphia, Type no. 10596.]

The curiously curved and uncinate plate borne by the eighth flagellar article of the males distinguishes this recently described species from all other forms of *Moniaecera*. In addition, the frontal facial basin of *evansi* is transversely strigose; the postocellar and ocellocular lines are subequal in length; the pronotum and humeri are rounded, edentate and ecarinate; and the mesosternum is concave and densely pilose.

The male genitalia and hypopygium indicate that *evansi* is closely related to *asperata*, though the parameres of the present species are much larger and more foliaceous than in the latter form. Moreover, the hypopygium is much more strongly expanded and spatulate on the apical portion while the basal petiole is very characteristically angulate mediolaterally on each side.

Distribution.—This species is still known only from the type series of males taken recently at Tucson, Arizona, in August.

Moniaecera (Moniaecera) abdominalis (Fox) (Figs. 2, 3.)

Crabro abdominalis Fox, Trans. Amer. Ent. Soc., XXII, p. 198, (1895); [♀; Texas].—Cockerell, Proc. Davenport Acad. Nat. Sci., VII, p. 148, (1898); [New Mexico: Mesilla Valley; Mesilla Park, Sept. 12, on *Isocoma wrightii* (i.e. *Aplopappus heterophyllus*)].—Cresson, Mem. Amer. Ent. Soc., no. 5, p. 52, (1928); [♀; Texas].

Rhopalum (*Crabro*) *abdominale* Hartman, Bull. Univ. Texas, no. 65, Sci. Ser. no. 6, p. 43, (1905); [♀, ♂; Texas: near Austin (biology)].

Rhopalum (*Moniaecera*) *abdominalis* Rohwer, Ent. News, XX, p. 323, (1909); [♀, ♂; Texas: Lee Co. (Birkmann)].

Euplilis abdominalis Pate, Mem. Amer. Ent. Soc., no. 9, p. 47, (1937).

Moniaecera abdominalis Ashmead, Canad. Ent., XXXI, p. 220, (1899).—Pate, Amer. Midl. Nat., XXXI, p. 353, (1944).

The present species bears a marked resemblance to the more westernly distributed *asperata*, from which it may be distinguished

by the simple flagellar apices, edentate fore coxae, and the rather sharply dentate to angulate pronotal humeri of the males, and in the females by the much deeper oral fossa and the flat non-callate post-temporal region of the head. In addition, the ocellocular-postocellar ratio of *abdominalis* is distinctly longer than that of *asperata*.

Type.—♀; Texas. (No other data.) [Academy of Natural Sciences of Philadelphia, Type no. 4698.]

FEMALE. Length 7 mm. Black; the propodeum with greenish reflections; the following eburneous: mandibles except red apices; scape broadly annulate at base and apex; fore femora narrowly annulate at apex; fore tibiae and tarsi entirely; middle and hind tibiae annulate at base; middle and hind metatarsi and tibial calcaria. Abdominal venter and third to sixth tergites ferruginous. Tegulae fulvous; axillary sclerites lacteous. Wings clear hyaline; veins very light fulvous, the longitudinal veins lacteous at base.

Head fulgid; inner orbits narrowly, and clypeus with dense appressed silvery sericeous pile; vertex and temples with sparse, short, decumbent subaureous hair. Front strongly concave between lower inner orbits but neither strigose nor punctate; medially just above antennal sockets with a large, slender, acuminate, declivent spine, flattened above; inner orbits at junction of upper and lower front swollen and subtorate; upper front with microscopically fine cancellate sculpture superposed on which are a few scattered, coarse punctures, and bisected by a fine impressed line from anterior ocellus; supra-orbital foveae linear; vertex coarsely and rather closely punctate, particularly posteriorly; ocelli situated in a low triangle, the ocellocular line almost seven-eighths (0.85) the postocellar distance. Temples with distinct, well-separated, moderate punctures. Occipital carina moderately flanged, efoveate, separated medioventrally from apex of subtrigonal oral fossa which is two-thirds as deep as wide anteriorly, the areas laterad of oral fossa flat, without tubercles or calli, and polite, impunctate. Antennae with scapes slender, subcylindrical, ecarinate, about two-thirds (0.676) the vertical eye length; pedicel obterete; flagellum with all segments simple, unmodified; relative lengths: scape 23; pedicel 5; flagellar segment one 4, two 3, three 3, eight 3, nine 3, ten 6. Clypeus short, one-sixth the vertical eye length; median lobe bisected by a weak keel, the apical margin arcuate. Mandibles as customary for genus; lower margins beneath at base with a large distinct tooth.

