

SHORT COMMUNICATIONS

**PHYLLOGOMPHOIDES APICULATUS SPEC. NOV., A NEW MEXICAN
DRAGONFLY, AND DESCRIPTION OF THE FEMALE OF
P. PACIFICUS (SELYS, 1873) (ANISOPTERA: GOMPHIDAE)***

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P. apiculatus sp. n., found in the Pacific coastal states of Mexico, is described and illustrated (holotype male and allotype female: Nayarit State, Mexico, are deposited in Mus. Zool., Univ. Michigan, Ann Arbor, USA). The previously undescribed female of the closely related *P. pacificus* is also described, the neallotype designated and deposited in the same institution. Because of the close resemblance of *P. pacificus* to the present new sp. and several others yet to be described, and the considerable amount of historical uncertainty in the literature concerning its status, the type of *P. pacificus* was borrowed for study. Brief notes on the ecology and behavior of *P. apiculatus* sp. n. are added.

INTRODUCTION

DONNELLY (1979) made the most extensive revision of Central American *Phyllogomphoides* which has appeared to date. That paper treated the 7 species then known to occur in Mexico: *albrighti* (Needham), *bifasciatus* (Hagen), *duodentatus* Donnelly, *pacificus* (Selys), *pugnifer* Donnelly, *stigmatus* (Say), and *suasus* (Selys); BELLE (1987) added an eighth Mexican species with his description of *P. nayaritensis*; we now bring on record one additional new species, *P. apiculatus* sp. n.

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When SELYS (1873) described *Gomphoides pacifica* he provisionally placed it as a race of *G. suasa* SELYS (1859). CALVERT (1899) correctly recognized morphological differences that separated the two, but later (1905) again suggested *pacifica* was probably only a race of *suasa* because they appeared to be separated by "only slight colour-differences". Apparently Calvert intended to publish something further concerning the matter but never did, because the holotype of *G. pacifica* bears a pin label "dessiner par Calvert 1929". ST. QUENTIN (1967) seems to have been the next person who recognized the specific distinctness of *G. pacifica*, but without giving any characterization or descriptive notes. It remained for DONNELLY (1979) to validly establish the distinctness of *P. pacificus* by providing detailed figures and characterizations which showed extensive morphological differences between this well-known, but much disputed form, and all other species of the genus known up to that time. It was unfortunate, however, that Donnelly did not examine Selys' type in order to conclusively establish its identity with the form historically attributed to *P. pacificus* (Selys) in the literature.

The senior author in 1979 was studying gomphine material from the Williamson Collection, University of Michigan Museum of Zoology (UMMZ) when he came across examples of an apparent new species misidentified as *P. pacificus* (Selys). Communication with Mrs L.K. Gloyd revealed that she too had detected the misidentification, and that a large series of the new species was present in the UMMZ collection among the material collected by J.H. Williamson in Nayarit State, Mexico, in 1923. This material was sent to the senior author with Mrs Gloyd's permission to include it in a description of the new species. In 1980 the junior author collected a series of the same species and independently concluded they were undescribed. Subsequently BELLE (1987) detected a different undescribed species belonging to this complex from material in the Ris Collection, but which originally came from the same series collected in 1923 by the Williamson Expedition and which also had been incorrectly identified as *P. pacificus*. BELLE (1987) described this form as *P. nayaritensis*, but again without examining the Selysian type of *G. pacifica*.

Because several additional undescribed species of *Phyllogomphoides*, all closely related and belonging in the *pacificus* complex, have continued to be discovered in Mexico and other Central American countries recently, and because Selys' original description failed to provide certain details necessary for positive identification, we felt some hesitancy about describing any additional species until the true position of *Gomphoides pacifica* was known. We thereupon applied to the Institut Royal des Sciences Naturelles de Belgique (IRSNB) for permission to examine the type of *G. pacifica* Selys. Our examination has confirmed that the Selysian type is conspecific with the form traditionally associated with the name *P. pacificus* (Selys) (i.e. CALVERT, 1899 and DONNELLY, 1979).

