THE RAFFLES BULLETIN OF ZOOLOGY 1997 **45**(1): 39-51

PTECTICUS MINIMUS, A NEW SPECIES OF SARGINAE FROM WEST MALAYSIA INCLUDING THE DESCRIPTION OF ITS LARVA AND PUPARIUM (INSECTA: DIPTERA: STRATIOMYIDAE)

R. Rozkošný and D. Kovac

ABSTRACT. - *Ptecticus minimus*, a new species of Stratiomyidae from West Malaysia, is described. Compared with the other species of the genus, it is unusually small and virtually lacks the characteristic inner projection of the 2nd antennal segment. Also its wing microtrichia are conspicuously long and the male genitalia are very specific. The larvae of the new species were found in the wall of decaying bamboo shoots of *Gigantochloa scortechinii* Gamble. They are characterized by the cylindrically elongated maxillary part of the mandibular-maxillary complex. The puparium shows unusually protuberant postocular lobes on the head capsule. The generic characters are briefly discussed on the ground of the detailed description of the new species.

KEY WORDS. - *Ptecticus minimus*, new species, Malaysia, Diptera, Stratiomyidae, taxonomy.

INTRODUCTION

About 300 species of Oriental Stratiomyidae have been described (cf. Brunetti, 1923, 1927; James, 1975; Woodley, 1989). Recently both authors of this study presented a set of papers devoted to the Stratiomyidae of West and East Malaysia (Rozkošný & Kovac, 1991, 1994a, 1994b, 1996a, 1996b; Kovac & Rozkošný, 1995). Special attention was paid to species of the extensive genus *Ptecticus* Loew, the larvae of which were observed in decaying bamboo shoots. This genus includes about 40 species but needs revision, as many earlier descriptions are difficult to interpret. An attempt to summarize the recent knowledge on *Ptecticus* occuring in Malaysia resulted in a key including 12 species (Rozkošný & Kovac, 1996a).

Here we describe *Ptecticus minimus*, a new species from the Ulu Gombak Region in West Malaysia with larvae inhabiting decaying bamboo shoots. The external morphology of the larva of *P. minimus* is compared with two other species included in our previous paper

Rudolf Rozkošný - Department of Zoology and Ecology, Faculty of Science, Masaryk University, Kotlárská 2, 611 37 Brno, Czech Republik. **Damir Kovac** - Forschungsinstitut Senckenberg, Senckenberganlage 25, 60325 Frankfurt am Main, Germany.

(Rozkošný & Kovac, 1996b). The description of the puparium completes a series of four puparia described recently (Rozkošný & Kovac, 1991, 1996b).

SYSTEMATICS

FAMILY STRATIOMYIDAE

Ptecticus minimus, new species
(Figs. 1-30)

Material examined. - Holotype - West Malaysia, Ulu Gombak Field Studies Centre near Kuala Lumpur, 1 male ex larva found in the wall of decaying bamboo shoot, 18 Nov.1995, coll. D. Kovac, deposited in the Senckenberg Forschungsinstitut, Frankfurt am Main.

Paratypes - 2 males same as the holotype, 24 males and 14 females ex larvae and puparia found at the same locality but 10 Sep.1994 (1 female), 12 Sep.1995 (1 female), 12 Nov.1995 (4 females), 18 Nov.1995 (17 males and 6 females), 21 Nov.1995 (4 females), 24 Nov.1995 (1 male) and 25 Nov.1995 (2 females) deposited in the Senckenberg Forschungsinstitut, Frankfurt am Main, Germany (SMF) (12 males and 6 females), in the Department of Zoology and Ecology, Masaryk University in Brno (MUB) (10 males and 6 females), in the Forest Research Institute, Kepong, Malaysia (FRIM) (1 male and 1 female) and in the Zoological Reference Collection, Singapore (ZRC) (1 male and 1 female).

Larvae - 33 larvae found on 21 Nov.1995 in a decaying bamboo shoot of *G. scortechinii* at the Ulu Gombak Field Studies Centre (see holotype), deposited in SMF (24 larvae), in MUB (5 larvae), in FRIM (2 larvae) and in ZRC (2 larvae).

Puparia - 2 puparia found on 31 Aug.1994 and 30 puparia on 21 Nov.1995 in decaying bamboo shoots of *G. scortechinii* near Ulu Gombak Field Studies Centre and 2 puparial exuviae from the same locality (see type material), deposited in SMF (20 puparia), in MUB (8 puparia and 2 puparial exuviae), in FRIM (2 puparia) and in ZRC (2 puparia).

Diagnosis. - An unusually small species with indistinct inner projection of pedicel. Upper frons shining black and band-shaped in both sexes, wing microtrichia dense and long.

Description. - Holotype male - Head (Fig. 1) about as high as long, almost globular in lateral view, deeply concave posteriorly, ocellar triangle distinctly prominent, frontal callus relatively low and rounded. Frontal band in narrowest part broader than antenna, slightly tapered from occiput to anterior third. Upper frons shining black, sharply separated by a transverse line from pale yellow lower frons bearing frontal callus. Antennae (Fig. 2) inserted below middle of head, small, pale yellow. Basal segments shining, pedicel with rounded distal margin on inner side, barely prominent. Flagellum rather rounded distally, arista brownish, longer than complete antenna, subapical. Face entirely yellow, lower face membranous. Palpi yellow, two-segmented, rather slender, reaching half distance between posteroventral angle of eye and base of antennae. Pubescence long, erect and pale on upper frons and occiput. Longer yellow hairs also above and below insertion of antennae. Relatively short yellow hairs on postocular margin of head and palpi.

