

## Taxonomic and Nomenclatural Studies on American Polistine Wasps (Hymenoptera: Vespidae)

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The paper is dedicated to my colleague Dr. Richard M. Bohart, with thanks for his encouragement and patient assistance over the past thirty years.

The recent monograph by Richards (1978) of the social wasps (except Vespinae) of the New World has done much to improve our understanding of the taxonomy of these wasps. Such a monumental work cannot be without errors, nor can all the taxonomic decisions made therein be final or universally accepted. Therefore, in the spirit of continuing and partially correcting the study so admirably initiated by Richards, I offer the following in the hope of further clarifying the taxonomy and nomenclature of some of these wasps.

### Genus *Polistes* Latreille

*Polistes* is a large, cosmopolitan genus of social wasps. The increasing interest in the social behavior of wasps has focused on *Polistes* because species occur almost everywhere, the wasps themselves are relatively mild tempered, and nest activity takes place on a single exposed comb.

The taxonomy of *Polistes* is, however, less amenable to easy study: often the subtle differences between species have not been appreciated by earlier workers, whose species concepts were often broad enough to include several closely related species by modern criteria. Many species are apparently widespread, sometimes exhibiting a bewildering range of color variants. These are considered localized, or geographical, races or varieties and often have been formally named; some species have acquired a formidable clutter of supposed geographic subspecies. In some cases, these forms are truly nothing more than color variants. In others, they appear to be sympatric or allopatric sibling species. Often, morphological evidence is inconclusive and some decisions as to the status of a given form may be nothing more than intuitive.

### Subgenus *Aphanilopterus* Meunier

#### *POLISTES EXCLAMANS* OF AUTHORS

Richards (1978) treated seven forms as geographical segregates of *P. exclamans*. This was in line with my own views on this wasp (Snelling, 1954, 1955, 1970). Previously the following have been considered subspecies of *P. exclamans*: *arizonensis* Snelling, *bahamensis* Bequaert and Salt (= *louisianus* Bequaert), *bilineolatus* Bequaert and Salt, *durangoensis* Snelling, *lineonotus* R. Bohart, *picturatus* Bequaert and Salt, as well as *exclamans* Viereck (*s. s.*). I no longer believe this interpretation to be correct. Rather, I am of the opinion that there are several species, morphologically almost identical, largely allopatric and, possibly, behav-

iorally different. Most of these forms are wholly allopatric and internally homogeneous. I now interpret the group as follows:

*P. arizonensis* **New status**

*P. bahamensis* **New status**

= *P. exclamans louisianus* (syn. by Snelling, 1955)

= *P. bahamensis bilineolatus* **New synonymy**

= *P. bahamensis picturatus* **New synonymy**

*P. exclamans* **New status**

= *P. exclamans durangoensis* **New synonymy**

= *P. instabilis coahuilae* **New synonymy**

*P. lineonotus* **New status**

The form that occurs in southern Arizona and adjacent Mexico was originally described as *P. e. arizonensis*. Throughout its range, this is a remarkably consistent wasp and its color pattern exhibits no tendency to vary toward the richer markings of *P. exclamans* to the east nor toward *P. lineonotus* in Lower California. The head and body are reddish-brown, without mesonotal stripes and with very narrow apical fasciae on the first to third terga. Both *P. exclamans* and *P. lineonotus* have abundant yellow marks on the thorax, including longitudinal mesonotal stripes in *P. lineonotus*, and broad fasciae on all the abdominal terga and most sterna.

In addition to the characteristic color pattern, *P. arizonensis* differs from *P. exclamans* in the more sharply lobate humeral angle of the pronotal keel (as in Fig. 2, versus Fig. 4) and the narrower first tergum (about 0.85–1.00 times as wide as long) which is distinctly depressed beyond the middle when viewed in profile (much as in Fig. 1, versus Fig. 3). Very short (0.02–0.03 mm long) hairs are present on the eyes and are sufficiently abundant to be easily visible at 100× magnification. A very few hairs may be present on the eyes of *P. exclamans*, but these are consistently less than 0.01 mm long and easily overlooked at 100× magnification.

In the more southern parts of its range in Mexico, *P. exclamans* is represented by a color phase which is strikingly similar to *P. arizonensis*. The body is wholly ferruginous, except for the following yellow marks: narrow inner orbital stripe; narrow postorbital line; line or pronotal keel and on scutellum and metanotum; very narrow submedian pair of propodeal stripes; narrow distal fasciae on first three terga and second and third sterna. The wings are yellowish brown. I have seen specimens of these from the States of Jalisco (Guadalajara and Jocototec), Hidalgo (14 mi NW Ixmiquilpan) and Guanajuato (Roque). I have also examined specimens intermediate between this form and more typical *P. exclamans* from Zacatecas (Ojo Caliente, Nochistlan) and Guanajuato (64 km SE La Saucedá).

In 1955 I described *P. e. durangoensis* from a few specimens from the States of Durango and Chihuahua, Mexico. They differed from the typical form in possessing greater amounts of black on the thorax and in the more extensively yellow abdomen. This variant is a trivial one and is synonymized here. Richards (1978) described *P. instabilis coahuilae* from two specimens from Las Delicias, Coahuila, Mexico. I have examined these specimens; in my opinion they are of the same color phase as *P. e. durangoensis* and, therefore, also a synonym of *P. exclamans* (**New synonymy**).

Bohart (1949) described *P. e. lineonotus* from Lower California, where it is

common. Geographically isolated from all its more closely related congeners, this wasp represents a self-consistent population. Although variable in the expression of the markings, they do not tend toward those of either *P. exclamans* or *P. arizonensis* and I believe this wasp should be accorded specific status.

