

NEOTROPICAL SPECIES OF PSEN AND PSENEO (HYMENOPTERA, SPHECIDAE, PSENINI)

by

J. P. VAN LITH

Allard Piersonstraat 28c, Rotterdam

ABSTRACT

The following new species from Central and South America are described and illustrated: *Psen* (*Psen*) *metallicus* (♂), *paranaensis* (♀ and ♂) and *erythrocnemus* (♀ and ♂) and *Psen* (*Pseneo*) *canalicus* (♀), *auriger* (♀ and ♂), *aureolus* (♀ and ♂), *funicularius* (♂), *magnificus* (♀), *taschenbergi* (♀ and ♂), *auriventris* (♀) and *eliasi* (♀ and ♂). Keys to all American species, supplementary descriptions, illustrations of male genitalia and new records are given.

Since Malloch's revision of the Nearctic Psenini (1933), a study of the North American *Pseneo* was published by Krombein in 1950. Cameron (1891) described eight Psenini from Mexico, six of which belong to the subgenera *Psen* and *Pseneo*. More recently a few Central American species were published by Pate (1946) and Bohart & Grissell (1969). From South America only two species, both belonging to *Pseneo* (Taschenberg, 1875, and Brèthes, 1910), were known.

The total number of Psenine forms from North and South America now amounts to over 100 (partly still unpublished), of which 35 occur in Central and South America. Many institutions and private collectors kindly sent me their material for study. Of course, I am aware that there are still many unsorted Psenini waiting for a name label in other museums and also that the collections which I could study usually contain only small samples of the Neotropical Psenine fauna. Yet I hope that the keys presented in this paper may form a useful basis for further studies of the Neotropical Psenini.

There are certainly good reasons to consider *Psen* and *Pseneo* distinct genera, as Bohart & Grissell (1969) do. However, pending the solution of some problems relating to Palaearctic and Indo-Australian Psenini, I prefer to maintain, provisionally at least, *Psen* and *Pseneo* as subgenera of *Psen* Latreille, in accordance with Malloch (1933) and Gittins (1969). Gittins' key to the genera and subgenera is apparently based on Nearctic forms and needs some re-construction to include also the Neotropical species.

I am much indebted to the authorities of the museums and to the private collectors who entrusted me with their material. In particular I am grateful to the institutions who sent me valuable types (museums of Buenos Aires, Cambridge (Mass.), Halle). They are mentioned in the following list, together with the symbols used in the text. I am also much obliged to Mr. Colin R. Vardy of the British Museum (Natural History), London, who was always very helpful to me, especially during my visits there.

- AMNH — The American Museum of Natural History, New York, N.Y., U.S.A., J. G. Rozen, Jr. and Mrs. M. Favreau
- BM — British Museum (Natural History), Department of Entomology, London, U.K.; L. A. Mound, C. R. Vardy
- CNC — Entomology Research Institute, Canada Department of Agriculture, Ottawa, Canada; J. Barron, L. Masner, C. M. Yoshimoto
- CRB — C. R. Baltazar collection, Manila, Philippine Islands
- CU — Cornell University, Department of Entomology and Limnology, Ithaca, N.Y., U.S.A.; L. L. Pechuman, A. C. Miller
- GRF — G. R. Ferguson collection, 1972; now in Entomological Museum of the Oregon State University
- HT — H. and M. Townes collection, American Entomological Institute, Ann Arbor, Michigan, U.S.A.
- IML — Instituto Miguel Lillo, Tucumán, Argentina; J. A. Haedo, A. Willink
- MACN — Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina; M. J. Viana, M. A. Fritz
- MCZ — Museum of Comparative Zoology, Harvard College, Cambridge, Massachusetts, U.S.A.; Ms. J. C. White
- MF — Manfredo A. Fritz collection, Buenos Aires, Argentina
- ML — Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands; S. C. Willemstein, C. van Heijningen
- OSU — Oregon State University, Entomological Museum, Corvallis, Oregon, U.S.A.; G. R. Ferguson
- PMFV — P. M. F. Verhoeff collection, Utrecht, The Netherlands
- SEM — Snow Entomological Museum, University of Kansas, Lawrence, Kansas, U.S.A.; Charles D. Michener, George W. Byers
- SMF — Senckenberg Museum, Frankfurt/Main, Germany
- UFP — Universidade Federal do Paraná, Departamento de Zoologia, Curitiba, Paraná, Brazil; J. S. Moure
- UI — University of Idaho, Department of Entomology, Moscow, Idaho, U.S.A.; A. R. Gittins
- USNM — National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.; P. D. Hurd, K. V. Krombein, A. S. Menke
- ZIH — Zoologisches Institut der Martin-Luther-Universität, Halle (Saale), Germany; J. O. Hüsing
- ZMB — Zoologisches Museum der Humboldt Universität, Berlin, Germany; E. Königsmann
- ZMC — Universitetets Zoologiske Museum, Copenhagen, Denmark; O. Lomholdt

Subgenus *Psen* Latreille, 1796

Eight representatives of *Psen* s.str. are known from the Neotropical region including Mexico; three are only South American and are described as new species in the present paper.

In the subgenus *Psen* the lateral epicnemial carinae are not always bent backwards below and the acetabular carina is not always incomplete or absent, as I thought earlier (Van Lith, 1959). Some of the species discussed here have a complete acetabular carina,

the epicnemium being shaped as in *Pseneo*, but the males have long fasciculate hairs on the apical margin of the third and fourth sternites, as is characteristic for the subgenus *Psen*.

Key to the species of the subgenus *Psen*

(Females of *metallicus* and *unifasciculatus* and males of *irwini*, *venetus*, *pulcher* and *montivagus* unknown)

1. Pronotum with long lobular projections. Acetabular carina complete. Scutum coarsely punctate. Petiole slightly longer than first tergite. Pygidial area broadly triangular, surface coriaceous, on either side at least two rows of punctures. Black, propodeum with gold and green reflections. Male unknown. El Salvador, Honduras, Mexico *irwini* Bohart & Grissell
- Pronotum without projections 2
2. Acetabular carina incomplete or absent. Pygidial area of female more broadly triangular and surface coriaceous (to be confirmed for unknown female of *metallicus*) 3
- Acetabular carina complete. Pygidial area of female narrowly triangular, shining, at most very faintly or only apically coriaceous (to be confirmed for unknown female of *unifasciculatus*) 6
3. Propodeum with slight greenish-metallic shine, tempora and mesopleura with some bronze reflections. Acetabular carina incomplete. Petiole over $2\frac{1}{2}$ times as long as first tergite. Scutum coarsely striato-punctate. Base and apex of petiole dark reddish-brown, legs and base of antennae including scape pale reddish-brown. Pubescence of face pale golden, of rest of body brownish-golden. Hind margin of tergites 3 and 4 with long, dark, fasciculate hairs. Female unknown. Peru . *metallicus* sp. nov.
- Propodeum black, no distinct metallic reflections. No acetabular carina. Petiole shorter. Face silvery 4
4. Pygidial area of female on either side with at least two rows of punctures. Gaster red, petiole black; underside of antennae, mandibles, tibiae and tarsi largely reddish-brown, sometimes hind femora entirely fulvous. Scutum finely punctate. Petiole about $1\frac{1}{3}$ or $1\frac{1}{2}$ times as long as first tergite. Antennal segments 6—13 of male with tyloidea. Nearctic *monticola* (Packard)
- Pygidial area of female with one distinct lateral row of punctures. Petiole about twice as long as first tergite. Gaster black, petiole black or dark reddish . . . 5
5. At least petiole reddish or dark reddish, following segments black; in female base of antennae including scape, hind legs and fore and mid tibiae and tarsi reddish, in male scape and legs brown. Scutum rugoso-punctate, laterally more finely separately punctate. Nearctic *erythropoda* (Rohwer)
- Petiole black. Base of antennae below, excluding scape, reddish, tarsi pale. Scutum coarsely rugoso-punctate, antero-laterally with fine separated punctures. Sternites 3 and 4 of male with long, dark, fasciculate hairs. Mexico . . *striolatus* (Cameron)
6. Scutum finely punctate or striate. Petiole at most $1\frac{2}{3}$ times as long as first tergite 7
- Scutum coarsely sculptured. Petiole nearly twice or over twice as long as first tergite 8
7. Black. Scutum with fine punctures in rows, large interstices. Scutellum almost impunctate. Petiole about $1\frac{1}{3}$ times as long as first tergite. Only fourth sternite of male with fasciculate soft hairs. Nearctic *barthi* Viereck
- Uniform cyaneous. Scutum sparsely finely punctate, discally and posteriorly finely longitudinally striate, scutellum with scattered punctures. Petiole about $1\frac{2}{3}$ times

- as long as first tergite, longer than hind femur. Male unknown. Cuba . *venetus* Pate
8. Pubescence of mesosternum golden-brown. Face golden. Femora more or less reddish 9
- Pubescence of mesosternum whitish or yellowish-grey. Femora black 10
9. Legs including trochanters and base of flagellum reddish. Interantennal tooth protruding, laterally flattened. Scutum densely striato-punctate, scutellum punctate only, interstices often a few times size of punctures, mesopleura almost impunctate. Male unknown. Mexico *pulcher* (Cameron)
- Tibiae, tarsi, foreside of femora and base of flagellum reddish. Interantennal tooth pyramid-shaped. Scutum densely rugoso-punctate. Scutellum punctate in female, in male partly rugoso-punctate, anteriorly with shining interstices. Mesopleura of female almost impunctate, of male finely punctate. Eyes of male broader than tempora, in lateral view. Apical margin of fourth sternite with golden fasciculate hairs. Brazil *erythrocnemus* sp. nov.
10. Scutellum rugoso-punctate, a few shining interstices, in male anterior half with larger shining interstices. Scutum densely striato-punctate. Postocellar area in both sexes much raised, finely punctate. Mesopleura very finely punctate. Face pale golden in both sexes, pubescence of mesosternum yellowish-grey. Underside of scape and base of flagellum reddish-brown in female, blackish in male. Tibiae of female reddish, of male brownish. Sternites 3—4 of male with golden-brown fasciculate hairs. Brazil *paranaensis* sp. nov.
- Scutellum shining, with large separate punctures. Scutum coarsely rugoso-punctate, stronger than in *paranaensis*. Postocellar area little raised, distinctly punctate, punctuation of mesopleura slightly stronger. Face silvery. Pubescence of mesosternum whitish. Antennae including scape black. Foreside of fore and mid tibiae brown. Male unknown. Mexico . . . *montivagus* (Dalla Torre) (= *unifasciculatus* Malloch?)

Psen (Psen) monticola (Packard)

Packard, 1867: 407—408, ♂ (*Mimesa monticola*; New Hampshire).

Dalla Torre, 1897: 354.

Fox, 1898b: 11—12, ♀—♂ (*Psen monticola*; Philadelphia, New Hampshire).

Ashmead, 1899: 225, ♀—♂.

Viereck, 1901: 342, ♀—♂ (*Psen monticola*).

Smith, 1908: 66, ♀ (*Psen monticolus*; Nebraska).

Mickel, 1918 (1917): 41, ♀ (*Psen monticola*; Nebraska).

Malloch, 1933: 14, ♀—♂ (*Psen (Psen) monticola*; New Hampshire, Philadelphia, Maryland, Virginia, District of Columbia, Pennsylvania, Alabama).

Krombein, 1951: 959 (*Psen (Psen) monticola*; New Hampshire to Georgia, Michigan, Alabama); 1958: 189 (West Virginia).

New records. — Canada (Ontario): 1 ♀, Toronto, 23 Aug., 1893; 1 ♀, Constance Bay, 20 July, 1933, G. S. Walley; 1 ♂, Dundas, 28 June, 1955, O. Peck; 1 ♀, Chatterton, 8 Aug., 1955, John C. Martin; 1 ♀, Foxboro, 27 July, 1956, John C. Martin; 1 ♀, Ottawa, 7 Sept., 1958, J. R. Vockeroth; 2 ♀ 2 ♂, Kent Bridge, 11 July, 1960, 2 ♀ 2 ♂, Dresden, 15 July, 1962, 15 ♀ 17 ♂, Bothwell, 7—18 July, 1962, 2 ♀, Rondeau Park, 17 and 18 July, 1962, 2 ♀, Guild, 14 July, 1962, 2 ♀ 1 ♂, Florence, 8—15 July, 1962, 2 ♀ 6 ♂, Shetland, 18 July, 1962, 1 ♀, Pt. Pelee, 17 July, 1962; all, as far as not mentioned otherwise, collected by S. M. Clark (CNC).

U.S.A. — North Carolina: 1 ♂, Highlands, 14 July, 1957, C. J. Durden (CNC); Georgia: 1 ♀, Satolah, Rabun Co., 2000 ft, 1 July, 1957, J. R. Vockeroth (CNC).

Some of these specimens have reddish mid and hind femora or reddish hind femora, in a few cases one specimen only of a series of females or males with normal dark brown hind femora.

***Psen (Psen) erythropoda* Rohwer**

Rohwer, 1910: 102—103, ♀ (*Psen (Mimesa) erythropoda*; Virginia).

Malloch, 1933: 14—15, ♀ (*Psen (Psen) erythropoda*; Virginia, Maryland, Pennsylvania, North Carolina).

Krombein, 1951: 959; 1967: 396 (Indiana).

New records from U.S.A. — Georgia: 1 ♀, Pine Mountain, Rabun Co., 1400 ft, 25 May, 1957, W. R. M. Mason (CNC); Maine: 1 ♂, Dryden, 26 July, 1959, G. H. Heinrich (BM); Wisconsin: 1 ♀, West Bend, Washington Co., 13—14 Aug., 1966, H. E. Evans (MCZ).

Canada: 1 ♀, Bothwell, Ontario, 18 July, 1962, S. M. Clark (CNC).

***Psen (Psen) striolatus* (Cameron) (Fig. 1—4)**

Cameron, 1891: 136—137, ♀ (*Mimesa striolata*; Mexico: Guerrero).

Dalla Torre, 1897: 354.

Ashmead, 1899: 255.

Supplementary description of female (type no. 21.826, BM). — Black; outer half of mandibles reddish, pedicel and following four segments of antennae reddish, tarsi and base of hind tibiae yellowish-red.

Clypeus broadly triangularly emarginate, densely punctate. Interantennal tooth laterally flattened, triangularly projecting. Vertex sparsely punctate. Tempora almost smooth, with very fine striae. Mandibles broad, indistinctly bidentate.

Scutum coarsely rugoso-punctate, antero-lateral corners punctate with narrow interstices. Scutellum punctate, interstices a few times larger than punctures, a few indistinct rugae. Propodeum not very coarsely reticulate. Mesopleura very finely punctate, interstices larger than punctures, hypo-epimeral area almost smooth. No acetabular carina. Petiole about twice as long as first tergite, rounded below, dorsally flattened, no sharp lateral ridge. Pygidial area triangular, apex bidentate, surface coriaceous, distinct punctures along margin. Also sides of last gastral segment coriaceous.

Face silvery pubescent, mostly appressed, head and thorax whitish, gaster yellowish-grey pubescent. Pygidial area with lateral row of whitish bristles.

In contradiction with Cameron's description the scutellum of the female is not distinctly striolated and the pygidial area has distinct punctures along the margin. Three males from Mexico are very similar and are considered the opposite sex of *P. striolatus*.

Description of these males. — Length about 8.5 mm. Antennal segments 3—7 below and apex of last segment below orange-brown. Foreside of fore and mid legs brown, base of hind tibiae, basitarsi and underside of following tarsal segments yellowish-brown. Tegulae and veins of wings brown, apical part of stigmata paler.

Clypeus dull with small triangular emargination. Frons finely punctate, interstices somewhat larger than punctures. Vertex sparsely finely punctate. Pronotal corners sharp but not spicate. Scutum shining, centrally coarsely rugoso-punctate, laterally and anteriorly finely punctate, interstices about as large as punctures. Scutellum sparsely punctate. Petiole with lateral depression.

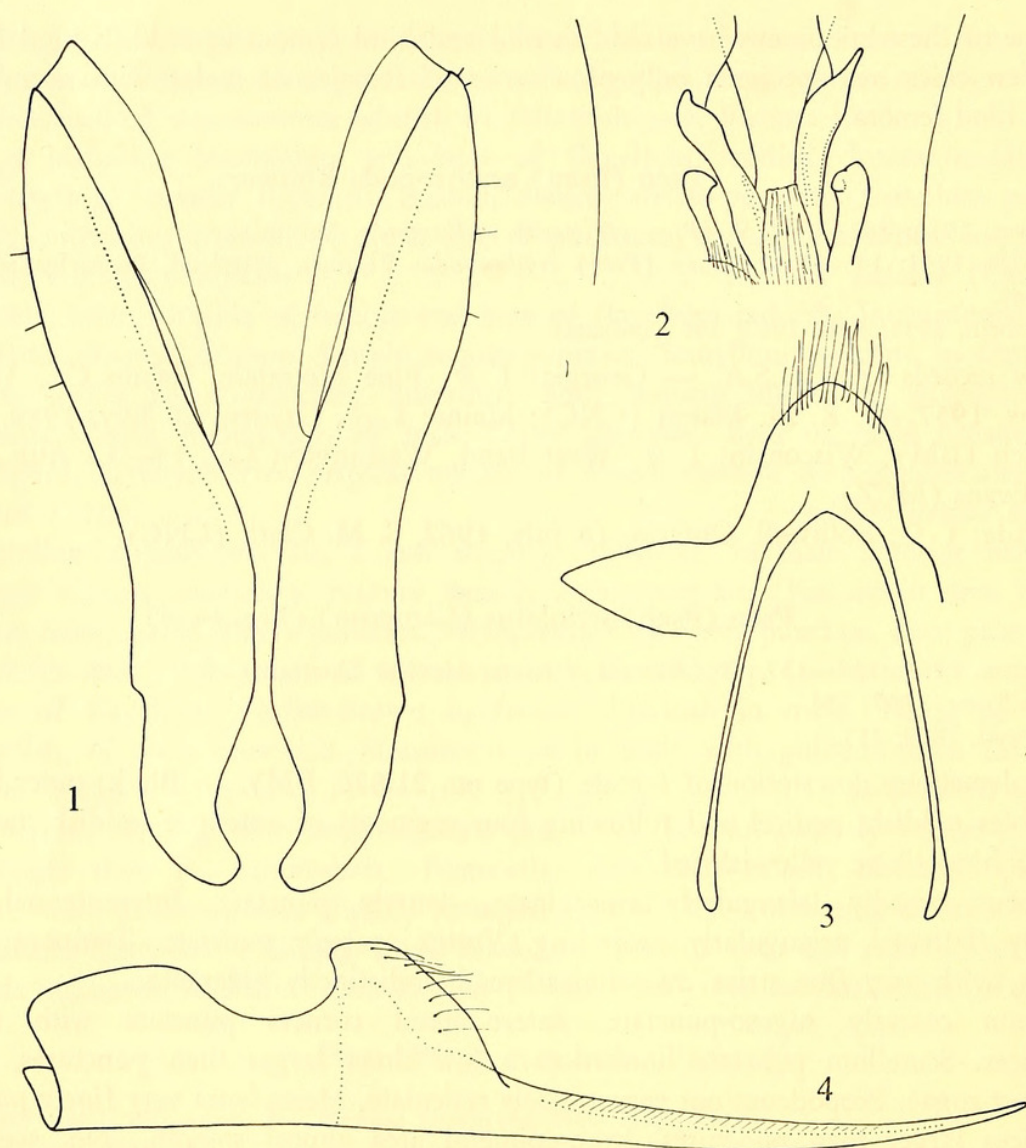


Fig. 1—4. *Psen (Psen) striolatus* (Cameron), ♂. 1, genitalia, dorsal aspect; 2, penis valves and volsellae, ventral aspect; 3, seventh sternite; 4, eighth sternite

Third antennal segment about $2\frac{1}{2}$ times, segments 4—6 about twice as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base. No tyloidea.