Thorax uniformly yellow to yellowish brown, mesonotum with a slightly brownish shade. Pubescence generally short, semi-erect and yellow but especially on posterior half of mesonotum, scutellum and mediotergite predominantly brown, with dark insertions so that these parts of thorax finely but distinctly punctate. Wings hyaline, pterostigma indistinct. Vein R2+3 very short, barely distinct, arising proximally to anterior crossvein and ending

in R1. Anterior crossvein about as long as discal cell, broad in its apical third. Stronger longitudinal veins including costa covered by relatively long, dense, fine and erect brownish hairs, also microtrichia covering wing membrane unusually long. Halteres yellow, with darkened stem. Posttegulae only little distinct, with several black setae each. Fore and mid legs pale yellow including coxae, with short yellowish hairs, only distal half of mid femur with a slight brownish shade and last tarsomere of both anterior legs pale brown. Hind femur with a narrow semicircular brownish patch behind middle. Hind tibia predominantly dark brown, yellow on both ends. Hind tarsi white. Pubescence on hind legs mainly yellow but predominantly brown on tibia and completely white on tarsi.

Abdomen (Fig. 5) yellow with transverse, dark brown bands on tergites. Each band occupying less than anterior half of tergite, also anterior margin of each tergite narrowly yellow. Laterally these bands reach the margins of tergites or nearly so. Venter entirely yellow as well as male terminalia. Abdominal pubescence semi-erect, relatively long only at sides of base, virtually corresponding with ground colour of relevant abdominal parts.

Male genitalia (Figs. 6-9): Epandrium arched, surstyli well developed, narrow and pointed, curved ventrad. Proctiger and cerci as in other related species, surrounded by distal part of epandrium. Synsternite very reduced, therefore gonocoxites almost separated, connected by a slender and bipartite medial process. Gonostylus simple, leaf-shaped and pointed apically.

Measurements. - Length: body 5.5 mm, wing 5.2 mm. Paratypes: body 5.35-6.14 mm, wing 5.0-5.7 mm.

Female. - Frontal band (Fig. 4) usually parallel-sided, not slightly narrowed in anterior third, its upper part black, sharply separated from yellow frontal callus as in male. Frontal callus, as a rule, even lower than in male. Antennal flagellum (Fig. 3) relatively larger and palpi more robust. Mesonotum, scutellum and mediotergite predominantly brown and blackish punctate. Halteres dark brown, only their apical part and knob paler. Posttegulae with black setae as in male. Legs virtualy identical to those of male though femora more brownish in distal half and hind basal tarsomere narrowly blackish at proximal end. Transverse bands on abdomen broader, occupying about 2/3 of tergite length but somewhat tapered towards lateral margins. Female terminalia dark brown. Cerci two-segmented as in other species but apical segment short, only about twice as long as broad.

Measurements. - Length: body 6.3-7.2 mm, wing 5.8-7.2 mm.

Variability. - The darkening of mesonotum, scutellum and mediotergite as well as the darker part beyond middle of mid and hind femur from pale brownish to brown in both sexes though, on average, somewhat darker in females. Width of abdominal bands broader in females, especially in the middle, but often narrowed towards lateral margins.

Larva (penultimate instar). - Elongate oval, somewhat flattened but not as remarkably as puparium. Head (Figs. 10-11) without postocular lobes, anal segment (Fig. 14) rounded posteriorly. Head yellow and mostly mat, only clypeofrons and distal third of genal lobes subshining to shining and darkened apically. Body segments brown but paler in medial third (or more), particularly on abdominal segments 1-6. Darker and larger cuticular plates (in comparison with other surface reticulation) forming sublateral ornamentation on body segments often little distinct dorsally (especially on middle body segments) but well developed ventrally, consisting of transverse oval group of 8-12 plates placed in a sublateral depression

on each side. Moreover, a transverse line consisting of 3-5 cuticular plates is distinct on each posterolateral corner of segment (except for thoracic segment 1). Similar groups of dark plates are more or less distinct dorsally on thoracic segments 2-3 and abdominal segments 1-7 but transverse line of posterolateral plates missing.

Head somewhat tapered anteriorly, labrum barely longer than genal lobes (Fig. 10). Antennae very small, two-segmented, situated subapically on genal lobes (Fig. 12). Eye prominences pale, only slightly protuberant. Labrum curved ventrad, with a series of flat setae on ventral side. Genal lobes bordered by hair fringe along ventral margin. Each mandibular-maxillary complex with elongate maxillary part provided with brushlike, transversely arranged rows of flat setae. Slender maxillary palpus bearing usual group of apical sensillae inserted relatively deep, far below apex of maxillary part. Molar area elongate, transversely ridged, consisting of 18-20 transverse lamellae. Labial projection with a bushlike tuft of setae (Fig. 12).

