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Taxonomic notes on the western palaearctic species of *Trachusa*, subgenus *Paraanthidium*, with description of a new species from Turkey

(Hymenoptera, Apoidea, Megachilidae)

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Abstract

Trachusa (Paraanthidium) heinzi **sp. n.** from Turkey is described as new for science and is compared to the western palearctic representatives of the subgenus *Paraanthidium*. Diagnostic features of the new species are documented by SEM and an illustrated key for the western palearctic species of *Paraanthidium* is provided.

Introduction

The anthidiine bee genus *Trachusa* PANZER comprises 43 species and is found in the holarctic, oriental and African regions (MICHENER, 2000). Although *Trachusa* sometimes is not recognized as distinct genus (WARNCKE, 1980, 1982; WESTRICH & DATHE, 1997; SCHWARZ et al., 1996, 2005) it is clearly characterized by the combination of the following characters (MICHENER & GRISWOLD, 1994; MICHENER, 2000): (1) middle tibia broad, nearly as broad as hind tibia with anterior and posterior margins convex, (2) vein cu-v of hind wing oblique, usually nearly half as long as 2nd abscissa of M+Cu or longer, (3) male T7 small, with its dorsal surface directed ventrad and (4) claws always cleft or toothed in females. Furthermore females of some subgenera (*Trachusa* s. str., *Orthanthidium*, *Paraanthidium* and *Trachusomimus*) use self-cut pieces of leaves in combination with resin for building their cells. MICHENER & GRISWOLD (1994) subdivided *Trachusa* into 11 subgenera, of which four (*Heteranthidium, Legnanthidium, Trachusomimus* and *Ulanthidium*) exclusively occur in the New World, whereas two subgenera are each restricted to the palearctic (*Archianthidium*, *Trachusa s. str.*), the oriental (*Metatrachusa*, *Orthanthidium*) and the ethiopian regions (*Congotrachusa*, *Massanthidium*). Species of the subgenus *Paraanthidium* FRIESE are distributed as well in the palearctic (including Northern Africa) as in the oriental region but the subgenus clearly shows its greatest diversity in the oriental region. Contrary to PASTEELS (1969), MICHENER (2000) synonymised the subgenera *Protanthidium* and *Philotrachusa* with *Paraanthidium*. Nevertheless their exact position within *Trachusa* remains dubious and should be addressed in a cladistic analysis. Species of *Paraanthidium* are characterized by the bifid, Y-shaped gonoforceps of male genitalia, the characteristic comb-like bristles on male S4 and S5, the presence of an omaular carina, the arcuate subantennal suture and the presence of arolia. While in the western palearctic region only two species of *Paraanthidium* have been recorded so far (WARNCKE, 1980), at least ten species of this subgenus have been described for the oriental region (PASTEELS 1969; WU, 1962). After extensive examination of palearctic *Trachusa*, a third hitherto undescribed species of *Paraanthidium* from the western palearctic realm was identified and is described herein. Taxonomic notes are provided for the western palearctic species of the subgenus *Paraanthidium* together with a key to the species.

Materials and methods

Studied specimens of *Trachusa* were obtained from the following institutions and collections:

Museum für Naturkunde, Berlin (MNB)
Biologiezentrum des Oberösterreichischen Landesmuseums, Linz (OLL)
Zoologische Staatssammlung, München (ZSM)

Specimens of the new species were photographed with a Olympus SZX 12 stereoscopic microscope in combination with a Spot Insight Color 3.2.0 CCD camera (Visitron Systems GmbH) using Spot Advanced

Version 4.0.9 (Diagnostic Instruments, Inc.). Photographs were subsequently processed with CombineZ (Alan Hadley, free software package) to obtain confocal images. All files were processed with Adobe Photoshop 7.0.1 and Adobe Illustrator CS.

Specimens were softened using the method mentioned in PLANT & DUBITZKY (in press). Preparation of male genitalia followed the procedure described in DUBITZKY (2006). For detailed information on SEM techniques, see DUBITZKY (2005, 2006).

The terminology used in this study follows that of MICHENER (1944, 2000). Different or new morphological terms are explained in the text.

The following abbreviations are used throughout:
AS: antennal segment (scape = AS1), BL: body length, FWL: length of forewing, OD: diameter of lateral ocellus, PMX maxillary palpus, PLB: labial palpus, S: metasomal sternum, T: metasomal tergum.

Trachusa (Paraanthidium) heinzi sp. n.

