

**Three new species of the *Philonthus furvus* species group (Coleoptera: Staphylinidae) from Guatemala and México, with taxonomic remarks and distributional records of related Mexican species**

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ABSTRACT

Three new species of *Philonthus furvus* species group with orange elytra are described: *P. rufotibialis* sp. nov. from Chiapas (Mexico) and San Marcos (Guatemala); *P. pollens* sp. nov. from Morelos (Mexico) and *P. navarretei* sp. nov. from Oaxaca (Mexico). Diagnostic features, new state and locality records for *P. hoegei*, *P. testaceipennis* and *P. yaqui* are included. Also, a key to identify the six species recorded from Mexico and the species shared with Guatemala is presented, with some schemes of the most important structures.

INTRODUCTION

Three species of *Philonthus furvus* species group with red elytra, or with orange elytra as will be considered in this work, are recorded from Mexico. This species are *P. hoegei* Sharp, 1885, *P. testaceipennis* Erichson, 1840 and *P. yaqui* Navarrete-Heredia, 2003; whereas none of them or someone of this species group with orange elytra has been recorded for Guatemala (Sharp 1885, Smetana 1991, Herman 2001).

In spite of the existence of several works including these species (Sharp 1885, Santiago Jiménez 1999, Asiain 2002, Navarrete-Heredia et al. 2002, Navarrete-Heredia 2003, Márquez 2004, 2006), their distinction has been difficult, mainly in the females, due to their great morphological similarity. In addition, *P. hoegei* and *P. testaceipennis* has been collected together (*e. g.* in several localities from Hidalgo, Mexico).

The observation of the characters given for Navarrete-Heredia (2003) and previous authors, and the search of additional structures to distinguish specimens of *P. hoegei* from *P. testaceipennis*, both males and females, led us to check specimens of several states of Mexico, and some specimens of Guatemala. This drove us to consult type material of *P. yaqui*, and to request loan of specimens of the principal collections with staphylinids from Guatemala and Mexico. The analysis of the specimens results in the discovery of three new

species, the recognition of useful characters to the identification of the males and females of the new and previously known species, and additional data of geographical distribution of two known species.

The objectives of this work are to describe three new species of *Philonthus furvus* species group with orange elytra from Mexico and Guatemala; to include taxonomical comments and additional data of geographical distribution for *P. hoegei* and *P. testaceipennis*; and to give a key for the identification of the six species, with some schemes of the most important structures.

MATERIAL AND METHODS

Specimens studied proceed of the following Mexican collections: CC-UAEH, Colección de Coleoptera, Universidad Autónoma del Estado de Hidalgo, Pachuca, México (J. Márquez); CNIN, Colección Nacional de Insectos, Instituto de Biología, UNAM, México, D.F. (S. Zaragoza); CZUG, Colección Entomológica, Centro de Estudios en Zoología, Universidad de Guadalajara, Zapopan, Jalisco (J. L. Navarrete-Heredia); IEXA, Colección Entomológica, Instituto de Ecología, A.C., Xalapa, México (M. A. Morón); MZFC, Colección de Coleoptera, Museo de Zoología "Alfonso L. Herrera", Facultad de Ciencias, UNAM, México, D.F. (J. J. Morrone). Some specimens were deposited in the ZMUC, University of Copenhagen Zoological Museum / Natural

History Museum of Denmark (A. Solodovnikov).

Taxonomic treatment follows Smetana (1991, 1995) and Navarrete-Heredia (2003), except for the abdominal segments that we used the visible abdominal segments, and the color of elytra and tarsi, orange instead of red. Measurements were obtained using a micrometer attached to a microscope; the total specimens of the new species, nine paratypes of *P. yaqui* (5 males and 4 females), and 20 specimens of *P. hoegei* and *P. testaceipennis* were measured (10 males and 10 females).

*Philonthus roscius* Smetana, 1995 is excluded of this work because as not be recorded from México, and because this species is adequately characterized in the work of Smetana (1995), and also commented in Navarrete-Heredia (2003).

## RESULTS AND DISCUSSION

### Description of new species

#### *Philonthus rufotibialis* sp. nov. Fig. 1

*Description* (based on the holotype male):

Total body length 14.2 mm. Mandibles with apical half, maxillary and labial palpi and genital segment reddish brown; elytra, tibiae and tarsi orange; remaining body black shining.

*Head:* Transverse, 1.35 times as wide as long. Dorsal surface with microsculpture of wavy lines. Medial interocular punctures separated by 3 times distance separating medial from lateral punctures.

*Eye* 0.4 times as long as head. *Tempora* moderately developed, visible at level of anterior half of eye (similar to Fig. 4). Antennomeres 1-8 and 11 elongated, antennomeres 9-10 as long as wide.

Labrum bilobed, each lobe with 2 setae longer than 8 additional setae. Mandible 1.2 times longer than head, with two teeth, apical tooth longer than basal tooth. Maxillary palp elongated, apical palpomere 1.5 times as long as preapical palpomere. Labial palp elongated, apical palpomere 1.25 times as long as preapical palpomere. Ventral surface of head slightly rugose at center and with sparse setae laterally.

*Thorax:* Pronotum slightly transverse, 0.9 times as long as wide; with 3 pairs of central punctures; microsculpture as in head. Pronotum with carinated

lateral lines, with contiguous, parallel area slightly sunken with punctures of macrosetae inside.

Elytra with some long and black setae distributed as known in species of *P. furvus* species group (Smetana, 1991, 1995), and with dense fine, yellow setae, as dense as in *P. hoegei* (Fig. 11) or slightly sparse, but denser than in *P. testaceipennis* (Fig. 12). Scutellum with fine, yellow setae, as dense as on elytra, except on basal border that is almost smooth. Prosternum between procoxae with sparse fine setae and two long setae. Mesosternum plane, with sparse fine setae, with a "v" shaped line parallel to borders of mesosternum. Metasternum with dense yellow setae. Coxa of first leg with ten strong spines at center of its internal face and dense fine setae on anterior area; femur with 5-6 spines on anterior third of internal border and without spines on external border (similar to Fig. 8); tibia with black spines as dense as on tibia of middle leg, but denser than on posterior leg; internal side covered almost completely with fine, yellow setae; apex with two apical red spurs; tarsi lightly dilated, less wide than apex of tibia, ventrally with modified setae moderately dense, fifth tarsomere longest, followed by first, second, third and fourth smallest. Coxae of middle and last legs with sparse setae; femora with dense fine setae; tibiae with 2 apical red spurs; tibia of middle leg with black spines denser than tibia of posterior leg, internal side covered almost completely with fine, yellow setae; tibia of posterior leg with sparse fine setae on internal side; tarsi of middle and posterior legs with **first tarsomere longest, followed by apical, second, third and fourth smallest**; first tarsomere of middle and posterior legs with 2-4 black spines ventrally and dense yellow setae on internal border.

*Abdomen:* Black shiny, with fine, yellow setae as on elytra, less dense than *P. hoegei*, but denser than *P. testaceipennis*. Fifth visible sternite not emarginated apically (similar to Fig. 14). Pregenital sternite emarginated apically, v-shaped (similar to Fig. 14). Genital sternite elongated (L/W proportion 3.24); apical margin deeply emarginated in v-shape, emargination 0.25 times as long as sternite, with a pair of preapical long setae and two pairs of apical setae shorter than previous (Fig. 17).

*Aedeagus:* Total length 1.6 mm; base of median lobe right in lateral view, median lobe with a tooth