The wasp here called *P. bahamensis* occurs in the Bahamas and Florida; it ranges sporadically along the Gulf Coast to New Orleans, Louisiana. Parts of its range in Florida and Louisiana are sympatric with that of *P. exclamans*. In these areas there is no evidence among the several hundred specimens that I have seen that the two forms hybridize. It is largely on this basis that I feel compelled to regard *P. bahamensis* as a separate entity.

The two remaining forms, *P. bahamensis bilineolatus* and *P. b. picturatus*, are localized, insular variants of *P. bahamensis*. Although each does differ slightly from *P. bahamensis* in the extent of yellow markings, neither is consistently marked on any of the islands and some specimens, which, on the basis of locality should be one or the other subspecies, are marked like typical *P. bahamensis*. Under these circumstances, I can see neither need nor justification for treating these variants as subspecies.

#### *Polistes dominicus* (Vallot)

*Vespa dominica* Vallot, 1802:173.

*Polistes cincta* Lepeletier, 1836:522. ♀. Preoccupied, **New synonymy.**

*Polistes cinctus cinctus*: Richards, 1978:478. ♀, ♂.

*Polistes cinctus* subsp. *barbadensis* Richards, 1978:479. ♀. **New synonymy.**

This is the wasp previously treated as *Polistes cinctus* by various authors. Long unnoticed is the fact, pointed out to me by A. S. Menke (pers. comm.), that *P. cinctus* is preoccupied by *Vespa cincta* Drury (1770), a synonym of *P. annularis* (Linne). The older name of Vallot is based on specimens figured by Réamur (1742 6: pl. 14, figs. 9 & 10). The Réamur specimens were presumably from Santo Domingo and apparently are no longer in existence. Among the Lesser Antillean wasps, only the present species matches the figures at all well.

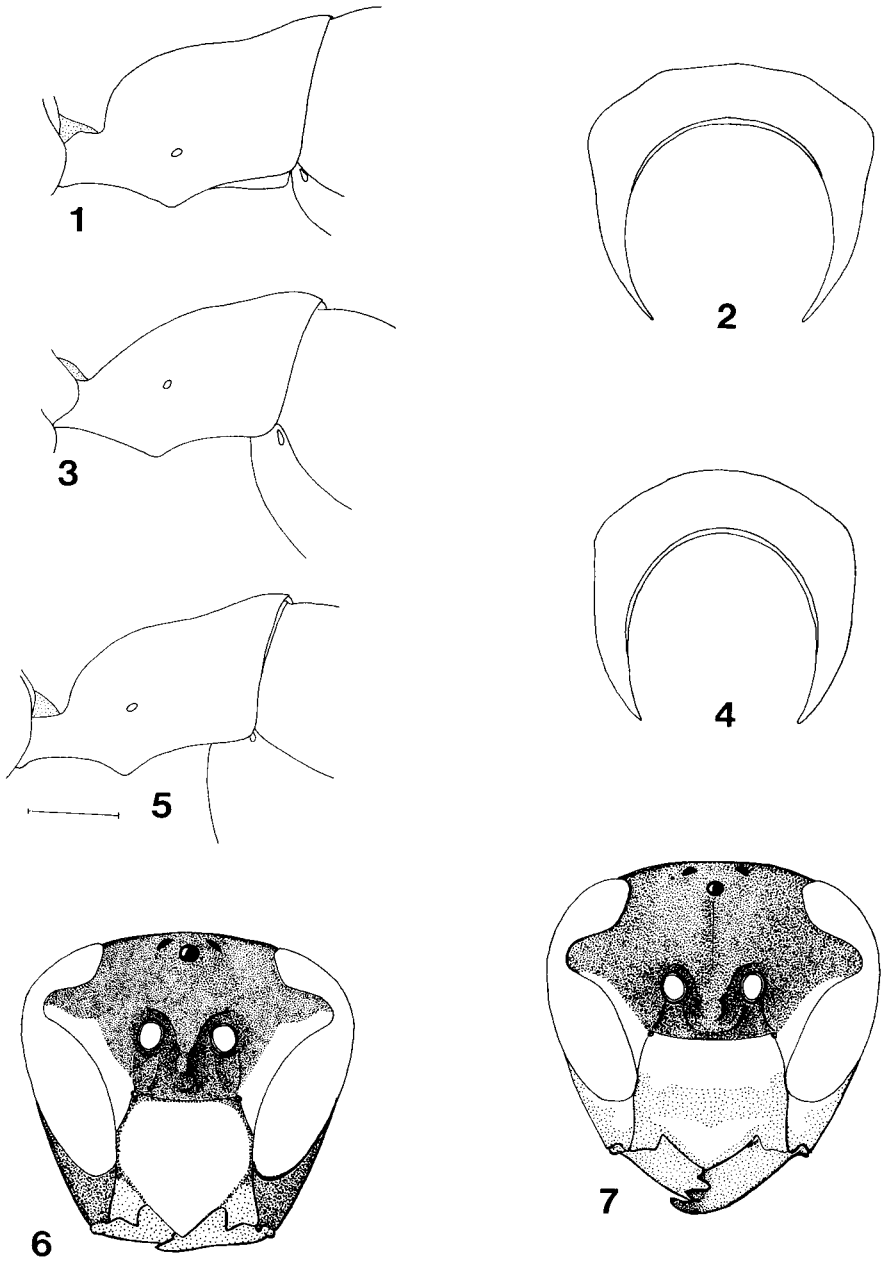
In the absence of verifiable original material, and in order to stabilize the nomenclature, a female **Neotype** is here designated which agrees with the characteristics cited by Richards (1978) for *P. cinctus cinctus*. The neotype is from St. Pierre, Martinique, 23 April 1965 (D. R. Davis) and is in the USNM. Additional specimens, all from Martinique, are neoparatypes and deposited in AMNH, LACM and USNM.