Thorax subfulgid; dorsum with a fine inconspicuous vestiture of short, suberect aeneous hair; pleura more noticeably clad with decumbent silvery pubescence. Pronotum strongly, closely punctate; dorsum notched medially; anterior margin rounded, ecarinate except at humeri which are dentate. Mesonotum closely, evenly and distinctly punctate throughout; suture between mesonotum and scutellum very deeply impressed but efoveate; scutellum flat, with microscopic cancellate sculpture and scattered somewhat coarse

punctures, laterally more or less marginate; postscutellum flat, closely, rather finely punctate; lateral edges marginate. Mesopleura rather finely and closely punctate throughout; prepectus sharply margined anteriorly; episternal suture oblique, impressed. Propodeum glabrous; dorsal face with anterior margin coarsely foveolate, medially with a cup-shaped marginate area, followed by a polite, transverse zone of radiating carinules; posterior and lateral faces subopaque, very finely granulate, the posterior face bisected by a large and deep obpyriform depression; lateral carina absent.

Legs simple, normal for genus. Middle and hind tibiae strongly spinose on outer faces. Hind tibiae with longer calcar seven-ninths the length of hind metatarsi which are three-fourths the combined length of four distal segments.

Fore wings with marginal cell three times as long as wide and broadly, squarely truncate at apex; radius with first and second abscissae subequal, third abscissa (truncation) about three-eighths (0.38) the length of second; transverse cubital vein straight, oblique, inclivous, one third the length of second abscissa of cubitus; first abscissa of cubitus seven-ninths (0.77) the length of second.

Abdomen subfulgid, subglabrous; impunctate. Tergites with microscopically fine, transverse aciculation. Ultimate tergite with a broad, flat trigonal pygidial area, the disc perfulgid, with scattered coarse punctures.

Allodigm.—♂; Fedor, Lee County, Texas. June 7, 1903. (Birkmann.) [United States National Museum.]

MALE. Length 5 mm. Agrees with the type (female) except as follows: Livery similar but antennal flagellum entirely stramineous; abdomen wholly black, with purplish and greenish reflections.

Head with supra-orbital foveae not apparent; ocellocular line about seven-eighths (0.88) the postocellar distance. Oral fossa with median depth three-fourths the anterior width. Antennae with scapes cylindrical, not flattened, about five-ninths (0.57) the vertical eye length; pedicel obterete, not angulate below; flagellum with all segments simple, unmodified; relative lengths: scape 17; pedicel 4; flagellar segment one 3, two 2.5, three 2.5, nine 2.5, ten 2.5, eleven 4.5. Clypeus short, one-fifth the vertical eye length. Mandibles edentate beneath at base.

Legs simple. Fore coxae edentate anteriorly. Middle and hind tibiae weakly spinose on outer faces. All metatarsi simple, slender, elongate. Longer hind tibial calcar two-thirds length of hind metatarsi which are about seven-eighths (0.88) the length of four distal segments combined.

Fore wings with marginal cell three times as long as wide; radius with first abscissa about four-fifths (0.81) the length of second, the third abscissa one-half length of second; transverse cubital vein one-third length of second abscissa of cubitus; first cubital abscissa about two thirds (0.64) length of second.