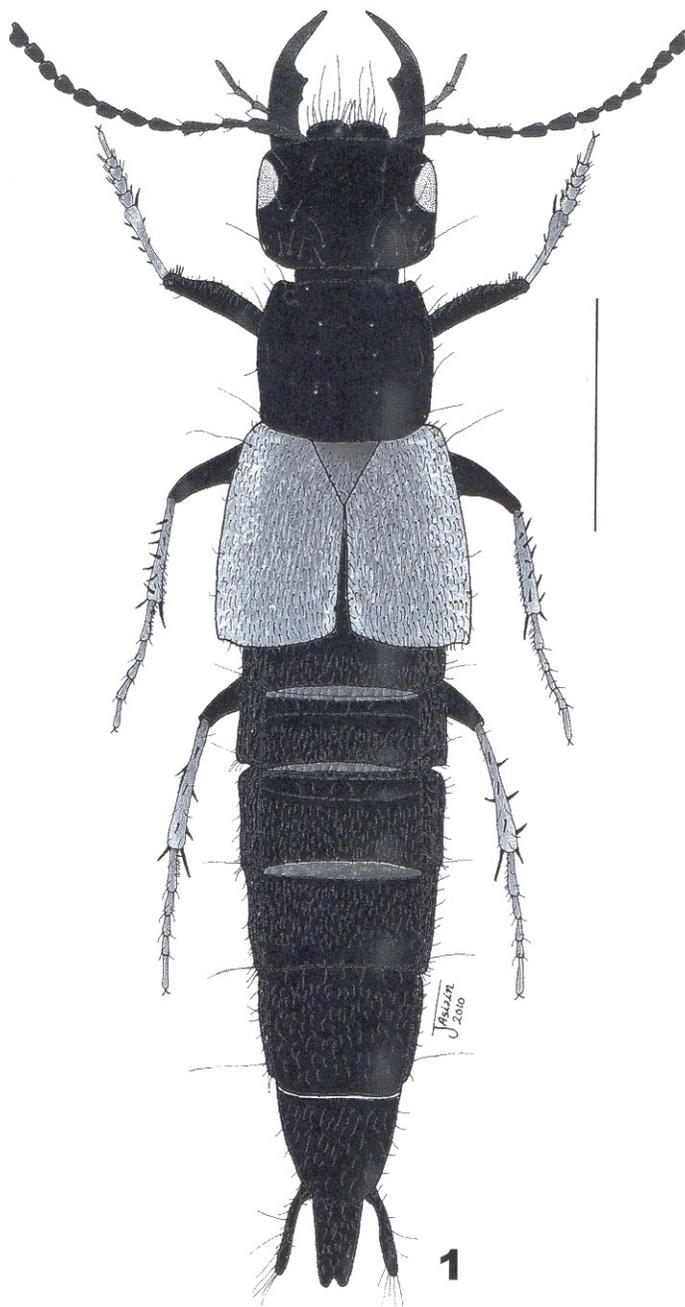


Figure 1. Dorsal view of *Philonthus rufotibialis* sp. nov. Scale bar = 3 mm.

placed below of apical level of parameres, apex of median lobe rounded; parameres with peg setae distributed forming an arch (Figs. 23, 29).

*Variation:* Total body length of male paratype 12.1 mm; total body length of female paratype 11.6 mm. Pale tonality of elytra and reddish brown legs (except tibiae and tarsi) of paratypes suggest they are teneral. Mandibles in female shorter than length of head (0.74 times). Head of female 1.24 times as wide as long, 1.3 times in male paratype. Tarsi of first legs of female less dilated than in the males.

*Bionomics:* This species was collected on cow dung, probably one of the substrates when it searches prey as occurs with their congeners. The location of only three specimens is due to only an occasional collect for some hours, lacking systematic samples using distinct types of traps (J. Márquez pers. obs.); but we know than several specimens to exist in the Entomological collections of Colegio de la Frontera Sur (San Cristobal de la Casas, Chiapas; U. Caballero pers. comm.) and Colección de Artrópodos, Universidad del Valle de Guatemala (Guatemala city, J. Schuster pers. comm.), because we send photos and comments of the new species to the curators of these collections, but they were unable to loan us the specimens. As in the previously known Mexican species of *P. furvus* species group of orange elytra, this new species is recorded at more than 2000 m of altitude in cloud forest and oak-pine forest.

*Geographical distribution:* Species known from Guatemala (San Marcos) and Mexico (Chiapas) in the Sierra Madre de Chiapas (Fig. 35).

*Etymology:* The name of this species is derived of the Latin words "rufus" and "tibiae", refers to the orange tibiae and tarsi, which contrasts with remaining black body (except elytra).

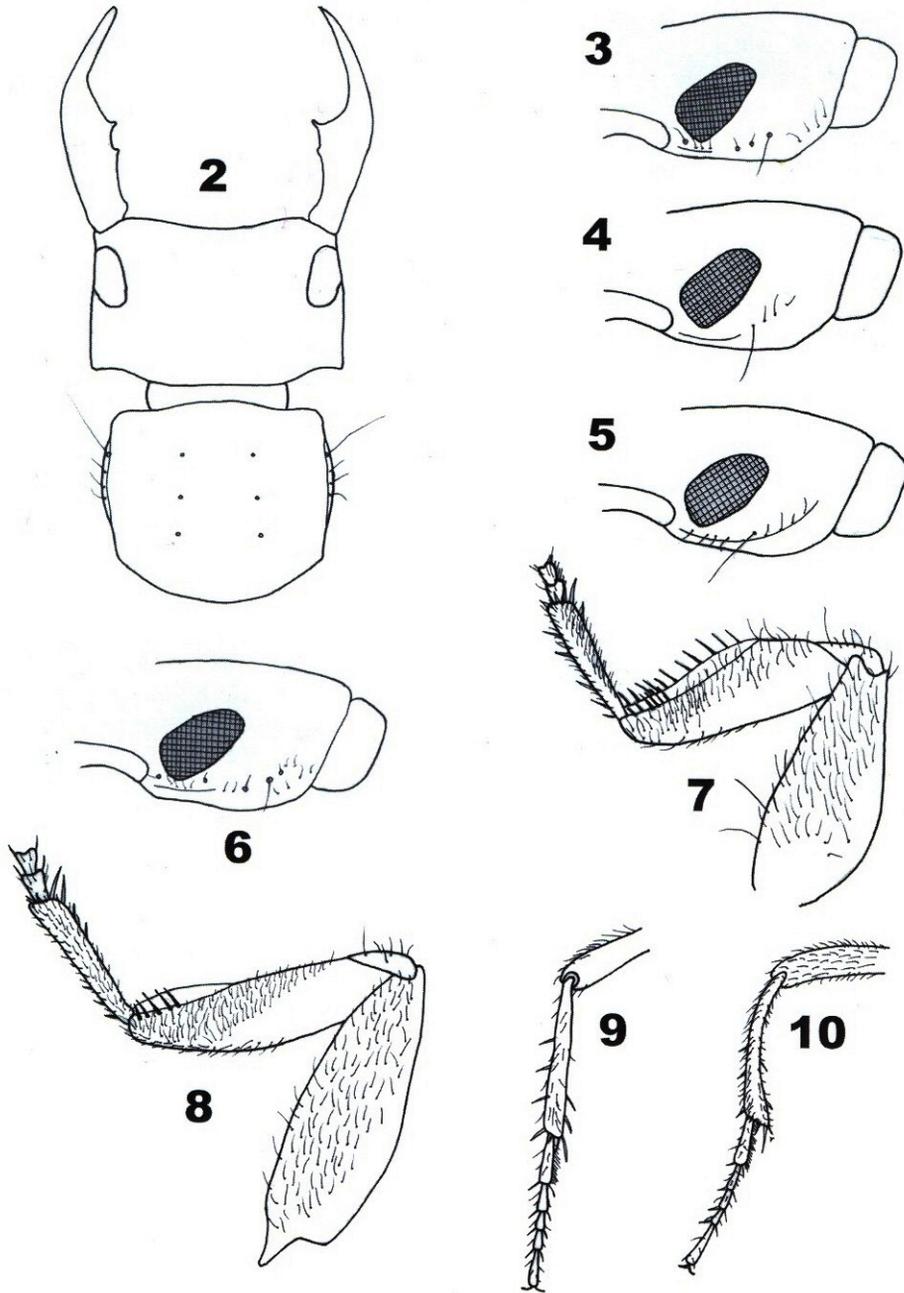
*Type material.* Holotype (male): "**Guatemala: San Marcos**, 2 km E Tajumulco y 500 m al volcán. Bosque mesófilo de montaña, 2062 m, N 15° 04.99', W 91° 55.563', 23-XI-1999, en excremento vacuno, J. Márquez col." (MZFC). One paratype (male): same data as holotype (CC-UAEH). One paratype (female): "**México: Chiapas**, San Cristóbal de las Casas, 4 km W de Tenejapa, bosque mixto, 2192 m, N 16° 49.248', W 92°32.265', en excremento vacuno, 20-XI-1999, J. Márquez col." (MZFC).

*Philonthus pollens* sp. nov.