Body segments with vestiture of short, golden to silvery yellow hairs, mostly adpressed and not too dense except for medial third of dorsal side. Sublateral depressions almost bare, and marginal hairs rather sparse. Ventral hairs even sparser, only mediolateral ridges of anal segment with relatively dense and erect hairs. Ventral side of abdominal segments 1-7 with small, shining brown and distinctly longer cuticular spines arranged in irregular 1-3 transverse rows along anterior margin. Their extent and number gradually decrease towards the anal segment. Midsternal patch on abdominal segment 6 (Fig. 13) large, usually dilated in middle and occupying whole length of segment and extending onto abdominal segment 5. Cells of sternal patch with papillae (Fig. 15) as in some other species. Anal segment (Fig. 23) rounded posteriorly, its posterolateral corners barely prominent. Posterior margin of anal segment usually with a low medial incision. Anal slit (Fig. 26) bordered by a row of massive, bluntly pointed marginal teeth.

Respiratory system: as in other species of genus. Anterior spiracle on thoracic segment 1 oval, brownish. Posterior spiracular opening (Figs. 14, 25) placed dorsally beyond transverse fold of anal segment, both lips bordered by short flat setae. Usual vestiges of dorsolateral spiracles on thoracic segment 3 and abdominal segments 1-7 indistinct.

Chaetotaxy: All constant setae usually well distinguishable from relatively short and adpressed hairs. Virtually all setae on head short and bushlike (Figs. 10-11). Setae on body segments simple but distinctly pubescent. As to general scheme of setae see Rozkošný (1982) or Rozkošný & Kovac (1996b). Apparently all usual setae on lateral wall of abdominal segments 1-7 developed, i.e. 1 dorsolateral, 1 ventrolateral and 2 laterals. Anal segment with 1 pair of isolated dorsal setae. Ventral setae almost indistinct among long and erect hairs. Subapical and apical setae conspicuous (Fig. 23).

Measurements. - Length: 6.3-9.1 mm, maximum width: 2.2-2.9 mm.

Puparium (ultimate instar) (Fig. 22). - Subcylindrical, head remarkably flattened, anal segment with prominent corners. Integument rigid, retaining mozaic appearance of cuticle as well as ornamentation in sublateral depressions on dorsal as well as ventral side. Surface smooth, without any hairs, only with strong and pubescent constant setae. Predominantly brown, only lateral margins of 2-3 last abdominal segments paler, often almost yellow.

Head (Figs. 16-17) yellow, darkened medially on dorsal side and almost black laterally beyond ocular prominences. Postocular lobes remarkably prominent, globose. Labrum rounded anteriorly, vestiges of maxillary palpi and antennae easily visible, rests of molar area barely distinct (Fig. 18).

Body segments without ventral rows of cuticular spines along anterior margin. Sternal patch (Figs. 19, 21) often confined to middle of abdominal segment 6, consisting of about 3-6 irregular longitudinal rows of cells. Sometimes a small group of 5-8 cells distinct also in middle of abdominal segment 5. Anal segment (Fig. 20) with low longitudinal ridges in area of dorsal setae and with usual elevations on ventral side, i.e. a semicircular transverse elevation in front of anal slit and two mediolateral ridges in distal half (Fig. 24). Corners of anal segment bearing insertions of lateral setae fairly prominent. Anal slit with a compact marginal wall, marginal teeth completely reduced.

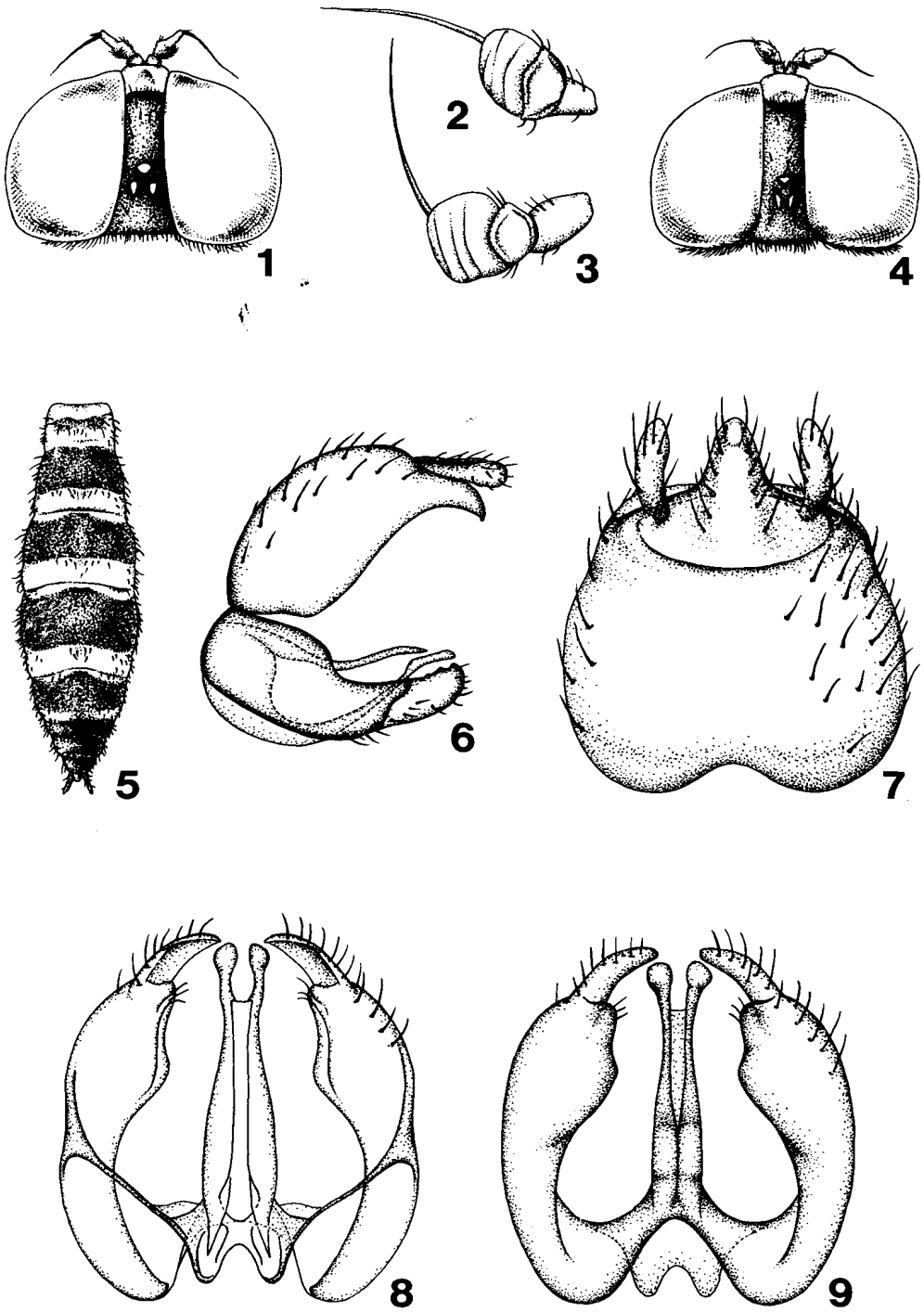
Respiratory system: Anterior spiracles of same shape and in same position as in larva, relatively larger, spiracular slits darkened. Remainder of dorsolateral spiracles on thoracic segment 3 and abdominal segments 1-7 known in other species of genus indistinct. Posterior spiracular opening as in larva, i.e. in mid-dorsal position and beyond a complete transverse fold (Fig. 20). Short marginal fringe on lips well retained. Special puparial respiratory horns very small, rodlike, distinct on abdominal segments 2-5 in dorsolateral position (in place of posterior lateral seta).