Apical margin of sternites 3—4 with long, brown, fasciculate hairs.

Genitalia long (Fig. 1), yellowish-brown. Parameres long, sides about parallel, apex pointed, underside covered with a finely reticulate membrane, protruding as a "flag" on the inner side of the parameres and slightly surpassing apex. Penis valves and volsellae, Fig. 2. Seventh sternite, Fig. 3. Eighth sternite (Fig. 4) dark brown, basal part transparent.

Mexico: Sinaloa, 3 ♂, 15 mi. W. of El Palmito, 5000 ft, 16 and 30 July, 1964, W. R. M. Mason (CNC).

***Psen (Psen) irwini* Bohart & Grissell**

Bohart & Grissell, 1969: 221, ♀ (*Pseneo irwini*; El Savador).

New records. — Mexico: 1 ♀, Michoacan, Tuxpan, 6400 ft, 19 Sept., 1957, H. A. Scullen (OSU).

Honduras: 1 ♀, Tegucigalpa, 30 Oct., 1965, N. L. H. Kraus (USNM).

Although I have not seen the type I am convinced that the two females recorded above are identical and also that they should be placed in the subgenus *Psen*. Bohart & Grissell have given a good description and illustrations of *irwini*. They already pointed out that it displays several unique features as compared with species of *Pseneo*. The discovery of a male will undoubtedly confirm that it is a true *Psen* s.str.

The females from Mexico and Honduras have a complete acetabular carina, the upper half of the hypo-epimeral area is more or less strongly transversely striato-punctate, its lower half very sparsely punctate. Upper half of back (inner side) of femora smooth, separated from sparsely pubescent lower half by a narrow band of close fine punctures and fine short hairs. This band gradually broadens towards the apex of the femur. Petiole about $1\frac{1}{2}$ times as long as first tergite, in dorsal aspect.

***Psen (Psen) metallicus* sp. nov. (Fig. 5—11)**

Male (holotype). — Length about 8 mm. Black, tempora and mesopleura with faint bronze reflections, propodeum with slight greenish-metallic shine. Basal half of antennae including scape and legs including trochanters pale reddish-brown. Base and apex of petiole and last gastral segment reddish-brown. Mandibles yellowish-red with dark red tips. Palpi yellowish-brown. Pronotal tubercles and tegulae reddish-brown. Wings smoky, veins dark brown, stigma reddish-brown.

Frontal carina ending between antennae in a laterally flattened tooth, which in ventral view is narrowly triangular. Clypeus shining, extremely finely punctate, anterior margin triangularly emarginate, distance between lateral angles nearly $\frac{1}{4}$ of total distance there between the eyes (Fig. 5). Frons superficially punctate, vertex shining, finely punctate, interstices mostly a few times size of punctures. Postocellar area hardly raised. Tempora as broad as eyes in lateral view. Mandibles broad, apex bidentate. Antennae long and slender, third segment over $2\frac{1}{2}$ times, segments 4—5 about $2\frac{1}{4}$ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about $1\frac{3}{4}$ times as long as broad at apex, last segment about $2\frac{1}{2}$ times as long as broad at base.

Pronotal angles sharp. Scutum coarsely striato-punctate, anteriorly and laterally finely, indistinctly, punctate. Scutellum shining, sparsely and very finely, punctate. Metanotum dull. Enclosed area of propodeum shining with rather close, parallel, straight carinae, also medially. Back of propodeum with coarse irregular reticulation. Mesopleura including hypo-epimeral area and mesosternum shining, not perceptibly punctate. Acetabular carina very short. Legs normal. First recurrent vein of fore wings ending in second submarginal cell, second recurrent vein interstitial.

Petiole over $2\frac{1}{2}$ times as long as first tergite, laterally slightly depressed. Gastral tergites and second sternite shining, very finely punctate, sternite 3 and following sternites finely aciculate.

Pubescence of face, tempora and pronotum pale golden, mostly appressed, rest of body brownish-golden. Apical margin of sternites 3 and 4 medially with long, shining, dark brown fasciculate hairs. Petiole laterally and ventrally with long, erect hairs.

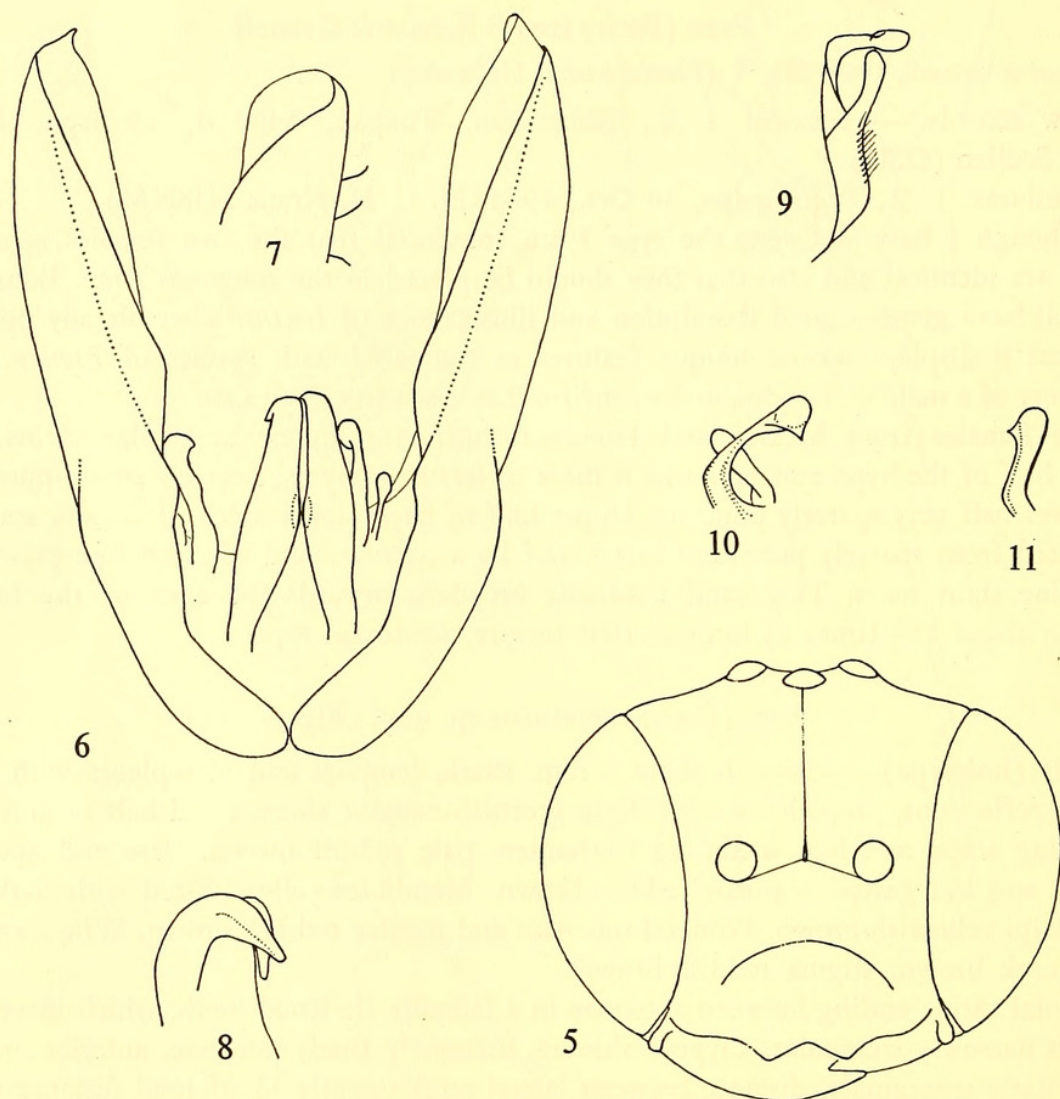


Fig. 5—11. *Psen (Psen) metallicus* sp. nov., ♂, holotype. 5, head; 6, genitalia, dorsal aspect; 7, apex (bent downwards) of left paramere, posterior aspect; 8, penis valves; 9—11, right volsella in latero-ventral, antero-dorsal and ventral aspect

Genitalia long (Fig. 6); basiparameres brown, parameres yellowish-brown. Parameres gradually narrowing towards apex, the membrane on the ventral side extending as a "flag" on the inner side of the parameres (Fig. 7). Penis valves and volsellae, Fig. 8—11.

Peru: 1 ♂, holotype, Chanchamayo, 18 Aug., 1948, D. G. Shappirio Collection 1970 (USNM).

This species resembles *P. striolatus*, e.g. as regards epicnemium, clypeal margin, parameres and sculpture of head and thorax. However, the colour, the pubescence and the length of the antennal segments are different.

Psen (Psen) barthi Viereck

Viereck, 1907: 251, ♀ (*Psen (Mimesa) barthi*; Wisconsin).

Barth, 1907: 251—257 (*Psen barthi*).

Rohwer, 1909: 324—325, ♀—♂ (*Mimesa myersiana*; Pennsylvania).

Malloch, 1933: 15, ♀—♂ (*Psen (Psen) myersiana*; Pennsylvania, Maryland).

Krombein, 1951: 959 (*Psen (Psen) barthi*; Connecticut, Pennsylvania, Maryland, Wisconsin).

Evans, 1959: 142—143.

Krombein, 1967: 396.

New records. — U.S.A.: 1 ♀, Georgia, Tennessee River, 13 July, 1957, C. J. Durden (CNC).

Canada. — Quebec: 1 ♀, Queen's Park (Aylmer), 7 July, 1925, C. E. Yauch (?); 1 ♀, Knowlton, 8 July, 1930, L. J. Milne (CNC).

The narrowly triangular pygidial area of the female, the fine punctures of the scutum, partly in rows and the relatively short petiole easily distinguish this species from its relatives. In the male only the fourth sternite shows fasciculate hairs on its apical margin.

Psen (Psen) venetus Pate

Pate, 1946: 4—6, ♀ (*Psen (Psen) venetus*; Cuba).

Dalmau, 1970: 181.

The striking bluish colour of the whole wasp is unique in this genus thus far. Pate's statement: "petiole five-sixths the length of hind femora" is misleading. The holotype was kindly sent to me for examination by the authorities of the Museum of Comparative Zoology, Cambridge, Massachusetts. Its petiole is about $1\frac{2}{3}$ times as long as the first gastral tergite, in dorsal view, and slightly longer than the hind femora.

Psen (Psen) pulcher (Cameron)

Cameron, 1891: 135—136, ♀ (*Mimesa pulchra*; Mexico)

Dalla Torre, 1897: 354.

Ashmead, 1899: 255, ♀ (*Mimesa pulchra*).

Female. — Head and thorax black, middle part of mandibles yellowish-red, palpi testaceous. Base and apex of scape of antennae, in type also foreside of scape, antennal segments 3—4 entirely, segment 5 below and apex of last segment reddish-brown. Narrow hind margin of pronotal tubercles reddish. Legs including trochanters reddish, femora below with narrow brown mark, broader on hind femora. Tegulae reddish, wings yellowish, veins and stigma yellowish-brown, subcostal vein darker brown. Gaster including petiole black, first tergite laterally and second tergite apically somewhat dark-reddish transparent.

Fine frontal carina below median ocellus, between antennae much raised and forming a large triangular, laterally flattened tooth, not distinctly connected with antennal sclerites. Face and clypeus with dense, rather superficial punctation. Protruding median part of clypeal margin smooth, slightly triangularly emarginate, more or less bidentate. Frons densely punctate, finer below, coarser and even somewhat punctato-striate near ocelli, margin along eyes and vertex shining, finely and sparsely punctate. A deep narrow furrow behind posterior ocelli, widened at outer side of each posterior ocellus, a short narrow groove connecting posterior groove with median ocellus. Vertex before each posterior ocellus and behind ocelli slightly raised. Tempora smooth with fine hair-bearing punctures. Occipital carina ending normally in hypostomal carina. Mandibles normal, apex bidentate. Antennae gradually thickening towards apex, segment 3 about four times, segment 4 about twice, segment 5 about $1\frac{3}{4}$ times, segments 6—7 about $1\frac{1}{2}$ times, segment 8 about $1\frac{1}{4}$ times as long as broad at apex, segments 9—11 about

quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base.

Corners of pronotum obtuse. Scutum densely striato-punctate, antero-lateral parts with finer punctures, interstices here about as large as punctures. Prescutal sutures indistinct, one quarter of length of scutum. Parapsidal sutures indistinct. Scutellum shining, punctate with interstices a few times size of punctures. Metanotum dull, indistinctly sculptured. Enclosed area of propodeum triangular, the two median longitudinal carinae close at base, diverging backwards; lateral parts with longitudinal carinae. Median longitudinal groove on back of propodeum narrow, back of propodeum and posterior half of sides dull, with irregular reticulate carination, anterior half of sides shining, a few fine punctures on their upper part. Metapleura shining; mesopleura and mesosternum shining, sparsely punctate, hypo-epimeral area densely punctate, its upper part somewhat rugoso-punctate. Anterior plate of mesepisternum with superficial sculpture. Anterior oblique suture foveolate, widened upper part with five or six oblique carinae. Lateral epicnemial carinae ventrally somewhat curved backward, connected with acetabular carina which is complete. Mesosternum with median longitudinal carina. Metasternum deeply triangularly emarginate. Mid tibiae flattened at apex, this part margined behind by three stout reddish thorns, upper two-thirds of back of hind femora smooth and shining, separated from pubescent lower part by a narrow band of fine punctures; base of hind tibiae with small elongate smooth area, defined by small reddish thorns, rest of hind tibiae with dorsal longitudinal row of stouter reddish thorns, apex with five reddish spines. First recurrent vein of fore wings ending about middle of second submarginal cell, second recurrent vein near apex. Petiole longer than first and second tergites together, cylindrical, dorsally rounded with lateral row of extremely fine punctures, sides slightly flattened with indistinct upper and lower carinae. Gaster finely sparsely punctate, apical margin of tergites 3—5 smooth, impunctate. Pygidial area narrowly triangular with sharp lateral carina, apex slightly emarginate, surface smooth, apex somewhat aciculate, distinct median longitudinal carina, a few punctures along lateral carinae.

Head golden pubescent, dense and mostly appressed on face below antennae, sparse on vertex. Dorsal side of pronotum and hind margin of pronotal tubercles with dense, short, golden pubescence. Rest of thorax with longer golden pubescence, densest on propodeum and mesosternum. Legs golden-brown pubescent, base and apex of hind tibiae golden velvety. Gaster sparsely golden-brown pubescent, last segment with some long stiff hairs. Petiole laterally and ventrally with obliquely downwards directed long hairs.

Male unknown.

New record. — Mexico: 1 ♀, Oaxaca, Vista Hermosa, 96.5 km SW. of Tuxtepec (San Juan Bautista Tuxtepec?), 1450 m, 19 Oct., 1962, coll. H. and M. Townes (HT).

The length of this female, the gaster of which is somewhat extracted, is about 12.5 mm, excluding the sting. Cameron mentions a length of 10 mm which seems to be incorrect, as head plus thorax of the holotype have a length of about 4.5 mm, as in the female from Oaxaca. Unfortunately gaster and petiole of the type are missing. It is, therefore, also impossible to check Cameron's statement that the petiole is furrowed deeply above. He must have intended to say that the sides of the petiole are furrowed.

P. pulcher is easily recognized by the red legs and the golden pubescence of the face. *P. erythrocnemus* of Brazil has also largely reddish legs and a golden face.

***Psen (Psen) montivagus* Dalla Torre**

Cameron, 1891: 137—138, ♀ (*Mimesa monticola*; Mexico: Guerrero).

Dalla Torre, 1897: 354 (*Mimesa montivaga* new name).

Ashmead, 1899: 255, ♀ (*Mimesa Cameronei* new name for *monticola* Cam. nec Packard)

? Malloch, 1933: 15—16, ♂ (*Psen (Psen) unifasciculatus*; New Mexico).

? Krombein, 1951: 959, ♂ (*Psen (Psen) unifasciculatus*).

A study of the holotype (No. 21.823, BM) resulted in the following notes.

Female. — Black, including antennae. Base of fore and mid tibiae, basal third of hind tibiae, and fore and mid tarsi reddish-brown.

Median part of clypeal margin much protruding, distance between apical teeth nearly $\frac{1}{8}$ of total distance there between the eyes, margin broad and shining, triangularly emarginate. Vertex rather strongly punctate, wide interstices, postocellar area slightly raised. Scutum coarsely rugoso-punctate, finer in anterior lateral corners. Scutellum shining, punctures large, interstices larger than diameter of punctures, on fore part often a few times diameter of punctures, posterior third with longitudinal rugae. Mesopleura somewhat stronger punctate than vertex, interstices larger than punctures, in upper posterior corners below hypo-epimeral area somewhat striato-punctate. Distinct acetabular carina. Propodeum not very coarsely reticulato-carinate. Petiole slightly over twice as long as first tergite, rounded below, upper and lateral sides somewhat flattened.

Pubescence of face, tempora and pronotum silvery, mostly appressed, of rest of body whitish below, yellowish-grey on upper side of head and thorax.

New records. — Mexico: 1 ♀, Vera Cruz, La Joya, 15 mi. W. Jalapa, 7 Aug., 1960, H. F. Howden (CNC); 1 ♀, Oaxaca, 85.5 km SW. of Tuxtepec, 900 m, 18 Oct., 1962, H. and M. Townes (OSU, GRF 1972).

The pygidial area of these females is narrowly triangular, shining, apex slightly coriaceous with short median carina, a few large punctures, each with long bristle along the margin. Length 8—9 mm. The pygidial area of the type is not well visible but seems to be similar.

***Psen (Psen) unifasciculatus* Malloch**

Malloch, 1933: 15—16, ♂ (*Psen (Psen) unifasciculatus*; New Mexico).

Krombein, 1951: 959.

Judging from Malloch's description the male of *P. unifasciculatus* probably is the opposite sex of *monticola* Cameron of which the male is still unknown. In my key it runs to *montivagus* (*monticola* Cameron). More material is required to solve this problem.