The form from Barbados, described as *P. cinctus* subsp. *barbadensis*, is a minor color variant, here placed in synonymy. In addition to Martinique and Barbados, I have seen material of *P. dominicus* from St. Kitts, Montserrat, St. Vincent, Sta. Lucia and Trinidad. Richards (1978) recorded *P. c. barbadensis* from Mustique and Carriacou Islands.

#### *Polistes bequaertellus* Snelling, **NEW SPECIES**

(Figs. 1, 2)

*Diagnosis.*—Known from females only. Morphologically most similar to *P. exclamans*, but differs in the laterally depressed pronotal keel (Fig. 2) and the



Figs. 1-7. *Polistes* spp. 1, 2, *P. bequaertellus*, profile of first tergum and frontal view of pronotal collar. 3, 4, *P. exclamans*, same. 5-7, *P. boharti*, profile of first tergum, frontal view of head of male and female. Scale line = 1.0 mm.

more slender first tergum, which is distinctly depressed beyond mid-length when viewed in profile (Fig. 1); eyes without erect hairs.

*Description female holotype.*—Measurements (mm): Head width 4.00; head length 3.54; wing length 17.0; total length 18.0.

Structurally almost identical to *P. exclamans*, to which it will run in Richards' (1978) key; pronotal keel distinctly depressed on either side of the humeral angle (Fig. 2); first tergum (Fig. 1) slender (1.2× longer than wide) and, in profile, is distinctly less convex than in *P. exclamans* and depressed at about the distal one-third; eyes without erect hairs.

Integument generally reddish brown, the following yellow: head, except supra-clypeal area and ocellar area; broad stripe confluent with pronotal keel, extending to lower corner; stripe on dorsal margin of pronotum and along posterior margin; pair of long, submedian stripes on mesoscutum and spot, or very short stripe, next to tegula; transverse anterior stripe on scutellum; anterior half of metanotum; large spot on upper mesepisternum; short longitudinal bar at side of propodeum and narrow submedian stripes; narrow stripe along distal margins of terga 1-5, that of second extended forward along lateral margin nearly to base; most of sixth tergum; broad stripes along distal margins of sterna 2-5, slightly constricted sublaterally; entire sixth sternum; apices of all femora; broad outer stripe on pro- and mesotibiae; basal one-third of metatibia; tarsi. Wings yellowish, veins and stigma light reddish brown.

*Type material.*—Holotype and 11 paratype ♀: Cockburn Town, San Salvador, EL SALVADOR, no date (P. Bartsch). Holotype and 8 paratypes in USNM, 3 paratypes in LACM.

*Etymology.*—This species is named in memory of the late Joseph C. Bequaert, in recognition of his many outstanding contributions to the systematics of the Vespoidea.

*Discussion.*—Variation among the paratypes is not very great. Head width, as an indicator of size, varies from 3.64 to 4.10 mm. The mesoscutal stripe adjacent to the tegula, is always present and is usually broad and complete, but in two specimens it is narrow and briefly interrupted. The lateral stripes of the propodeum may be short and separated from the submedian stripes by about their own width, or long and broadly connected to the submedian stripes along their distal one-half (approximately).

The morphological distinctions between this species and *P. exclamans* are slight, but consistent. In *P. exclamans* the pronotal ridge is very slightly, or not at all, depressed mesad of the humeral angle, and often not depressed below it (Fig. 4). In that species, too, the first tergum is a little stouter, about 1.0-1.1 times longer than wide, and in profile is more convex and weakly, if at all, depressed in the apical one-third (Fig. 3). The first abdominal tergum of *P. bequaertellus* is a little more slender (1.15-1.28 times longer than wide,  $\bar{x}$  = 1.20). In *P. exclamans* the thorax is more abundantly marked with yellow and the distal stripes of the abdominal terga are broader and sublaterally constricted.

Superficially, *P. bequaertellus* resembles *P. cubensis* Lepeletier, but that species has conspicuous short hairs on the eyes, lacking in *P. bequaertellus*. The common Central American species, *P. instabilis* Saussure, is also similar but is extensively black on the thorax and abdominal venter, lacks mesoscutal stripes and is generally less richly marked (though with four propodeal stripes).

Subgenus *Epicnemius* Richards*Polistes pacificus* FABRICIUS

*Polistes pacificus* Fabricius, 1804:274.

*Polistes liliaciosus* Saussure, 1854:97, pl. 11. fig. 7. ♀. **New synonymy.**

*Polistes liliaceusculus* Saussure, 1854:98. ♀. **New synonymy.**

*Polistes modestus* F. Smith, 1862:38. ♀. **New synonymy.**

*Polistes pacificus* var. *flavopictus* Ducke, 1918:360, 374. ♀. **New synonymy.**

*Polistes pacificus* var. *trinitatis* Bequaert, 1937:195, 197. ♀. **New synonymy.**

Richards (1978) treated all of the above synonymous forms as subspecies of *P. pacificus*, a species which ranges from southern Texas to Argentina and Paraguay. These are all based on varying color combinations of black, ferruginous and yellowish markings. The darkest form with reduced yellow and ferruginous markings is *P. p. modestus* in the north. The southern form, in Brazil, Paraguay and Bolivia, is *P. p. liliaciosus*, with abundant yellow markings, including broad mesonotal stripes.