We are herein describing the new Nayarit material as *P. apiculatus* sp. n., and are also taking this opportunity to illustrate and describe in detail the female of *P. pacificus* (Selys) and designate the neallotype.

PHYLLOGOMPHOIDES APICULATUS SPEC. NOV.

Figures 1-7

Material. — All from Mexico. 47 ♂ and 14 ♀ have been examined. — **Holotype** ♂: Nayarit State, Acaponeta River, 2 Nov. 1923, J.H. Williamson leg. — **Allotype** ♀: Nayarit State, Jumatán River below Jumatán hydroelectric plant, 10 Sept. 1980, R. López leg. — **Paratypes**: Nayarit State, Acaponeta River, 2 Nov. 1923, 12 ♂, — 3 Nov. 1923, 1 ♂, — 5 Nov. 1923, 1 ♂, — 6 Nov. 1923, 1 ♂, all J.H. Williamson leg.; — Jumatán River below Jumatán hydroelectric plant, 28 Sept. 1979, R. López leg., 2 ♂, — same location, 10 Sept. 1980, G. Jimenez leg., 2 ♂ 2 ♀, — same location and date, E. González leg., 6 ♂ 3 ♀ (two pairs in copula), — same location and date, R. López leg., 8 ♂ 4 ♀ (two pairs in copula); — Guerrero State, 55 km S of Cuernavaca, on road to Taxco, 3 Aug. 1937, L.J. Lipovsky leg., 1 ♀. — Michoacan State, El Sabino, 32 km SSE of Uruapan, 21-27 July 1936, H. Devlin Thomas leg., 3 ♂ 1 ♀; — Oaxaca State, Candelaria, Loxicha, 22 Aug. 1973, 2 ♂, — 24 Aug. 1973, 2 ♂, — 27 Aug. 1973, 1 ♀, — 4 Sept. 1973, 1 ♀, — 9 Sept. 1973, 2 ♂, — 31 July 1975, 2 ♂, all E.C. Welling leg.; — Sinaloa State, Concordia Branch of Rio Presidio, on Rt No. 40, 22 July 1975, S.W. Dunkle leg., 2 ♂.

Holotype, allotype and paratypes from Acapoteta, El Sabino and Guerrero State deposited in UMMZ (Ann Arbor); other paratypes in Universidad Nacional Autonoma de México (Mexico) (UNAM); Florida State Collection of Arthropods (Gainesville) (FSCA); U.S. National Museum (Washington) (USNM); British Museum (Natural History) (London) (BMNH); Institut Royal des sciences Naturelles de Belgique (Bruxelles): collections of J. Belle (Velp); C. Cook (Center); J. Daigle (Tallahassee); T. Donnelly (Binghamton); S. Dunkle (Gainesville); R. Garrison (Azusa); D. Paulson (Tacoma) and K. Tennesen (Florence).

Etymology. — *P. apiculatus* [a-pic-u-lát-us] (Latin: "small-pointed"), referring to the pointed spine at the apical-ventral angle of male cerci.

MALE (holotype). — Dimensions (in mm): forewing 38.5, — hindwing 36.5, — abdomen (with appendages) 49.0, — cerci 3.50, — epiproct 1.25, — hind tibia 4.50, — length of spine at apical-ventral angle of cerci 0.30.

Head. — Median lobe of labium dark brown, lateral lobes brown becoming pale distally; mandibles pale at base becoming fuscous on distal half; labrum pale yellow with fuscous margins and narrow fuscous vertical bar at center; anteclypeus pale yellow above, brown along depressed lower portion; postclypeus with upper half divided into three elongated pale spots, lower half brown; anterior frons pale just below the frontal ridge, obscured with brown along lower half; frontal ridge and top of frons pale, with fuscous rear border along frontal suture; vertex fuscous, the median depression with quadrilateral pale spot; first and second antennal segments black, each with pale apical ring, terminal segments brown; occiput pale medially, posterior carina and lateral edges fuscous, posterior edge with fringe of brown hairs; postgenae brown with obscure pale lateral spots.

Prothorax. — Anterior, median and posterior lobes yellow medially, be-

coming darker laterally. — Legs: Coxae brown, trochanters brown with interior half-rings of yellow; exterior surfaces of femora brown, interior surfaces greenish-yellow; tibiae, tarsi and armature black.

