

A new species of *Platyceridion* TOLLET (Diptera, Keroplatidae) with a larva predatory in ant infested internodes of *Humboldtia laurifolia* VAHL

[Eine neue Art der Gattung *Platyceridion* TOLLET (Diptera, Keroplatidae), deren Larven als Prädatoren in den von Ameisen bewohnten Internodien von *Humboldtia laurifolia* VAHL. leben]

by

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- Abstract** The adult female and myrmecophagous larva of a second species of *Platyceridion*, *P. edax* spec. nov., are described. This species is compared with the previously known species *P. talarocerooides* (SENIOR-WHITE, 1921), of which both sexes are redescribed. The genus is presently known only from Sri Lanka.
- Key words** Diptera, Keroplatidae, *Platyceridion*, taxonomy, description of species, myrmecophagy
- Zusammenfassung** Eine zweite Art aus der Gattung *Platyceridion*, *P. edax* spec. nov., wird anhand der weiblichen Imagines und ihrer myrmecophagen Larven beschrieben. Es erfolgt ein Vergleich mit der anderen Spezies der Gattung, *P. talarocerooides* (SENIOR-WHITE, 1921), von der außerdem beide Geschlechter nachbeschrieben werden. Die Gattung *Platyceridion* ist bislang nur von Sri Lanka bekannt.
- Stichwörter** Diptera, Keroplatidae, *Platyceridion*, Taxonomie, Neubeschreibung, Myrmecophagie

Introduction

Adults reared from larvae inhabiting the internodes of *Humboldtia laurifolia* VAHL (Fabaceae) in Sri Lanka were referred to us by Dr Karl V. KROMBEIN of the U. S. National Museum of Natural History, Washington, D. C. These had been found during a study of the occupants of the hollow internodes of this understorey myrmecophyte tree, the results of which are being published elsewhere (KROMBEIN et al., in press). These insects were found to belong to the Orfelliini genus *Platyceridion* TOLLET, one of several genera of this tribe of Keroplatinae with strongly pectinate antennae. This is the second myrmecophagous keroplatid recorded from the Oriental Region, the first being a member of another orfelliine genus *Truplaya* EDWARDS, the larvae of which live in bamboo internodes in West Malaysia (KOVAC & MATILE 1997). A third myrmecophagous species of the same tribe, belonging to the genus *Proceroplatus* EDWARDS, has also recently been recorded from the Neotropical Region; its larvae live in ant-plants like the species described here (AIELLO & JOLIVET 1997, MATILE 1997b).

Platyceridion was previously known from a single species, *P. talarocerooides* (SENIOR-WHITE, 1921), also recorded only from Sri Lanka. *P. talarocerooides* was described in *Platyura* MEIGEN, but SENIOR-WHITE (1924) subsequently referred it to *Platyroptilon* WESTWOOD, which then included two South American species, "on the authority of Mr. F. W. EDWARDS"; this was evidently based on the shared character of pectinate antennae. However, when EDWARDS (1934) described a further species of *Platyroptilon* from South

America, he remarked that the Sri Lankan species certainly did not belong there, citing several important differences including moderately long three (actually four) segmented palpi, hairy laterotergites and all tibiae with a single spur. Thus TOLLET (1955), at the same time as describing a new species of *Platyroptilon* from Africa, proposed the genus *Platyцерidion* for *P. talaroceroides* on the basis of the characters stated by EDWARDS.

The genera including species with pectinate antennae were discussed by MATILE (1981). Most such genera belong to the tribe Keroplatini, as characterised by MATILE (1990), which have reduced mouthparts and palpi, the latter with only two segments, the apical segment thickened and often erect. *Platyцерidion* belongs to the tribe Orfelliini, which has normally developed mouthparts and palpi, with four segments of which the apical is usually slender. The only other relevant genera of this tribe are *Tamborinea* MATILE (1981), based on a single Australian species and *Proceroplatus* EDWARDS of which all species have simple, but flattened, antennae except for the Neotropical myrmecophilous species referred to above. MATILE (1981) suggested that *Platyцерidion* was more allied to *Proceroplatus*, but a later phylogenetic analysis of the tribe (restricted to genera with known larvae) has shown that the genus was more closely allied to *Neoditomyia* LANE & STURM (a genus with flattened, but not pectinate antennae) than to *Proceroplatus* (MATILE 1997a). The three genera share the reduction of the outer tibial spurs 2-3, while *Platyцерidion* and *Neoditomyia* share the loss of the median ocellus. *Tamborinea* differs from all three by the longer mouthparts, the thorax strongly flattened dorsoventrally, the costa not produced beyond the tip of R_1 , and the laterotergite without bristles.