Each of these forms appears distinctive when isolated examples are seen. It is also true that when several hundred specimens from throughout the range of the species are available, there is a continuous cline of color variation. Richards noted the difficulty of dealing with this complex of overlapping forms, but opined that "several . . . will ultimately turn out to be species . . ." I do not agree with this prediction; too much obvious intergradation is present in the samples I have seen for this prediction to hold up. Nor do I see any utility in recognizing a series of subspecies based on selected populations in a highly variable species.

*Polistes boharti* Snelling, NEW SPECIES

(Figs. 5-7)

*Diagnosis.*—Related to *P. pacificus*, to which it will run in Richards' key. Male differs in having clypeus yellow, with apex acute, and digitus of genitalia with only a few straight setae. Female differs in having apex of clypeus acute, genal ridge complete to base of mandible; greatest width of gena equal to greatest width of eye, in profile.

*Description male holotype.*—Measurements (mm): Head width 3.74; head length 3.59; wing length 13.5; body length (head + thorax + extended abdomen) 19.5.

Head (Fig. 6): Slightly broader than long in frontal view, posterior ocelli anterior to slightly convex occipital margin; least length of malar area subequal to minimum antennal socket diameter. Clypeal breadth (between inner orbits) and length subequal; clypeus contiguous with eye margin for distance equal to maximum antennal socket diameter; apex of middle lobe acute, margins nearly straight; lateral sinus deep. Interocellar distance about 1.3 times diameter of anterior ocellus; ocellocular distance about 2.1 times diameter of anterior ocellus; ocelloccipital distance about 3.0 times diameter of anterior ocellus. Antennal segment 13, in profile, hardly curved in ventral view, about 1.4 times longer than broad. Gena, in profile, widest at about midlength, about equal to profile width of eye; genal ridge distinct, somewhat sinuate, continuous to base of mandible, though weak below sinuation.

Thorax: Pronotal keel well developed, narrowly lamellate, abruptly rounded onto side, blunt below on side; fovea well developed. Epicnemial groove strong;

dorsal groove of mesepisternum absent; entrance to spiracular chamber slightly raised, about half as wide as subalar plate. Groove between metepisternum and propodeum very weak, median furrow of propodeum broad, with fine, well spaced, transverse striae in middle which do not extend onto side except below; muscle-slit with sides converging above, apex narrowly rounded.

Abdomen: First tergum, in dorsal view, about as broad as long, spiracle prominent; in profile, sloping up steeply behind insertion of muscle (Fig. 5). Last ventral segment broad, apex rounded, disc depressed.

Terminalia: Digitus with only a few straight setae.

Sculpture: Clypeus dull, distal one-fourth closely micropunctate, remainder of disc contiguously micropunctate; head and thorax generally dull, contiguously minutely granulopunctate.

Color: Black. The following ferruginous: mandible; lateral lobes of clypeus; antenna (last 6 segments darker above); most of legs (except coxae, trochanters and dorsal portions of femora); irregular blotch on each side of second tergite. The following yellow: minute mandibular spot; clypeus mostly; inner orbital stripe, well into ocular sinus; outer orbital stripe (somewhat reddened); pronotal collar and dorsal margin and stripe down side almost to lower corner and spot at lower corner; margin of tegula; very narrow, evanescent stripe along anterior margin of scutellum; distinct stripe along anterior margin of metanotum; small spot on upper mesepisternum; broad submedian propodeal stripes; propodeal valve; anterodorsal stripe and ventral blotch on mesocoxa; anterodorsal stripe on metacoxa; apical fasciae on first three terga, somewhat broadened laterally on first and second; narrow apical fascia on second sternum, weak across middle. Wings yellowish, slightly clouded; veins and stigma yellowish brown.

*Female allotype*.—Measurements (mm): Head width 3.64; head length 3.33; wing length 11.5; total length 15.0 (paratypes: head width 3.69–4.10; head length 3.33–3.79; wing length 11.5–13.5; total length 15.0–17.0).

Head (Fig. 7): Slightly broader than long in frontal view; ocelli, in frontal view, well anterior to nearly straight occipital margin; minimum length of malar area distinctly greater than minimum antennal socket diameter. Clypeal breadth slightly greater than length; clypeus contiguous with eye for distance about equal to minimum antennal socket diameter; apex of middle lobe acute, margins nearly straight, lateral sinus deep. Interocellar distance about 1.6 times diameter of anterior ocellus; ocellocular distance about 2.5 times diameter of anterior ocellus; ocelloccipital distance about 3.4 times diameter of anterior ocellus. Genal profile widest at about midlength and equal to greatest width of eye in profile; genal ridge distinct to base of mandible, weaker below, slightly sinuate.

Remainder about as in male, except usual sexual differences. Lower gena and malar area tessellate and moderately shiny, with sparse, conspicuous, moderate punctures (about 0.04 mm diameter).

Color: Black. The following ferruginous: mandible; most of malar area, transverse clypeal band; antenna (last six segments infuscated above); pale stripe on upper two-thirds of outer orbit; femoral apices; tibiae; tarsi. The following yellow: most of clypeus; irregular blotch on malar area adjacent to eye; inner orbital stripe, extending into ocular sinus; pronotal collar and dorsal margin and stripe down side to below level of fovea; side of axilla; anterior transverse stripe on scutellum and metanotum; spot on subalar plate; tegula; spot on upper mesepisternum; pair

of submedian propodeal stripes; propodeal valve; anterodorsal stripe on meso- and metacoxae; broad apical stripes on first three terga, sublaterally constricted on second and third segments, moderately expanded at side; medial one-half of margin of fourth tergum; very narrow margin of second sternum, greatly expanded at side. Wings as in male.