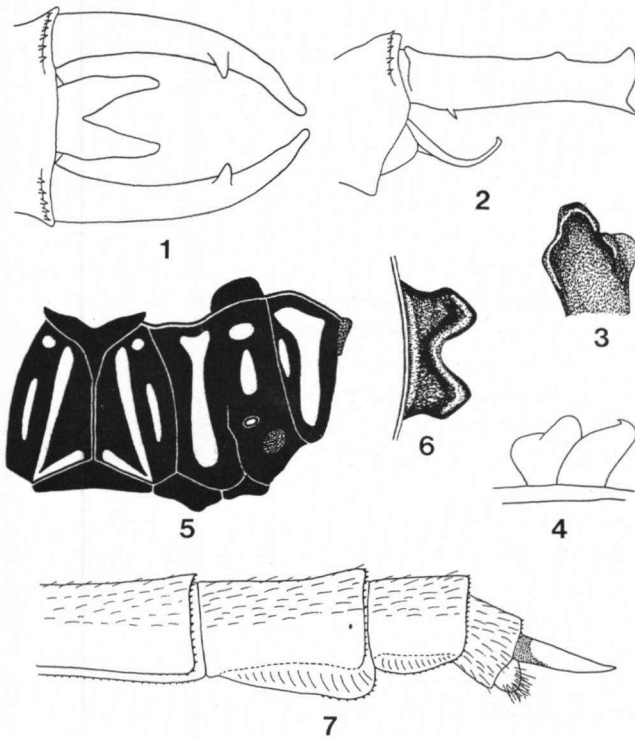
Pterothorax (Fig. 5). — Predominantly dark reddish brown, with pale greenish-yellow stripes. Dorsal carina and suture between antealar ridge narrowly pale; dorsal "inverted 7" stripes full length and uniform in width, confluent with and slightly overspreading mesothoracic half-collar below; antehumeral stripe narrow, obsolete above and below, and discontinuous from expanded upper spot; no pale stripe on humeral suture; 1st lateral stripe well developed and broadened at upper end; 2nd lateral stripe divided into two spots, upper rounded and lower elongated, the elongated lower spot not reaching downward to spiracle; 3rd lateral stripe shaped like inverted "boot", covering median pleura of metepimeron. — Legs: Coxae brownish; femora reddish brown basally, black anteriorly; tibiae and tarsi black.

Wings. — Membrane hyaline (in aged individuals narrow flavescent areas surround veins causing wings to appear smoky). Anterior edge of costa yellow almost to pterostigma, all other veins black; pterostigma black, 5.30 mm long, covering 6-7 and 5-7 cells in front and hind wings respectively. Antenodal and postnodal first series cross vein indices: 15: 19 — 21: 13 / 14: 15 — 14: 14 in front and hind wings respectively; second primary antenodal the seventh in all wings; triangles and supratrangles three-celled, subtriangles two- and three-celled in frontwings; triangles three-celled, subtriangles two-celled and supratrangles two- and three-celled in hindwings; anal loops compact, of two and three cells; anal triangles of four cells.

Abdomen. — Predominantly black with yellow markings. Segment 1 black on dorsum, obscurely yellowish ventrolaterally; 2 with middorsal yellow stripe; auricles and carinae around genital pocket also yellow, with external black stripe on auricles; 3 to 6 black, with laterobasal subquadrate spots, ventral carinae and narrow longitudinal middorsal stripes yellow; 7 with basal 2/3 yellow; 8 to 10 black dorsally, reddish ventrolaterally, lamella of 8 and 9 black, 0.60 mm wide (0.45 mm in *pacificus*).

Anal appendagés (Figs 1-2). — Cerci pale yellow dorsomedially, brown basally, ventrally and on apices; appendages in dorsal view semicircular-forcinate, evenly curved to apex, laterally flattened and upturned at apices; a stout dorsomedially directed black tooth at ca 3/5 of appendage's length; in lateral view cerci are nearly straight (in *pacificus* and *nayaritensis* slightly undulated); the ventrobasal spine smaller, 0.12 mm long (in *pacificus* and *nayaritensis* larger, 0.25 mm long); the apical-ventral angle of expanded apices produced into acuminate spine 0.30 mm long (*pacificus* and *nayaritensis* without spine). Epiproct brown, 1.25 mm long (*pacificus* 1.15 mm), deeply cleft in dorsal view, and strongly upcurved, semicircle-like, in lateral view.