***Psen (Psen) paranaensis* sp. nov. (Fig. 12, 13)**

Female. — Length about 9 mm. Head and thorax black, labrum reddish, greater part of mandibles reddish-brown, palpi brown. Antennae black, third segment except apex brown, underside of following two segments brownish tinged. Hind margin of pronotal tubercles dark brownish, tegulae reddish-brown. Wings slightly smoky, veins brown, stigma yellowish-brown. Trochanters partly brown, dorsal side of femora and entire tibiae and tarsi reddish-brown. Petiole and gaster black, apical margin of tergites and of sternites 1—5 brownish transparent.

Fine frontal carina, below median ocellus almost absorbed by sculpture, ending between antennae in a low pyramidal tooth which is connected with antennal sclerites by a fine carina. Face below antennae with dense superficial punctation, supra-clypeal area with shallow broad-oval depression. Protruding median part of clypeal margin smooth, slightly emarginate, bidentate (Fig. 12). Frons below median ocellus coarsely densely punctato-striate, vertex and broad margin along eyes almost impunctate, shining. A deep narrow suture behind posterior ocelli, widened on outer side of ocelli, a short narrow longitudinal suture connecting posterior transverse suture with median ocellus. Postocellar area distinctly raised. Tempora shining, impunctate, in lateral view slightly broader than eyes. Occipital carina ending normally in hypostomal carina. Mandibles normal. Third antennal segment nearly three times, segment 4 nearly $1\frac{3}{4}$ times, segments 5—6 about $1\frac{1}{2}$ times, segments 7—8 about $1\frac{1}{4}$ times as long as broad at apex, segments 9—11 nearly quadrate, last segment about $1\frac{3}{4}$ times as long as broad at base.

Pronotal corners rectangular. Scutum densely striato-punctate, prescutal sutures short, $\frac{1}{4}$ of length of scutum, parapsidal sutures distinct, shallow. Antero-lateral parts of scutellum shining with large interstices between punctures, rest of scutellum coarsely punctate, posterior $\frac{2}{3}$ with distinct longitudinal rugae. Metanotum dull, finely transversely rugose. Enclosed area of propodeum triangular, shining, with oblique carinae which are irregular on outer side. Back of propodeum coarsely reticulato-carinate, median longitudinal groove narrow. Greater part of sides of propodeum finely sculptured, anterior margin smooth. Metapleura smooth. Mesopleura scarcely finely punctate, very short longitudinal rugae against posterior margin. Upper half of hypoepimeral area striato-punctate, lower half almost impunctate. Anterior plate of mesepisternum obliquely striate. Anterior oblique suture foveolate, widened upper part with oblique carinae. Outer epicnemial carinae not bent backwards, continuing into acetabular carina, which is complete. Mesosternum finely densely punctate, with distinct median longitudinal carina. Metasternum with deep triangular emargination. Apical $\frac{2}{5}$ of median tibiae flattened on outer side, margined behind by a row of six reddish thorns, base of hind tibiae somewhat flattened, this part margined by two rows of small dark-red thorns which continue into posterior row of dark reddish thorns, apical margin with four short reddish spines. First recurrent vein of fore wings ending near middle of base of second submarginal cell, second recurrent vein ending near end of second submarginal cell. Petiole nearly twice as long as first gastral tergite, seven to eight times as long as broad in the middle (dorsal aspect), laterally flattened, hardly depressed, dorsally round and smooth with lateral row of almost imperceptible punctures, ventrally rounded and smooth, with lateral row of punctures, each with a fine long hair. Gastral tergites 1—5 smooth, densely, very finely, punctate, apical margin of fifth tergite rather broadly impunctate. Pygidial area narrow with almost blunt apex and margined by a distinct carina, surface shining, apical $\frac{1}{3}$ finely aciculate and with a few distinct hair-bearing punctures along the sides. Greater part of second sternite shining, following sternites very finely aciculate and sparsely finely punctate.

Face, and pronotum dorsally, with appressed golden pubescence. Head, scutum and back of propodeum golden-brown pubescent, lateral and ventral sides of thorax yellowish-grey. Petiole ventro-laterally with long obliquely downwards directed greyish hairs, ventral plate laterally with a pubescent patch. Femora below with long yellowish-grey hairs, pubescence on rest of legs shorter, upper $\frac{2}{3}$ of back of hind femora smooth, lower part normally pubescent, separated from upper part by a narrow longitudinal

band of fine punctures. Gastral tergites densely golden-brown pubescent. Margins of sternites 2—5 with a few long stiff hairs.

Male. — Similar. Length nearly 8 mm. Antennae black. Tibiae and tarsi dark brown. Central area of stigma paler than veins of wings.

Clypeal margin less protruding, emarginate, distance between apices of teeth less than $\frac{1}{4}$ of total distance there between the eyes. Tempora in lateral view slightly narrower than eyes. Face less broad, postocellar area raised as in female. Third antennal segment over $2\frac{1}{2}$ times, segment 4 over $1\frac{1}{2}$ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about quadrate, last segment about $1\frac{3}{4}$ times as long as broad at base; no tyloidea. Propodeum more coarsely reticulate. Petiole longer, twice as long as first tergite, sides slightly depressed. Tibiae without conspicuous thorns. Apex of seventh sternite lanceolate, with long yellowish-golden hairs. Genitalia (Fig. 13) long, yellowish-brown, apex with a few short hairs, underside with longer hairs. Pubescence of face more or less pale golden.

Brazil: 1 ♀, holotype, Paraná, Ponta Grossa, 22 April, 1970, O. W. Richards (BM); 1 ♀, paratype, Paraná, Prudentópolis, 23—25 Febr., 1969, C. Porter and A. Garcia, 1 ♀, paratype, Santa Catarina, Nova Teutonia, Dec., 1966, F. Plaumann (MCZ); 1 ♂, allotype, Nova Teutonia, $27^{\circ}11' S.$, $52^{\circ}23' W.$, 29 Nov., 1937, Fritz Plaumann (ML), 2 ♂, paratypes, Nova Teutonia, Nov., 1937 and 21 Aug., 1944, Fritz Plaumann (BM), 1 ♂, Nova Teutonia, 12 March, 1952, Fritz Plaumann (OSU, GRF 1972).

Resembling *P. pulcher* from Mexico and certainly closely related. Differs in the darker antennae and legs, the raised vertex, the striate scutellum and the much smaller interantennal tooth; its gaster is much more pubescent.

Psen (Psen) erythrocnemus sp. nov. (Fig. 14, 15)

Female. — Length about 10.5 mm. Head black; antennal segments 3—5 brown below, labrum and central part of mandibles reddish-brown, palpi yellowish-brown. Thorax black, propodeum with brassy shine, tegulae brown. Gaster black. Femora, tibiae and tarsi reddish-brown, femora often partly, rarely entirely, darker brown. Hind margin of gastral tergites and sternites somewhat transparent brownish. Wings somewhat smoky, veins brown, stigma much paler.

Frontal carina ending between antennae in a pyramid-shaped tooth. Clypeus convex, apical margin broad, dull, triangularly emarginate, bidentate. Surface of clypeal disk superficially coriaceous, frons densely coarsely punctate, vertex sparsely, much finer, punctate, very widespread between oculi and ocelli. Postocellar area distinctly raised. Tempora almost smooth. Scape of antennae about three times as long as broad at apex, segment 3 about $3\frac{1}{2}$ times, segment 4 about twice, segment 5 about $1\frac{3}{4}$ times, segments 6—7 about $1\frac{1}{2}$ times, segment 8 about $1\frac{1}{4}$ times. Segments 9—11 almost quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base.

Pronotal angles nearly rectangular. Scutum densely striato-punctate, anteriorly and laterally finer punctate, no distinct rugae. Scutellum shining, densely punctate. Metanotum with superficial sculpture. Prescutal sutures indistinct. Enclosed area of propodeum triangular, with oblique lateral carinae, back of propodeum coarsely reticulate. Mesopleura including hypo-epimeral area, and mesosternum, finely punctate, interstices larger than punctures. Anterior oblique suture foveolate, upper part widened

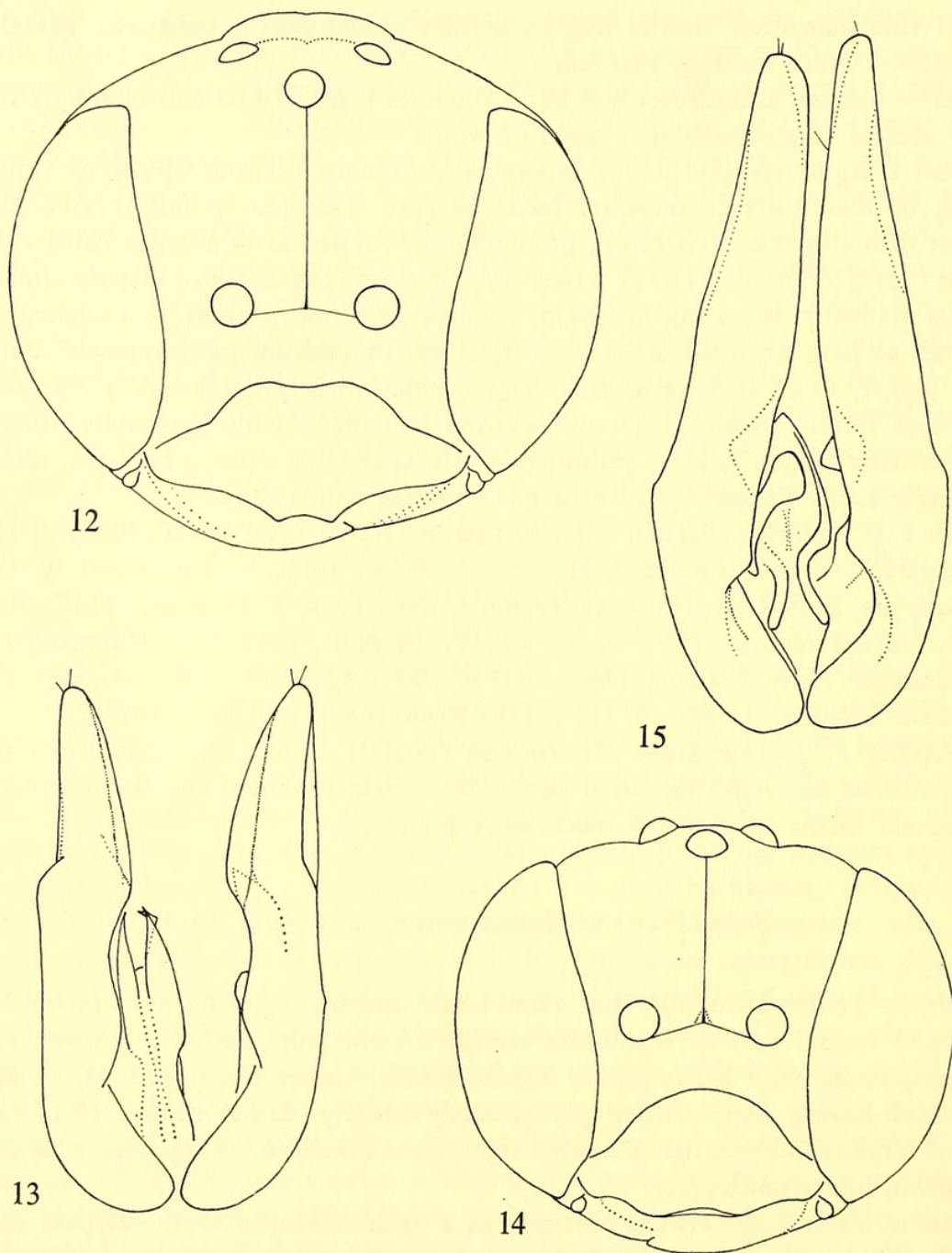


Fig. 12—13. *Psen (Psen) paranaensis* sp. nov. 12, head of female, holotype; 13, genitalia of male, allotype, dorsal aspect. Fig. 14—15. *Psen (Psen) erythrocnemus* sp. nov., ♂. 14, head; 15, genitalia, dorsal aspect

with transverse carinae. Lateral epicnemial carinae curved backwards, confluent with acetabular carina, which is complete. Legs normal. Both recurrent veins end in second submarginal cell. Petiole twice as long as first tergite, quadrate in transverse section, sides with indistinct groove. Gaster finely punctate. Pygidial area narrowly triangular, with high lateral carinae and a few large, hair-bearing punctures along the sides. Surface smooth, apical part coriaceous, a low median longitudinal carina, broadening and fading out towards base.

Pubescence of face and tempora golden, mostly appressed, frons golden, vertex

brownish-golden, scutum and scutellum dark brown, metanotum, propodeum, mesopleura, mesosternum and gaster golden-brown pubescent. Petiole laterally and ventrally with sparse, long, erect hairs, a latero-dorsal row of long and partly very short hairs.

Male. — Similar. Length 9–10 mm. Black. Base of antennae somewhat paler than in female. Apex of last gastral segment reddish. Clypeus with weak triangular emargination (Fig. 14). Tempora distinctly narrower than eyes in lateral view. Scape of antennae about twice as long as broad at apex, segment 3 about $3\frac{1}{2}$ times, segment 4 about $2\frac{1}{2}$ times, segments 5–7 over twice, segments 8–12 about twice as long as broad at apex, segment 13 over $2\frac{1}{2}$ times as long as broad at base. No tyloidea.

Sculpture of dorsal side of thorax somewhat coarser, scutellum and metanotum rugoso-punctate. Legs slender. Petiole over twice as long as first tergite. Apical spine long.

Genitalia (Fig. 15) yellowish-brown or reddish-brown, long, sides of parameres almost parallel, apex rounded and with long hairs below. Fourth gastral sternite with fringe of dark golden fasciculate hairs (in one specimen also on one side of median part of third sternite a small tuft of fasciculate hairs).

Brazil: 1 ♀, holotype, Serra do Caraca, S. Barbara, Minas Gerais, 1600 m, April, 1969, F. M. Oliveira, 1 ♀, paratype, Margaritiba, Muriqui, Rio de Janeiro, July, 1969, M. Alvarenga (HT); 12 ♂, allotype and paratypes, Serra da Bocaina, S. J. Barreiros, Sao Paulo, 13–17 Jan., 1969, Porter and Garcia, 1 ♂, paratype, Nova Teutonia, Santa Catarina, Febr., 1966, Fritz Plaumann (MCZ).

P. erythrocnemus seems to be closely related to *P. pulcher* (Cameron), of which the male is still unknown. It differs from *pulcher* in the pyramid-shaped interantennal tooth and the darker legs. The wings are not yellowish, as in *pulcher*, but somewhat smoky. The male is characterized by the narrow tempora, the long antennal segments and the absence of fasciculate hairs on the third sternite. I expect that the difference in the width of the tempora is a sexual dimorphism only, although this was not yet noticed in other neotropical *Psen*.

Subgenus *Pseneo* Malloch, 1933

In the Neotropical region the subgenus *Pseneo* seems to comprise more species than the other *Psenine* genera or subgenera, with the exception perhaps of the genus *Pluto* Pate, 1937. Eighteen American forms of *Pseneo* can be distinguished at the moment, of which eleven on the South American continent, five in Central America and five north of Mexico. The South American species of *Pseneo* have a very uniform appearance. The pronotal angles are always more or less pointed, spicate or lobular, which is also found in some Neotropical species of *Psen* s.str. and *Pluto*. The scutum is always coarsely sculptured, very densely punctate or rugoso-punctate, often with distinct shining longitudinal rugae. These rugae may be long and straight or short and irregular and seem to be very constant in the various species.

Krombein (1950) paid already attention to the male genitalia of *Pseneo*. They may offer good characteristics to distinguish the species. Therefore I made drawings of these parts of as many species as possible, including a number of Nearctic species. In accordance with Snodgrass (1941) and Richards (1956) the terms basiparamere and paramere (stipes and squama, Van Lith, 1965) have been used in the present paper. These two parts are fused together and usually form an angle, in lateral view (Fig. 22).

The apices of the parameres are best compared when examined from above or somewhat from aside, in such a position that their greatest width is exposed. Examination may be hampered when the parameres are thin and curl when dried, as often occurs in *P. longiventris*.

Morphology

The Neotropical species of *Pseneo* have a number of characteristics in common. These are enumerated below and will not be repeated in the descriptions of the species.

Median part of anterior margin of clypeus narrowly raised, emarginate, and except in *P. eliasi*, tridentate in anterior view, at least lateral teeth continuing as a carina on ventral side of clypeus which is relatively broad. Disk of clypeus densely superficially punctate. Fine frontal carina ending between antennae in a low tubercle or tooth, connected by a fine carina with the antennal sclerites. A rectangular groove behind and on outer sides of posterior ocelli, sometimes a median longitudinal groove between posterior ocelli. On frons against oculi a small and raised, impunctate or almost impunctate area. High occipital carina, ending in hypostomal carina. Mandibles rather broad, apex bidentate.

Anterior oblique suture with large alveolae, widened upper part with transverse carinae. Prescutal sutures indistinct because of sculpture of scutum. Metanotum dull, rugose. Enclosed area of propodeum triangular, lateral parts with oblique carinae, much concave between carinae, back of propodeum coarsely reticulato-carinate. Lateral epicnemial carinae continuing in acetabular carina. Metasternum feebly triangularly emarginate in female, in male almost straight. Petiole dorsally and ventrally smooth, in nearly all species with distinct lateral groove or depression. First tergite much convex. Gaster finely punctate. Pygidial area of female narrowly triangular, lateral carinae high; most species have also a longer or shorter median keel. Surface of pygidial area almost smooth, a row of distinct punctures along the sides; only *P. eliasi* has a very densely punctate pygidial area. Genitalia of male long, parameres narrowed towards apex. Seventh sternite of male emarginate; eighth sternite protruding as a long apical spine, bent upwards.

Both recurrent veins of fore wings ending in second submarginal cell. Hind coxae with high upper keel. Back of hind femora bare on upper half or two-thirds, near apex a depressed dull area about as long as width of femur, very densely pubescent. Mid tibiae of female with a row of slender or short reddish thorns on outer side of apical part, hind tibiae with row of stouter thorns on outer side. Hind tibiae of male with a few much weaker thorns only.

Pubescence of face and pronotum mostly appressed, also a few long erect hairs.