*Type material.*—All from MEXICO: Holotype male: Compostela, Nayarit, 26 Aug. 1959 (A. S. Menke and L. A. Stange). Allotype female: 3.9 km NE Taxco, elev. 1707 m, Guerrero, 16 Sept. 1976 (C. D. George and R. R. Snelling). Paratypes: 1 ♀, 64 mi W. Tehuantepec, Oaxaca, 21 July 1952 (E. E. Gilbert and C. D. MacNeil); 1 ♀, Terra Blanca, Vera Cruz, 15 Aug. 1962 (H. E. Milliron); 1 ♀, Santa Lucia, elev. 4000 ft, Sinaloa, 4 Aug. 1964 (W. R. M. Mason). Holotype and allotype in LACM; paratypes in CNC and UCB.

*Etymology.*—This species is dedicated to R. M. Bohart, colleague and early inspiration to my own work in vespoids.

*Discussion.*—Richards (1978) tentatively recorded under *P. pacificus* a female from Vulkan, Colima, MEXICO, which he thought might represent a different species; evidently this specimen is *P. boharti*.

The paratype females are somewhat variable in the extent of the ferruginous markings. In one (Tehuantepec), the clypeal stripe is broad and the outer orbital stripe is connected to the expanded blotch of the malar area; the yellow malar blotch is reduced to a narrow stripe along the lower orbit of the eye. There is a very obscure, reddish blotch on each side of the second tergum. The two remaining paratypes have only minute, ferruginous spots on the clypeal disc; both have distinct, ferruginous blotches on the second tergum.

Although this species is obviously close to *P. pacificus* the differences noted above should easily separate the two. The characteristic setation of the male digitus of *P. boharti* is especially distinctive. Although the male genitalic structures of the two species are very similar, the digitus of *P. pacificus* males bears many dark, stout, distally curved or hooked setae.

Females of the two species are similar. In females of *P. pacificus* the genal ridge is usually weak below, often not reaching much below the level of the lower one-fifth to one-fourth of the eye; if it extends below this level, it is very weak and rarely attains the base of the mandible. In *P. boharti* the ridge is as strong at the mandibular base as elsewhere. The gena, in profile, is narrower than the greatest eye width in *P. pacificus*, greater in *P. boharti*. The lower (lateral) extension of the pronotal ridge is not depressed in *P. pacificus* and a lobate humeral angle is not defined; in *P. boharti* the pronotal ridge is definitely depressed below the humeral angle and the latter is thus lobate.

### *Polistes palmarum* Bequaert

*Polistes major* var. *palmarum* Bequaert, 1936:11. ♀.

*Polistes major* subsp. *slevini* R. Bohart, 1949:103. ♀. **New synonymy.**

This wasp is completely allopatric to *P. major* Beauvois, of which it has been considered a subspecies. The color pattern is remarkably stable and different from that of *P. major* and *P. palmarum* is therefore considered to be a separate species. The range of *P. palmarum* extends from canyons along the western margin of the Colorado Desert in California to the Cape Region of Lower California. Specimens

from the Cape Region were described as a separate subspecies, *P. major slevini*, by Bohart (1949). This form, with somewhat darker red integument than in more northern samples, is a minor variant of *P. palmarum*.

**Genus *Clypearia* Saussure**

***Clypearia naumanni* Richards**

*Clypearia naumanni* Richards, 1978:197-198. ♀.

Richards (1978) described this species from a single female from Barro Colorado Island, Canal Zone, PANAMA. The following specimens extend the range to the north: 1 ♀, Hacienda Comelco, 24 km NW Cañas, Guanacaste Province, COSTA RICA, 13 Jan. 1972 (E. R. Heithaus; LACM); 1 ♀, Los Mangos, Los Tuxtlas, Vera Cruz, MEXICO, 11 Sept. 1973 (M. Sousa; LACM).

**Genus *Mischocyttarus* Saussure**

Subgenus ***Kappa*** Bequaert

***Mischocyttarus atrocyanus* Zikán**

*Mischocyttarus atrocyanus* Zikán, 1949:204. ♀.

*Mischocyttarus (Kappa) atrocyanus*: Richards, 1978:297. ♀.

Previously known only from PANAMA (BoQUITOS, Volcan de Chiriqui), COSTA RICA (San José) and MEXICO (Yucatán, no further data). New distribution data: Fortin de las Flores Vera Cruz, MEXICO; 2.5 mi W Quezaltepeque, EL SALVADOR; 9 km NW Gamboa, Canal Zone, PANAMA. The short series from near Gamboa is associated with two nests. One of these is small (12 cells), with a centrally placed pedicel; a single wasp was on the nest. The second nest, oblong, with the pedicel at one end, consists of 74 cells (many barely begun) and had seven or eight wasps when collected. Both nests were suspended under leaves.

***Mischocyttarus immarginatus* Richards**

*Mischocyttarus immarginatus* Richards, 1940:182. ♀.

*Mischocyttarus oaxacanus* Zikán, 1949:168-169. ♀, ♂. **New synonymy.**

*Mischocyttarus immarginatoides* Zikán, 1949:236. ♀ (*nomen nudum*).

Zikán (1949) described *M. oaxacanus* from a few specimens from several localities in MEXICO (Nuevo León and Oaxaca). Richards (1978) omitted mention of *M. oaxacanus* in his treatment of this genus. Dr. Richards informed me (*in litt.*) that he failed to find specimens that agreed with Zikán's description either in Paris or in Zikán's collection. The description and figures of *M. oaxacanus* agree, however, with specimens of *M. immarginatus* and I think it safe to assume them conspecific; *M. immarginatus*, described in 1940, has priority over *M. oaxacanus* (**New synonymy**).