Secondary genitalia (Figs 3-4). — Anterior hamuli bilobed, anterior lobe



Figs 1-7. *Phyllogomphoides apiculatus* sp. n.: (1) Dorsal view of male caudal appendages; — (2) Lateral view of male caudal appendages; — (3) Interolateral view of male anterior hamule; — (4) Lateral view of male genital hamules; — (5) Diagram of thoracic color pattern; — (6) Ventral view of female vulvar lamina; — (7) Lateral view of female abdominal lamellae and caudal appendages.

tumid, a small shallow "notch" in cleft between lobes, a medioposterior expansion of anterior hamuli is mostly concealed in lateral view by posterior hamuli; posterior lobe campanulate, outwardly convex, inwardly concave, the distal end rounded, not hooked (in *pacificus* terminating in a medially directed recurved hook); posterior hamuli slightly arched, terminating in a well developed medially directed hook (without the prominent shoulder and anteriomesal swollen hump characteristic of *nayaritensis*). Vesicle bivalve shaped, strongly produced ventrad, with a small tooth in cleft.

FEMALE (allotype). — Dimensions (in mm): forewing 40.0, — hindwing 38.5, — abdomen (with appendages) 47.0, — cerci 2.15.

Head. — Markings similar of those of male, except pale colors greenish-gray.

Prothorax. — As for male, but pale colors greenish-gray, pale a little more

extensive on femora.

Pterothorax. — Similar to male, pale areas greenish-gray; dorsal stripes abbreviated below, not confluent with pale mesothoracic half-collar or crescentic pale spot on mesinfraepisternum; pale markings on 2nd and 3rd pairs of legs more extensive.

Wings. — More heavily infumed than in males, especially in aged individuals. Veins, including costa, dark brown; pterostigma dark brown, 6.00 mm long, covering 6-6½ cells in frontwings, 7-8 cells in hindwings. Antenodal and postnodal first series indices: 11:20 — 21:14 / 11:14 — 14:13 in front and hind wings respectively; second primary antenodal the sixth and seventh in frontwings, sixth in hindwings. Supratrangles, triangles and subtriangles three-celled in all wings. Anal loops with 3-4 cells.

Abdomen. — Segments 1 and 2 with more yellow laterally than in males; 7 with basal half yellow; 8 to 10 mostly black, with some laterobasal reddish on 8. Lamellate expansion of 8 and 9 (Fig. 7) wide, (0.72 mm on 8 versus 0.30 for *pacifcus*).

Anal appendages (Fig. 7). — Cerci pale medially, brown on the base and extreme acuminate apices; conical shaped, slightly incurved at about ⅓ length.

Genitalia (Fig. 6). — Vulvar lamina black, short, deeply emarginate medio-posteriorly, strongly convex in cross section.

VARIATION. — There is considerable variation of pale colors in the large paratype series; these range from bright yellow through gray to blue, and may be attributed to post mortem effects of specimen preservation and to varying state of maturity of individuals when collected. Juvenile individuals always have completely hyaline wings, the wings becoming more fumose in older individuals.

BIONOMICS. — On several of the envelopes holding the Rio Acajoneta paratypes, J.H. Williamson has written notes describing their behavior and ecology: 2 November 1923, — "All gomphines today caught on wing (few) or resting on bushes — generally on dead twigs & branches near or over running water just above rapids". 5 November 1923, — "Gomphine netted on dead twig near road above river". 6 November 1923, — "♂ on dead twig in bushes above river".