Description and comparison of species

Platyцерidion was described only from the male of *P. talaroceroides*, but subsequently collected material of both sexes is present in the collection of the Natural History Museum, London; a further male was collected by one of us (PC) during a visit to Sri Lanka in 1974. EDWARDS (1934) referred to the sexual differences in antennal structure and both sexes are described and illustrated here. The new species, of which only the female could be examined, was found to share the characters common to both sexes of *P. talaroceroides* enumerated above.

Platyцерidion edax spec. nov. strikingly differs from *P. talaroceroides* in coloration. Both species are mainly yellow with abdominal segment 7 and the genitalia dark brown, but *talaroceroides* also has basal dark bands on segments 2-6 in both sexes. *P. edax* is also larger with a more robust ovipositor, differing most obviously in the form of tergite 9 which is broadly truncated apically while in *talaroceroides* it is deeply bilobed. The costa in *P. edax* is less produced beyond R_1 , the dark apical marking on the wing is more restricted and the antennal structure differs.

As mentioned by EDWARDS, there is a sexual difference in antennal structure in *P. talaroceroides* and this is also likely to occur in *P. edax*. The male of *talaroceroides* has 13 flagellomeres of which the first 12 bear pectinations, while the female has only 11 flagellomeres, the first 8 with pectinations (the 9th a little produced). In *edax* the female has 12 flagellomeres, the first 9 with pectinations.

Platyцерidion talaroceroides (SENIOR-WHITE, 1921)

(Figs 1, 2, 4-5, 6, 8-9)

Platyura talaroceroides SENIOR-WHITE, 1921: 381.

Platyroptilon talaroceroides: SENIOR-WHITE, 1924: 375.

Platyцерidion talaroceroides: TOLLET, 1955: 22.

Male

Recognition: Mainly brownish yellow except dark brown anterior bands on abdominal segments 2-6, segment 7 onwards including genitalia entirely dark brown. Wing length 2.8-3.1 mm.

Head brownish yellow, face and palpi paler and a dark brown patch around and between the two ocelli. Palpi four segmented, with basal segment slender, two intermediate segments relatively short and thick; the apical segment is slender and elongate; the second segment bears a rounded sensory pit. Antennae (Fig. 1) 15 segmented, the two basal segments short; first 12 flagellomeres with long parallel pectinations, the tips of which form a curved line with the tip of the apical 13th flagellomere which is as long as the pectination on the preceding segment; first 8 flagellomeres very short, succeeding segments progressively lengthened; the pectinations covered with short close-set setae and each with a longer terminal seta.

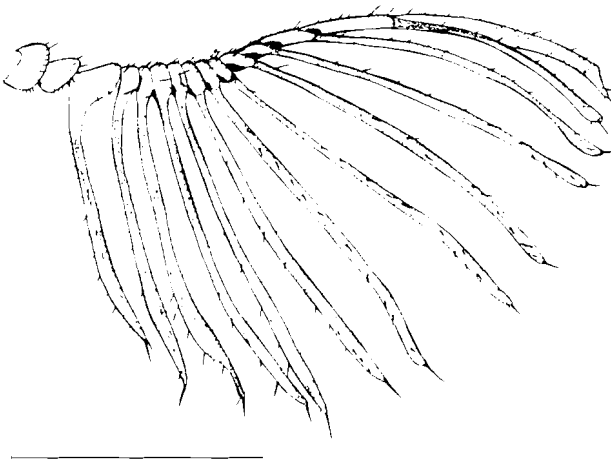


Fig. 1: Male antenna of *Platyceridion talaroceroides* (SINIOR-WHITE, 1921). Scale = 0.5 mm.