Abdomen subfulgid, subglabrous; generally impunctate. Tergites with a very fine microscopic cancellate sculpture, the last two with scattered, coarse punctures; the pygidium perfulgid. Hypopygium and genitalia as figured.

Distribution.—This species ranges throughout the Gulf Coastal Plain from southern Georgia to eastern Texas as far west as the ninety-eighth parallel. Unlike the other species of *Moniaecera,* all of which seem to be pronounced xerophiles, *abdominalis* has apparently adapted itself to humid mesophytic conditions. From the dates when *abdominalis* has been taken, the species presumably has at least two generations a year.

In addition to the localities recorded below, Hartman found *abdominalis* nesting in relative abundance during August and September in sandy woods five miles southeast of Austin, Texas.

Specimens examined: 11; 7 females, 4 males, as follows:

GEORGIA: Thomasville, Thomas Co.; May 12, 1915: 1♀.

TEXAS: Lamar Co.; August 2, 1941; (R. W. Strandtmann): 1♂; [RWS]. Mineola, Wood Co.; July 19, 1906; (F. C. Bishopp): 1♂; [USNM]. College Station, Brazos Co.; June 10, 1937; (R. W. Strandtmann): 1♀; [RWS]. Fedor, Lee Co.; June 7, 1903; (Birkmann): 1♂, 1♀; [USNM]. "Tex[as]," (no other data): 1♀; [*type,* ANSP]. Sand dunes on Galveston Island, Galveston Co.; July 25, 1938; (R. W. Strandtmann): 1♀; [RWS]. Cuero, Dewitt Co.; June 19: 1♀; [USNM]. Corpus Christi, Nueces Co.; October 16, 1908; (Mitchell & Bishopp): 1♀; [USNM]. Brownsville, Cameron Co.; October 16, 1908; (Mitchell & Bishopp): 1♂; [USNM].

Huavea[4] new subgenus

The unusual structure of the mesopleura, the transversely carinate mesosternum, and the polite, perfulgid habitus readily differentiate *Huavea* from the nominate complex of *Moniaecera.*

Subgeneric Characters.—Polite, fulgid forms with the head, mesonotum and mesopleura relatively finely punctate. Head with the upper front not bisected by a furrow running forward from anterior ocellus to facial basin. Ocelli arranged in a higher triangle (3.0:2.5) than in *Moniaecera* s. s.; ocellocular line one and a half times the postocellar distance.

Mesopleura with well-developed foveolate hypersternauli and a posterior epicnemium defined by a sharp carina descending vertically from the mesopleural pit to the precoxal carina before the middle coxae. Mesosternum sharply and transversely carinate anteriorly. Propodeum with lateral carinae sharp, distinct, and well-developed above and below.

Abdomen with first sternite distinctly shorter than corresponding tergite, and either truncate or abruptly inflexed apically. Last tergite quadrangular in cross section, longer than broad, and with a large, impressed subquadrate area discally. Hypopygium flat, semicircular.

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[4] After the Huave Indians who formerly inhabited the western coastal region of the Isthmus of Tehuantepec, Oaxaca, Mexico.

GENOTYPE: *Moniaecera* (*Huavea*) *chontale* new species.

The subgenus *Huavea* comprehends at present only the following species from southern Mexico.

Moniaecera (Huavea) chontale[5] new species

The polite, dark cyaneous head and thorax, the unusual structure of the mesopleura and male pygidium, and the costulate upper frontal region distinguish *chontale* from all other known forms of *Moniaecera*.

Type.—♂; Salina Cruz, Oaxaca, Mexico. December 7.[6] (Frederick Knab.) [United States National Museum.]

MALE. Length 6 mm. Head and thorax polite, perfulgid, very dark cyaneous; legs and abdomen very dark brunneous. The following eburneous: scapes anteriorly; mandibles except red apices; fore tibiae on outer faces; middle and hind tibiae narrowly annulate at base; all tarsi. Dark brunneous: tegulae and axillary sclerites; antennal scapes and pedicels. Last abdominal segment castaneous. Wings clear hyaline; veins and stigma light brunneous.