Chaetotaxy: Position of constant setae (cf. Figs. 16-18, 20, 27-30) virtually same as in other species of genus (see Rozkošný & Kovac 1996b). All setae on head simple and usually short pubescent. Flat sublabral setae distinct (Fig. 16). Each prominent postocular lobe bearing 1 dorsolateral and 3rd ventrolateral seta, 3rd ventral seta near its base (Figs. 16-17). Setae on body segments relatively strong and pubescent (Fig. 19). Lateral wall of abdominal segments with 4 setae on abdominal segments 1, 6 and 7 (i.e. both lateral setae developed) (Fig. 20) and with 2 setae on abdominal segment 2-5 (i.e. both lateral setae absent). Anal segment with 1 pair of dorsal setae, apical and subapical seta of same length but both distinctly shorter than lateral setae (Fig. 24).

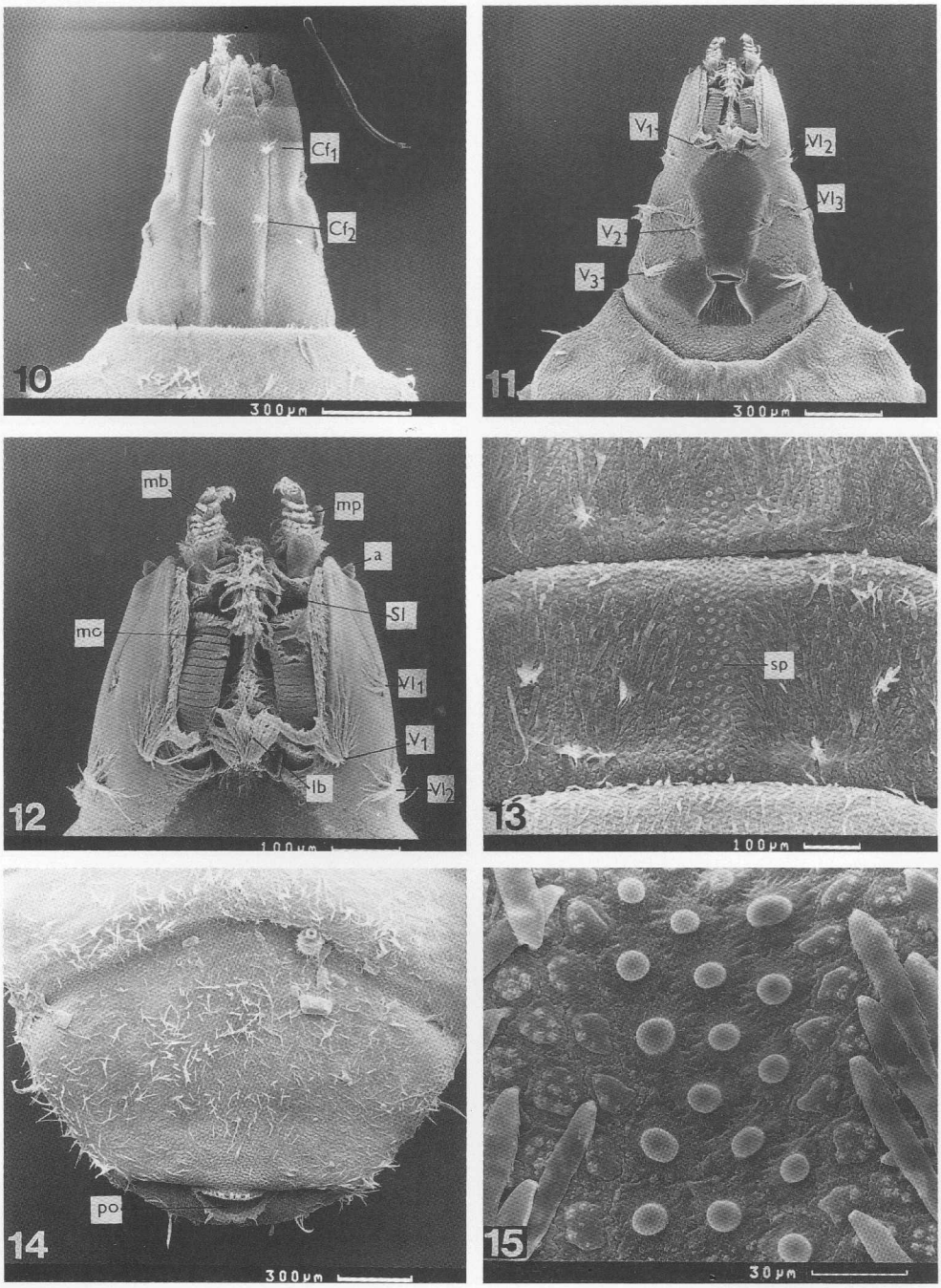
Measurements. - Length: 4.6-8.2 mm, maximum width: 2.0-2.8 mm.