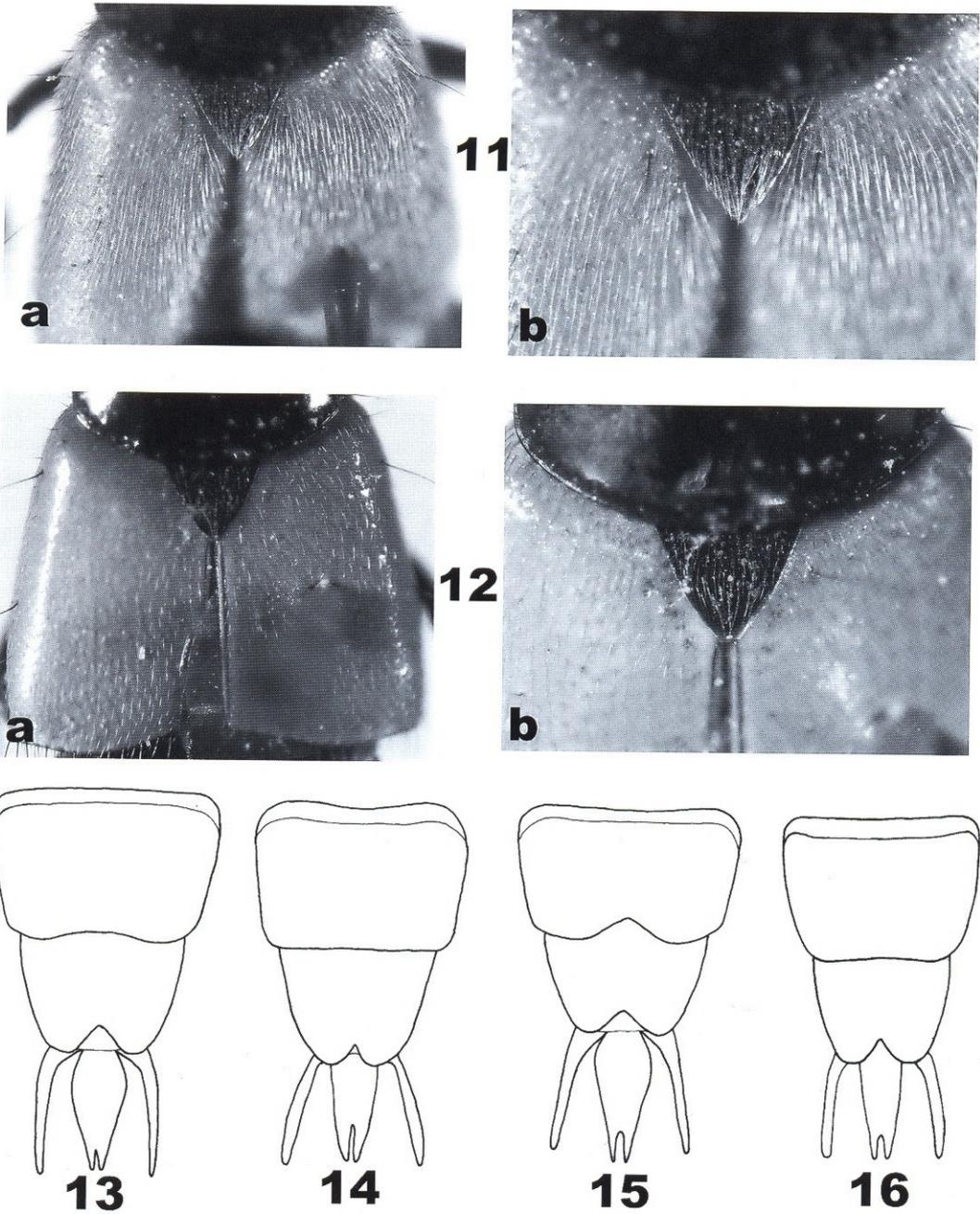
*Description* (based on the holotype male): Total body length 17.7 mm. Elytra orange, remaining body (including antennae, mouthparts and tarsi) black.

*Head:* Transverse, 1.53 times as wide as long; with conspicuous posterior corners, forming nearly right angle (Fig. 2). Dorsal surface with microsculpture of wavy lines. Medial interocular punctures separated by 2.4 times distance separating medial from lateral punctures. Eye 0.36 times as long as head. Tempora moderately developed, visible at level of anterior half of eye, curved shape, with one puncture above (similar to Fig. 3). Antennomeres 1-6 and 11 elongated, 7-10 almost as long as wide, slightly transverse (L/W proportion = 0.91). Labrum bilobed, each lobe with 2 setae longer than 7 additional setae. Mandible 1.39 times as long as head, with 2 teeth each, the apical longer than basal. Maxillary apical palpomere 1.4 times as long as preapical palpomere. Labial apical palpomere 1.3 times as long as preapical palpomere. Ventral surface of head with microsculpture as oblique lines on middle anterior region, and fine, sparse punctures on posterior region.

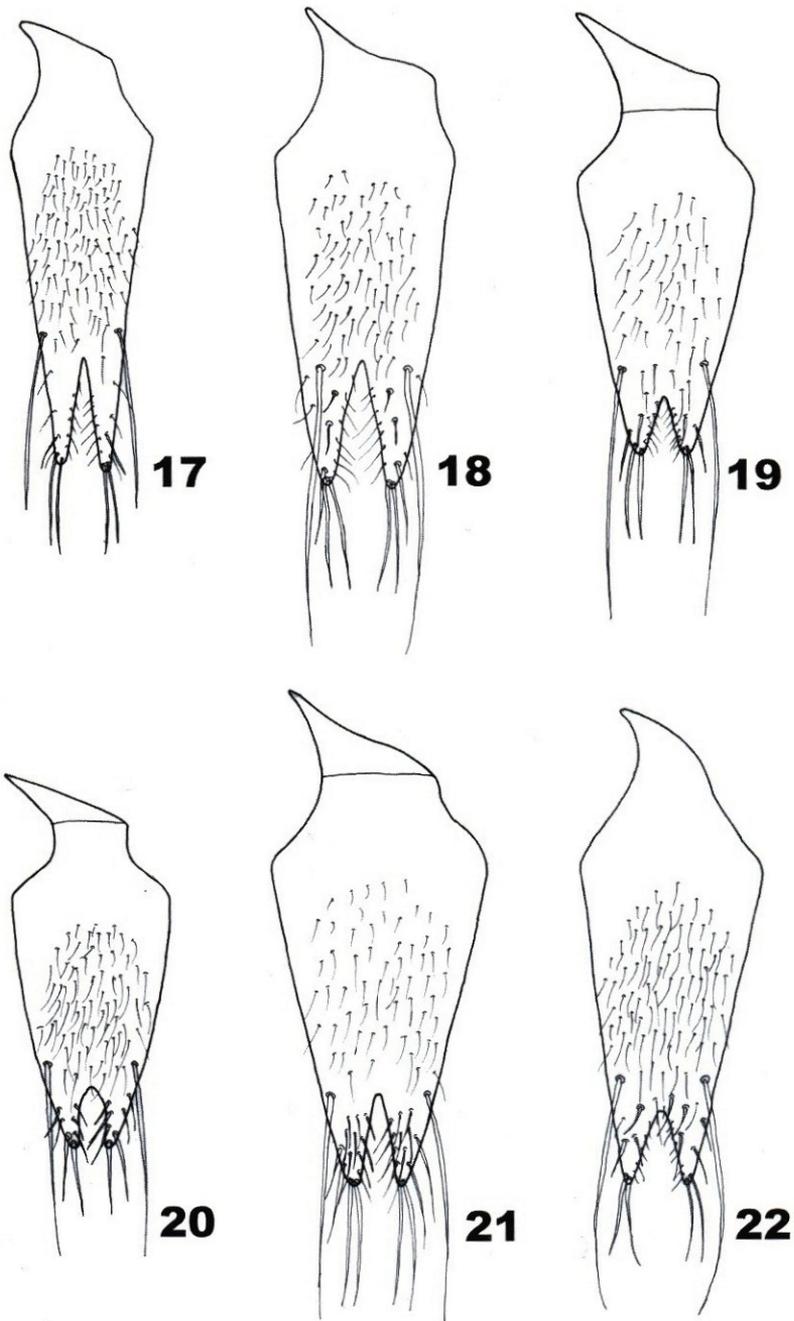
*Thorax:* Pronotum slightly transverse (L/W proportion = 0.86; Fig. 2); with 3 pairs of central punctures (Fig. 2); microsculpture as in head. Lateral margins of pronotum with remarkable sunken area parallel to marginal line, wider at level of puncture of lateral large seta (Fig. 2). Elytra and scutellum with yellow setae denser than *P. testaceipennis* (Fig. 12), but sparser than *P. hoegei* (Fig. 11). Prosternum between procoxae with sparse fine setae. Mesosternum with an impressed "v" shaped line, with long setae near borders. Metasternum with dense fine, yellow setae. Coxa of first leg with dense long setae and 3-6 short spines on internal face; femur with 3-6 spines in the apical third of internal border and without spines on external border, though with 3 wide setae similar to spines, but these are notably slender than spines on internal side (similar to Fig. 8); tibia with 2 apical red spurs, with black spines as dense as spines on tibia of middle leg, and with dense yellow setae covering almost all internal side; tarsomeres moderately dilated, with dense modified setae in