Head perfulgid; clypeus, and inner orbits narrowly, with appressed, silvery sericeous pile; vertex with a thin vestiture of suberect, short, dark hair; temples more noticeably clad with decumbent light pubescence. Front between inner orbits glabrous, polite, impunctate; not bisected above by a deep furrow; upper front and vertex to ocellocular line coarsely, longitudinally costulate, with scattered, rather coarse punctures posteriorly. Ocelli arranged in an equilateral triangle which is bisected to behind postocellar line by a fine furrow; postocellar line two-thirds the ocellocular distance. Occipital carina moderate, not appreciably flanged, separated below, not tangent to, apex of oral fossa. Antennae with scapes cylindrical, ecarinate, five-ninths the vertical eye length; pedicel obterete; flagellum with all segments simple, unmodified; relative lengths: scape 21; pedicel 5; flagellar segment one 5, two 4, three 4, ten 4, eleven 6. A small compressed, laminate, disc-shaped process between and above antennal sockets. Clypeus short, flat, median length one-sixth the vertical eye length. Mandibles as customary in genus; lower margins entire and edentate beneath at base.

Thorax perfulgid; with a moderate vestiture which is dark and suberect on dorsum, and silvery and decumbent on pleura. Pronotum distinctly, closely punctate; strongly notched medially, anterior dorsal margin rounded, posterior margin strongly impressed; humeri strongly, acutely dentate, and with a carinule descending vertically from the tooth and another passing backward to the tubercles. Mesonotum closely and evenly striatopunctate; suture between mesonotum and scutellum very strongly impressed; scutellum strongly

[5] After the Chontale Indians of southern Mexico.

[6] Or July 12. The label merely bears the notation "12.7" in arabic numerals, and I have been unable to discover when Knab was at Salina Cruz.

tumid, punctate like mesonotum, the anterior margin foveolate; postscutellum barely punctate. Mesopleura finely acupunctate; prepectus very strongly margined anteriorly; episternal suture arcuate, deeply impressed, strongly foveolate; hypersternauli strongly foveolate; a vertical carina before each middle coxa and continued upward to mesopleural pit. Metapleura glabrous, polite, impunctate. Mesosternum transversely margined anteriorly. Propodeum subglabrous, fulgid; dorsal face margined anteriorly by a row of areoles, the remainder feebly areolate; posterior face bisected by a deep impression on each side of which it is polite then finely rugulose in neighbourhood of well-developed lateral carinae which are simple below; lateral faces subpolite.

Legs simple, normal for genus. Fore coxae edentate anteriorly. All tibiae slender, obterete, not spinose, the middle and hind pair shorter than the slender elongate, simple tarsi; fore tarsi simple. Longer calcar of hind tibiae three-fifths the length of hind metatarsi which are four-fifths the length of the combined four distal segments.

Fore wings short, not surpassing apex of third abdominal tergite; marginal cell three and a half times as long as wide and broadly, squarely truncate at apex; radius with first abscissa six-tenths the length of second, third abscissa (truncation) about one-fourth (0.277) the length of second abscissa; transverse cubital vein oblique, inclivous, two-fifths the length of second abscissa of cubitus which is one and a quarter the length of first cubital abscissa.

Abdomen fulgid; subglabrous; impunctate but with a microscopically fine, transverse aciculation. First segment slender, petioliform but not appreciably nodose at apex; remainder of abdomen gradually ampliate to clavate apex. Last tergite longer than wide, subquadrate in cross section, polite, discally with a large, impressed subquadrate area set off laterally by low ridges, apex truncate. Hypopygium flat, semicircular.

Female. Unknown.

This distinctive Mexican species is known only from the unique male taken on the west coast of the Isthmus of Tehuantepec.

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