Richards (1978) recorded *M. immarginatus* from MEXICO (Guerrero, Nayarit, San Luis Potosí, Vera Cruz and Yucatán), NICARAGUA and COSTA RICA. I have seen specimens from MEXICO (Guerrero, Jalisco, Nayarit, Oaxaca, Sinaloa and Yucatán), GUATEMALA (El Rancho), HONDURAS (Tegucigalpa), NICARAGUA (Managua; San Juan del Sur) and COSTA RICA (Hacienda Comelco and Nicoya, Guanacaste Province).

***Mischocyttarus tolensis* Richards**

*Mischocyttarus tolensis* Richards, 1941:128. ♀.

This species was known from a few specimens from PANAMA, (Tolé; Barro Colorado Island; Alajuela). I have seen the following additional material: 1 ♂, 9 km NW Gamboa, Canal Zone, PANAMA, 4–8 Aug. 1975 (E. M. and J. L. Fisher; LACM); 4 ♀, Puerto Viejo, Heredia Province, COSTA RICA, 6 Aug. 1965 (R. J. Hamton; LACM).

The male of *M. tolensis* is unknown and the male collected near Gamboa is only provisionally assigned to *M. tolensis*. In the key to males of *Kappa* by Richards (1978), it runs to couplet 7 where it fails to agree with either alternative. The last antennal segment is about 2.5 times longer than wide and is distinctly shorter than the third flagellar segment; the occiput is sharply margined; the propodeal furrow bears abundant fine punctures and sparse coarser punctures; the propodeal valves are black; the clypeus and mandibles are largely ferruginous. Except for the flagellar characters and usual sexual differences, the male is very similar to females of *M. tolensis*, but lacks erect hairs on the eyes.

Subgenus ***Monocyttarus*** Richards

***Mischocyttarus flavitarsis* (Saussure)**

*Polybia flavitarsis* Saussure, 1854:199. ♀.

*Mischocyttarus flavitarsis* var. *centralis* Bequaert, 1933:129. ♀. **New synonymy.**

*Mischocyttarus flavitarsis* var. *idahoensis* Bequaert, 1933:133. ♀. **New synonymy.**

*Mischocyttarus flavitarsis* var. *kaibabensis* Bequaert, 1933:133. ♀. **New synonymy.**

*Mischocyttarus flavitarsoides* Zikán, 1949:236 (*nomen nudum*).

The range of *M. flavitarsis* extends from the Pacific Coast to the Rocky Mountains, from British Columbia and Alberta to northern Mexico. Throughout this range there exist a number of color phases which have been treated as subspecies: *M. f. centralis* Bequaert, *M. f. idahoensis* Bequaert, *M. f. kaibabensis* Bequaert, and *M. f. navajo* Bequaert, in addition to the nominate form. These various forms are based on differing combinations of the basic black and yellow color pattern, including replacement of black by ferruginous.

The northern, melanic, form is *M. f. idahoensis*, which is black, with greatly reduced yellow markings. The xanthic, southern, form is *M. f. kaibabensis*, in which the black color is completely replaced by ferruginous. Complete replacement of black by ferruginous also occurs in some populations of *M. f. centralis* from northern México, but the wings are yellowish rather than brown as in *M. f. kaibabensis*.

While the various color phases, in their ideal phenotypes, are distinct from one another, it is also true that considerable intergradation takes place in areas between such populations. In general, the variation is clinal and one form gradually replaces another. This is especially true of the series *M. f. idahoensis* → *M. f. flavitarsis* → *M. f. centralis* → *M. f. kaibabensis*. These forms do not, in my opinion, merit formal recognition. Each represents a selected point in a long clinal series. Therefore, *M. f. centralis* = *M. f. idahoensis* = *M. f. kaibabensis* = *M. flavitarsis*.

One form, *M. f. navajo*, seems to be much more stable, perhaps due to its relatively isolated distribution in central and southern Arizona. I have not yet

seen any material which I can consider to be intermediate between *M. f. navajo* and any other of the color phases attributed to *M. flavitarsis*. Therefore, I am inclined to believe that *M. navajo* should be elevated to species level until evidence is advanced to the contrary.

***Mischocyttarus navajo* Bequaert**

*Mischocyttarus flavitarsis* var. *navajo* Bequaert, 1933:133. ♀.

This wasp is found in Arizona, southwestern New Mexico and northern Sonora. It is common and quite stable in its color pattern. The wings are dark fuscous and the thorax is principally blackish, with limited yellow markings on the pronotum, spot below tegula and a pair of submedian propodeal stripes; the first tergum is black, with a broad apical yellow band. Richards (1978) remarked that this is "rather larger than subsp. *flavitarsis*." I have measured head width of 50 randomly selected females of *M. flavitarsis* and 50 of *M. navajo*, no two individuals with the same collection data.

The results confirm Richard's assumption. For *M. flavitarsis* the head width range is 3.08–3.95 mm, with the mean at 3.52 mm; only 24% of the specimens measured had a head width in excess of 3.75 mm. Head width, in the measured specimens of *M. navajo* ranged between 3.18 and 4.21 mm, with a mean width of 3.75 mm; 62% of the measured specimens have a head width of 3.75 mm or more.