Key to the species of the subgenus *Pseneo*

(Males of *auriventris* and *magnificus* and females of *canalicus* and *funicularius* unknown)

1. Pronotal angles, at least of female, not or little produced, rectangular in frontal view and mesopleura distinctly or coarsely punctate or rugoso-punctate. If pronotal angles of male spicate, then tyloidea dull and on segments 8—11 almost as long as segment. North America, *P. punctatus* also in Mexico 2
- Pronotal angles spicate, if not distinctly produced, mesopleura finely punctate and entire pubescence golden. Tyloidea of male shorter, usually shining. Mexico and

- South America, *P. longiventris* also in Arizona and New Mexico 6
2. Scutum and scutellum coarsely rugoso-punctate, also mesopleura. Hypo-epimeral area strongly rugose. Vertex behind ocelli finely, not densely punctate. Pronotal angles in both sexes not spicate. Tarsi, sometimes also tibiae and petiole, reddish. Face silvery pubescent. Male with small papilliform tyloidea on segments 3—10, indistinct on 11th segment. Largely confined to Carolinian zone *koblii* Fox
- Scutellum mostly punctate only, at least anteriorly, with shining, smooth interstices. Mesopleura strongly punctate or striato-punctate. Antennae of male with large tyloidea 3
3. Scutum coarsely striato-punctate, in female antero-laterally most of punctures subcontiguous. Mesopleura strongly punctate, in female somewhat striato-punctate, in male coarsely rugoso-punctate, hypo-epimeral area strongly rugose. Frons rather densely deeply punctate, vertex sparsely finely punctate. Pronotal angles in both sexes not spicate. Face, pronotum and propodeum silvery pubescent, legs black or brown, tarsi orange-brown. Tyloidea on antennal segments 6—13 of male large oval, shining; smaller and less distinct on segment 5. Chiefly Carolinian zone, New Jersey to North Carolina and Canada *simplicicornis* Fox
- Scutum of female antero-laterally with separated punctures and/or face pale golden and/or petiole and legs more or less ferruginous. Antennal segments 5—12 of male with elongate, dull and closely punctate tyloidea, almost as long as segments 4
4. Petiole and legs black except reddish or brownish tarsi. Face silvery or pale golden. Mesopleura with separated punctures on most of disk, interstices larger than punctures. Scutum antero-laterally with most of punctures separated by about half diameter of punctures. Male with spicate angles of pronotum. Upper Sonoran zone and Mexico *punctatus* Fox
- Legs more or less reddish. Face of female golden or pale golden. Mesopleura of male rugoso-punctate or tergites 1—2 reddish 5
5. Wings feebly yellowish. Petiole often dark reddish. At least tibiae and tarsi reddish. Mesopleura of female with separated irregular punctures on most of disk, interstices of same size or smaller, in male mesopleura rugoso-punctate. Chiefly in Austro-riparian zone, north to district of Columbia *carolina* Rohwer
- Wings strongly yellowish. Legs, propodeum in part, petiole and tergites 1—2 reddish, mesopleura in both sexes rugoso-punctate. Tropical zone southern Florida *ferrugineus* (Viereck)
6. Pygidial area of female with distinct median longitudinal carina, at least on apical half. Scutum with longitudinal rugae, if scutum densely rugoso-punctate stigma of fore wings yellowish-brown and legs reddish. Vertex sparsely or densely punctate, but shining interstices behind ocelli group of *longiventris* (Cameron) 7
- Pygidial area of female without distinct median carina or densely punctate there. Scutum densely coarsely punctate, no distinct longitudinal rugae, at least not on anterior half. Scutellum coarsely rugoso-punctate, sometimes with shining interstices. Vertex densely striato-punctate, no distinct shining interstices, a small smooth area on outer side of posterior ocelli group of *argentinus* (Brèthes) 15
7. Scutum with shining and relatively broad rugae, mostly as long as scutum. Scutellum shining with longitudinal rugae. Postocellar area usually finely sparsely punctate. Mesopleura finely sparsely punctate, hypo-epimeral area at most weakly sculptured. Scape and legs black, often tarsi and foreside of fore tibiae reddish-brown.

- Pubescence of clypeus and frons silvery or pale golden, of pronotum pale golden, of scutellum, metanotum and gaster from yellowish-grey to brownish, of propodeum pale golden. Mesopleura and mesosternum whitish pubescent. Stigma dark. Tyloidea of male short and narrow on segments 3—6, small, round and shining on segments 7—10, indistinct or absent on 11th segment. Arizona, New Mexico, Mexico, British Honduras (now Belize), Guatemala, El Salvador, Costa Rica, Panama Canal Zone, Trinidad, Colombia, Surinam *longiventris* (Cameron)
- Scutum with shorter, less strong and straight, more irregular or indistinct rugae. Scape sometimes reddish. Hypo-epimeral area usually with irregular rugae and/or vertex strongly punctate or stigma yellowish-brown 8
8. Face silvery. Pronotum dorsally pale golden. Vertex finely punctate. Hypo-epimeral area with lower half smooth, upper part weakly sculptured. Stigma yellowish-brown. Male unknown. Panama Canal Zone *canalicus* sp. nov.
- Face golden or pale golden, if silvery, stigma black or dark brown. Vertex more strongly and more densely punctate. Hypo-epimeral area usually with irregular rugae 9
9. Pronotal angles not strongly spicate. Petiole in both sexes with rounded or flattened sides, no distinct carina or groove. In female base of antennae including scape, mandibles, legs including trochanters and petiole reddish, stigma of fore wings pale yellowish-brown. Head, thorax except enclosed area of propodeum and gaster densely golden pubescent, unusually densely on propodeum. Vertex distinctly punctate, interstices a few times larger than punctures. Scutum with distinct but incomplete rugae. Anterior half of scutellum not rugose, shining interstices between punctures. Mesopleura finely punctate. Male: petiole, trochanters and greater part of femora dark. Small tyloides on 6th antennal segment, shining small oval tyloidea on segments 7—9. Peru, Brazil (Mato Grosso) *auriger* sp. nov.
- Pronotal angles strongly spicate. Petiole laterally flattened or with distinct groove 10
10. Stigma of forewings yellowish-brown. Scutum densely punctate with tendency to longitudinal striation. Anterior half of scutellum punctate with large interstices, posterior half rugoso-punctate. Mesopleura finely punctate, in male on upper part also some fine striation. Hypo-epimeral area with coarse rugae. Vertex densely punctate. Scape black, tibiae, tarsi, upper side and foreside of femora reddish. Pubescence of face and pronotum pale golden, vertex and scutum golden-brown, remainder of thorax including mesosternum, gaster and legs pale golden pubescent. Antennal segments 4—6 of male with narrow oblong, segments 7—10 with shining black, oval tyloidea, 11th segment with small or indistinct tyloides. Brazil *aurifrons* (Taschenberg)
- Stigma brown or black. Scutum except anterior and antero-lateral margins distinctly longitudinally striate or rugose 11
11. Mesopleura coarsely punctate, interstices as large as or larger than punctures, slight tendency to striation. Hypo-epimeral area with strong rugae and punctures. Scutellum entirely striato-punctate. Frons and vertex coarsely punctate with shining interstices. Face usually silvery pubescent, rarely pale golden. Mesopleura silvery pubescent, vertex and dorsal and posterior part of thorax yellowish-grey or pale golden. Antennal segments 4—11 of male with small, shining, papilliform tyloidea. Mexico *claviventris* (Cameron)
- Mesopleura usually finely punctate. Face distinctly golden or pale golden, if clypeus of male silvery, at least frons and tempora distinctly golden or pale golden . 12

12. Mesopleura and mesosternum yellowish-grey or whitish pubescent. Femora and tibiae black or brown, at most foreside of fore and mid tibiae dark reddish-brown 13
 — Mesopleura and mesosternum distinctly pale golden pubescent. Legs reddish, at least greater part of tibiae 14
13. Vertex densely, not coarsely, punctate, posteriorly transversely striate, postocellar area with shining interstices. Frons finely punctate. Fore part of scutellum punctate with smooth interstices, rarely entirely rugose. Mesopleura usually finely punctate, hypo-epimeral area either entirely rugose or on upper $\frac{2}{3}$ or upper half only. Scape of antennae reddish, rarely dorsally blackish. Vertex and scutum brownish-golden, propodeum greyish-golden pubescent. Antennal segments 3—10 or 3—11 of male with small, shining, papilliform tyloidea. Sculpture of frons and vertex coarser than in female. Brazil, Argentina, Uruguay, Paraguay, Peru, Guyana, Venezuela *aureolus* sp. nov.
 — Scape black. Vertex hardly or not striate. Brazil, Peru, Ecuador *aureolus* sp. nov., var. nov.
14. Tibiae reddish with black streak on outer or lower side. Mandibles largely black. Base of flagellum, especially below, reddish. Golden pubescence of normal density. Punctuation of vertex and postocellar area coarse and dense. Scutum antero-laterally densely punctate. Scutellum longitudinally rugose. Tyloidea of male on antennal segments 6—10 linear, small on segment 11. Female unknown. Brazil (Santa Catarina) *funicularius* sp. nov.
 — Legs including trochanters entirely, mandibles largely and antennae including scape reddish, apical half of flagellum above brownish. Golden pubescence dense, appressed on clypeus, tempora, mesopleura and propodeum. Punctuation of vertex fine, sparse between and behind ocelli. Scutum laterally and antero-laterally finely punctate with shining interstices. Scutellum punctate with large interstices. Male unknown. Brazil (Pará) *magnificus* sp. nov.
15. Pygidial area of female densely punctate. Antennal segments 8—12 of male slightly rounded below, with hardly raised tyloidea, about half length of segments, shining black, broad oval on segments 8—11. Fore and mid tibiae and tarsi largely reddish-brown. Face and pronotum usually pale golden, scutum brownish-grey, mesopleura and mesosternum whitish. Brazil *eliasi* sp. nov.
 — Pygidial area of female with lateral row of punctures. Antennal segments 7—11 of male angular below, tyloidea papilliform and smaller. Fore and mid tibiae usually dark brown or black, or mesosternum golden pubescent 16
16. Pubescence of pronotum, face, tempora, mesosternum and gaster silvery, of vertex, scutum and propodeum yellowish-grey. Scape and following segment of antennae black, base of flagellum and apex of last segment below reddish. Legs black, tarsi somewhat brownish. Mesopleura distinctly finely punctate, upper half finely striate. Hypo-epimeral area coarsely rugose. Vertex densely punctate. Antennal segment 7—11 of male with distinct small papilliform, shining black, tyloidea, segment 5 with indistinct, segment 6 with smaller, segment 12 with indistinct tyloides. Argentina *argentinus* (Brèthes)
 — Pubescence of pronotum and face golden or pale golden 17
17. Foreside of fore and mid tibiae reddish-brown or dark brown. Scape and pedicel of antennae black or reddish, base of flagellum reddish. Pubescence of face and pronotum pale golden in female, in male face more silvery. Mesopleura and

- mesosternum pale golden, often whitish or greyish, scutum, scutellum, metanotum and gaster golden-brown pubescent. Vertex densely coarsely punctate. Mesopleura usually finely punctate, posteriorly some indistinct striation, in males from Paraguay and Argentina mesopleura sometimes strongly punctate. Antennal segments 5—6 of male with small tyloidea, segments 7—11 or 7—12 with somewhat larger, oval, tyloidea. Brazil, Argentina, Paraguay, Bolivia *taschenbergi* sp. nov.
- All tibiae and tarsi and base of flagellum reddish. Pubescence of head, thorax, gaster and legs deep golden. Mesopleura finely punctate. Male unknown. Peru *auriventris* sp. nov.

Psen (Pseneo) simplicicornis Fox (Fig. 18)

- ? Fox, 1898b: 9, (*Psen Koblii*, female variety and ♂, cf. Krombein (1950); Pennsylvania, Virginia).
- Fox, 1898b: 10 (*Psen simplicicornis*, ♀ type only; Virginia, North Carolina).
- Ashmead, 1899: 225 (*Psen simplicicornis*).
- Viereck, 1901: 342, ♀ ♂ (*Mimesa simplicicornis*).
- Malloch, 1933: 10, ♀ ♂ (*Psen (Pseneo) simplicicornis*; North Carolina, Virginia, Pennsylvania, Maryland).
- Brimley, 1938: 445 (*Psen simplicicornis*).
- Krombein, 1950: 284—286, ♀ ♂ (*Psen (Pseneo) simplicicornis*; U.S.A.); 1951: 959; 1967: 396.
- Evans, 1959: 142 (larva).

Recorded (Krombein, 1950) from New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina.

New records. — Canada: Quebec, 2 ♀, Aylmer, 11 and 16 Aug., 1926, R. P. (CNC).

This species is very near to *P. punctatus* from which it can be distinguished by the coarser sculpture of scutum and mesopleura. Antennal segments 7—12 of male convex below, with large shining tyloidea, longer than half the length of the segments, tyloidea dull on segment 13, much smaller on segment 6 and indistinct on segment 5.

Genitalia (Fig. 18) brownish-yellow; basiparameres with angular inner shoulder, as in *P. punctatus*, parameres basally broad, abruptly narrowed towards apex, apices below with long hairs.

Psen (Pseneo) punctatus Fox (Fig. 16)

- Fox, 1898b: 9—10, ♀ (*Psen punctatus*; Colorado).
- Ashmead, 1899: 225, ♀ (*Psen punctatus*).
- Viereck, 1901: 342, ♀ (*Mimesa punctata*).
- Mickel, 1918 (1917): 361, ♀ (*Mimesa punctata*, Nebraska).
- Malloch, 1933: 10—11, ♀ ♂ (*Psen (Pseneo) punctatus*; Nebraska, Colorado).
- Krombein, 1950: 282—284, ♀ ♂ (*Psen (Pseneo) punctatus punctatus*; South Dakota, Nebraska, Colorado); 1951: 959.

New records. — Mexico: Morelos, Cuernavaca, 5500 ft, 2 ♀, 22 March and 9 May, 1959, 2 ♂, 17 May, 1959, H. E. Evans, 1 ♂, 3 mi. N. Alpuyecá, 3400 ft, 30 March, 1959, H. E. Evans and D. M. Anderson (CU). Length of female 13 mm.

Krombein (1950) suggested that additional collecting (in the west) might show that the ranges of this form and *P. koblii spicatus* (*Mimesa longiventris* Cameron) overlap in part. If my identifications are correct both species have now been collected in Mexico. The area of *P. punctatus* s.str. ranges from North Dakota to Southern Mexico. I have not seen the male recorded by Viereck (1903) from New Mexico. His description of

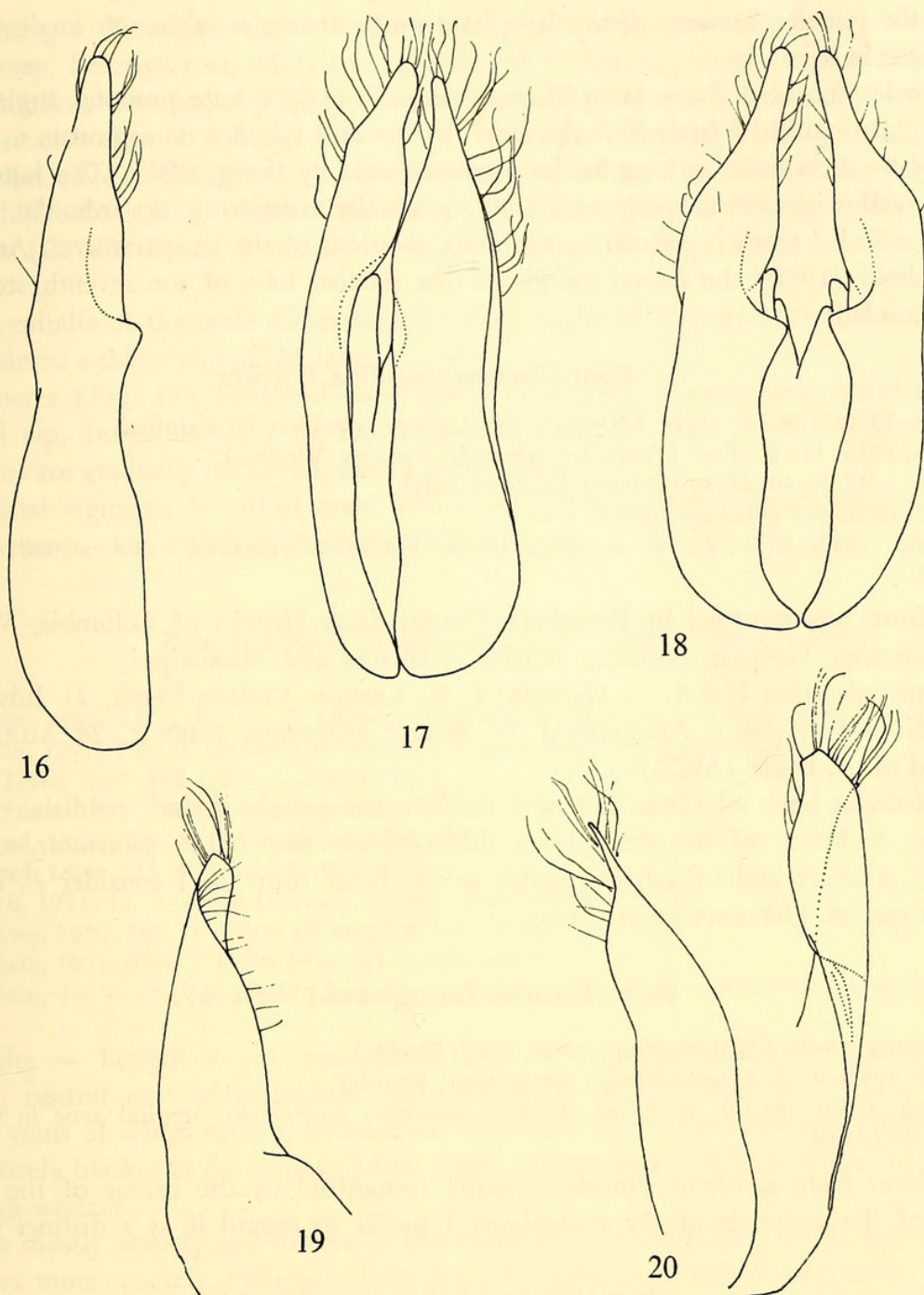


Fig. 16—18. Male genitalia of various species of *Psen* (*Pseneo*). 16, *P. punctatus* Fox, Mexico, right basiparamere and paramere; 17, *P. koblii* Fox; 18, *P. simplicicornis* Fox. Fig. 19—20. *Psen* (*Pseneo*) *longiventris* (Cameron), ♂, Colombia. 19, left paramere, lateral aspect; 20, parameres in latero-dorsal aspect, apex of right paramere twisted

the antennae “joints two to eight inclusive of flagellum with a weak point beneath” does not suit that of *P. punctatus*.

P. punctatus much resembles *P. longiventris* as regards the sculpture of the disk of the scutum but on the anterior corners of the scutum the punctures are fine and separated, the scutellum is less distinctly rugose, the punctation of the mesopleura is stronger and closer — interstices between punctures being as large as or slightly larger than punctures

— and the females have no distinctly spicate pronotal angles, although in dorsal view they appear to be acute.

The males recorded above from Mexico have distinctly spicate pronotal angles. They are easily distinguished from *P. longiventris* by the dull tyloidea on segments 6—11, on segments 8—11 almost as long as the segments, and by the genitalia. The latter (Fig. 16) are yellowish-brown, parameres long, gradually narrowing towards the apex, a distinct, rounded tooth is formed by the inner shoulder of the basiparameres. According to Krombein (1950) the lateral margin of the median lobe of the seventh sternite is evenly rounded.