Etymology.- The species described here is, on the average, the smallest known species of the genus (minimus = the smallest).

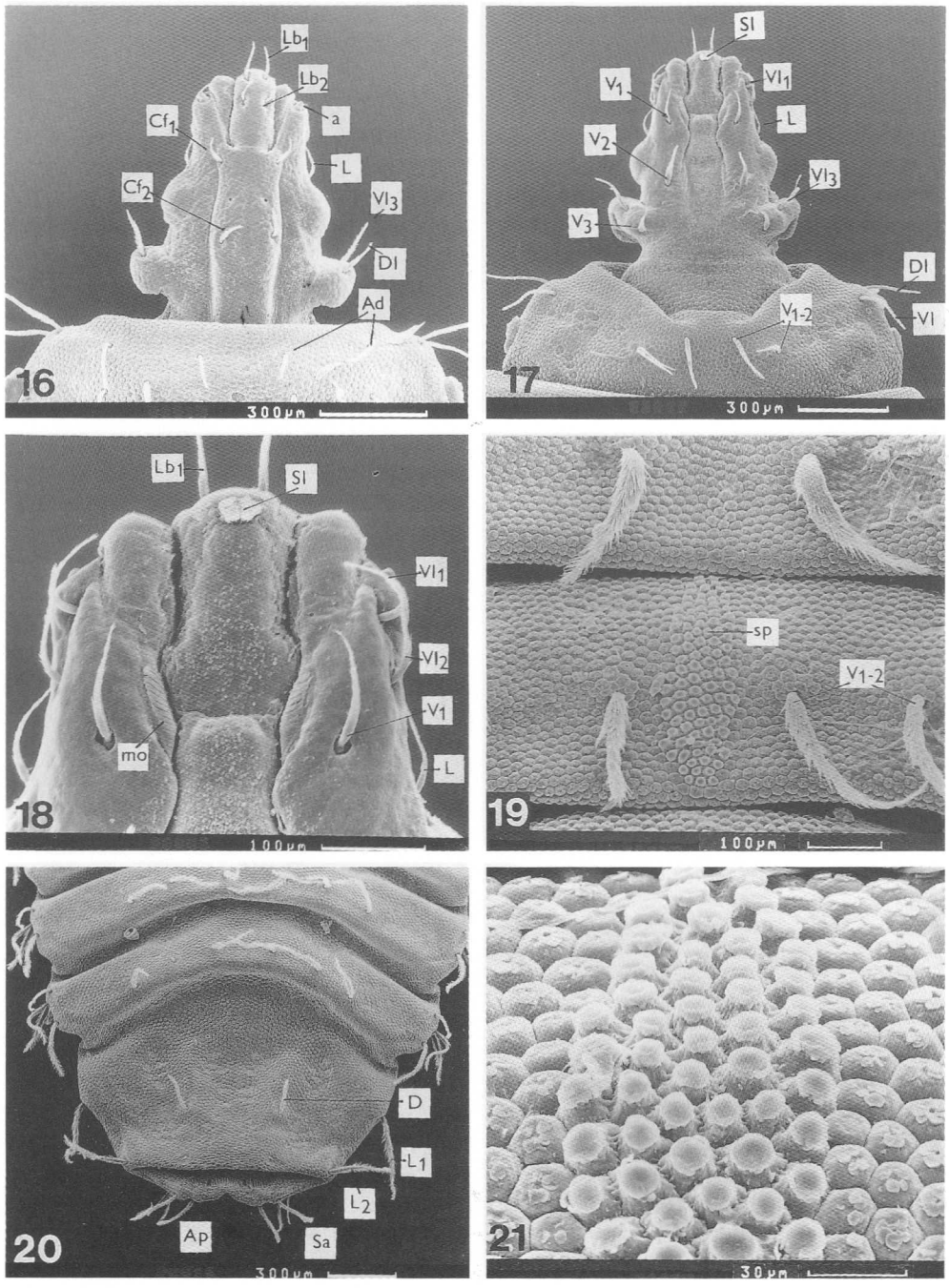
Notes on the habitat and biology. - So far the larvae of *P. minimus*, new species have only been found in decaying shoots of the bamboo *Gigantochloa scortechinii*. In order to collect larvae, several bamboo shoots (height c. 2 m) were felled. The shoots remained lying on the ground. Several cuts into the culm sheaths with a parang allowed easier access for the larvae. *P. minimus*-larvae were found only in the damp, fibrous bamboo wall of the upper, softer part of the shoot, which is completely enclosed in culm cheaths. The larvae pupated in the bamboo wall and the puparia stayed there until eclosion. In case of disturbance, puparia started to move away in search of a place to hide. One shoot known to be colonized by *P. minimus* larvae (felled on 14 Oct.95) was taken to the lab to rear out the flies. The first adults eclosed on 12 Nov.1995, the last adults on 28 Nov.1995 (n=30), i.e. the whole developmental cycle took about 4-6 weeks.