Subgenus *Monacanthocnemis* Ducke

***Mischocyttarus chalucas* Snelling, NEW SPECIES**

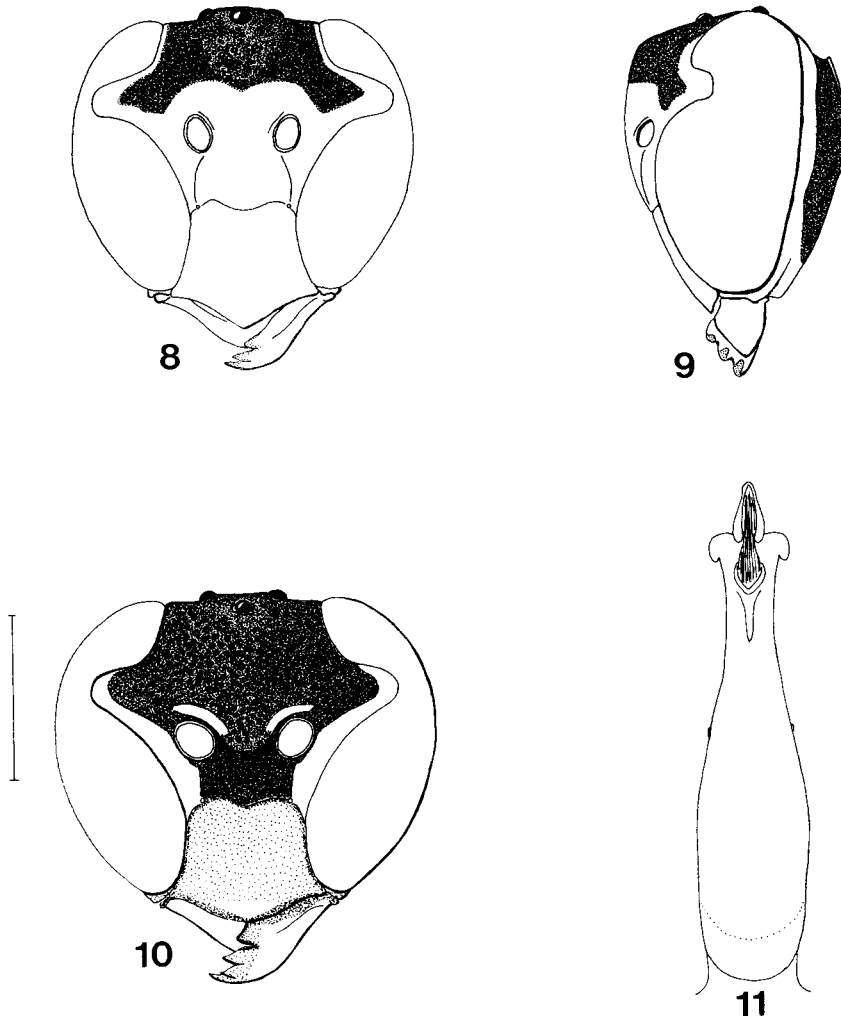
(Figs. 8–11)

*Diagnosis.*—First tergum slender, anterior width less than distal width of metafemur; dorsal mesepisternal groove distinct; mesoscutum closely to densely coarsely punctate, interspaces with abundant very fine punctures; last antennal segment of male weakly curved, about 2.5 times longer than broad at base; and fifth to seventh flagellar segments a little broader than long.

*Description female holotype.*—Measurements (mm): Head width 2.32; head length 1.65; wing length 7.5; total length 11.5.

Head (Fig. 10): About 1.4 times broader than long; ocelli at top of flat vertex. Malar space very narrow, eye nearly touching base of mandible. Clypeus narrow, about 1.2 times longer than wide, contiguous with eye for distance about twice minimum antennal socket diameter; apical margin obtuse. Interantennal distance about twice minimum antennal socket diameter; minimum antennal socket diameter about 1.5 times antennocular distance and slightly greater than antennoclypeal distance. Flagellum stout, first segment about 0.8 times length of scape and longer than combined second and third segments. Frons very slightly bulging and very weakly depressed in middle. Interocellar distance about 1.6 times anterior ocellus diameter; ocellocular distance subequal to anterior ocellus diameter. Gena about one-half as wide as eye profile at sinus.

Thorax: Slender, about 1.5 times longer than wide. Pronotal keel, in dorsal view, concave, strongly lamelliform laterad, weak in middle, strongly lobate and somewhat reflected at humerus. Proepisternum bi-reflexed in front. Propodeal furrow broad, weak, without median ridge; valves narrow. Mesotibia with two



Figs. 8-11. *Mischoctytarus chalucas*. 8, ♂ head, frontal view; 9, ♂ head, lateral view; 10, ♀ head, frontal view; 11, petiole dorsal view. Scale line = 1.0 mm.

apical spurs. Inner, distal margin of last two metatarsal segments not produced, outer margin strongly produced.

Gaster: Petiole slender, about 3.5 times longer than greatest width, when measured from propodeal insertion (Fig. 11); spiracle at about midlength and short of apex of metacoxa.

Sculpture: Clypeus and supraclypeal area dull, subcontiguously to densely micropunctate and with dense to close, moderate punctures; gena dull, closely micropunctate and with sparse, somewhat coarser punctures; occiput shiny, with irregularly spaced moderate punctures and a few micropunctures; remainder of head and thorax shiny, with dense to close, moderate punctures, interspaces closely micropunctate.

Color: Black, but irregularly replaced with ferruginous on head (especially clypeus and gula) and thorax (especially below and on side). Following pale yellow: broad stripe along dorsal mandibular margin; transverse bar at apex of clypeus; inner orbital line to top of sinus; curved bar above each antennal socket; outer orbital line nearly to top of eye; keel, most of dorsal margin and lower corner of pronotum; subalar and lower posterior spot on mesepisternum; broad anterior stripe on scutellum; anterior stripe, narrowed in middle, and lateral extensions of metanotum; large, submedian, posterior spots on propodeum; valves; narrow distal fascia on first five terga and second to fifth sterna, that of second tergum extended along side nearly to base; short lateral stripe on sixth tergum and sternum; short apicoventral stripe on procoxa; outer stripe on mesocoxa; two dorsal stripes on metacoxa; small apicodorsal spot on each femur; outer stripe on protibia; basal spot, long median stripe and small apical spot on mesotibia; short stripe on outer face of probasitarsus and on outer face of prodistitarsus. Tibial spurs dirty white. Wings clear, slightly infuscated; veins and stigma brown.