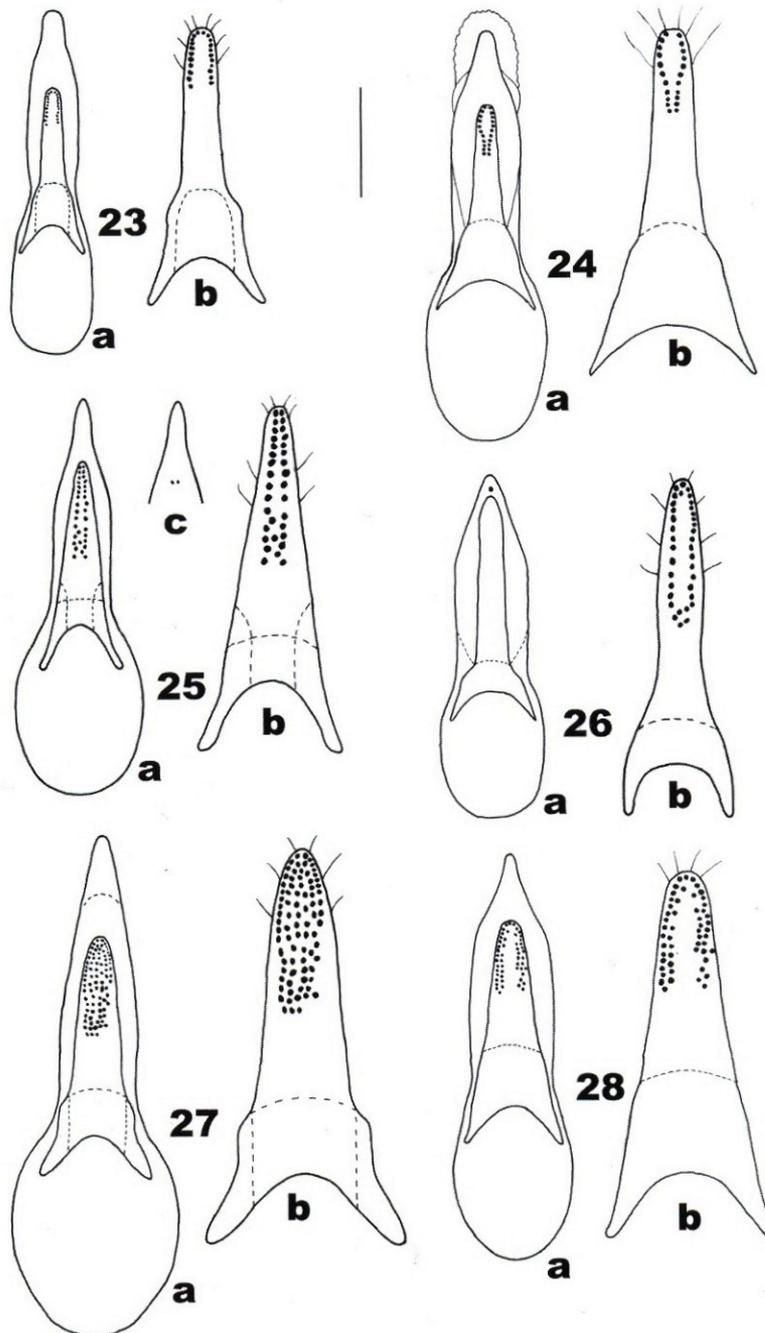
Figures 2-10. 2, Dorsal view of the head and pronotum of *P. pollens*. 3-6, Lateral view of the head of: 3, *P. navarretei*; 4, *P. hoegei*; 5, *P. testaceipennis*; 6, *P. yaqui*. 7-8, Ventro-lateral view of the first leg showing spines on internal or/and external border of the femur of: 7, *P. hoegei*; 8, *P. testaceipennis*. 9-10, Posterior view of the posterior leg showing the shape of the tibia of: 9, *P. navarretei*; 10, *P. testaceipennis*.



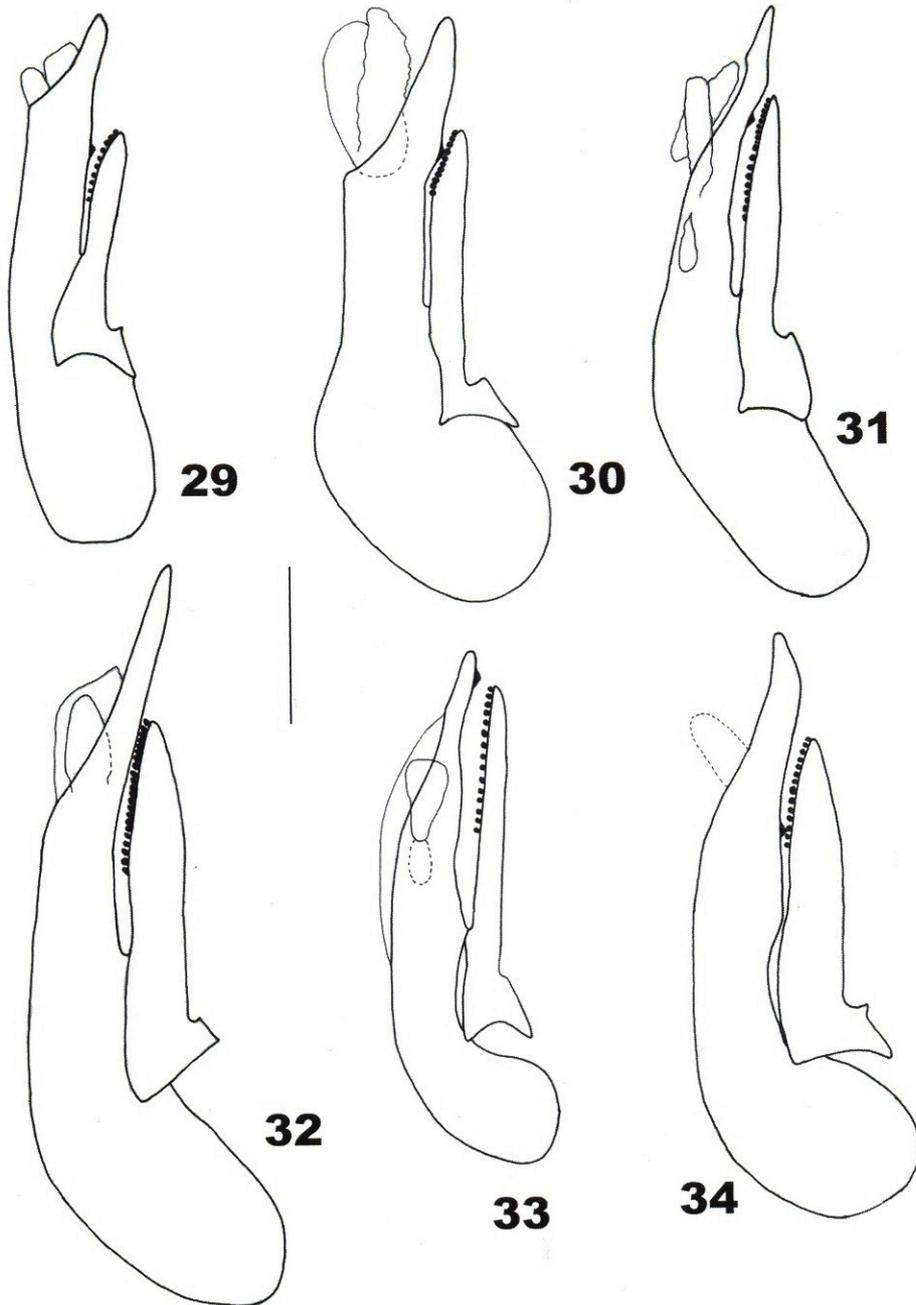
Figures 11-16. 11-12, Photo at two zooms (a, b) of the elytra and scutellum showing the setae pattern of: 11, *P. hoegei*; 12, *P. testaceipennis*. 13-16, Ventral view of the last three abdominal sternites of males showing the shape of the apical margin of the fifth and sixth sternites of: 13, *P. navarretei*; 14, *P. hoegei*; 15, *P. testaceipennis*; 16, *P. yaqui*.