Psen (Pseneo) carolina Rohwer

Rohwer, 1910: 103, ♀ (*Psen (Mimesa) punctata* var. *carolina*; N. Carolina).

Malloch, 1933: 11, ♀ (*Psen (Pseneo) carolina*; N. Carolina, Virginia).

Malloch, 1933: 9—10 (*Psen (Pseneo) kohlii*, ♂ only).

Brimley, 1938: 445 (*Psen carolina*).

Krombein, 1950, 283—284, ♀ ♂ (*Psen (Pseneo) punctatus carolina*, new status; U.S.A.); 1951: 959.

This form was recorded by Krombein (1950) from District of Columbia, Virginia, North Carolina, Georgia, northern Florida, Alabama and Mississippi.

New records from U.S.A. — Georgia: 1 ♀, Carlton, Carlton Creek, 21 July, 1957, W. R. Richards (CNC); Arkansas: 1 ♀, Mount Magazine, 2800 ft, 24 Aug., 1965, H. E. and M. A. Evans (MCZ).

Both females have all tibiae and tarsi reddish, the petiole is dark reddish.

As the sculpture of the mesopleura differs from that of *P. punctatus* s.str. — punctures stronger and interstices smaller in the latter form — I consider *P. carolina* a distinct species. I have seen no males.

Psen (Pseneo) ferrugineus (Viereck)

Viereck, 1901: 341, ♂ (*Mimesa ferruginea*; South Florida).

Malloch, 1933: 9, ♂ (*Psen (Pseneo) ferrugineus*; Florida).

Krombein, 1950: 284, ♀ ♂ (*Psen (Pseneo) punctatus ferrugineus*; tropical zone in southern Florida); 1951: 959.

This form from southern Florida is easily recognized by the colour of the gaster. Because of the sculpture of the mesopleura I prefer to regard it as a distinct species.

Psen (Pseneo) kohlii Fox (Fig. 17)

? Packard, 1867: 399, ♂ (*Psen niger*; cf. Fox (1898) and Krombein (1950)).

Fox, 1898b: 9, ♀ type only (*Psen Kohlii*; Philadelphia, Virginia).

? Fox, 1898b: 10, ♂ only (*Psen simplicicornis*, cf. Krombein (1950)).

Ashmead, 1899: 225, ♀ ♂ (*Psen kohlii* (!)).

Viereck, 1901: 342, ♀ ♂ (*Mimesa kohlii*).

Rohwer, 1917 (1916): 659 (*Psen (Mimesa) kohlii*).

Malloch, 1933: 9, ♀ only (*Psen (Pseneo) kohlii*).

Malloch, 1933: 11, ♀ (*Psen (Pseneo) fulvipes*; Alabama. Cf. Krombein (1950)).

Malloch, 1933: 12, ♂ (*Psen (Pseneo) angulatus*; Virginia, Pennsylvania. Cf. Krombein (1950)).

Brimley, 1938: 445 (*Psen Kohlii*).

Krombein, 1950: 280—281, ♀ ♂ (*Psen (Pseneo) kohlii kohlii* new status; America north of Mexico); 1951: 959; 1958: 189 (West Virginia).

Krombein, 1967: 396 (*Psen (Pseneo) longiventris kohlii* new status; Indiana).

According to Krombein (1950, 1958, 1967) this species was collected in New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Alabama, Kansas, West Virginia and Indiana.

New records from U.S.A. — New York: 1 ♀, Farmingdale, 31 July, 1938, H. and M. Townes (BM); Georgia: 1 ♀, Warwoman Cr., Rabun Co., 1500 ft, 31 July, 1957, J. G. Chillcott (CNC); North Carolina: 1 ♀, Pisgah Forest, 12 Aug., 1957, W. R. Richards (CNC); South Carolina: 1 ♂, Anderson, 21 July, 1957, W. R. Richards (CNC).

The genitalia of the male differ so much from those of *P. longiventris* that it cannot be considered a subspecies of the latter.

Parameres (Fig. 17) in dorsal view with short, abruptly narrowed, apical part and rounded tip. Inner shoulder of basiparameres not tooth-like. In *P. longiventris* the parameres are gradually narrowed, their apex is blunt.

Antennal segments 3—10 of male with small papilliform tyloidea, dark and shining on segments 6—10, indistinct on segment 11.

***Psen (Pseneo) longiventris* (Cameron) (Fig. 19, 20)**

Cameron, 1891: 137, "♀" = ♂ (*Mimesa longiventris*; Mexico: Atoyac in Vera Cruz).

Cameron, 1891: 138, ♀ (*Mimesa montezuma*; Mexico: Atoyac in Vera Cruz).

Dalla Torre, 1897: 354 (*Mimesa longiventris*).

Dalla Torre, 1897: 354 (*Mimesa montezuma*).

Ashmead, 1899: 225, ♀ (*Mimesa longiventris*).

Ashmead, 1899: 225, ♀ (*Mimesa Montezuma*).

Malloch, 1933: 12, ♂ (*Psen (Pseneo) spicatus*; New Mexico).

Krombein, 1950: 282, ♂ (*Psen (Pseneo) koblii spicatus* n. status).

Krombein, 1951: 959, ♂ (*Psen (Pseneo) koblii spicatus*).

Krombein, 1967: 396, ♂ (*Psen (Pseneo) longiventris longiventris* n.status and n. comb.).

Female. — Length 9—11 mm. Black; base of flagellum and last segments below reddish, central part of mandibles dark red, palpi yellowish-brown, tegulae reddish-brown, veins of wings brown, foreside of fore tibiae and all tarsi reddish-brown, rarely legs entirely black (El Salvador). Tibial spurs of fore legs yellowish-white, of mid and hind legs whitish.

Frons mostly densely and distinctly, but finely, punctate, between ocelli and oculi and on vertex more sparsely, interstices behind ocelli many times size of punctures. Tempora shining, finely punctate. Scape of antennae about $2\frac{1}{2}$ times, segment 3 about four times, segments 4—6 about twice, segment 7 about $1\frac{1}{2}$ times, segment 8 about $1\frac{1}{4}$ times as long as broad at apex, segments 9—11 about quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base.

Pronotum narrow, angles strongly spicate. Scutum with strong broad rugae which have mostly length of scutum and punctures between, sides of scutum punctate only, interstices often larger than punctures. Scutellum longitudinally rugoso-punctate, rugae weaker than on scutum. Mesopleura and mesosternum finely sparsely punctate, hypopleural area shining, upper third somewhat rugoso-punctate. Anterior plate of mesepisternum weakly sculptured, shining. Petiole about twice as long as first tergite, laterally with distinct longitudinal groove. Pygidial area with median longitudinal keel which is high and distinct on apical third, low on rest of pygidial area.

Pubescence of face pale golden, sometimes almost silvery, especially in females from Mexico, tempora short and silvery, vertex yellowish-grey in females from Mexico, brownish-golden in southern specimens, pronotum dorsally pale golden, scutum and scutellum more or less brownish, metanotum and propodeum pale golden, mesopleura and mesosternum whitish, legs and gaster pale golden or yellowish-grey pubescent. Petiole ventrally with long erect hairs, also a few on sides, latero-dorsally a row of short hairs.

Male. — Similar. Length 7—9 mm. Scape of antennae and segment 3 about twice, segments 4—6 about $1\frac{1}{4}$ times as long as broad at apex, segments 7—8 gradually decreasing in length, segments 9—12 about quadrate, segment 13 about $1\frac{1}{2}$ times as long as broad at base. Segments 3—6 with small narrow tyloidea, tyloidea on segments 7—10 small, shining, papilliform, on segment 11 indistinct or absent. Segments 4—10 slightly rounded below. Punctuation of vertex and mesopleura often stronger than in female.

Genitalia (Fig. 19—20) brownish-yellow, parameres broad and thin, twisted in dry state, apical part below with long hairs.

New records. — U.S.A.: 1 ♂, Arizona, 5 mi. N. Phoenix, 7 July, 1962, R. F. Sternitzky (CNC).

Mexico: 1 ♀, "Cordova F. Sm. Coll. 79.22" (Vera Cruz?) (BM); 3 ♀, San Luis Potosi, El Naranjo, about 24 km W. Nuevo Morelos, 9 Oct., 1962, H. and M. Townes (OSU, GRF 1972), 1 ♀, nr. El Naranjo, about 64 km W. Nuevo Morelos, oak forest, 8 Oct., 1962, H. & M. Townes (OSU, GRF 1972); 1 ♀, Sinaloa State, 13 mi. E. Concordia, 1500 ft, 9 Aug., 1964, W. R. M. Mason (CNC).

British Honduras (now Belize): 10 ♀, Middlesex, 125 m, 15 March—25 April, 1964, E. C. Welling (CNC).

Guatemala: 2 ♀ 2 ♂, Mocá, Guatallon, 1000 m, March—April, 1931, J. Bequaert (MCZ).

El Salvador: 1 ♀, Santa Tecla, 638 m, 28 June, 1974, C. G. Dean (BM).

Costa Rica: Turrialba, 1 ♀ 1 ♂, "V.21", Heyne (ZMB), 1 ♀, 1—6 March, 1965, S. S. and W. D. Duckworth, 1 ♀, 15—19 July, 1965, P. J. Spangler (USNM); 6 mi. W. Turrialba, 1 ♂, 13 July, 1963, 4000 ft and 1 ♂, 17 July, 1963, 3800 ft, Scullen and Bolinger (OSU); 1 ♂, Cartago Turrialba, 646 m, 13 Sept., 1964, M. G. Naumann (SEM); San José, 1 ♀, "1.1", H. Schmidt (ZMB); 1 ♀, No. 428, Weyrauch coll. (IML); 1 ♀, 9 mi. NW. Esparta, 22 July, 1965, Paul J. Spangler (USNM); 1 ♀, Alajuela Prov., 5 mi. N. Quesada, 750 ft, 20 Febr., 1964, H. Evans (MCZ); 2 ♀ 1 ♂, Pandora, 19 July, 1966, C. R. Baltazar (CRB).

Panama Canal Zone: 1 ♀, Corozal, 21 Jan., 1929, C. H. Curran; 1 ♀, Barro Colorado I., 28 Jan., 1929, C. H. Curran (AMNH).

Colombia: 1 ♀, Dept. Boyaca, Muzo, 900 m, June, 1936, J. Bequaert (MCZ); 1 ♀, Buenaventura, Llano Bajo, 100 m, 3 Oct., 1971, M. Cooper; 1 ♀ Llano Bajo nr. Buenaventura, 28 July, 1974, M. Cooper; 1 ♂, Cauca, Popayan, 1800 m, 10—12 Nov., 1971, M. Cooper; 2 ♀, Sierra Nevada, Magd. Minca, SE. of Santa Marta, 1000 m, 26 Febr., 1974, M. Cooper (BM).

Surinam: 1 ♀, Paramaribo, 11 Jan., 1958, P. H. van Doesburg Jr. (PMFV).

Trinidad: 1 ♀, Caiman Valley, 31 Jan., 1961 (CNC).

P. longiventris is characterized by the rugae on the scutum which are stronger and more regular than in any other form and by the sparse punctuation of the vertex, in the

male also by the apices of the genitalia. The specimens from Mexico are paler pubescent than the rest of the material.

Cameron (1891) mistook the male type for a female, whilst his *Mimesa montezuma*, from the same locality, is undoubtedly the true female of *P. longiventris*. The clypeal margin of this female is normally emarginate and tridentate. Cameron wrote: "this part being semicircular". He did not mention the structure of the pygidial area; this is the same as in the fresh material recorded above.

Psen (Pseneo) canalicus sp. nov.

Female (holotype). — Very similar to *P. longiventris*. Length about 10 mm. Not only base of flagellum but also scape and pedicel reddish. Tegulae very dark brown. Veins brown, stigma of fore wings much paler. Tarsi except bases of basitarsi orange-brown.

Clypeus, frons and tempora silvery, vertex brownish, pronotum pale golden, scutum, scutellum and metanotum dark brown, propodeum pale golden, mesosternum whitish pubescent.

Scape of antennae about $2\frac{1}{2}$ times, segment 3 nearly four times, segment 4 over twice, segment 5 nearly twice, segment 6 about $1\frac{1}{2}$ times, segments 7—9 about $1\frac{1}{4}$ times as long as broad at apex, segments 10—11 about quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base.

Longitudinal rugae of scutum less strong and more irregular, punctures in anterior corners of scutum separated. Anterior half of scutellum sparsely punctate, posterior half rugoso-punctate. Mesopleura and mesosternum superficially sparsely punctate. Lower half of hypo-epimeral area smooth, upper part weakly sculptured. Sides of petiole with groove.

Easily distinguished from *P. longiventris* by the sculpture of the scutum and the colour of face, scape, stigma and tarsi.

Male unknown.

Panama Canal Zone: 1 ♀, holotype, Barro Colorado Island, July, 1967, W. W. Wirth (USNM).

Psen (Pseneo) auriger sp. nov. (Fig. 21—26)

Female (holotype). — Length 10—13 mm. Black; following parts reddish: basal half of antennae including scape, mandibles except dark apices, labrum, tegulae, legs including trochanters. Palpi yellowish-brown. Pronotal tubercles brownish. Petiole, including ventral plate reddish-brown. Veins of wings brown, stigma yellowish-brown, upper half of radial cell slightly fuscated.

Frons densely finely punctate. Vertex finely punctate, between ocelli and oculi interstices at least as large as punctures; interstices behind ocelli a few times size of punctures, no distinct transverse striae. Tempora not perceptibly punctate. Scape of antennae about twice, segment 4 over four times, segments 4—6 about twice, segment 7 about $1\frac{1}{2}$ times as long as broad at apex, following segments gradually decreasing in length, segment 11 quadrate, segment 12 nearly twice as long as broad at base.

Pronotal angles not always distinctly spicate. Scutum densely coarsely, somewhat longitudinally rugoso-punctate, antero-lateral corners much more finely, densely punctate. Posterior half of scutellum striato-punctate, anterior half with large shining interstices. Mesopleura shining, with hardly perceptible hairbearing punctures; hypo-epimeral area with coarse oblique rugae. Mesosternum finely punctate. Petiole over twice as long as

first tergite, almost cylindrical, no lateral carinae or groove. Pygidial area with median keel which is almost complete but ends before apex, between this keel and lateral carinae a row of large punctures.

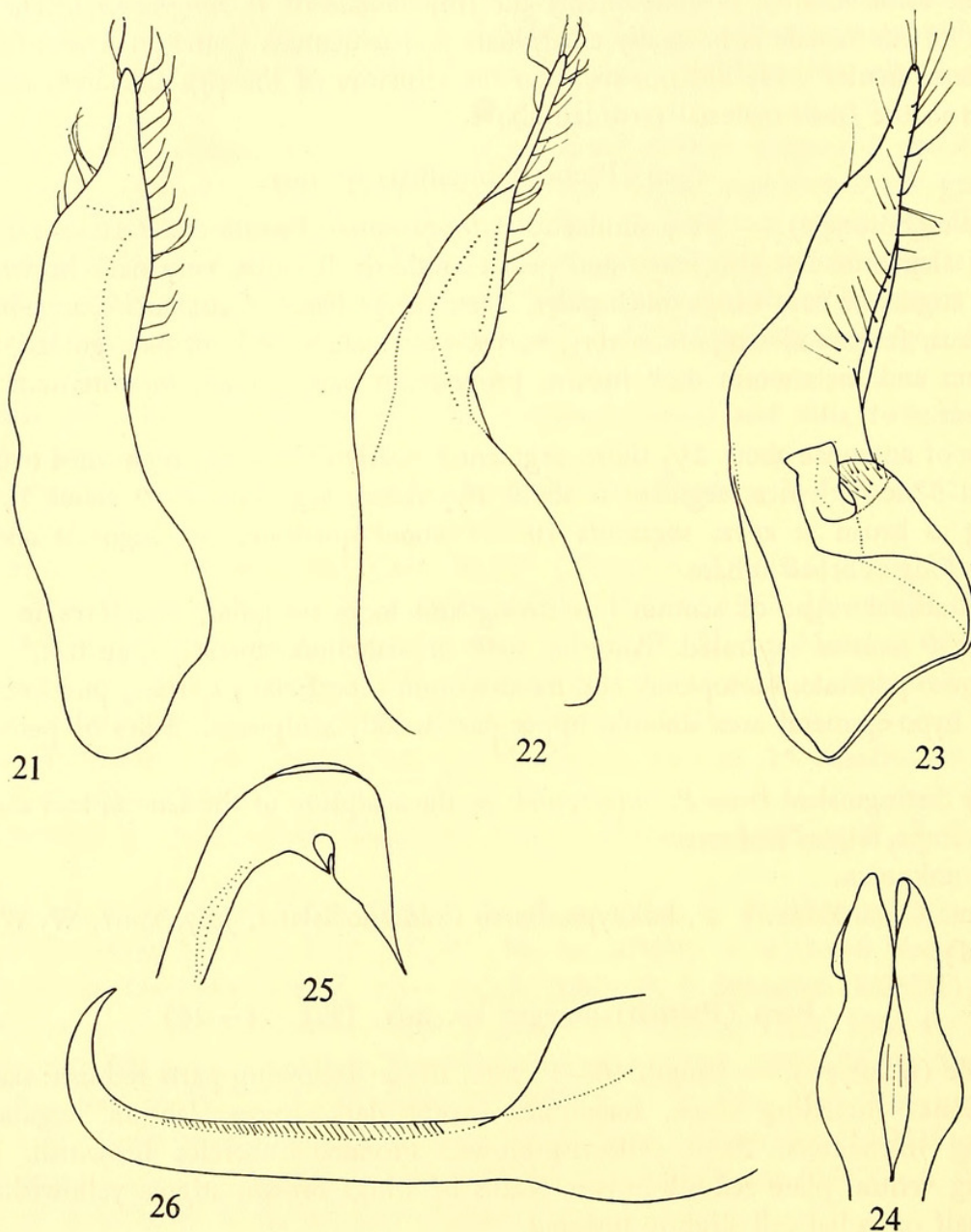


Fig. 21—26. *Psen (Pseneo) auriger* sp. nov., ♂, allotype. 21, left basiparamere and paramere, latero-dorsal aspect; 22, same, lateral aspect; 23, same, inner side; 24—25, penis valves, dorsal and lateral aspect; 26, eighth sternite, lateral aspect

Face below antennae and pronotum densely, golden pubescent. Rest of head, entire thorax and gaster and underside of legs with dense golden pubescence, unusually conspicuous on propodeum. Petiole ventrally with long erect hairs, latero-dorsally a row of very short hairs, base laterally with long hairs.

Male. — The male which I have associated with the females, mainly because of the rounded sides of the petiole, is much darker. Mandibles, base of antennae including scape, which is darkened dorsally, tegulae, greater part of fore femora, apex of mid

femora and foreside of fore and mid tibiae reddish-brown. Tarsi brown and reddish-brown. Petiole black. Stigma of wings dark brown, upper half of radial cell fuscated.