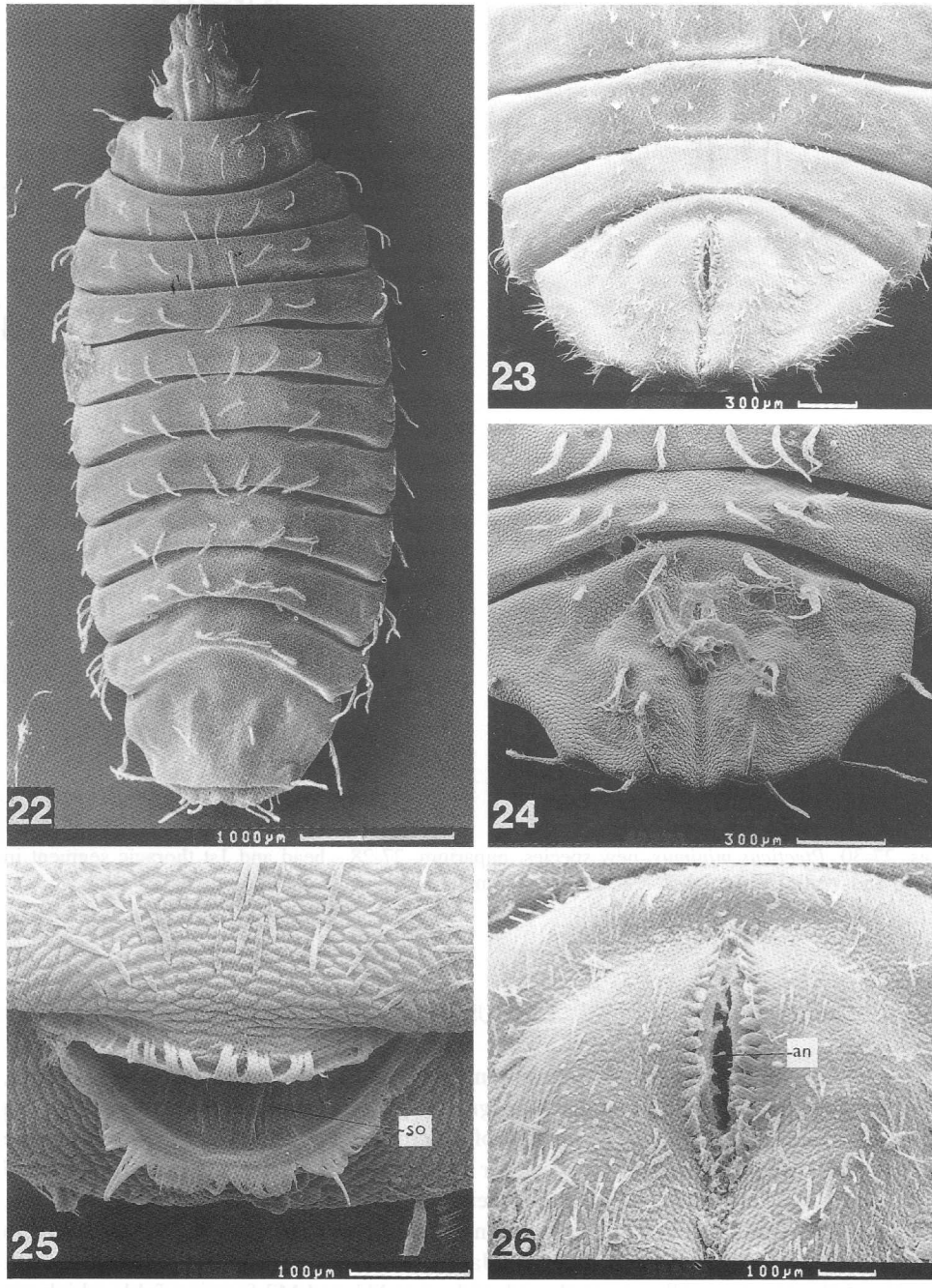
Figs. 1-9. *Ptecticus minimus*, new species, adult characters. 1 - male head in dorsal view, 2 - male antenna from inner side, 3 - female antenna from inner side, 4 - female head in dorsal view, 5 - female abdomen, 6 - male genitalia in lateral view, 7 - epandrium, proctiger and cerci, 8-9 - ventral part of male genitalia in dorsal and ventral view.