Type material: Holotype: ♂, Türkei, Maras, 700 m, 2.VI.1983, leg. WARNCKE, ex Coll. WARNCKE (OLL).

Paratypes: 2 ♂♂, 4 ♀♀, Türkei, Hakkari, 1300 m, südl. Beytüssebap, 13.VI.1984, leg. WARNCKE, ex Coll. WARNCKE (OLL); 3 ♀♀, Türkei, Maras, 700 m, 10.6.1984, leg. WARNCKE, ex Coll. WARNCKE (OLL); 2 ♀♀, Türkei, 40 km O Midyat/Mardin, 17.VI.1981, 900m, leg. WARNCKE, ex Coll. WARNCKE (OLL).

Description

Male. BL: 10.4-11.2 mm (10.8 mm). FWL: 8.1-8.6 mm (8.5 mm). Habitus as in Fig. 1A.

Structure. Head rounded, about 1.2 times broader than long in frontal view. Face rectangular, inner margins of compound eyes nearly parallel. Galea smooth and shiny with fine wrinkles laterally. PLB two-, PMX four-segmented. Mandibles tridentate, with fine and dense punctation basally. Labrum weakly shiny with distinct, dense punctation. Clypeus convex rounded, about 1.5 times broader than long with distinct, dense punctation (<1). Apical margin of clypeus straight to slightly convex rounded, distinctly granulate in the middle. Supraclypeal area and paraocular area shiny with distinct dense punctation (<1). Genal area, face and vertex with honeycombed, coarse punctation. Hind margin of vertex distinctly lamellate (similar Figs 2A, B). Scape cylindrical about 2.5 times as long as broad. AS3 truncate, about as long as broad in ventral view. AS4-AS12 about 1.7 times longer than broad, AS13 about 2.2 times as long as broad. Pronotum dull to weakly shiny with distinct toothlike projection at dorsolateral angle each (similar Figs 2C, D). Pronotal lobe shiny, quadrangular with large, flat punctation. Front margin of pronotal lobe carinate, slightly curled up. Omaulus of mesepisternum distinctly carinate. Mesepisternum with honeycombed punctation dorsally, becoming more and more dispersed and obliqued ventrally. Anterior surface of mesepisternum with smooth and shiny area along omaulus. Scutum and scutellum dull, with honeycombed coarse punctation. Metanotum with large irregular punctation, dull except small shiny area in the middle. Declivous part of propodeum dull, with coarse dense punctation except smooth and shiny triangular area in the middle. Lateral parts of propodeum dull with small, dense punctation except impunctate smooth area along margin to insertion of middle coxa. Tegula shiny to weakly dull with small, dense punctation. Legs weakly dull to shiny with large, dense punctation on posterior surface and small, dense to dispersed punctation on anteriorsurface. Anterior surface of hind femur nearly impunctate. Basitarsus of middle legs elongate, nearly as long as tibia. T1-T5 with dense (< 0.5) to honeycombed punctation being distinctly larger on disc than on marginal zone. Marginal zone less than 1/3 as long as complete T. All T with strong dorsolateral convexity. T6 triangular, apically rounded, with large, dense punctation. T7 apically with distinct semicircular emargination in the middle. S2 broad triangular, with minute apical incision in the middle. S4 dull with small dense punctation, no patches of subapical bristles developed. Apical margin of S4 straight with narrow median incision, the latter being flanked by comb-like rows of 12-14 strong bristles (Fig. 2E). S5 divided into two curved parts by broad median incision. Each part of S5 with row of strong cuticular bristles along curved inner margin each. S6 with irregular punctation and broad flat rim in the middle (Fig. 2E). Apical margin of S6 straight. Male genitalia as shown in Figs 3A, B, similar to *T. interrupta* with gonoforceps strongly Y-shaped apically.