The locality where the allotype and a large series of paratypes were collected is the Jumatán River, north of Tepic, Nayarit State. This location is reached by taking Highway # 15 north 36 km to the "El Limon" crossroads, then proceeding west 5 km to the small town of Jumatán. The habitat here for *P. apiculatus* is the Jumatán River where it flows through a canyon some 150 m below a waterfall of about 80 m in height, and close by the Jumatán hydroelectric plant. The habitat has riparian vegetation along stream, the river bed is rocky, and current rather rapid at this site from effects of the waterfall. *P. apiculatus* males flew close to the surface of the water and generally upstream toward the waterfall. Copulation took place amongst vegetation at the river edges in shaded areas; copulating pairs were collected only at this type of habitat.

P. apiculatus coexisted at this location with several other species of gomphids: *Erpetogomphus* sp., *Phyllocycla* sp., *Progomphus clendoni* Calvert and *Phyllogomphoides pacificus* (Selys).

PHYLLOGOMPHOIDES PACIFICUS (SELYS, 1873)

Figures 8-14

SELYS, 1873, p. 60 (reprint): *Gomphoides pacifica*, "race de suasa?"; description of type male. — CALVERT, 1899, p. 384: *Gomphoides pacifica*; descriptive notes. — CALVERT, 1905, p. 158: *Gomphoides suasa race pacifica*; descriptive notes. — ST. QUENTIN, 1967, p. 139: *Gomphoides pacifica*. — DONNELLY, 1979, p. 252: *Phyllogomphoides pacificus*; description.

Material. — All from Mexico, 14 ♂ and 8 ♀ examined including Selys' type male. — **Type data:** "Putla Mexique", (no other collecting data given), Institut Royal des Sciences Naturelles de Belgique (Bruxelles). The exact location of "Putla" referred to by Selys remains uncertain. SELANDER & VAURIE (1962) stated that the place name "Putla sur la cote du Pacifique" could not be located on present day maps of Mexico. We suggest the location may refer to a village, Putla de Guerrero, which is on the Pacific Slope in western Oaxaca near the border of Guerrero, and 129 km west of the city of Oaxaca; 15° 16', 90° 13', at 4,000' altitude. — **Neallotype ♀:** Michoacan State, El Sabino, 20 mi SSE of Uruapan, 1 Aug. 1936, H.D. Thomas leg., designated and described herein, and deposited in University of Michigan Museum of Zoology (Ann Arbor). — **Other material examined:** Chiapas State, Huixtla, 26 July 1969, R. Wind leg., 3 ♂, 1 ♀; — Colima State, 24.2 mi S of Colima, elev. 200 ft, 21 Aug. 1965, D.R. Paulson leg., 2 ♂; — Michoacan State, El Sabino, 20 mi SSE of Uruapan, 26-27 July 1936, H.D. Thomas leg., 2 ♂, 5 ♀; — Morelos State, km 18.3 Ruta No. 95, 5 km S Acatlipa (Palo Bolerio), 26 June 1985, E. González leg., 4 ♂; — Nayarit State, La Hierba, Tepetitla, 3 Sept. 1979, R. López leg., 2 ♂, 1 ♀.

MALE (redescription of type). — Selys' type is juvenile and has affixed the following pin labels: "Putla Mexique" (a green label); "106"; "106"; "*Gomphoides pacifica* S. ♂" (in Selys' handwriting); "Dessiner par Calvert 1929" (in Calvert's handwriting); and "det. *Gomphoides pacifica* Selys" (in an unknown handwriting).

Dimensions (in mm): forewing 36.0, — hindwing 34.5, — abdomen (with appendages) 42.0, — cerci 2.95, — epiproct 1.15, — hind tibia 4.15, — ventrobasal spine of cerci 0.25.