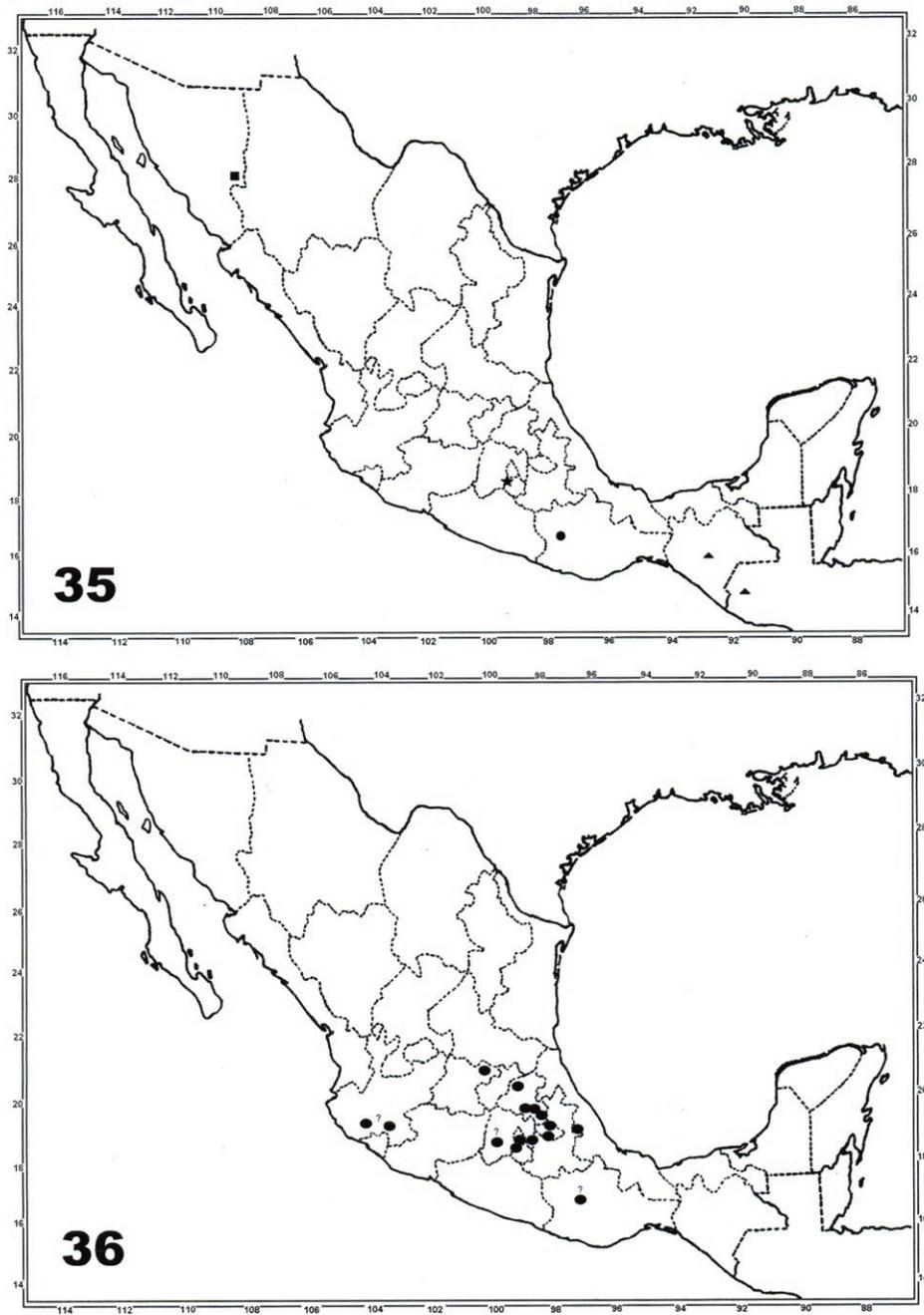
Figures 17-22. Ventral view of the male genital sternite of: 17, *P. rufotibialis*; 18, *P. pol-lens*; 19, *P. navarretei*; 20, *P. hoegei*; 21, *P. testaceipennis*; 22, *P. yaqui*.



Figures 23-28. Ventral view of the aedeagus (a), detail of the distribution of peg setae on the parameres (b) and detail of teeth on apex of median lobe (c; only to *P. navarretei*): 23, *P. rufotibialis*; 24, *P. pollens*; 25, *P. navarretei*; 26, *P. hoegei*; 27, *P. testaceipennis*; 28, *P. yaqui*. Scale bar = 0.5 mm only to figures a.



Figures 29-34. Lateral view of the aedeagus of: 29, *P. rufotibialis*; 30, *P. pollens*; 31, *P. navarretei*; 32, *P. testaceipennis*; 33, *P. hoegei*; 34, *P. yaqui*. Scale bar = 0.5 mm.



Figures 35-36. Distributional records of: 35, *P. rufotibialis* (triangles), *P. pollens* (star), *P. navarretei* (circle), *P. yaqui* (square). 36, *P. hoegei* (circles; interrogation mark indicate state record only).



Figure 37. Distributional records of *P. testaceipennis* (circles; interrogation mark indicate state record only).

ventral area, slightly slender than apex of tibia, with apical tarsomere longest, followed by first, second, third and fourth shortest. Coxae of middle and posterior legs with sparse setae; femora with dense setae; tibiae with 2 apical red spurs; tibia of middle leg with spines denser than tibia of posterior leg and fine, yellow setae covering almost all internal side; tibia of posterior leg only with sparse setae on internal side; tarsi of middle and posterior legs with first tarsomere longest, followed by apical, second, third and fourth shortest; with setae distributed as in *P. rufotibialis*.

Abdomen: Black shiny, with fine, yellow setae as on elytra, less dense than *P. hoegei*, but denser than *P. testaceipennis*. Fifth visible abdominal sternite poorly emarginated apically (similar to Fig. 16). Sixth visible abdominal sternite emarginated apically as "U" shaped. Genital sternite wide (L/W proportion 2.76); apical margin with deep v-shaped emargination, emargination 0.26 times as long as sternite, with a pair of preapical long setae and two pairs of apical setae shorter than previous (Fig. 18).

Aedeagus: Total length 1.85 mm; base of median lobe convex in lateral view, median lobe with a tooth placed below of apical level of parameres, apex of median lobe moderately acute; parameres with peg setae homogeneously distributed forming a long ellipse basally narrows (Figs. 24, 30).

*Variation*: Unknown.

*Bionomics*: Nothing is known about the biology of this new species, because only one specimen was located in the collections studied. In the National Park Lagunas de Zempoala the dominant vegetation is pine-oak forest (Challenger 1998). It is interesting that the holotype specimen was collected 70 years ago and as not be collected in this same places or adjacent areas, as Tlayacapan and Cuernavaca, state of Morelos, where there have been effected systematic and occasional collections of staphylinids (Navarrete-Heredia 1995, Burgos Solorio and Trejo-Loyo 2001, Márquez 2001, 2003). It is not possible to know if still this species exists in the nature, but in spite of that only one male was studied, possesses distinctive characteristics with respect to the known and new species here described, for what we consider pertinent to describe it and to leave the possibility of

collect it again in this or in other sites ecologically and biogeographically similar.

*Geographical distribution*: National Park "Lagunas de Zempoala", Morelos, México (the main proportion of this National Park is placed in the State of México, but the label specific "Morelos"; Fig. 35).

*Etymology*: The name of this species is derived from the Latin word "pollens", refers to the "strong" or "potent" aspect of their body.

*Type material*: Holotype (male) "México: Morelos: Cempoala, 15.IV.1940, F. Islas" (CNIN).

*Philonthus navarretei* sp. nov.

*Description* (based on the holotype male): Total body length 14.9 mm. Apical half of mandibles, maxillary and labial palpi, first tarsomere of middle and posterior legs reddish-brown; genital segment brown; elytra, tarsi of first legs, tarsomeres 2-4 of middle and posterior legs orange.

Head: Transverse, 1.64 times as wide as log. Dorsal surface with microsculpture of wavy lines. Medial interocular punctures separated by 1.5 times distance separating medial from lateral punctures. Eye 0.38 times as long as head. Tempora poorly developed, visible at level of anterior half of eye (Fig. 3). Antennomeres 1-7 and 11 elongated, antennomeres 8-10 almost as long as wide. Labrum bilobed, each lobe with 2 setae longer than 7 additional setae. Mandible 1.5 times as long as head; with two teeth each, apical longer than basal. Maxillary apical palpomere 1.04 times as long as preapical palpomere. Labial apical palpomere 1.28 times as long as preapical palpomere. Ventral surface with microsculpture as wavy lines, with sparse, fine setae, anterior area slightly rugose.

Thorax: Pronotum slightly transverse, 0.84 times as long as wide; with 3 pairs of central punctures; microsculpture as on head. Pronotum with carinated lateral lines, with contiguous, parallel area slightly sunken with punctures of macrosetae inside. Elytra with dense yellow setae (as in *P. hoegei*; Fig. 11), and with some sparse black setae. Scutellum with yellow setae as dense as on elytra. Prosternum inflated between procoxae, with sparse fine setae and two long setae. Mesosternum plane, with sparse fine setae, with a "v" shaped line having

long setae at sides. Metasternum with dense yellow setae. Coxa of first leg with some short and wide spines at center of their internal face combined with dense fine setae; femur with 6 spines on apical third of internal margin and without spines on external margin, though with 4 wide setae similar to spines, but these are notably slender than spines on internal side (similar to Fig. 8); tibia with two reddish apical spurs, with black spines as dense as on tibia of middle leg, and with dense yellow setae covering almost all internal side; tarsomeres moderately dilated, less wide than apex of tibia, ventrally with dense modified setae; with apical tarsomere longest, follows by first, second, third and fourth shortest. Coxae of middle and posterior legs with sparse setae; femora with long setae; tibiae with two apical reddish spurs; tibia of middle leg with spines denser than tibia of posterior leg, and dense yellow setae covering almost all their internal side; tibia of posterior leg only with sparse setae in their internal side; tarsi of middle and posterior legs with first tarsomere longest, follows by apical, second, third and fourth tarsomere shortest; setae distributed as in *P. rufotibialis*.

Abdomen: Black shining, with dense fine setae, fifth visible sternite moderately emarginated apically (Fig. 13). Pregenital sternite apically emarginated as "v" shaped (Fig. 13). Genital sternite wide (L/W proportion 2.63); apical margin moderately emarginated in v-shape, emargination 0.14 times as long as sternite, with a pair of preapical long setae and two pairs of apical setae shorter than previous (19).

Aedeagus: Total length 0.95 mm; base of median lobe slightly curved in lateral view, median lobe with two teeth placed below of apical level of parameres, apex of median lobe acute; parameres with peg setae distributed in two lines, but in posterior part are heterogeneously distributed (Figs. 25, 31).