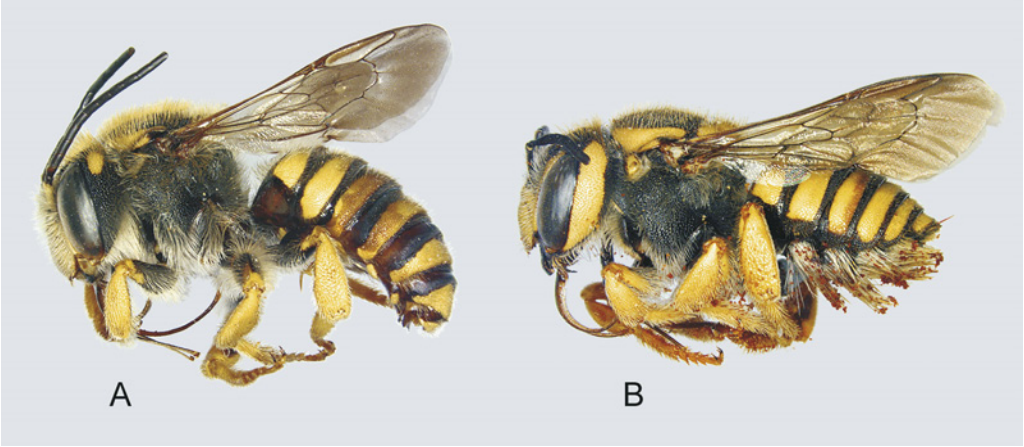

Fig. 1. Habitus of *Trachusa heinzi* **sp. n.: A.** Male holotype; **B.** Female paratype.

Integumental colour. Clypeus, paraocular area, lower part of supraclypeal area and mandibles ivory coloured. Apical part of mandibles, especially teeth black coloured. Area behind compound eye with bright yellowish coloured oval maculation each. Other parts of head black. Scape ivory ventrally, black dorsally. AS black to blackish brown except bright yellowish brown apical maculation on ventral surface of AS3. Scutum black except rectangular yellowish stripe between lateral parts of front margin and lateral margin on each side. Main parts of scutellum and axillae with large yellow maculation. Colouration of pronotal lobe variable, completely black to mainly yellowish coloured. Anterior half of tegula yellow, posterior half blackish brown. Other parts of thorax black. Wings slightly infuscated apically. Apical parts of coxa (esp. hind coxa) yellowish. Femur mainly black, with small to medium sized yellow maculations apically. Tibia and basitarsus of all legs bright yellowish. Distal tarsal segments dark yellowish. Claws yellowish brown basally, blackish brown apically. Disc of T1 black, with two yellow triangular maculations laterally, nearly meeting each other in the middle. Marginal zone of T1-T5 completely black. T2 basally with broad triangular yellow maculations sometimes meeting each other in the middle. Disc of T3-T4 with complete yellow banding along premarginal line, being most narrow in the middle. Basal part of T5 yellow except a small black triangle basally in the middle. T6 completely yellow except black marginal zone and a small black triangle basally. T7 completely yellow. All S blackish brown sometimes with yellowish maculations of varying size lateroapically. Bristles of S4 and S5 black.

Pubescence. Clypeus with short and dispersed, yellowish white hairs on disc and longer whitish pubescence laterally. Paraocular and supraclypeal area with medium long to long yellowish white pubescence of branched hairs. Frons, vertex and upper part of genal area with medium long to long yellowish grey hairs. Lower parts of genal area with long whitish pubescence. Scape with long yellowish white hairs laterally. Scutum, scutellum and axillae with medium long to long yellowish grey hairs. Lateral parts of thorax with medium long to long yellowish white to whitish pubescence of feathered hairs. Declivous part of propodeum with short to medium long greyish pubescence, lateral parts of propodeum with medium long to long whitish hairs. Pubescence of legs with yellowish white to whitish pubescence, being medium long on coxa to femur and short on tibia and tarsi. T1 with long, branched whitish hairs being most dense laterally. Pubescence of T2-T6 short and more dispersed than on T1. S2 with long, whitish hairs, forming a distinct hair-fringe along apical margin. S3 with medium long yellowish white pubescence, forming a distinct fringe at medium incision of apical margin. S4 basally with broad patches of extremely short velvet-like pubescence on both sides of median rim but not bristle-like (Fig. 2E). S5-S6 with inconspicuous sparse pubescence of short yellowish white hairs. S7-S8 nearly bare, only apically with distinct whitish hairs.

Female. BL: 9.9-11.4 mm (10.6 mm). FWL: 8.7-9.4 mm (9.0 mm). Habitus as in Fig. 1B.