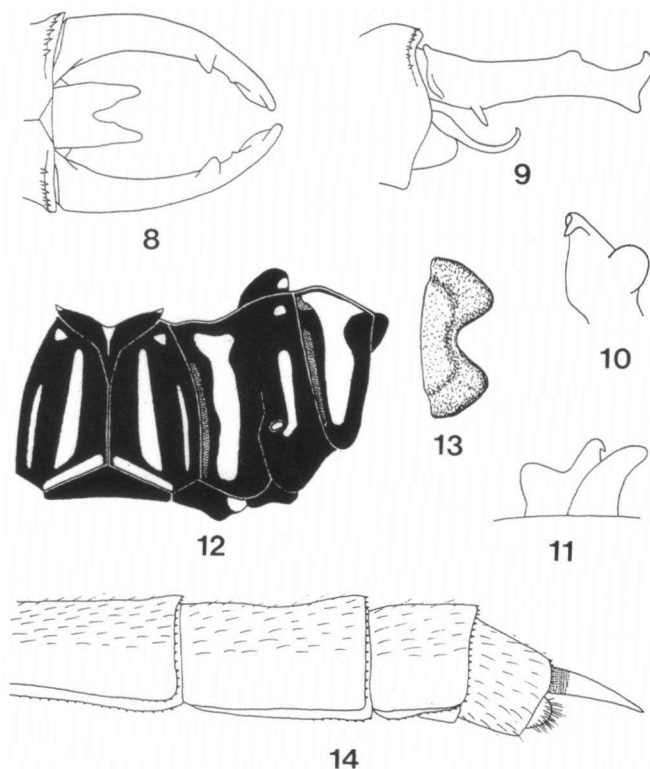
Head. — Labium lateral and median lobes yellow; mandible bases yellow, tips black; labrum yellow with dark apical border, and median vertical bar faintly fuscous; anteclypeus yellow, darker in lateral depressions; postclypeus mostly yellow basally, the median and lateral areas fuscous; anterior frons brown below frontal ridge, frontal ridge and frons dorsum pale with dark posterior border behind frontal suture; vertex dark brown, a yellow quadrilateral spot in posterior depression; first and second antennal segments dark brown with yellow apical rings; occiput yellow, its lateral edges obscurely darker, the posterior carina dark brown and the posterior hair fringe lighter brown; postgenae dull yellow, its dorsum darker.

Prothorax. — Anterior, median and posterior lobes yellow medially, reddish brown laterally. — **Legs:** Coxa, medial surfaces of trochanters and femora yellow, their exterior surfaces and entire tibiae and tarsi black.

Pterothorax (Fig. 12). — Reddish brown with pale yellow stripes. Dorsal carina and suture between antealar ridge yellow; "inverted 7" stripes on dorsum

extend from antealar ridge, slightly broadened below, not confluent with transverse stripe on mesothoracic half-collar; antehumeral stripe narrow, obsolete above and below, discontinuous from expanded upper spot; humeral stripe somewhat obscure and abbreviated at upper end; 1st lateral stripe well developed, broadened above, extending full length of mesepimeron; an obscure elongated spot above spiracle on metepisternum; metepimeron with "inverted boot" shaped stripe covering median pleura. — Legs: The basal coxae yellowish becoming brownish distally; trochanters brown at base, yellow distally; femora yellow basally, brownish on distal $\frac{3}{4}$; tibiae and tarsi black.

Wings. — Membrane hyaline. Anterior edge of costa yellow out to proximal end of pterostigma, all other venation brown; pterostigma dark brown; 4.60 mm long, covering $6\frac{1}{2}$ — $7\frac{1}{2}$ cells. Indices of antenodal and postnodal first series



Figs 8-14. *Phyllogomphoides pacificus* (Selys): (7) Dorsal view of male caudal appendages; — (9) Lateral view of male caudal appendages; — (10) Interolateral view of male anterior hamule; — (11) Lateral view of male genital hamules; — (12) Diagram of thoracic color pattern; — (13) Ventral view of female vulvar lamina; — (14) Lateral view of female abdominal lamellae and caudal appendages.

cross veins: 10:18 — 20:11 / 11:12 — 13:12 in front and hind wings respectively; second primary antenodal the seventh in frontwings and sixth in hindwings; triangles three-celled and subtriangles two-celled in all wings; right hind supratriangle three-celled, all others two-celled; anal loops pentagonal, of three cells; anal triangles of four cells.

Abdomen. — Brown, with pale yellow markings. Segment 1 with pale anteriorly pointed dorsal triangle, and obscurely pale along ventro-lateral border; 2 pale as follows: an hour-glass shaped dorsal spot, underside and posterior half of auricles, and carinae around genital pocket; 3-6 each with pale laterobasal subquadrate spots, a pale middorsal stripe full length on 3-4, $\frac{3}{4}$ length on 5, reduced to basal spot on 6; 7 pale on basal $\frac{2}{3}$, distally brown; 8-10 mostly dark, obscurely pale just above lamellate expansion on 8-9. Lamella widest on 8 (0.45 mm).