Variation: Total body length 12.4-15.8 mm (males and females). Males with L/W proportion of head = 1.40-1.73; females with L/W proportion of head = 1.25-1.37. Mandibles of males 1.40-1.58 times as long as head; mandibles in females 1.03-1.11 times as long as head. Males and some females, with apical tooth of right mandible longer than basal tooth, other females with basal tooth

undistinguished. Tempora in males shorter than in females. Medial interocular punctures separated by 1.5-2.8 times distance separating medial from lateral punctures. Femur of first leg with 4-6 spines in anterior third of internal margin. Some males and females with first tarsomere of middle and posterior legs reddish-brown.

Bionomics: This species was collected on decayed mushrooms and horse dung, similar to the habits known for *P. hoegei* and *P. testaceipennis*. Organisms of this species were observed abundantly at the type locality on those substrates, but in that moment (2005) we supposed that the specimens was to *P. hoegei* or *P. testaceipennis*, and we decided not to collect any more than those included in the type series. Their habitat is pine-oak forest placed to more than 2000 m of elevation, but we suppose that its distribution can to include more localities of the Sierra Madre del Sur with elevations near to 2000 m and with pine, oak and pine-oak forests.

*Geographical distribution:* Species known only from Oaxaca, México (Santiago Yosondua), in the Sierra Madre del Sur (Fig. 35).

*Etymology:* We have pleasure to dedicate the name of this species to Dr. J. L. Navarrete-Heredia (Centro de Estudios en Zoología, Universidad de Guadalajara), for his important contribution and impulse to the study of the Mexican staphylinids.

*Type material:* Holotype (male): "**México: Oaxaca**, Santiago Yosondua, camino a Santa María Yolotepec, 2398 m, bosque de pino-encino, N 16° 51'13", W 97° 33'43.6", en hongos, 10-VII-2005, J. Asiain y J. Márquez cols." Paratypes: same data as holotype (11 males-18 females, CC-UAEH; 1 male-1 female, CZUG; 1 male, ZMUC). "Oaxaca, Santiago Yozondua, camino a La Cañada de Garnica, 2299 m, bosque de pino-encino, N 16° 52'26.9", W 97° 37'44.4", en excremento caballo, 12-VII-2005, J. Asiain, S. Bautista, R. Bautista y J. Márquez cols." (2 females, CC-UAEH).

Taxonomical remarks, first state records  
and new localities

*Philonthus hoegei* Sharp, 1885

*Diagnosis.*— This species is most similar to *P. navarretei* and *P. yaqui*, sharing a short tempora (Figs. 3-4, 6), the dense fine and yellow setae on the elytra and scutellum (Fig. 11), and the right posterior tibiae (Fig. 9). It can be distinguished from these species by the spines on both internal and external apical margin of the femur of the first leg (Fig. 7), the fifth visible abdominal sternite of the male not emarginated apically (Fig. 14) and aedeagus with a tooth in the middle lobe placed above of the level of the apex of parameres (Fig. 33).

*Variation.*— *Philonthus hoegei* is morphologically very variable, except by total body length (12.0-14.8 mm). Tempora developed at level of anterior third of eye or at anterior half of eye (Fig. 4). Males with head wider (1.32-1.57 times length of head) than head of females (1.25-1.32 times length of head). Males with mandibles 1.03-1.62 times as long as head, females with mandibles 1.03-1.08 times as long as head. Tarsi of all legs orange or reddish brown, with first tarsomere of middle and posterior legs black; some specimens with tarsi of all legs almost black to reddish brown. Few specimens with fifth visible abdominal sternite poorly emarginated apically (similar to Figs. 13, 16). Tooth of median lobe of aedeagus usually near or slightly beyond apex of parameres, but not covered by parameres (Figs. 26, 33); some specimens with tooth placed about halfway between apex of median lobe and apex of parameres.

*Geographical distribution.*— *Philonthus hoegei* has been recorded from México: Distrito Federal (Tacubaya), Estado de México, Hidalgo (Omitlán de Juárez), Jalisco, Oaxaca, Tlaxcala (P. N. La Malinche) and Veracruz (Las Vigas) (Sharp 1885, Navarrete-Heredia et al. 2002, Márquez 2004, 2006). It is recorded for the first time from the states of Guanajuato and Morelos (Fig. 36). The record for Oaxaca given by Navarrete-Heredia et al. (2002) is only to state level, but we think this record requires confirmation because specimens from this place can be *P. navarretei*.

*Material examined* (first state records):

“**México: Guanajuato**, Victoria, Puerto del Aire, km 32, N 21° 18.306', W 100° 9.911', bosque de Encino, NTP-80 (calamar), 13 a 16-VII-2009, M. Vargas y J. Márquez cols.” (16, CC-UAEH). Same data as previous, except: “trampa de intercepción de vuelo” (11, CC-UAEH). Same data as previous, except: “en suelo, 13-VII-2009” (1, CC-UAEH). “**México: Guanajuato**, Xichú, km 36 después de Puerto del Aire, N 21° 18.943', W 100° 08.253', bosque de encino reforestado con pino, NTP-80 (calamar), 13 a 16-VII-2009, M. Vargas y J. Márquez cols.” (15, CC-UAEH; 1, ZMUC). Same data as previous, except: “trampa de intercepción de vuelo” (14, CC-UAEH; 1, ZMUC). Same data as previous, except: “en hongo podrido, 13-VII-2009” (1, CC-UAEH). “**Morelos**, Huitzilac, 2400 m, en hongos podridos, 16-IX-1953, C. Bolívar col.” (2, CNIN).

*New localities for P. hoegei:* “**México: Distrito Federal**, La Venta, V-1950, C. Bolívar col.” (1, CNIN). “D. F., La Venta, 1-XII-1958, en estiércol viejo de vaca, J. Hendrich col.” (1, CNIN). “Distrito Federal, Xochimilco, 1.5 km sur de San Andrés Ahuayucan, bosque de encino, 2450 m, NTP-80 (calamar), 1 a 3-VII-1999, J. Márquez col.” (1, CC-UAEH). “**Estado de México**, Popo Park, 13-VIII-1961, hongos en descomposición, col. J. Hendrich (1, CNIN). “**Hidalgo**, Cuauhtepac de Hinojosa, Tezoncualpan, El Campanario, bosque de pino-encino, 2724 m, NTP-80 (calamar), 31-XII-2008 a 24-I-2009, M. Torres col.” (4, CC-UAEH). “Hidalgo, Huasca de Ocampo, Rancho Santa Elena, bosque de pino-encino, en hongos podridos, 3-VII-2003, I. Menchaca y A. Contreras cols.” (2, CC-UAEH). “Hidalgo, El Arenal, Fray Francisco, camino a San Jerónimo, N 20° 14'47.8", W 98° 52'23.5", bosque de encino, 2696 m, en excremento, 24-VII-2008, J. Asiain y J. Márquez cols.” (3, CC-UAEH). “Hidalgo, Mineral del Chico, Peña del Cuervo, bosque de *Abies*, 2562 m, N 20° 12'38.7", W 98° 42'54.18", necrotrampa (calamar), 1-VI-2006, J. R. Verdú, C. Pavón y J. Márquez cols.” (14, CC-UAEH). Same data as previous, except: “Centro de Convivencia, 2950 m, 12 a 27-IX-2006, I. Castellanos col.” (4, CC-UAEH). “Hidalgo, Singuilucan, Ejido La Lagunilla, bosque de pino-encino con cultivos de maíz, 2500 m, N

20° 3' 25.1", W 98° 28' 33.14", NTP-calamar, 1 a 4-IX-2004, I. Castellanos col." (4, CC-UAEH). "Hidalgo, Zimapán, La Encarnación, camino a Villa Juárez, bosque de encino-pino, 2412 m, N 20° 52' 44.4", W 99° 12' 27.5", NTP-80 (calamar), 23-VI a 13-VII-2007, J. Asiain, S. Sierra y J. Márquez cols." (9, CC-UAEH). Same data as previous, except: "coprotrampa" (1, CC-UAEH). Same data as previous, except: "coprotrampa, 30-V a 23-VI-2007" (1, ZMUC). "Hidalgo, Zimapán, Trancas, camino a Nicolás Flores, N 20° 48' 12.2", W 99° 14' 41", bosque de encino, 2444 m, NTP-80 (calamar), 23-VI a 13-VII-2007, J. Asiain, S. Sierra y J. Márquez cols." (21, CC-UAEH). Same data as previous, except: "18-VIII a 20-IX-2007" (6, CC-UAEH). Same data as previous, except: "en excremento, 23-VI-2007" (3, CC-UAEH). Same data as previous, except: "12-VII-2007" (1, CC-UAEH). Same data as previous, except: "coprotrampa, 12-VII a 18-VIII-2007" (2, CC-UAEH). "Tlaxcala, Tlaxco, bosque de encino-pino, 2715 m, N 19° 38' 15.5", N 98° 5' 53.3", en hongos podridos, 5-VII-2006, J. Márquez y J. Asiain cols." (11, CC-UAEH). "Tlaxcala, carretera Tlaxco-Chignaguapan, 5 km NE de Tlaxco, bosque de encino-pino, 2715 m, N 19° 38' 15.5", W 98° 5' 53.3", NTP-80 (calamar), 5 a 9-VII-2006, J. Márquez y J. Asiain cols." (4, CC-UAEH). Same data as previous, except: "coprotrampa" (5, CC-UAEH). Same data as previous, except: "en excremento, 9-VII-2006" (3, CC-UAEH). Same data as previous, except: "en hongo podrido" (1, CC-UAEH).