Structure. Head round, as long as broad in frontal view. Face rectangular to slightly trapezoid, with inner margins of compound eyes slightly subparallel and diverging from ventral to dorsal. Proboscis like male. Mandibles broad with 4 teeth apically. Clypeus about 1.7 times broader than long with honeycombed

punctation. Front margin of clypeus convex, with a broad, weak concavity in the middle and 6 small granulate teeth laterally. Supraclypeal area and paraocular area, as well as main parts of face, with honeycombed punctation. Hind margin of vertex distinctly curled up, lamellate, similar to male (Figs 2A, B). Scape about 5.5 times as long as broad, cylindrical. AS3 ca. 1.2 times as long as broad, AS4 about as long as broad, AS5 distinctly broader than long. AS6-AS11 about as long as broad, AS12 1.5 times longer than broad. Pronotum tesselate, dull to weakly shiny, with distinct, dense punctation. Dorsolateral angle of pronotum with distinct toothlike projection (Figs 2C, D). Smooth triangular area of declivous propodeum smaller and more dull than in male. Lateral parts of propodeum more tesselate and dull than in male. Other parts and structures of thorax similar to male. Legs with large, dense punctation except impunctate on inner surface of front tibia and small punctation on inner surface of trochanter to femur of front legs and hind tibia. Basitarsus of middle legs clearly shorter than tibia. Claws of all legs bidentate, arolia present. Punctation of T1-T6 similar to male, but more dispersed on disc. Ventrolateral part of T1 mainly impunctate, polished. Marginal zone about half as long as disc. Dorsolateral convexity developed but not as strong as in male. T6 broad, triangular with minute median incision apically. All S dull with dense punctation.

Integumental colour. Similar to male except in the following characteristics: Mandibles black to blackish brown, sometimes yellowish brown basally. Clypeus yellow with brownish transparent line along lateral parts of apical margin. Front margin of clypeus along median concavity and crenulation black to blackish brown. Main parts of paraocular area and lower part of supraclypeal area yellow. Genal area with large yellow maculation between outer margin of compound eye and preoccipital ridge. Other parts of head black. Antenna black to blackish brown except ventral surface of AS4 and AS5 being bright brownish coloured. Pronotal lobe bright yellowish, other parts of pronotum black. Yellow maculations of scutum similar to male but more extended. Axilla nearly completely yellow except thin black line basally. Scutellum mainly yellow except black triangular area basally which divides yellow maculation in the middle. Mesepisternum sometimes with yellow maculations, other parts of thorax black. Coxa and trochanter of all legs blackish brown to black, except small yellow spot apically on ventral surface of hind coxa. Femur of front and middle legs blackish except apical part and ventral surface being yellow. Hind femur only apically yellow. Distal parts (tibia to tarsus) of all legs completely yellow. Claws yellowish basally, blackish brown apically. T6 yellow with small black triangle apically. All S blackish brown to black, sometimes with small yellow maculations laterobasally.

Pubescence. In general similar to male but distinctly shorter and more dispersed. Outer surface of tibia of all legs with short thornlike bristles. Inner surface of middle and hind legs with brush of long and strong, simple hairs. Metasomal scopa (S2-S5) white. S6 with yellowish grey pubescence of short, simple hairs.

Diagnosis: *T. heinzi* **sp. n.** is very closely allied to *T. interrupta* (FABRICIUS) from which it can be clearly distinguished by the following characters (character states of *T. interrupta* given in parentheses): Average body length of female 10.6 mm (11.7 mm); vertex of both sexes curled up, lamellate as in Figs 2A, B (rounded to slightly carinate); dorsolateral angle of pronotum with toothlike projection in both sexes as in Figs 2C, D (dorsolateral angle flat to weakly convex rounded, without projection); basal declivous part of T1 with coarse, rather dense punctation in female (indistinct, flat, more dispersed); male S4 without patches of subapical bristles as in Fig. 2E (distinct patches of subapical bristles, as in Fig. 2F); pronotal lobes nearly completely yellow in female, partly yellowish in male (pronotal lobes completely black in both sexes); extended yellow colouration on dorsal parts of male thorax, especially scutum with broad lateroapical yellow maculation (dorsal part of thorax mainly black coloured, scutum nearly always black, sometimes with thin, lateral maculations); mesepisternum of female often with yellow maculations (never yellow maculations, always completely black); all female T with extended yellow colouration, especially T1 and T2 nearly always with complete yellow banding, only sometimes weakly interrupted (yellow colouration of all T of female less extended, on T1 and T2 always broadly interrupted).