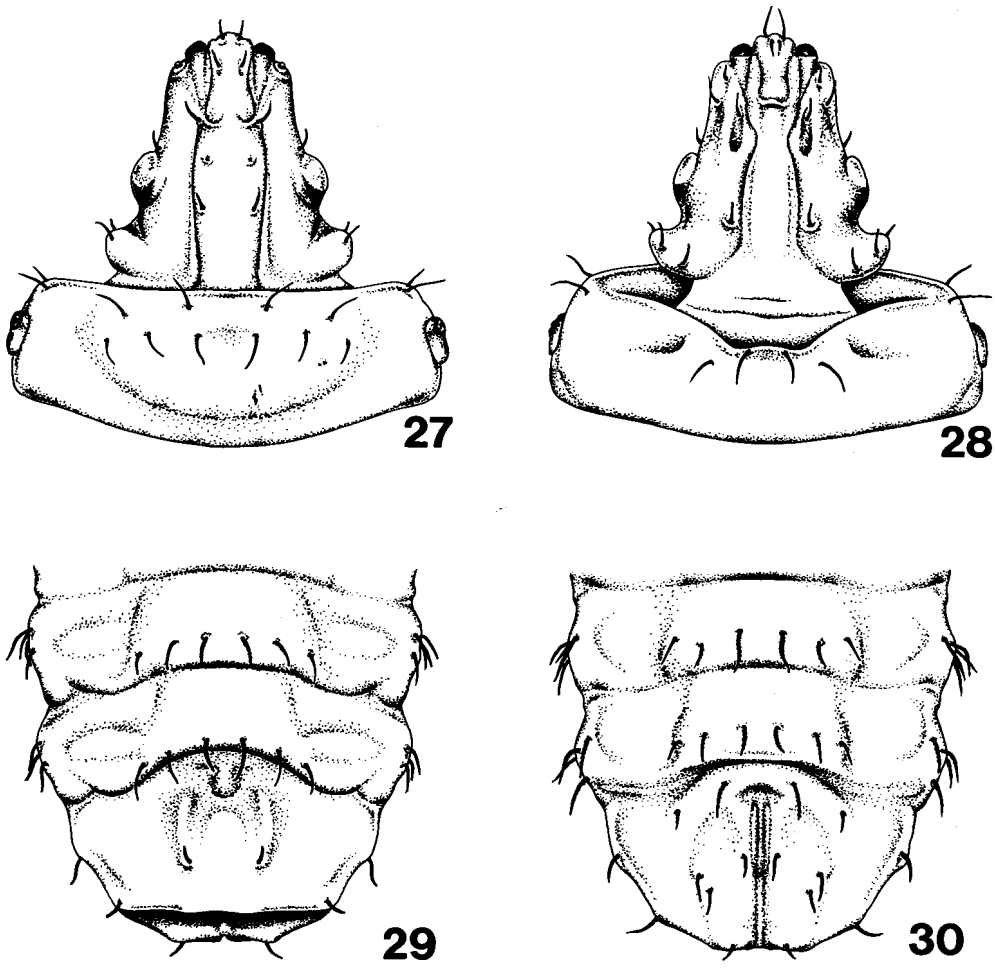
Figs. 10-15. *Ptecticus minimus*, new species, larval characters. 10-11 - head in dorsal and ventral view, 12 - mouthparts in ventral view, 13 - midsternal patch on abdominal segments 5 and 6, 14 - anal segment in dorsal view, 15 - part of midsternal patch.
a - antenna, Cf - clypeofrontal setae, lb - labial tuft of setae, mb - mandibular-maxillary complex, mo - molar area, mp - maxillary palpus, po - posterior spiracular opening, Sl - sublabral setae, sp - midsternal patch, V - ventral setae, Vl - ventrolateral setae.



Figs. 16-21. *Ptecticus minimus*, new species, puparium. 16-17 - head in dorsal and ventral view, 18 - anterior part of head in ventral view, 19 - midsternal patch on abdominal segments 5 and 6, 20 - last 3 abdominal segments in dorsal view, 21 - part of sternal patch.
a - antenna, Ad - anterodorsal setae, Ap - apical setae, Cf - clypeofrontal setae, D - dorsal setae, Dl - dorsolateral setae, L - lateral setae, Lb - labral setae, mo - molar area, Sa - subapical setae, Sl - sublabral setae, sp - midsternal patch, V - ventral setae, Vl - ventrolateral setae.



Figs. 22-26. *Ptecticus minimus*, new species, larva and puparium. 22 - puparium in dorsal view, 23 - four posterior segments of larva in ventral view, 24 - three posterior segments of puparium in ventral view, 25 - posterior spiracular opening of larva, 26 - anal slit of larvaan - anal slit, so -posterior spiracular opening.



Figs. 27-30. *Ptecticus minimus*, new species, puparium. 27-28 - head and 1st thoracic segment in dorsal and ventral view, 29-30 - last three abdominal segments in dorsal and ventral view.