*Philonthus testaceipennis* Erichson, 1840

*Diagnosis.*— This species is easily distinguished from the remaining species of *Philonthus furvus* species group with orange elytra because the tempora is as long as, or longer than the eye and forming a sunken area at inferior side of the tempora (Fig. 5); elytra and scutellum with fine, yellow setae sparse, poorly contrasting with the black color of the scutellum (Fig. 12); the tibia of the posterior leg are moderately curved (Fig. 10); males with fifth and sixth visible abdominal sternites notably emarginated apically (Fig. 15); genital sternite of male wide, moderately

emarginated apically (Fig. 21); aedeagus long size, without tooth on the middle lobe, with dense peg setae heterogeneously distributed (Figs. 27, 32).

*Variation.*— Males slightly bigger than females (13.6-16.9 mm and 13.2-15.9 mm respectively), but one female from Jalisco (El Grullo, Puerto de los Mazos) is also big size (17.9 mm). Male with L/W proportion of head = 1.28-1.50; females with L/W proportion of head = 1.25-1.39. Mandible of males 0.95-1.35 times as long as head; mandible of females 0.91-1.10 as long as head. Tibia of posterior leg of males most curved than in females. Color of tibia and tarsi greatly variable from almost black, to reddish brown and orange.

*Geographical distribution.*— *Philonthus testaceipennis* has been previously recorded from México: Distrito Federal, Estado de México, Hidalgo (Zacualtipán), Jalisco (Volcán Tequila, Sierra de Manantlán, Puerto de Los Mazos, Nevado de Colima), Morelos (Tlayacapan), Nuevo León (Hacienda Vista Hermosa), Oaxaca (La Parada, Yolos), Querétaro (Landa de Matamoros), Tamaulipas (Miquihuana) and Veracruz (Las Vigas, Calcahualco) (Sharp 1885, Navarrete-Heredia et al. 2002, Márquez 2004, 2006). It is recorded for the first time from the states of Guanajuato and Tlaxcala (Fig. 37).

*Material examined* (first state records):

"México: Guanajuato, Sierra de Santa Rosa, Cañada de La Virgen, 6/8-VII-1995, altitud 2350 m, L. Delgado col." (1, IEXA). "Tlaxcala, Tlaxco, 2822 m, bosque de Abies-pino, N 19° 39' 14.9", W 98° 4' 48.9", necrotrampa temporal (calamar), 7 a 10-VI-2005, J. Asiain, F. Ramírez y J. Márquez cols." (1, CC-UAEH). Same data as previous, except: "en excremento humano, 7-VI-2005" (1, CC-UAEH). "Tlaxcala, carretera Tlaxco-Chignaguapan, 5 km NE de Tlaxco, bosque de encino-pino, 2715 m, N 19° 38' 15.5", W 98° 5' 53.3", coprotrampa, 5 a 9-VII-2006, J. Márquez y J. Asiain cols." "Tlaxcala, Huamantla, P. N. La Malinche, Cañada Grande, bosque de pino-Abies, 3001 m, N 19° 14' 38.4", W 97° 59' 28.4", en troncos, 11-X-2006, J. Márquez y J. Asiain cols." (1, CC-UAEH).

*New localities* for *P. testaceipennis*: "México: Distrito Federal, La Venta, 1-XII-1958, en excremento de vaca, J. Hendrichs col." (1, CNIN).

“Distrito Federal, Tacubaya, 19-XI-1946, sobre fango de perros, J. Hendrichs col.” (1, CNIN). “Estado de México: San Rafael, 1-V-1954, bajo roca, J. Hendrichs col.” (2, CNIN). “Hidalgo, Jacala de Ledezma, camino a Plomosas, N 20° 56′33.9”, W 99° 12′25.6”, bosque de pino-encino, 1811 m, en excremento, 20-IX-2007, J. Márquez col.” (1, CC-UAEH). “Hidalgo, El Arenal, Fray Francisco, camino a San Jerónimo, N 20° 14′47.8”, W 98° 52′23.5”, bosque de encino, 2696 m, en excremento, 24-VII-2008, J. Asiain y J. Márquez cols.” (1, CC-UAEH). “Hidalgo, Mineral del Monte, antes del P. N. El Chico, bosque de Encino-pino, 2744 m, N 20° 09′27.9”, W 98° 41′27.8”, en excremento, 1-VI-2008, J. Márquez, J. Asiain y J. Bueno cols.” (1, CC-UAEH). “Hidalgo, Mineral del Chico, Peña del Cuervo, bosque de Abies, 2562 m, N 20° 12′38.7”, W 98° 42′54.18”, necrotrampa (calamar), 1-VI-2006, J. R. Verdú, C. Pavón y J. Márquez cols.” (7, CC-UAEH). Same data as previous, except: “Centro de Convivencia, 2950 m, 12 a 27-IX-2006, I. Castellanos col.” (1, CC-UAEH). “Hidalgo, Omitlán de Juárez, 2407 m, bosque de encino, N 20° 9′45.6”, W 98° 38′3.9”, 29-V-2003, en hojarasca de riachuelo, J. Asiain y J. Márquez cols.” (4, CC-UAEH). Same data as previous, except: “en hongos podridos, 16-VII-2006, J. Asiain, J. Márquez y S. Bautista cols.” (1, CC-UAEH). Same data as previous, except: “en excremento caballar, 6-VI-2006, J. Márquez col.” (1, CC-UAEH). “Hidalgo, Tlahuiltepa, 500 m SE de Tlaxcuantitla, N 20° 51′41.8”, W 98° 53′17.3”, 2027 m, bosque de fresnos (?), trampa de intercepción de vuelo, 17 a 14-III-2009, J. Márquez, M. Rivero, M. Torres, M. Vargas y J. Sánchez cols.” (1, CC-UAEH). “Hidalgo, Zimapán, La Encarnación, camino a Villa Juárez, bosque de encino-pino, 2412 m, N 20° 52′44.4”, W 99° 12′27.5”, NTP-80 (calamar), 23-VI a 13-VII-2007, J. Asiain, S. Sierra y J. Márquez cols.” (2, CC-UAEH). Same data as previous, except: “en excremento, 30-V-2007” (4, CC-UAEH). Same data as previous, except: “23-VI-2007” (14, CC-UAEH). “Hidalgo, Zimapán, Trancas, camino a Nicolás Flores, N 20° 48′12.2”, W 99° 14′41”, bosque de encino, 2444 m, NTP-80 (calamar), 23-VI a 13-VII-2007, J. Asiain, S. Sierra y J. Márquez cols.” (4, CC-UAEH). Same data as previous, except:

“12-VII a 18-VIII-2007” (15, CC-UAEH). Same data as previous, except: “20-X a 17-XI-2007” (1, CC-UAEH). Same data as previous, except: “coprotrampa, 30-V a 13-VI-2007” (5, CC-UAEH). Same data as previous, except: “23-VI a 13-VII-2007” (65, CC-UAEH). Same data as previous, except: “12-VII a 18-VIII-2007” (19, CC-UAEH). Same data as previous, except: “18-VIII a 20-IX-2007” (12, CC-UAEH). Same data as previous, except: “20-IX a 20-X-2007” (1, CC-UAEH). Same data as previous, except: “20-X a 17-XI-2007” (6, CC-UAEH). Same data as previous, except: “en excremento, 12-VII-2007” (23, CC-UAEH). Same data as previous, except: “18-VIII-2007” (1, CC-UAEH). Same data as previous, except: “en hongos, 13-VII-2007” (1, CC-UAEH). “Hidalgo, Zimapán, P. N. Los Mármoles, Minas Viejas, N 20° 55′23.7”, W 99° 12′28”, bosque de encino, 1897 m, coprotrampa, 12-VII a 18-VIII-2007, J. Asiain, S. Sierra y J. Márquez cols.” (5, CC-UAEH). Same data as previous, except: “18-VIII a 20-IX-2007” (13, CC-UAEH). Same data as previous, except: “20-IX a 20-X-2007” (5, CC-UAEH). Same data as previous, except: “20-X a 17-XI-2007” (2, CC-UAEH). Same data as previous, except: “en excremento, 20-IX-2007” (1, ZMUC). Same data as previous, except: “20-X-2007” (13, CC-UAEH). Same data as previous, except: “NTP-80 (calamar), 12-VII a 18-VIII-2007” (2, CC-UAEH). “Hidalgo, Zimapán, El Salto, N 20° 54′4.3”, W 99° 12′52.2”, bosque de encino-pino, 1959 m, en excremento, 20-X-2006, J. Asiain, F. Ramírez y J. Márquez cols.” (1, CC-UAEH). “Hidalgo, Mineral del Oro, VI-1902, C. C. Hoffman col.” (1, CNIN).