Scutum coarsely irregularly rugose, separate punctures only distinct in antero-lateral corners. Scutellum longitudinally rugose and distinctly punctate. Pronotal angles rectangular in frontal view. Scape of antennae nearly twice, segment 3 nearly three times, segments 4—5 about $1\frac{1}{2}$ times as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, last segment over $1\frac{1}{2}$ times as long as broad at base. Tyloidea on antennal segments 7—9 small and low, papilliform, smaller on segment 6. Antennal segments slightly rounded below. Pubescence duller than in female.

Genitalia (Fig. 21—25) yellowish-brown; basiparameres without inner shoulder, parameres relatively broad, before apex abruptly narrowed, below with long hairs. Apical spine (Fig. 26) with tip very strongly bent upward, even somewhat backward.

Peru: 1 ♀, holotype, 1 ♂, allotype, Cuzco, Rio Tambo (MF); 1 ♀, Loreto, Pucallpa (MF).

Brazil: 1 ♀, paratype, Mato Grosso, $12^{\circ}50'$ S., $51^{\circ}47'$ W., 6 May, 1968, Cerradão, O. W. Richards, Royal Soc. and Royal Geogr. Soc. Exp. (BM). This specimen has a somewhat reddish clypeus, the pronotal angles are distinctly spicate, only the apical half of the pygidial area is keeled and the central area of the scutellum is more extensively rugose.

P. auriger is characterized by the absence of lateral grooves of the petiole, the beautiful golden pubescence and in the female also by the extent of the red colour.

***Psen (Pseneo) aurifrons* (Taschenberg) (Fig. 27)**

Taschenberg, 1875: 387—388, ♂ (*Mimesa aurifrons* partim; "Brasilia").

Dalla Torre, 1897: 351.

? Fox, 1898a: 378 (*Psen aurifrons*; Brazil: Chapada).

Taschenberg's description was based on a female and a male which in fact represent two different species. R. M. Bohart designated the male in the collection of the Zoological Institute, Halle, as lectotype; the female is the holotype of the new form *taschenbergi*.

Redescription of lectotype. Male. — Length about 10 mm. Black; first four segments of flagellum reddish below, reddish-brown above. Palpi yellowish-brown. Pronotal tubercles dark brown. Tibiae and tarsi reddish-brown, also great part of foreside of fore and mid femora and dorsal part of all femora, tibial spurs reddish-yellow. Tegulae reddish-brown. Wings yellowish, veins dark brown, stigma yellowish-brown.

Frons and vertex with coarse punctures, on vertex mostly narrowly separated. Behind ocelli somewhat transversely striate. Postocellar area slightly raised. Scape of antennae thick, about $1\frac{3}{4}$ times longer than broad, segment 3 nearly 3 times, segments 4—5 nearly twice, segment 6 about $1\frac{3}{4}$ times, segments 7—12 about $1\frac{1}{2}$ times as long as broad at apex, last segment about twice as long as broad at base. Segments 4—6 with narrow oblong tyloidea, short on segment 4, longer on segment 5, on segment 6 longer than width of segment, segments 7—10 rounded below, with oval, shining black, tyloidea, a small tyloides on segment 11. Tyloidea distinctly larger than in *P. longiventris*.

Pronotum strongly spicate. Scutum densely coarsely punctate, also antero-laterally on disk tendency to longitudinal striation, no distinct rugae. Scutellum longitudinally

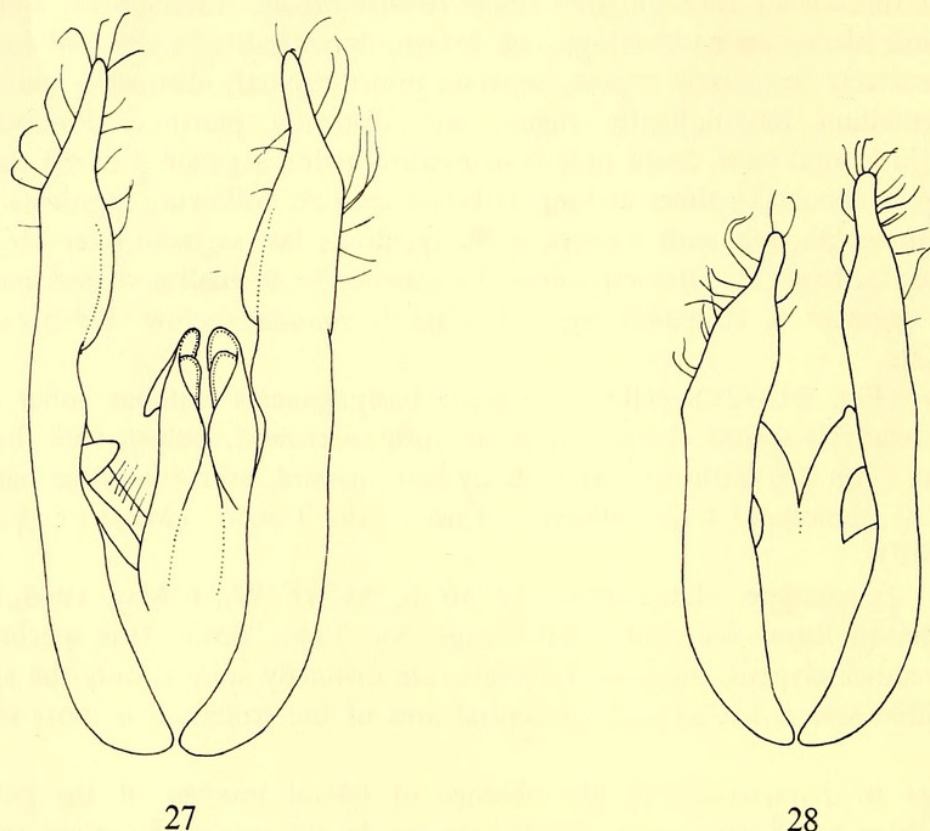


Fig. 27—28. Male genitalia, dorsal aspect. 27, (*Psen (Pseneo) aurifrons* (Taschenberg); 28, *Psen (Pseneo) claviventris* (Cameron), Mexico; right paramere (left in figure) bent downwards

rugoso-punctate, anterior half with large shining interstices. Mesopleura and mesosternum distinctly finely punctate, interstices a few times larger than punctures, upper half somewhat striate, hypo-epimeral area with coarse rugae, anterior plate of mesepisternum somewhat rugulose. Acetabular carina medially distinctly roundly protruding. Petiole over twice as long as first tergite, dorsally and ventrally smooth and flattened, sides with distinct groove. Legs normal, a few weak thorns on outer side of hind tibiae.

Pubescence of face and pronotum pale golden, mostly appressed, of rest of head, scutum, scutellum and metanotum brown, of propodeum golden-brown, of mesopleura, mesosternum and legs pale golden. Gaster brownish-golden pubescent. Underside of petiole laterally with long erect hairs, dorsally with lateral rows of very short hairs.

Genitalia (Fig. 27, male from Nova Teutonia (BM)) light brown, parameres long and slender, apical part narrower, underside with long bent hairs. No distinct shoulder on inner side of basiparameres.

Female. — Similar. Length about 11—13 mm. Apart from dorsal side of fore and mid femora also their entire foreside, apices of hind femora, tibiae and tarsi reddish. Veins and stigma of fore wings somewhat paler.

Scape of antennae over twice, segment 3 about four times, segments 4—5 over twice as long as broad at apex, following segments gradually decreasing in length, segments 10—11 about quadrate, segment 12 about $1\frac{1}{2}$ times as long as broad at base. Punctuation of scutum less rugose, more striato-punctate. Mesopleura very finely punctate, no striae. Pygidial area shining, with complete median longitudinal keel, along margin a row of strong punctures. Pubescence of face and pronotum golden, mostly appressed, of

mesopleura and mesosternum paler golden, of scutum, scutellum, metanotum and propodeum brownish-golden.

Lectotype (designated by R. M. Bohart): ♂, Nova Friburgo, Brazil (ZIH).

New records. — Brazil: 1 ♀, "Brasilia, Mus. Drews." (ZMC); Santa Catarina, Nova Teutonia, 27° S. 52—58° W., 1 ♂, 4 Dec., 1938, Fritz Plaumann (BM), 1 ♀, 4 March, 1963, 1 ♂, Febr., 1968, Fritz Plaumann (MCZ); Rio de Janeiro, 1 ♀, 27 Febr., 1966, H. and M. Townes; Sao Paulo, S. J. Barreiro, Serra da Bocaina, 1650 m, 1 ♀, Nov., 1968, Alvarenga and Seabra; Minas Gerais, Serra do Caraca, S. Barbara, 1 ♂, Jan., 1970, F. M. Oliveira (HT).

P. aurifrons is close to *P. aureolus* but is distinguished by the densely punctate scutum and vertex, reddish legs and golden pubescence of mesosternum; the antennae of the males are different. It differs from *P. auriger*, which also has a densely punctate scutum and golden pubescent mesosternum, in the more densely punctate vertex, the laterally grooved petiole, which is dark, and in the more protruding pronotal angles.

Dr. Ole Lomholdt, Copenhagen, kindly informed me that "Mus. Drews." is to be regarded as Coll. Drewsen. Drewsen was a Danish entomologist living about a century ago. He received insect collections both from Europe and from South America.

I could not yet trace the two specimens recorded from Chapada, Brazil, by Fox (1898a).

***Psen* (*Pseneo*) *claviventris* (Cameron) (Fig. 28)**

Cameron, 1891: 139, ♀ (*Mimesa claviventris*; Mexico: Guerrero).

Dalla Torre, 1897: 352, ♀ (*Mimesa claviventris*).

Ashmead, 1899: 225, ♀ (*Mimesa claviventris*).

Female. — Length about 9 mm. Black; base of flagellum reddish below, more or less brownish above, apex of mandibles dark reddish, palpi yellowish-brown, tibial spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings dark brown, upper part of radial cell dark fuscous.

Frons and vertex densely coarsely punctate, interstices mostly smaller than punctures. Behind lateral ocelli a small shining area, fore part of postocellar area with large interstices. Upper half of tempora finely striato-punctate. Scape of antennae about twice as long as broad at apex, segment 3 about four times, segment 4 about 2½ times, following segments gradually decreasing in length, segment 11 about as long as broad, segment 12 about 1½ times as long as broad at base.

Pronotal angles spicate, very acute in frontal view. Scutum coarsely rugoso-punctate, longitudinal rugae less distinct than in *P. longiventris*. Scutum laterally finely punctate, without distinct interstices. Scutellum striato-punctate. Mesopleura densely deeply punctate, interstices mostly larger than punctures, punctures smaller than on frons and vertex, upper part of mesopleura somewhat transversely striate. Hypo-epimeral area with punctures and coarse oblique rugae. Petiole over twice as long as first tergite, with lateral groove. Pygidial area with median keel on apical half.

Pubescence of face silvery, of pronotum very pale golden (in the type almost silvery). Vertex and scutum yellowish-grey, scutellum and propodeum very pale golden, tempora, mesopleura, mesosternum and legs whitish pubescent, base and apex of inner side of hind tibiae very densely so. Gaster very pale golden pubescent. Petiole ventrally with long erect hairs, dorsally with lateral rows of very short hairs.

Male. — Similar. Length about 9 mm. Face silvery. Scape about $1\frac{1}{2}$ times, antennal segment 3 about $2\frac{1}{3}$ times as long as broad at apex, following segments gradually decreasing in length, segment 12 about quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base. Antennal segments 4—11 with small, shining, papilliform tyloidea. Genitalia (Fig. 28) yellowish-brown. Basiparameres without inner tooth or shoulder; parameres near apex abruptly narrowed.

New records. — Mexico: Morelos state, 4 mi. E. of Cuernavaca, 6000 ft, 4 ♀, 2—20 June, 1959, 1 ♂, 2 June, 1959, H. E. Evans (CU); Durango, 24 mi. W. of La Ciudad, 7000 ft, 1 ♀, 28 June, 1964, W. R. M. Mason (CNC); Vera Cruz, Cordoba, 1 ♀, 5 Oct., 1966, Peters leg. (SMF).

In the females from Morelos State the face is pale golden, the scutum is laterally and antero-laterally somewhat striato-punctate.

The type (BM, no. 21.824) and the specimens recorded here have the back of the propodeum dull and normally coarsely irregularly reticulato-carinate (Cameron (1891): "median segment coarsely punctured, irregularly reticulated"). The lateral punctures of the pygidial area are distinct, rather large but not very deep, each with a long bristle. There is a distinct median keel on the apical half. (Cameron: "pygidial area shining, stoutly keeled down the centre, impunctate (!)").

I have some doubt with regard to the correct identification of the female from Cordoba, as the radial cell is only slightly infuscated, the pubescence of the hind legs is somewhat yellowish instead of silvery-white, the punctation of the vertex is less dense and the keel of the pygidial area continues, less distinctly, on the basal half.

Psen (Pseneo) aureolus sp. nov. (Fig. 29, 30)

Female. — Length about 9—11 mm. Black; labrum, median part of mandibles, base of antennae including scape and pedicel and last segment below, tegulae, foreside of fore and mid tibiae and often base of hind tibiae reddish. Tarsi brown, rarely reddish-brown. Palpi yellowish-brown. Pronotal tubercles reddish-brown. Veins of wings dark brown.

Frons and vertex densely punctate, on vertex transversely striato-punctate, postocellar area with narrow interstices between punctures, anteriorly with small impunctate area. Scape of antennae about twice as long, antennal segment 3 about four times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 shorter than broad, last segment about $1\frac{1}{2}$ times as long as broad at base.

Pronotum distinctly spicate. Rugae on scutum weaker than in *P. longiventris*, more irregular, punctures stronger and more numerous. Scutellum longitudinally rugoso-punctate, anteriorly with shining interstices. Mesopleura finely but distinctly punctate, interstices a few times larger than punctures, upper part with tendency to transverse striation; hypo-epimeral area usually with rugae and punctures on upper half. Petiole about twice as long as first tergite, with distinct lateral groove. Pygidial area with longitudinal median keel, strongest on apical half.

Pubescence of clypeus golden or pale golden, of frons, tempora and vertex golden. Pronotum dorsally pale golden pubescent. Scutum, scutellum and metanotum brownish-golden, propodeum greyish-golden, mesopleura and mesosternum whitish pubescent. Legs and gaster pale golden, sometimes almost whitish pubescent. Petiole ventrally with

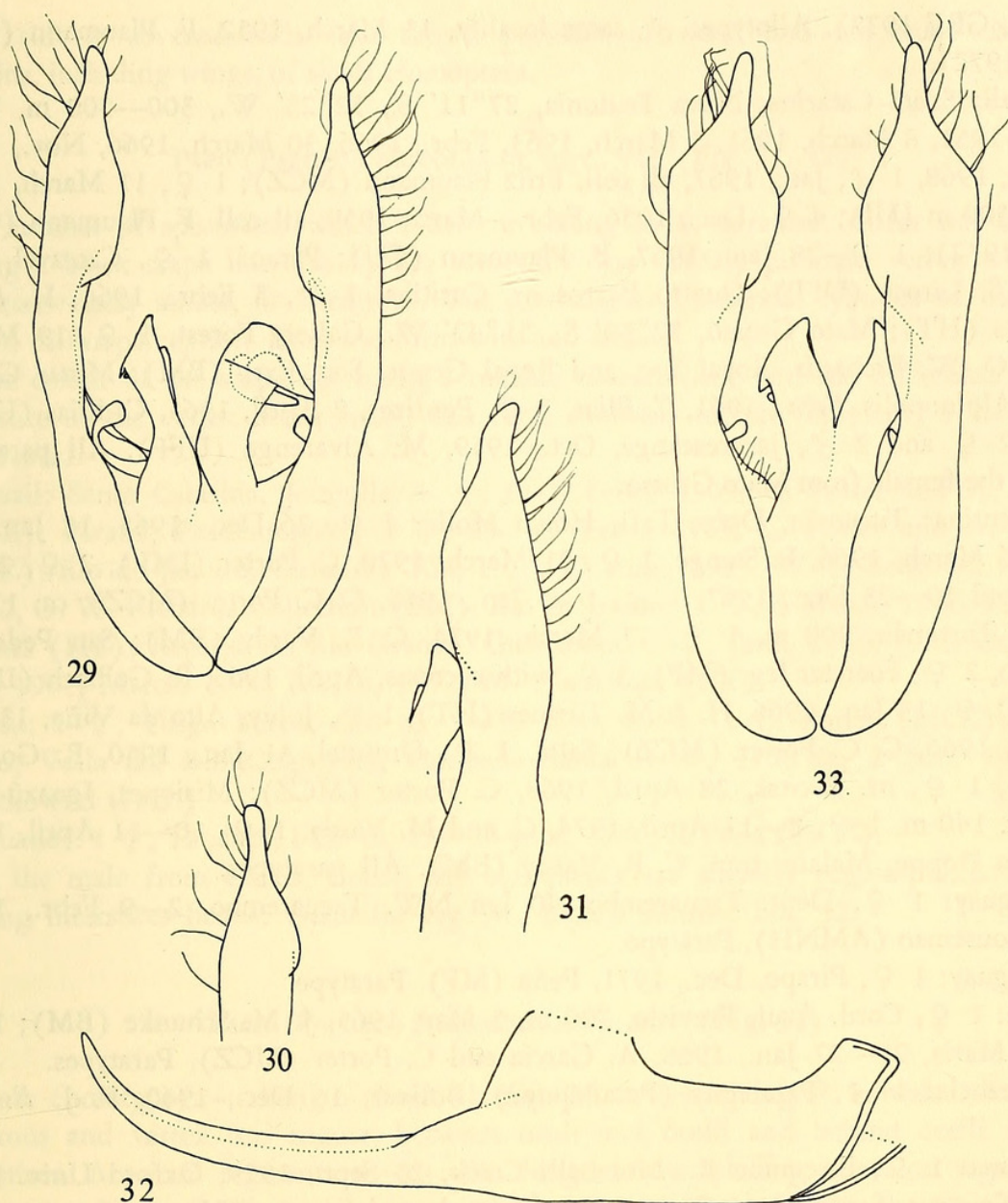


Fig. 29. *Psen (Pseneo) aureolus* sp. nov., ♂, allotype, genitalia, dorsal aspect. Fig. 30. *Psen (Pseneo) aureolus* sp. nov., ♂, Venezuela, apex of right paramere. Fig. 31—32. *Psen (Pseneo) aureolus* sp. nov., var., ♂, 31, left paramere, dorsal aspect; 32, eighth sternite, lateral aspect. Fig. 33. *Psen (Pseneo) funicularius* sp. nov., ♂, holotype, genitalia, dorsal aspect

long erect pale hairs, dorso-laterally with a row of very short hairs.