Anal appendages (Figs 8-9). — Cerci mostly dark, except pale dorsomedially; in dorsal view semicircular-forcinate, evenly curved to apex, the apices flattened and upturned; a stout dorsomedially directed tooth at ca $\frac{3}{5}$ appendage's length, cerci provided with a narrow mesal shelf extending from tooth $\frac{1}{3}$ distance to apex; from lateral view cerci stout in basal $\frac{1}{4}$, slightly undulated (straighter in *P. apiculatus*); ventrobasal spine 0.25 mm long (0.12 mm *P. apiculatus*); apices flattened and expanded, but without the acuminate spur at apical-ventral angle prominent in *P. apiculatus*. Epiproct brown; 1.15 mm long; in dorsal view deeply cleft and flattened; in lateral view strongly upcurved, with small recurved tooth at apex of each branch.

Secondary genitalia (Figs 10-11). — Genital hamuli and vesicle brown. Anterior hamuli bilobed; anterior lobe short, truncated apically and bicuspid like; posterior lobe longer, triangular, inturned and terminating in a well developed recurved hook; posterior hamuli smoothly arched, the apices rounded, not hooked as in *P. apiculatus* and *nayaritensis*, and without the prominent anterior shoulder and anteriomesal swollen hump of *P. nayaritensis*. Vesicle emarginate, strongly produced ventrad, deeply cleft posteriorly and with a small median tooth.

FEMALE (neallotype). — Dimensions (in mm): forewing 42.0, — hindwing 40.0, — abdomen (with appendages) 48.0, — cerci 2.45.

Head. — Markings and colors as for male except pale on frons and occiput is greenish-gray.

Prothorax. — Markings and colors as for male.

Pterothorax. — Markings and colors as for male except 2nd lateral pale stripe extends below spiracle; femora mostly yellow, with black spines.

Wings. — Colors of membrane and veins as for male except pterostigma reddish brown; pterostigma covers $5\frac{1}{2}$ — $6\frac{1}{2}$ cells. Indices of antenodal and postnodal cross veins of first series: 13:21 — 22:13 / 13:15 — 14:13 in front and

hind wings respectively; second primary antenodal the seventh in all wings; right front supratriangle two-celled, all others three-celled; left and right anal loops of 4 and 5 cells respectively; other venation similar to holotype male.

Abdomen. — Segment 1 predominantly yellow; 2 with black dorsum, a posteriorly expanded middorsal yellow stripe, and yellow ventrolaterally; 3-6 black with middorsal yellow stripes, the laterobasal yellow spots continued narrowly across venter; 7 with basal $\frac{3}{5}$ yellow, posterior $\frac{2}{5}$ black; 8-10 mostly black, obscure brown rings on 8-9. Lamellate expansion of 8-9 (Fig. 14) comparatively narrow, 0.30 mm at widest point (0.72 mm in *P. apiculatus*).

Anal appendages (Fig. 14). — Cerci with brown ring around base, otherwise pale; straight, conical, with acuminate apices.

Genitalia (Fig. 13). — Vulvar lamina black, short, deeply emarginate medio-posteriorly, strongly convex in cross section; both the apices of lobes, and base of cleft are rounded; the posterior edges of lobes are broadened ventrad along the lateral confluence with abdominal sclerites (in most instances this is hidden by the lamellate expansion of abdomen).

VARIATION. — Most differences noted are in the colors, or color patterns, and usually may be attributed to the maturity of individuals. In aged individuals the narrow pale stripe on the humeral suture will be obscured or obsolete, and the abdominal pale middorsal stripe will usually be reduced; the elongated pale spot on the mesepimeron is reduced or wanting in some examples. In some others the dorsal thoracic stripes are connected to the mesothoracic collar. Juvenile males have the femora mostly pale, and in all females the femora are paler than in mature males.

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