Comments: All material of the new species was found in a series of specimens in the Coll. WARNCKE (OLL), which were labelled as type material of *Anthidium tauricum* WARNCKE *in schedule*. However this species was never published by WARNCKE (1980, 1982) in his studies on Anthidiini. Furthermore, a precise examination of all specimens assigned by WARNCKE as type material of *Anthidium tauricum* WARNCKE actually showed that the series undoubtedly represents a mixture of two species, the common *T. (Paraanthidium) interrupta* and the new undescribed species. Although the holotype of *A. tauricum* desig-

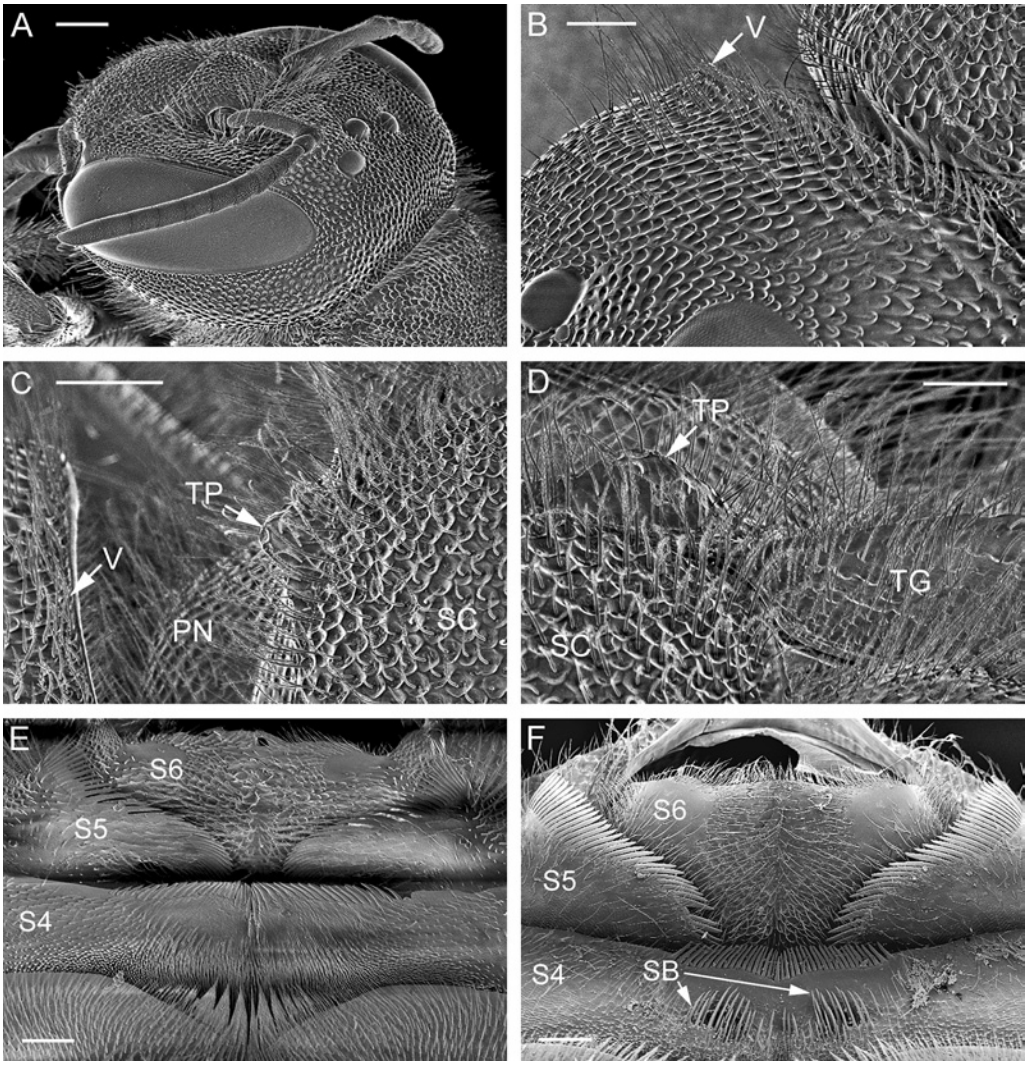

Fig. 2. Structures of *Trachusa heinzi* **sp. n.** (A-E) and *Trachusa interrupta* (F): **A.** Female head; **B.** Female vertex; **C, D.** Toothlike projection of pronotum; **E, F.** S4 and S5 of male. PN: pronotum; SB: subapical britles of S4; SC: scutum; TG: tegula; TP: toothlike projection of pronotum; V: vertex. Scale bars: 500 µm (A), 250 µm (B-F).

nated by WARNCKE belongs to the new species, WARNCKE probably did not recognize the true concept of the new species, otherwise he would not have confused the undescribed species with specimens of *T. (Paraanthidium) interrupta* in his type-series. Therefore, the new species is named differently from that postulated by WARNCKE.

Etymology: The new species is named in honour of my dear father Heinz DUBITZKY.