*Male allotype*.—Measurements (mm): Head width 2.10; head length 1.77; wing length 7.0; total length 11.0.

Similar to female, except usual sexual differences, and the following.

Head (Fig. 8): About 1.2 times wider than long. Mandible tridentate. Antennoclypeal distance a little greater than minimum antennal socket diameter; minimum antennal socket diameter about twice antennocular distance. Frons bifaced, i.e., there is a more or less vertical anterior portion and a definite dorsal face forming a flat plane in front of anterior ocellus (Fig. 9). Scape stout-pyriform, about 1.6 times longer than broad, apical width about 1.6 times basal width; first flagellar segment flattened, about 1.8 times longer than broad, about twice longer than second; fifth to seventh segments broader than long; eighth as broad as long and narrower than seventh; ninth and tenth a little longer than broad; apical segment about 2.5 times longer than wide at base, slightly curved in profile.

Color: Very similar to that of female, but underside of scape, ventral surface of thorax and coxae yellow.

*Type material*.—Holotype female and allotype: Tuxtla Gutierrez, Chiapas, MEXICO, 7 June 1964 (J. D. and D. Pallister) in AMNH.

*Etymology*.—Chalucas, for whom this species is named, is a trickster god and folk hero of the Zoque Indians indigenous to the Tuxtla Gutierrez region.

*Discussion*.—This species appears to be most similar to the South American *M. punctatus* (Ducke). The petiolar spiracle, however, is anterior to the end of the metacoxa (slightly beyond in *M. punctatus*), the dorsal mesepisternal groove is stronger, and the mesoscutal punctures are clearly a mixture of moderate (0.04–0.06 mm diameter) and very fine (less than 0.01 mm diameter) punctures. In *M. punctatus*, the finest punctures are about 0.02 mm diameter and grade up to the punctures of moderate size (about 0.05 mm diameter) and the punctures, irrespective of size, are very evenly spaced, while the moderate punctures of *M. chalucas* are irregularly spaced from subcontiguous to interspaces of more than a puncture diameter.

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## LITERATURE CITED

- Bequaert, J. C. 1933. The nearctic social wasps of the subfamily Polybiinae (Hymenoptera, Vespidae). *Ent. Amer. (n.s.)* 13:87-150.
- . 1936. Two new color forms of *Polistes major* Palisot de Beauvois from California and Arizona (Hymenoptera, Vespidae). *Ent. News* 47:7-13.
- . 1937. The American *Polistes* with prepectal suture. Their structural characters, distribution and variation. *Archiv. Inst. Biol. Vegetal.* 3:171-205.
- Bohart, R. M. 1949. Notes on North American *Polistes* with descriptions of new species and subspecies (Hymenoptera: Vespidae). *Pan-Pac. Ent.* 15:97-103.
- Drury, D. 1770. *Illustrations of natural history*. London. Vol. 1, xxviii + 130 pp.
- Ducke, A. 1918. *Catalogo das Vespas do Brasil*. *Rev. Mus. Paulista* 10:314-374.
- Fabricius, J. C. F. 1804. *Systema Piezatorum*. Hafniae, 572 pp.
- Lepeletier de St. Fargeau, A. L. M. 1836. *Histoire naturelle des insectes. Hyménoptères. I. Roret's Suites à Buffon*, Paris.
- Réaumur, R. A. F. de. 1742. *Mémoires pour servir à l'histoire des insectes*, 6. Paris, 608 pp.
- Richards, O. W. 1940. Preliminary diagnoses of some new species of *Mischocyttarus* Saussure (Hymenopt., Vespidae). *Ann. Mag. Nat. Hist. (11)* 5:176-183.
- . 1978. The social wasps of the Americas, excluding the Vespinae. *Publ. 786, Brit. Mus. (Nat. Hist.)*, London, 580 pp.
- Saussure, H. de. 1854. *Etudes sur la Famille des Vespides 2. Monographie des guêpes sociales on de la tribu des Vespiciens*. Paris and Geneva, pp. 97-256.
- Smith, F. 1862. Description of new species of Hymenoptera collected at Panama by R. W. Sketch, with a list of described species. *Trans. Ent. Soc. London (3)* 1:29-44.
- Snelling, R. R. 1954. Wasps of the genus *Polistes* in California and Arizona (Hymenoptera: Vespidae). *J. Kansas Ent. Soc.* 27:151-155.
- . 1955. Notes on some *Polistes* in the American Museum of Natural History, with descriptions of New North American subspecies (Hymenoptera, Vespidae). *Amer. Mus. Novit.* 1701, 9 pp.
- . 1970. The social wasps of Lower California, Mexico (Hymenoptera: Vespidae). *L. A. Co. Mus. Contr. Sci.* 197, 20 pp.
- Vallot, J. N. 1802. *Concordance systématique, servant de table des matières à l'ouvrage de Réaumur intitulé Mémoires*, Paris, 198 pp.
- Zikán, J. F. 1949. O Gênero *Mischocyttarus* Saussure (Hymenoptera, Vespidae), com a descrição de 82 espécies novas. *Bol. Parq. Nac. Itatiaia* 1:1-251.