*Philonthus yaqui* Navarrete-Heredia, 2003

*Diagnosis.*— This species was recently described by Navarrete-Heredia (2003). The description is made with great detail, including characters to males and females, and the species is integrated in a key to identify it from *P. hoegei*, *P. roscius* and *P. testaceipennis*.

With the addition on the three new species, *P. yaqui* is most similar to *P. hoegei* and *P. navarretei* sharing a short tempora (Figs. 3-4, 6); dense fine, yellow setae on elytra and scutellum (Fig. 11); right tibia of posterior leg (Fig. 9); first or

first and second tarsomeres black, and remaining tarsomeres orange; mainly. *Philonthus yaqui* can be distinguished from *P. hoegei* for the spines only in the internal apical margin of the femur of the first leg (similar to Fig. 8), setae on the elytra and the scutellum moderately dense compared with density of the setae in *P. hoegei*, the fifth visible abdominal sternite of the male slightly emarginated apically (Fig. 16), the aedeagus with one tooth placed between the middle and apical third of the medial lobe that is occult for the parameres, and peg setae distributed near to the lateral margins of the parameres (Figs. 28, 34). While *P. hoegei* has spines in the internal and external apical margins of the femur of the first leg (Fig. 7), dense setae on the elytra and the scutellum (Fig. 11), fifth visible abdominal sternite of the male right apically (Fig. 14), aedeagus with a tooth on the apical third of the median lobe not occult for the parameres (Figs. 26, 33).

Can be distinguished from *P. navarretei* for a less proportion length of the mandible / length of the head (males: 1.15-1.25 times; females 0.94-0.96 times), the apical maxillary palpomere 1.31-1.43 times as long as preapical palpomere, tempora visible in most than the anterior half of the eye, with several punctures above and at posterior side of it (Fig. 6), fifth visible abdominal sternite of the male poorly emarginated apically (Fig. 16), aedeagus with one tooth placed between the middle and apical third of the medial lobe and peg setae distributed near to the lateral margins of the parameres (Figs. 28, 34). While *P. navarretei* has a major proportion of length of the mandible / length of the head (males: 1.40-1.58 times; females 1.03-1.11 times), the apical maxillary palpomere 1.08-1.21 times as long as the preapical palpomere, a short tempora, developed at level of the anterior half of the eye or less, with less density of punctures (Fig. 3), fifth visible abdominal sternite of the male moderately emarginated apically (Fig. 13), aedeagus with two teeth placed on the half of the apical third of the median lobe and peg setae distributed separated of the lateral margins of the parameres (Figs. 25, 31).

*Variation.*— Variation of this species is presented in the original description (Navarrete-Heredia 2003) with base in the study of 51

specimens. We observed only nine paratype specimens.

*Geographical distribution.*— *Philonthus yaqui* is known only from Yécora, Sonora, México (Navarrete-Heredia 2003).

*Biogeographic comments.*— The six species studied are inhabitant of oak, pine, oak-pine and less frequently cloud forests, at elevations above of 1700 m. *Philonthus hoegei* and *P. testaceipennis* can be considered the best known with respect to geographical distribution, are distributed in the Eje Volcánico Transmexicano and Sierra Madre Oriental provinces (*sensu* Morrone 2006), where they are partially sympatric, with the latter species recorded also in the north portion of the Sierra Madre del Sur province (Figs. 36, 37).

The remaining four species are known from specific places, with possibilities to extend their geographical records in future samples, or possibly to exists more specimens of other localities in no studied collections, but can be confused with some of the previously known species. *Philonthus yaqui* is recorded from the Sierra Madre Occidental province, *P. pollens* is recorded from the Eje Volcánico Transmexicano, and *P. rufotibialis* is recorded from Chiapas province (Fig. 35).

Key to species of *Philonthus* with orange elytra of the *P. furvus* group from Mexico and Guatemala

- 1 Tempora as long as, or longer than length of eye (Fig. 5); elytra and scutellum with sparse yellow setae, contrasting poorly with black color of scutellum (Fig. 12); tibia of posterior leg moderately curved (Fig. 10); fifth visible abdominal sternite of males conspicuously emarginated apically (Fig. 15); aedeagus long size (2.35 mm), without tooth on apex of median lobe, with dense peg setae heterogeneously distributed (Figs. 27, 32) . . . . . *P. testaceipennis*
- 1' Tempora shorter than length of eye or lacking, frequently developed at middle level of eye (Figs. 3-4, 6); elytra and scutellum with dense to moderately dense yellow setae, contrasting notably with black color of scutellum (Fig. 11); tibia of posterior leg right (Fig. 9); fifth visible abdominal sternite of males not emarginated

- apically (Fig. 14), or poorly to moderately emarginated apically (Figs. 13, 16); aedeagus less than 2.35 mm of length, with one or two teeth on apex of median lobe, peg setae variably dense and distributed (Figs. 23-26, 28-31, 33-34). . . . . 2
- 2 All tarsomeres orange; tibiae of all legs orange, with black spines contrasting with orange color (Fig. 1); genital sternite of males elongated (L/W proportion 3.24; Fig. 17); base of median lobe of aedeagus right, median lobe with apex rounded, peg setae distributed homogeneously forming an arch (Figs. 23, 29) . . . *P. rufotibialis*
- 2' Not all tarsomeres orange; tibiae black, with spines of same color; genital sternite of males wide (L/W proportion 2.38-2.76; Figs. 18-20, 22); base of median lobe of aedeagus convex, median lobe with apex acute, if apex is rounded, then distribution of peg setae are forming a long ellipse (Figs. 24-26, 28, 30-31, 33-34) . . . . . 3
- 3 Head with posterior corners forming an almost right angle (Fig. 2); lateral interocular puncture separated of lateral margin of eye by approximately 4 times width of that puncture; tarsi of all legs black; sunken area parallel to lateral margin of pronotum clearly visible, widest on anterior third (at level of lateral large seta; Fig. 2); male with genital sternite deeply emarginated apically (emargination 0.26 times as long as sternite; Fig. 18); aedeagus with apex of median lobe moderately convex, distribution of peg setae forming a long ellipse (Figs. 24, 30) . . . . . *P. pollens*
- 3' Head with obtuse posterior corners; lateral interocular puncture separated of lateral margin of eye by less than 3 times width of that puncture; legs with first tarsomere, or first and second tarsomere black, and remaining tarsomeres orange to reddish brown; sunken area parallel to lateral margin of pronotum less developed; males with genital sternite moderately emarginated apically (emargination 0.14-0.16 times as long as sternite; Figs. 19-20, 22); aedeagus with apex of median lobe acute, peg setae differently distributed (Figs. 25-26, 28, 31, 33-34) . . . . . 4
- 4 Lateral interocular puncture separated of lateral margin of eye by less than 2 times width of that puncture; femurs of first legs with several spines on internal apical margin as on external apical margin (Fig. 7); elytra and scutellum with dense yellow setae (Fig. 11); males with fifth visible abdominal sternite right apically (Fig. 14); aedeagus with a tooth on apical third of median lobe placed above of apex of parameres (not occult for parameres; Figs. 26, 33) . . . . . *P. hoegei*
- 4' Lateral interocular puncture separated of lateral margin of eye by almost 2 times width of that puncture; femurs of first legs with several spines only on internal apical margin (similar to Fig. 8); elytra and scutellum with moderately dense yellow setae; males with fifth visible abdominal sternite slightly emarginated apically (Figs. 13, 16); aedeagus with one or two teeth on middle or apical third of median lobe placed below of apex of parameres (occults for parameres; Figs. 25, 28, 31, 34) . . . . . 5
- 5 Males with mandibles 1.15-1.25 times as long as head, females with mandibles slightly shorter than head (0.94-0.96 times); maxillary apical palpomere 1.31-1.43 times as long as preapical palpomere; tempora large, developed in most than half of eye level (but not more than posterior margin of eye), with several punctures above and at their posterior side (Fig. 6); apex of mesosternum with long setae combined with dense fine, yellow setae; males with fifth visible abdominal sternite poorly emarginated apically (Fig. 16); aedeagus with a tooth placed between middle third and apical third of median lobe (Fig. 34); peg setae close to margins of parameres (Fig. 28) . . . . . *P. yaqui*
- 5' Males with mandibles 1.40-1.58 times as long as head, females with mandibles slightly longer than head (1.03-1.11 times); maxillary apical palpomere 1.08-1.21 times as long as preapical palpomere; tempora short, without spreading beyond half of eye, shorter in males than in females, with less punctures (or without punctures) above and in their

posterior side, existing a even area before punctures of posterior corners (Fig. 3); apex of mesosternum only with long and brown setae; males with fifth visible abdominal sternite moderately emarginated apically (Fig. 13); aedeagus with two parallels teeth placed at half of apical third of median lobe, peg setae separated of margins of parameres (Figs. 25, 31)..... *P. navarretei*

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