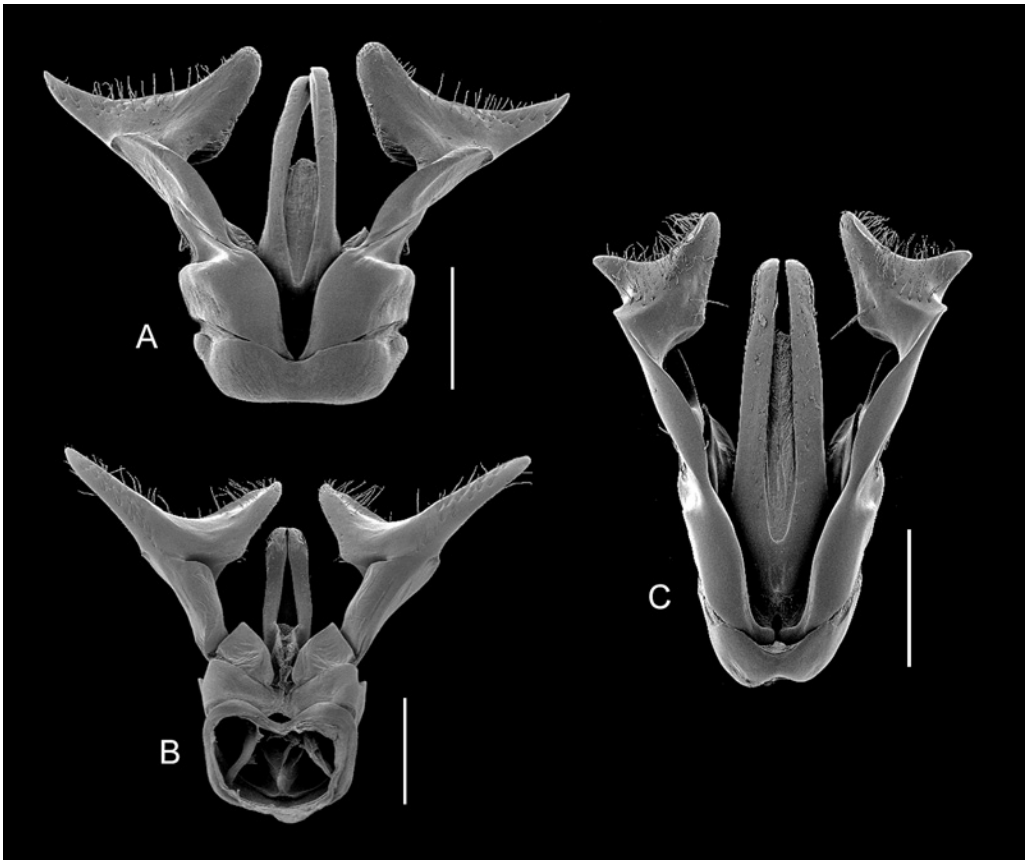

Fig. 3. Male genitalia of *Trachusa heinzi* **sp. n.** (A, B) and *Trachusa dumerlei* (C): **A, C.** Dorsal surface; **B.** Ventral surface. Scale bars: 250 µm.

Determination key to the western Palearctic species of the subgenus *Paraanthidium*

A. Females (12 AS)

1. Dorsolateral parts of pronotum without toothlike projection, hind margin of vertex rounded to weakly carinate 2
– Dorsolateral parts of pronotum with toothlike projection (Figs 2C, D), hind margin of vertex distinctly lamellate, (Figs 2A, B) . . . . . *T. (P.) heinzi* **sp. n.**

2. Mandibles completely black . . . . . *T. (P.) interrupta* FABRICIUS
– Mandibles basally yellowish . . . . . *T. (P.) dumerlei* WARNCKE

B. Males (13 AS)

1. Gonoforceps deeply forked apically (Figs 3A, B) 2
– Gonoforceps only slightly forked apically (Fig. 3C) . . . . . *T. (P.) dumerlei* WARNCKE

2. Hind margin of vertex distinctly lamellate (Figs 2A, B); pronotum with dorsolateral toothlike projection (Figs 2C, D); S4 without patches of subapical bristles (Fig. 2E) . . . . . *T. (P.) heinzi* **sp. n.**
– Hind margin of vertex rounded to weakly carinate; pronotum without dorsolateral toothlike projection; S4 with distinct patches of subapical bristles (Fig. 2F) . . . . . *T. (P.) interrupta* FABRICIUS

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