Male. — Length 8 mm. Punctuation of mesopleura coarser than in female. Scape of antennae about twice, segment 3 about $2\frac{1}{2}$ times, segments 4—6 about twice, segment 7 about $1\frac{1}{2}$ times, segments 8—12 about $1\frac{1}{4}$ times as long as broad at apex, last segment nearly twice as long as broad at base. Segments 3—10 or 3—11 with small, shining, papilliform tyloidea, on segments 3—4 somewhat elongated.

Genitalia (Fig. 29—30) yellowish-brown, apices brown. Basiparameres without inner shoulder; parameres basally broad, apices abruptly narrowed, underside and outer margin below with long pale hairs.

Holotype: ♀, Brazil, Santa Catarina, Nova Teutonia, Dec., 1953, F. Plaumann

(OSU, GRF 1972). Allotype: ♂, same locality, 13 March, 1952, F. Plaumann (OSU, GRF 1972).

Brazil: Santa Catarina, Nova Teutonia, 27°11' S., 52°23' W., 300—500 m, 7 ♀, April, 1951, 8 March, 1961, 3 March, 1963, Febr., 1966, 30 March, 1966, Nov., 1966, March, 1968, 1 ♂, Jan., 1967, all coll. Fritz Plaumann (MCZ); 1 ♀, 11 March, 1951, 300—500 m (UI); 4 ♀, Dec., 1956, Febr.—March 1959, all coll. F. Plaumann (OSU, GRF 1972); 1 ♀, 28 Jan., 1957, F. Plaumann (CU); Paraná, 1 ♀, Cascavel, Jan., 1962, S. Laroca (UFP); Quatro Barros nr. Curitiba, 1 ♀, 5 Febr., 1966, H. & M. Townes (HT); Mato Grosso, 12°50' S., 51°47' W., Gallery Forest, 1 ♀, 19 March, 1968, O. W. Richards, Royal Soc. and Royal Geogr. Soc. Exp. (BM); Minas Gerais, 1 ♀, Alpinópolis, Febr., 1961, C. Elias, 1 ♀, Perdizes, 8 April, 1965, C. Elias (UFP); Pará, 2 ♀ and 2 ♂, Jacareacanga, Oct., 1959, M. Alvarenga (UFP). All paratypes except the female from Mato Grosso.

Argentina: Tucumán, Dpto. Tafí, Horco Molle, 4 ♀, 26 Dec., 1965, 18 Jan. and 20—26 March, 1966, L. Stange, 1 ♀, 21 March, 1970, C. Porter (IML), 2 ♀, 2—15 Nov. and 10—23 Dec., 1967, 1 ♂, 1—5 Jan., 1968, C. C. Porter (MCZ), ca. 12 km W. of Tucumán, 700 m, 1 ♀, 17 March, 1974, C. R. Vardy (BM); San Pedro de Colalao, 2 ♀, Foerster leg. (MF), 3 ♀, with cocoons, April, 1965, R. Golbach (IML); Jujuy, 1 ♀, 13 Jan., 1966, H. & M. Townes (HT), 1 ♀, Jujuy, Alto da Viña, 13—20 March, 1966, C. C. Porter (MCZ); Salta, 1 ♀, Urundel, 31 Jan., 1950, R. Golbach (IML), 1 ♀, nr. Pocitas, 28 April, 1968, C. Porter (MCZ); Misiones, Iguazú Nat. Park, c. 140 m, 1 ♀, 8—11 April, 1974, C. and M. Vardy, 1 ♀, 10—11 April, 1974, hosteria Hoppe, Malaise trap, C. R. Vardy (BM). All paratypes.

Uruguay: 1 ♀, Dept. Tacuarembó, 40 km NW. Tacuarembó, 2—9 Febr., 1963, J. K. Bouseman (AMNH). Paratype.

Paraguay: 1 ♀, Pirapo, Dec., 1971, Peña (MF). Paratype.

Peru: 1 ♀, Cord. Azul, Previsto, 700 m, 5 May, 1965, J. M. Schunke (BM); 1 ♀, Tingo Maria, 20—27 Jan., 1968, A. Garcia and C. Porter (MCZ). Paratypes.

Venezuela: 1 ♂, Paratepuy (Peraitepuy?), Bolívar, 16 Dec., 1940, P. J. Anduze (CU).

Guyana: 1 ♀, Essequibo R., Moraballi Creek, 25 Sept., 1929, Oxford Univ. Exp., 1 ♂, Kaieteur, Savannah, 5 Sept., 1937, Richards and Smart (BM).

The vertex of the female from Mato Grosso, Brazil, is not densely punctate, hardly striate, the mesopleura are very sparsely and finely punctate, the hypo-epimeral area is almost smooth; the female from Guyana has similar vertex and mesopleura. The male from Guyana has a densely punctate vertex but almost impunctate mesopleura and a distinct tyloides on the 11th segment of the antennae.

P. aureolus and *P. claviventris* are much alike; the genitalia of the males (Fig. 28—30) and the tyloidea on the antennae are almost identical. The antennal segments of the male of *P. aureolus* are slightly longer than those of the single male of *P. claviventris* which could be examined. The main difference is in both sexes in the colour of the pubescence which is distinctly pale golden on frons, pronotum etc. of *P. aureolus*. The punctuation of the latter species is slightly weaker.

P. aureolus is also similar to *P. longiventris* which has stronger rugae on the scutum and finer punctuation of vertex and mesopleura. The genitalia of the males of these two species are distinctly different (Fig. 19 and 29).

The cocoons, about 11 mm long, are brown, also their inside, and very solid. The

outer side is covered with dark brown particles of wood and numerous chitinous remains, including wings, of small Homoptera.

Psen (Pseneo) aureolus sp. nov., var. (Fig. 31, 32)

A number of specimens which I believe belong to *P. aureolus*, differ not only in having a black scape but also by the somewhat less densely punctate vertex which is not transversely striate, or hardly so. The genitalia and antennal tyloidea of the male do not differ perceptibly from the form with red scape.

The colour of the scape not being a reliable characteristic and the difference in the sculpture of the vertex being small, this form probably merely represents a variety of *P. aureolus*.

Brazil: Santa Catarina, Joinville, 1 ♀, 8—9 Febr., 1969, C. Porter and A. Garcia (MCZ); Paraná, Prudentópolis, 2 ♀, 23—25 Febr., 1969, C. Porter and A. Garcia (MCZ); Rio de Janeiro, Gavea nr. Rio, 1 ♂, 27 Aug., 1923, W. S. Bristowe, number 35622, O. W. Richards Collection (BM), Rio de Janeiro, 1 ♀, 6 March, 1966, H. & M. Townes (HT); Reprêsa do Rio Grande, Guanabara, 6 ♀, June, 1966, June, Oct., and Dec., 1967, March, 1968, March, 1972, M. Alvarenga (HT).

Peru: 1 ♀, Tingo Maria, 620 m, 5—12 Oct., 1964, C. C. Porter (MCZ); 1 ♀, Cuzco, Valle del Rio Cogñipata, Hacienda Santa Isabel, 1700 m, 2 Jan., 1952, F. Woytkowski (IML).

Ecuador: 1 ♀, Taudapi, 1400 m, 15—20 June, 1965, L. Peña (MCZ).

In the male from Gavea, Brazil, the mesopleura are coarsely rugoso-punctate, with shining interstices below. Genitalia Fig. 31. Eighth sternite Fig. 32.

Psen (Pseneo) funicularius sp. nov. (Fig. 33)

Male (holotype). — Length about 11 mm. Much resembling *P. aureolus*. Sculpture of frons and vertex less rugose, between oculi and ocelli and behind ocelli shining interstices. Antennal segments 6—10 with long narrow tyloidea, short on segment 6, on segment 7 about as long as greatest width of segment, on segments 8—10 somewhat broader, gradually decreasing in length, on segment 11 reduced to a small shining point.

Scape of antennae black, tibiae reddish, on outer side near apex with black mark, tarsi brown, apices of tarsal segments of mid and hind legs reddish. Veins of wings dark brown.

Pubescence distinctly golden, pale golden on mesosternum and underside of gaster, more brownish on vertex, scutum, scutellum and metanotum, dense on gaster.

Genitalia (Fig. 33) different from *P. aureolus*, the narrowed apices of parameres being straight, not slightly bent outwards.

Brazil: 1 ♂, holotype, Santa Catarina, Nova Teutonia, Febr., 1968, Fritz Plaumann (MCZ).

P. funicularius is evidently close to *P. aureolus* but the tyloidea of the antennae and the genitalia are different, as well as the pubescence of mesopleura and mesosternum and the colour of the hind tibiae.

A damaged female from Colombia may belong to this species but this identification should be substantiated by more material. The vertex is rather densely punctate with

narrow interstices, and a rather large shining impunctate area on the outer side of and behind the posterior ocelli. Legs black.

Colombia: 1 ♀, Colombia Orient., Cundinamarca, Monterredondo (MF).

Psen (Pseneo) magnificus sp. nov.

Female (holotype). — Length about 10 mm. Black; antennae including scape, mandibles except apices, legs including trochanters, and tegulae red, apical half of flagellum above brown. Veins of wings including stigma brown.

Frons below ocelli finely punctate, interstices partly larger than punctures, vertex also finely, more sparsely, punctate, behind ocelli a large impunctate area. Tempora almost smooth. Mandibles broad. Scape of antennae about $2\frac{1}{2}$ times as long as broad at apex, third antennal segment over $3\frac{1}{2}$ times, segments 4—5 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 nearly quadrate, last segment about $1\frac{1}{2}$ times as long as broad at base. Pronotal angles distinctly spicate. Scutum striato-punctate, medially with distinct longitudinal rugae, laterally and antero-laterally with distinct shining interstices. Scutellum punctate with shining interstices a few times the size of the punctures. Mesopleura and mesosternum minutely sparsely punctate, hypo-epimeral area shining with a few weak rugae. Petiole about twice as long as first gastral tergite, cylindrical, sides slightly narrowly depressed or at least flattened. Pygidial area narrowly triangular, as usual, with rounded apex, shining, large punctures along sides and median carina distinct on apical half.

Pubescence golden, somewhat paler on mesosternum, very dense on frons and clypeus, tempora, pronotum, mesopleura and back of propodeum, much appressed.

Male unknown.

Brazil: 1 ♀, holotype, "Para 70 16" (small round lightpurple label) (BM).

This species resembles *P. auriger* which is also entirely densely golden pubescent and has red legs, but it differs in having a black petiole, in the flattened instead of rounded sides of the petiole and in the much less coarsely sculptured scutellum.

Psen (Pseneo) argentinus (Brèthes) (Fig. 34)

Brèthes, 1910: 283, ♀ (*Mimesa argentina*; Argentina).

Female. — Length about 10 mm. Black; base of flagellum, apex of last segment below and tegulae reddish. Palpi and last segments of tarsi brown. Veins of wings including stigma dark brown.

Frons, vertex and interocellar area densely coarsely punctate, vertex somewhat transversely striate. Upper part of tempora finely striato-punctate. Scape of antennae about twice, segment 3 nearly four times, segment 4 over twice, segment 5 twice as long as broad at apex, following segments gradually decreasing in length, segment 11 about quadrate, segment 12 about $1\frac{1}{2}$ times as long as broad at base. Pronotum strongly spicate. Scutum densely punctate, medially somewhat striato-punctate, scutellum longitudinally rugoso-punctate with narrow shining interstices. Mesopleura densely finely punctate, interstices often smaller than punctures, upper part somewhat longitudinally striato-punctate, hypo-epimeral area shining, coarsely obliquely rugose. Petiole about twice as long as first tergite, lateral groove shallow. Pygidial area flat, apically a number of fine punctures, a row of large punctures along the sides, no distinct median keel.

Pubescence of face and pronotum silvery. Vertex and thorax dorsally with yellowish-grey pubescence, more brownish and short on greater part of scutum, on which anteriorly also a number of long whitish hairs. Pubescence of tempora, mesopleura, mesosternum, gaster and greater part of legs whitish. Petiole with latero-dorsal rows of mostly short hairs, ventrally with long erect hairs.

Male. — Similar. Length about 8 mm. Base of flagellum darker above. Sculpture of frons, vertex, scutum and scutellum coarser and more irregular. Mesopleura stronger punctate. Scape of antennae about $1\frac{1}{2}$ times, segment 3 about $2\frac{1}{2}$ times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segment 12 about $1\frac{1}{2}$ times as long as broad at apex, segment 13 nearly twice as long as broad at base. Tyloidea on segment 5 very small and indistinct, on segments 6—11 shining black, papilliform, smaller on segment 6, an indistinct tyloides on segment 12. Underside of segments 6—11 angularly broadened, when seen from behind. In the male from Entre Ríos the tyloidea are somewhat larger.

Pubescence of gaster pale golden.

Genitalia (Fig. 34) yellowish-brown, apices of parameres dark brown, with long hairs on underside. Parameres slender, basiparameres with distinct inner shoulder.

New records. — Argentina: prov. Buenos Aires, 2 ♀, Moreno, 1 ♀, Moreno, Oct., 1970, 1 ♀, Moreno, Nov., 1973, 1 ♀, Glew, Carpintero Coll. (MF); 1 ♀, La Plata, 11 Dec., 1965, H. and M. Townes (HT); 12 ♀, La Plata, Fac. Agronomía, Sept.—Nov., 1968, C. Porter, 1 ♀ and 1 ♂, La Balandra, 19—30 Nov., 1968, C. C. Porter (MCZ); 1 ♂, prov. Entre Ríos, Palmar Colón, Zelich (MF).

The first mentioned three females, from Moreno, were labelled "*Mimesa argentina* Breth." by Mr. M. F. Fritz, Buenos Aires. The males from LaBalandra and Palmar Colón (Entre Ríos) agree in all details studied — the gaster of the type is missing — with the male type (MACN), of which the pubescence is somewhat paler than in the fresh males. The tyloidea of the type are of the same size as those of the male from LaBalandra. It is labelled "chasseur de Hémiptères, B.A. 6.XI.1902, Brèthes". It also carries a label written in a different, darker, ink "*Mimesa argentina*" and a printed label "Col. J. Brèthes". Brèthes described the female as well as the male, and apparently collected a female with her prey, although this was not mentioned in his publication. As Mr. Fritz informed me, a female could not be found in the museum of Buenos Aires. The female collected at Glew by Carpintero (MF) carries a Jassid on the pin.

***Psen (Pseneo) taschenbergi* sp. nov. (Fig. 35)**

Taschenberg, 1875: 387—388, ♀ (*Mimesa aurifrons* partim; "Brasilia").

Dalla Torre, 1897: 351, ♀ (*Mimesa aurifrons* partim).

Female. — Length 10—11.5 mm. Black; base of flagellum, tegulae, base of hind tibiae, all tarsi, reddish-brown. Palpi yellowish-brown. Labrum dark reddish. Pronotal tubercles black. Foreside of fore and mid tibiae brown. Spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings including stigma dark brown.

Frons, interocellar area and vertex, densely coarsely punctate, vertex with tendency to transverse striation. Upper part of tempora finely densely punctate, lower part smooth. Scape of antennae about twice as long as broad, segment 3 about four times, segments 4—5 about twice, segments 6—7 about $1\frac{1}{2}$ times as long as broad at apex, segment 8 slightly longer than broad, segments 9—11 about quadrate, last segment nearly $1\frac{1}{2}$ times as long as broad at base.

Pronotum spicate. Scutum very densely coarsely punctate, also its antero-lateral corners. Scutellum coarsely longitudinally rugoso-punctate. Mesopleura and mesosternum finely punctate, interstices equal to or larger than punctures. Hypo-epimeral area coarsely rugose. Anterior plate of mesepisternum dull, striato-punctate. Acetabular carina medially little protruding. Petiole dorsally flattened, laterally with distinct longitudinal groove. Surface of pygidial area shining, an irregular row of large punctures along the margin, no median keel.

Pubescence of head pale golden, face somewhat paler. Pubescence of pronotum golden, of dorsum and back of thorax and of gaster golden-brown, mesopleura paler, mesosternum pale golden or yellowish, in fresh specimens mesopleura and mesosternum almost whitish. Petiole below with row of long erect hairs.

Male. — Similar. Length 8—9.5 mm. Sculpture of head, mesopleura and mesosternum somewhat coarser. Legs black, tarsi brownish. Pubescence of face more silvery.

Scape about $1\frac{3}{4}$ times as long as broad, third segment $2\frac{3}{4}$ times, segments 4—6 about twice as long as broad at apex, following segments gradually shorter, segment 12 about $1\frac{1}{3}$ times as long as broad at apex and last segment about $1\frac{3}{4}$ times as long as broad at base. Fourth segment with point-shaped or indistinct tyloides, segment 5 with short narrow tyloides, segment 6 with small, segments 7—12 with larger, papilliform, black and shining tyloidea, distinct in lateral view, often segment 12 with narrow or indistinct tyloides.

Genitalia (Fig. 35) long, yellowish-red, apex of parameres blackish, narrow, rounded tip.

Holotype: ♀, Brazil, Rio de Janeiro, Nova Friburgo (ZIH) (*Mimesa aurifrons* det. Taschenberg, *Pseneo? aurifrons* Taschenberg, det. R. M. Bohart). Allotype: ♂, Santa Catarina, Nova Teutonia, 27°11' S, 52°23' W, 300—500 m, Dec., 1966, Fritz Plaumann (CNC). The following specimens are all paratypes.

Brazil: Santa Catarina, Nova Teutonia, 27°11' S., 52°23' W., 1 ♂, 29 Nov., 1937, Fritz Plaumann (Coll. van Lith), 1 ♀, 20 Oct., 1938, Fritz Plaumann (BM), 4 ♀, 31 March and 25 Nov., 1952, Nov., 1953, F. Plaumann (OSU, GRF 1972), 1 ♂, Nov. 1958, F. Plaumann (OSU), 3 ♀, 16 Febr., 1955, 27 Dec., 1955, 5 March, 1956, F. Plaumann (CU); Paraná, 1 ♀, Campina Grande nr. Curitiba, 15 Febr., 1966, H. & M. Townes (HT).