DISCUSSION

Ptecticus minimus, new species, shows some similarities to *Formosargus kerteszi* James, 1939, the only described species of *Formosargus*. However, this genus differs from all known Sarginae (including *P. minimus*) by the lack of the crossvein m-cu and, consequently, by the fifth posterior cell bordering the discal cell for a short distance. On the other hand, *F. kerteszi* resembles *P. minimus* in a reduction of the inner distal projection of the 2nd antennal segment, in the parallel-sided frons in both sexes and in vein R2+3 arising anteriorly to the crossvein r-m. Several further characters mentioned by James (1939) are more or less distinct in several species of *Ptecticus* as well, e.g. partly reduced veins M1 and M3 forming folds which are evident at the wing margin in the case of M1 and completely missing in the apical third of M3 and equidistant ocelli placed far before the occiput. In the face of the relatively poor knowledge on the Oriental Sarginae, it is only tentatively that we included *P. minimus* in the genus *Ptecticus*. We hope to be able to clarify the generic taxonomy of the Sarginae on the basis of more extensive material in one of our forthcoming papers.

Externally the new species particularly resembles *P. australis* Schiner. But in the latter species vein R2+3 arises at the anterior crossvein (not in front of it as in *P. minimus*, new species), runs parallel to R1 and ends in the costal vein. The posterior crossvein is virtually absent, wing microtrichia are not lengthened and the male frons is conspicuously tapered above frontal callus being narrower at this point than the anterior ocellus. Moreover, the male genitalia in both species under discussion are different in a such extent that a close relationship is virtually excluded.

The larvae of *P. minimus* belong to the species-group with an extensive vestiture of short hairs. Their maxillary complexes display an elongate maxillary part with the usual sets of brushlike flat setae. The number of transverse lamellae forming the molar area seems to be higher than that found in the two other described larvae of the genus (cf. Rozkošný & Kovac 1996b). Distinguishing characters are to be found especially in the shape of the anal segment that is regularly rounded and in the irregular rows of small cuticular spines along the anterior margins of abdominal segments.

The puparia are conspicuous by their small size and particularly by the form of the head which bears peculiar postocular lobes laterally. This character seems to be autapomorphic as results from a comparison with puparia of 8 species available in our collection (4 of them are still undescribed). The configuration of setae corresponds with the majority of the known species and the shape of the anal segment seems to be similar to some other species. The absence of the vestiges of lateral larval spiracles on body segments appear to be unique as well.

In the published identification keys to the genera of Stratiomyidae, *Ptecticus* is mostly separated from other Sarginae by the typical inner projection of the antennal pedicel. However, this projection is virtually reduced in *P. minimus*, new species, which thus resembles the related genus Sargus. Further diagnostic characters were re-examined in both genera. Some differences in the wing venation seem to be diagnostic. In the all examined species of *Ptecticus* vein R2+3 arises before or at the anterior crossvein, whereas this vein originates much more distally in Sargus species.

According to our identification key to the Malaysian species of *Ptecticus* (cf. Rozkošný & Kovac, 1996a), *P. minimus*, new species, is externally similar to *P. australis*. It may be distinguished by some characters mentioned above.

P. minimus, new species, is the fifth *Ptecticus* species whose larvae were recorded on decaying bamboo shoots in the Ulu Gombak area. A pronounced spatial segregation occurs among the larvae of these species: in fallen or felled apical parts of the bamboo shoots *P. brunettii* Rozkošný & Kovac inhabits the narrow space between the culm sheaths, *P. minimus*, new species, the internode walls and *P. tricolor* van der Wulp the internode cavities (Rozkošný & Kovac, 1996b). The larvae of *P. malayensis* Rozkošný & Kovac occur in the internode cavities in the apical region of upright shoots killed by larvae of the weevil *Cyrtotrachelus* sp. (Rozkošný & Kovac, 1994a; Kovac & Azarae, 1994) and the larvae of *P. flavifemoratus* Rozkošný & Kovac inhabit water-filled bamboo shoot stumps (Rozkošný & Kovac, 1996b).

Adults of *P. minimus*, new species were never seen flying around bamboo shoots and guarding them, differing in this respect from other *Ptecticus* species visiting bamboo shoots. This might be due to the considerably smaller size of *P. minimus*, new species, which makes the animal more difficult to detect, or they are not territorial, i.e. they do not stay in the

vicinity of the shoots for a long time. It is noteworthy in this context, that the males of *P. minimus*, new species, are smaller than females (length of males: M=5.8 mm, n=21; females: M=6.8 mm, n=9), in contrast to *Ptecticus* species with territorial males like *P. brunettii*, *P. flavifemoratus*, *P. malayensis*, *P. tricolor* and *P. melanurus* (Rozkošný & Kovac, 1996b and own observations)

ACKNOWLEDGEMENTS

The present paper includes part of results obtained in the framework of a research project funded by the Deutsche Forschungsgemeinschaft (DFG, Ko 1367/1-1 and Ko 1367/1-2). Special thanks are due to I. Azarae for supplying the facilities of the Ulu Gombak Field Studies Centre and to the Economic Planning Unit, Prime Minister's Department, Malaysia, for granting the research visa which made this study possible. The manuscript was prepared with a support by the Grant Agency of the Czech Republic (Grant No. 96/206/0997). For technical assistance, our thanks are due to Miss Vladana Procházková and Mrs. Andrea Vesmanis. Critical comments from one of the reviewers that improved the manuscript are gratefully acknowledged.

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Received 01 Sep 1996
Accepted 17 Oct 1996