Argentina: Tucumán, 1 ♀, Amaicha, 19 Nov., 1966, L. Stange, 1 ♂ Cadillal, 16—23 Jan., 1957, R. Golbach, 1 ♀, Farrallón Blanco, Dpto. Burruyacu, 7—8 Febr., 1961, R. Golbach, 1 ♀, Reserva Forestal Camino a Salta, 17 April, 1951, A. Willink, 1 ♀, Lacavera, Dpto. Tafí, 28 Nov., 1951, R. Golbach, 1 ♀, Traucas-Tacanas, Febr., 1951, J. M. Arnzu, Horco Molle, Dpto. Tafí, 1 ♀, 18 Jan., 1966, L. Stange, 3 ♀, 21 March and 19 Nov., 1970, 24 Nov., 1971, C. Porter (IML), 1 ♀, Horco Molle, nr. Tucumán, 19 Jan., 1966, H. & M. Townes (HT); 1 ♀, San Pedro de Colalao, Foerster leg. (MF), 1 ♀, San Pedro de Colalao, Traucas, Febr., 1951 (OSU, GRF 1972); 1 ♀, Jujuy, Los Perales, 6 Febr., 1950, Mourós-Willink (IML), 4 ♀, Jujuy, 14—15 Jan., 1966, H. & M. Townes (HT); Córdoba, 1 ♀, Chancon, 20 km NE., 1000 m, Febr., 1966, L. Stange (IML); Misiones, 1 ♂, Leandro N. Alem, Inst. Alberdi, 17—19 Nov., 1969, C. Porter (IML); Salta, 1 ♀, Urundel, 31 Jan., 1950, R. Golbach, 1 ♀, Campamento Jakúlica, 40 km E. Aguas Blancas, 20 Sept., 1971, Malaise trap, C. Porter, 1 ♂, Yacochuya (Cafayate), Malaise trap, Entomofauna Subandina, 1—15 Jan., 1969, Willink-Terán-Stange (IML).

Paraguay: Pirapo, 1 ♀, Peña, 11 ♂, Dec., 1971, Peña; 1 ♀, Caballero, Nov., 1971, Peña (MF).

Bolivia: 1 ♂, Santiago (MF).

In the females from Argentina and from Paraguay the scape of the antennae is reddish, in only two specimens from Argentina darkened or black; the pronotal tubercles are reddish-brown and the foreside of the fore tibiae is more reddish-brown. The punctation of the mesopleura of the males is often much stronger than in the females, especially in the males from Paraguay.

The female of *P. taschenbergi* is distinguished by the flat pygidial area, the dense punctation of vertex and scutum and the partly golden pubescence. The male is distinguished, apart from the punctation and the dark legs, by distinct tyloidea on the eleventh segment.

P. taschenbergi is much alike *P. argentinus* from which it seems to differ only in the golden pubescence of face and pronotum. The males are sometimes difficult to recognize, the more so as the genitalia and the antennal tyloidea seem to be identical. Further studies may prove that *taschenbergi* is to be regarded as a subspecies of *argentinus*.

***Psen (Pseneo) auriventris* sp. nov.**

Female (holotype). — Length about 13 mm. Black; apex of mandibles, base of flagellum, tegulae, knees, tibiae and tarsi reddish; underside of mid and hind tibiae brown. Palpi brownish-yellow. Tibial spurs of fore legs yellowish, of mid and hind legs whitish. Veins of wings brown, stigma yellowish-brown.

Frons and vertex densely punctate, partly striato-punctate, upper part of tempora densely finely punctate, lower part smooth. Scape of antennae over twice, segment 3 over four times, segment 4 about $2\frac{1}{2}$ times as long as broad at apex, following segments gradually decreasing in length, segment 11 about $1\frac{1}{4}$ times as long as broad at apex, last segment nearly twice as long as broad at base.

Pronotal angles weakly spicate in dorsal view, rectangular in frontal view. Scutum very densely striato-punctate, antero-lateral corners finer; scutellum rugoso-punctate, small shining interstices on fore part. Mesopleura and mesosternum superficially finely punctate, hypo-epimeral area coarsely rugose. Anterior plate of mesepisternum finely obliquely striate. Acetabular carina medially little protruding. Petiole over twice as long as first tergite, sides with shallow groove. Pygidial area flat, lateral row of medium-sized punctures.

Face with deep golden pubescence. Pubescence of head including tempora, entire thorax, gaster and legs golden pubescent. Petiole ventrally with long erect hairs, somewhat shorter hairs along latero-dorsal margins.

Male unknown.

Peru: 1 ♀, holotype, Chanchamayo, 4 May, 1948, D. G. Shappirio, 1970 (USNM).

P. auriventris is close to *P. taschenbergi* which also has a flat pygidial area and dense punctation of vertex and scutum. It is easily recognized by the beautiful golden pubescence and the reddish tibiae and tarsi.

***Psen (Pseneo) eliasi* sp. nov. (Fig. 36, 37)**

Female. — Length about 9 mm. Head black; apical half of mandibles and labrum reddish, palpi yellowish-brown, antennal segments 3—6 and underside of segments 7 and 12 reddish. Thorax and gaster black; tegulae reddish, greater part of pronotal tubercles reddish-brown, foreside of fore and mid tibiae, base of hind tibiae and apex of pygidial area brownish. Tibial spurs yellowish-white. Veins of wings including stigmata brown.

Anterior margin of clypeus thickened, protruding, very slightly emarginate, not tridentate. Fine frontal carina, ending between antennae in a very low tooth. Frons and vertex densely punctate, vertex behind ocelli transversely striato-punctate, tempora

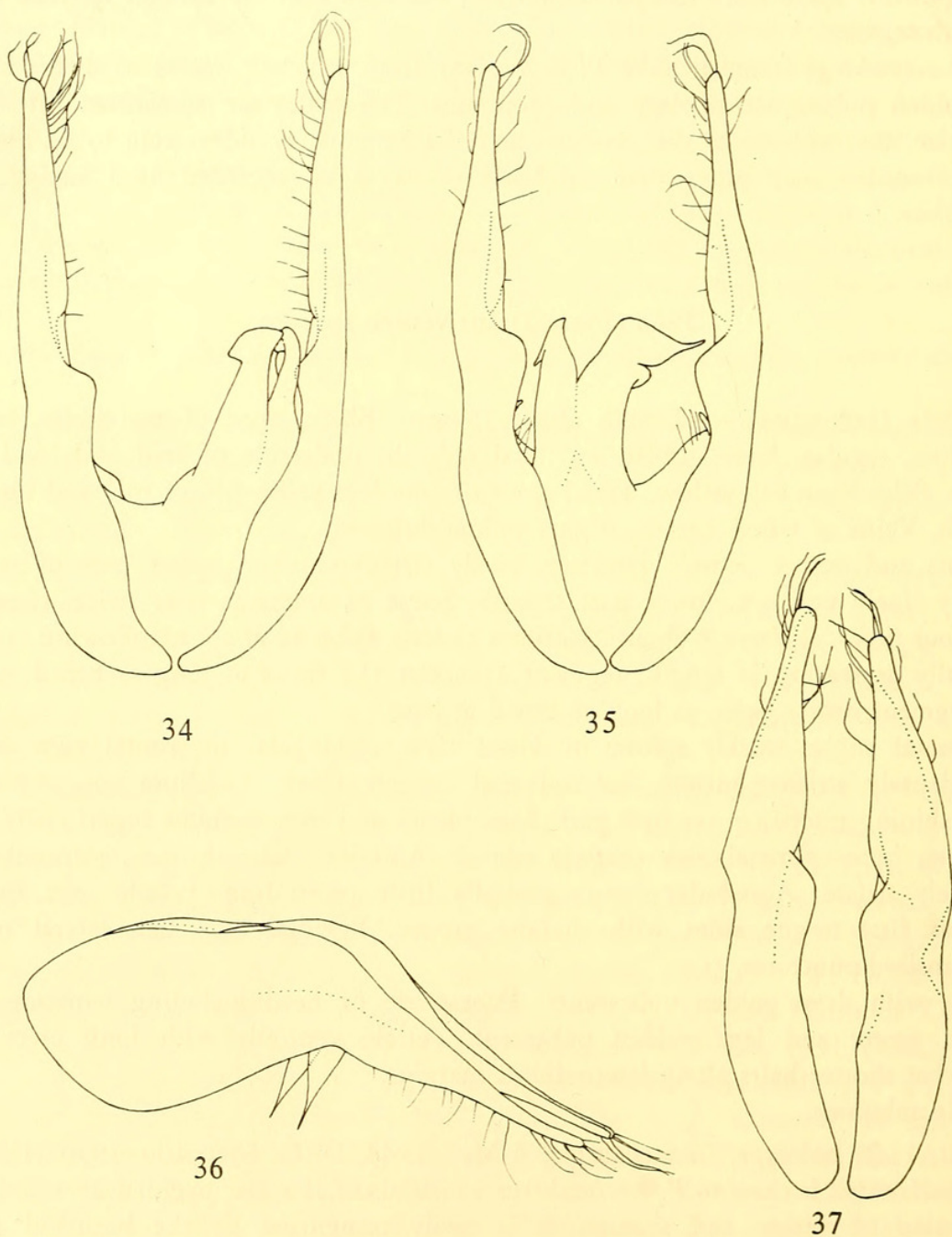


Fig. 34—37. Male genitalia of various species of *Psen (Pseneo)*. 34, *P. argentinus* (Brèthes); 35, *P. taschenbergi* sp. nov., both dorsal aspect; 36—37, *P. eliasi* sp. nov., lateral and dorsal aspect

finely punctate. Postocellar area slightly raised. Occipital carina high, ending in hypostomal carina. Third antennal segment about 4 times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 9—11 shorter than broad, segment 12 about $1\frac{1}{2}$ times as long as broad at base.

Pronotal angles spicate. Scutum and scutellum very densely coarsely punctate. Enclosed area of propodeum triangular, shining, back of propodeum coarsely reticulato-carinate. Mesosternum and mesopleura very densely finely punctate, hypo-epimeral area coarsely rugose. Acetabular carina complete. Anterior plate of mesepisternum obliquely striate, anterior oblique suture foveolate, widened part with a few transverse carinae. Legs and venation of wings normal.

Petiole over twice as long as first tergite in dorsal view, almost quadrate in cross-section, laterally depressed with distinct upper and lower ridges, dorsally with lateral irregular row of extremely fine hair-bearing punctures. Pygidial area narrowly triangular, flat, medially feebly raised, surface densely punctate, punctures reaching lateral margins except at base.

Pubescence of head, pronotum and metanotum pale golden, mostly appressed on face and pronotum. Scutum brownish-grey, propodeum yellowish-grey, mesopleura, mesosternum, gaster and legs whitish pubescent, pubescence rather dense on gaster including ventral plate of petiole and pygidial area. Petiole ventrally with lateral row of shorter and longer erect hairs, dorsally with some very short lateral hairs.

Male. — Similar. Length about 8 mm. Colour as in female but the male from Itapura has paler fore and mid tibiae and the antennal segments 3—7 are entirely, segments 8—13 ventrally reddish. The pubescence of face, pronotum and propodeum of this male is almost whitish.

Third antennal segment about 3 times, segment 4 about twice as long as broad at apex, following segments gradually decreasing in length, segments 11—12 about quadrate, segment 13 about $1\frac{1}{2}$ times as long as broad at base. Segments 8—12 with shining black tyloidea, almost linear on segment 12, broad oval on the other segments, about half as long as the segments. Indistinct tyloidea on segments 6—7.

Genitalia (Fig. 36, 37) reddish-brown, resembling those of *P. argentinus* and *P. taschenbergi*; the inner shoulder of the basiparameres is more rounded and the parameres are less slender than in these latter two species.

Brazil: Minas Gerais, 1 ♀, holotype, and 1 ♂, allotype, Passos, 10—15 Dec., 1962, Claudionor Elias (UFP). The following specimens are all paratypes: Minas Gerais, Passos, 1 ♂, 12—17 Nov., 1962, 1 ♂, 17—22 Sept., 1962, 1 ♂, 10—15 Dec., 1962, 1 ♂, 17—22 Dec., 1962, C. Elias; Minas Gerais, Araxá, 1 ♀, 22 April, 1965, 1 ♀, 15 May, 1965, 4 ♂, 27 Oct., 1965, C. Elias; Minas Gerais, Uberaba, 1 ♂, Oct., 1961, C. Elias; Paraná, Palmeira, Papagaios Velhos, 1 ♂, 11 Dec., 1966, J. S. Moure; Rio de Janeiro, Petrópolis, 1 ♂, April, 1961, M. Alvarenga (all UFP); Mato Grosso, 1 ♂, Três Lagoas, 6—10 Dec., 1919, 1 ♂, Itapura, 6—9 Dec., 1919, Cornell Univ. Exped., R. G. Harris (CU).

The female of *P. eliasi* takes a unique position in the subgenus *Pseneo* because of its slightly emarginate, instead of tridentate, clypeal margin and above all because of the densely punctate pygidial area. The male is similar to *P. argentinus* and *P. taschenbergi* from which it differs in the tyloidea and the genitalia. The tyloidea resemble those of *P. simplicicornis*.

REFERENCES

- ASHMEAD, W. H., 1899. Classification of the entomophilous wasps, or the superfamily Sphegoidea (Paper No. 3). — Can. Ent. 31 (8): 212—225.
- BARTH, G. P., 1907. On the nesting habits of *Psen barthi* Viereck. — Bull. Wisc. nat. Hist. Soc. 5 (4): 251—257.
- BOHART, R. M. & E. E. GRISSELL, 1969. New species of Psenini (Hymenoptera: Sphecidae). — Pan-Pacif. Ent. 45 (3): 216—221.
- BRÈTHES, J., 1910. Himenópteros Argentinos. — An. Mus. argent. Cienc. nat. 20: 205—316.
- BRIMLEY, C. S., 1938. The insects of North Carolina. — N. C. Dept. Agr. unnumbered publ.: 1—560.
- CAMERON, P., 1891. Insecta. Hymenoptera. (Fossores), Fam. Mimesidae. — Biologia Centr.-Amer. 2: 134—140.
- DALLA TORRE, C. G. DE, 1897. Fossores (Sphegidae). — Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus 8: 1—749.
- DALMAU, A., 1970. Catálogo de los Himenópteros de Cuba: 1—218.
- EVANS, H. E., 1959. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae). — Trans. Am. ent. Soc. 85: 137—145.
- FOX, W. J., 1898a. Contributions to a knowledge of the Hymenoptera of Brazil. No. 3. Sphegidae (sens. lat.). — Proc. Acad. nat. Sci. Philad. 1897: 373—388.
- , 1898b. The species of *Psen* inhabiting America North of Mexico. — Trans. Am. ent. Soc. 25 (1): 1—18.
- GITTINS, A. R., 1969. Revision of the Nearctic Psenini (Hymenoptera: Sphecidae). I. Redescriptions and keys to the genera and subgenera. — Trans. Am. ent. Soc. 95: 49—76.
- KROMBEIN, K. V., 1950. Taxonomic notes on the wasps of the subgenus *Pseneo* Malloch (Hymenoptera, Sphecidae). — Proc. ent. Soc. Wash. 52 (6): 277—287.
- , 1951. In: C. F. W. Muesebeck, K. V. Krombein & H. K. Townes, Hymenoptera of America North of Mexico. — U.S. Dep. Agric., Agric. Monograph 2: 1—1420.
- , 1958. Hymenoptera of America North of Mexico. — U.S. Dep. Agric., Agric. Monograph 2 (First Supplement): 1—305.
- , 1967. In: K.V. Krombein & B. D. Burks, Hymenoptera of America North of Mexico. — U. S. Dep. Agric., Agric. Monograph 2 (Second Supplement): 1—584.
- LITH, J. P. VAN, 1959. Contribution to the knowledge of the Indo-Australian Pseninae (Hymenoptera, Sphecidae). — Zool. Verh. Leiden 39: 1—69.
- , 1965. Contribution to the knowledge of the Indo-Australian Psenini. III. — Zool. Verh. Leiden 73: 1—80.
- MALLOCH, J. R., 1933. Review of the wasps of the subfamily Pseninae of North America (Hymenoptera: Aculeata). — Proc. U.S. natn. Mus. 82 (26): 1—60.
- MICKEL, C. E., 1918 (1917). A synopsis of the Sphecoidae of Nebraska (Hymenoptera). — Univ. Nebr. Stud. 17: 342—456.
- PACKARD, A. S., 1867. Revision of the Fossorial Hymenoptera of North America. — Proc. ent. Soc. Philad. 6: 353—444.
- PATE, V. S. L., 1937. The generic names of the Sphecoid wasps and their type species. — Mem. Am. ent. Soc. 9: 1—103.
- , 1946. On the Psenine wasps of Cuba (Hymenoptera: Sphecidae). — Mems Soc. Cubana Hist. nat. 18 (1): 3—10.
- RICHARDS, O. W., 1956. Hymenoptera, Introduction and keys to families. — Handbk Ident. Br. Insects 6 (1): 1—94.
- ROHWER, S. A., 1909. Notes and descriptions of wasps. — Ent. News 20: 323—325.
- , 1910. Descriptions of new Psenid wasps from the United States. (Hymenoptera; Psenidae). — Proc. ent. Soc. Wash. 12: 99—104.
- , 1917 (1916). In H. L. Viereck. Guide to the insects of Connecticut. Part III, the Hymenoptera or wasp-like insects of Connecticut. — State (Conn.) Geol. nat. Hist. Survey Bull. 22: 1—824.

- SMITH, H. S., 1908. The Sphegoidea of Nebraska. — Univ. Nebr. Stud. 8: 323—410.
- SNODGRASS, R. E., 1941. The male genitalia of the Hymenoptera. — *Smithson. misc. Collns* 99: 1—86.
- TASCHENBERG, E., 1875. Nyssonidae und Crabronidae des zoologischen Museums der hiesigen Universität. — *Z. ges. Naturw. Halle* 45: 387—389.
- VIERECK, H. L., 1901. New species of the subfamily Pseninae. — *Trans. Am. ent. Soc.* 27: 338—342.
- , 1903. Hymenoptera of Beulah, New Mexico. A list of the insects of Beulah, New Mexico. Edited by H. Skinner. — *Trans. Am. ent. Soc.* 29: 43—100.
- , 1907. A new species of *Psen*. — *Bull. Wisc. nat. Hist. Soc.* 5 (4): 251.

INDEX

(The names of new species are marked with an asterisk)

- | | | |
|--------------------|---------------------|-----------------------|
| angulatus 22 | ferrugineus 22 | niger 22 |
| argentinus 34 | fulvipes 22 | |
| * aureolus 30 | * funicularius 33 | * paranaensis 11 |
| aurifrons 27, 35 | | Pluto 15 |
| * auriger 25 | irwini 7 | Psen 2 |
| * auriventris 37 | | Pseneo 7, 15 |
| | kohlîi 20, 22, 23 | pulcher 9 |
| barthi 8 | | punctatus 20, 22 |
| | longiventris 22, 23 | |
| * canalicus 25 | * magnificus 34 | simplicicornis 20, 22 |
| cameroni 11 | * metallicus 7 | spicatus 23 |
| carolina 22 | Mimesa 4, etc. | striolatus 5 |
| claviventris 29 | montezuma 23 | |
| | monticola 4, 11 | * taschenbergi 35 |
| * eliasi 38 | montivagus 11 | unifasciculatus 11 |
| * erythrocnemus 13 | myersiana 8 | |
| erythropoda 5 | | venetus 9 |



Lith, J P V. 1975. "Neotropical species of Psen and Pseneo (Hymenoptera, Sphecidae, Psenini)." *Tijdschrift voor entomologie* 118, 1–41.

View This Item Online: <https://www.biodiversitylibrary.org/item/89568>

Permalink: <https://www.biodiversitylibrary.org/partpdf/66011>

Holding Institution

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Sponsored by

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.