Thorax brownish to reddish yellow, sometimes darker on narrow mid line and vague dorso-lateral patches may be apparent. Scutum has evenly distributed short dark setae on the disc and longer dark setae near the sides, especially above the wing bases and between these and the scutellum. Scutellum with short dark setae on disc and an irregular row of long widely spaced setae on the apical margin, these distinctly longer than length of scutellum. Pleura light brownish yellow, bare except for long dark bristling on laterotergite. Mediotergite bare. **Legs** yellow with short dark setae, irregularly distributed on femora but on tibiae and tarsi in regular close set rows; on tibiae 2-3 a few longer setae (half tibial width in length) are irregularly distributed between these rows. Fore first tarsomere shorter than its tibia. Tibial spurs 1:1:1, that on tibia 1 shorter than apical tibial width, but those on 2-3 long and slender. **Wings** yellowish, with brown shade filling cell r_1 and most of apical part of cell r_3 . Vein Sc ends in costa just before base of Rs. Vein R_4 ends in costa more than its length beyond end of R_1 . Costa extends nearly half way from tip of R_3 to that of M_1 . M_2 and sometimes M_4 distinctly abbreviated from wing margin. Vein A_1 almost reaching margin. Halteres yellowish brown.

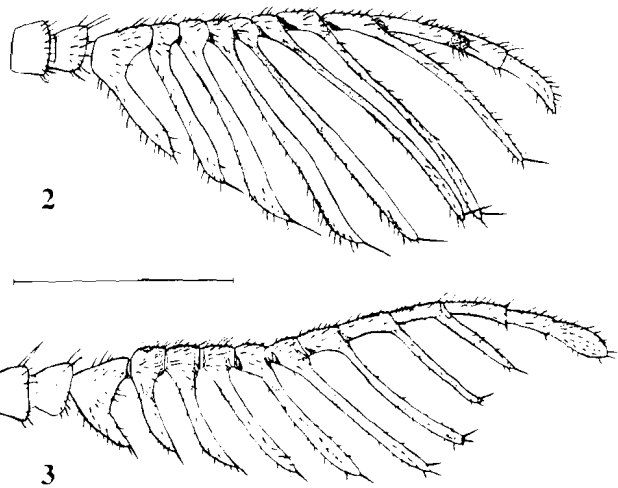
Abdomen broad, more or less dorsoventrally depressed. Tergite 2 with light brown basal band narrowed laterally; tergites 3-6 each with darker brown bands occupying basal two fifths, a little narrowed laterally; corresponding bands on sternites are narrower and

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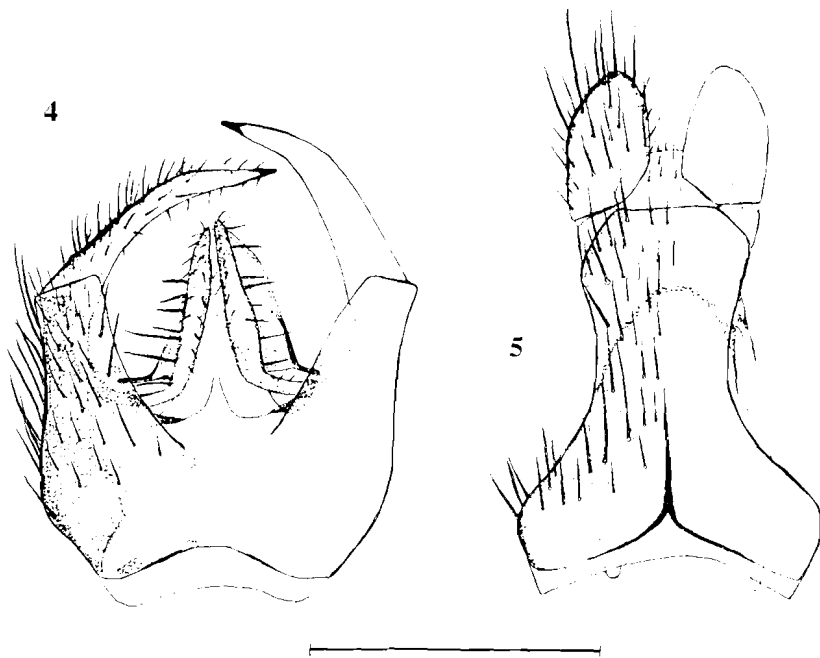
often divided medially. Segment 7 onwards including genitalia (Figs 4-5) dark brown: tergite 9 broad basally with elongate rounded median process, cerci short and rounded apically; lateral lobe of gonostylus slender, apically tapered and incurved to cross apically below tergite 9 and cerci.

Female

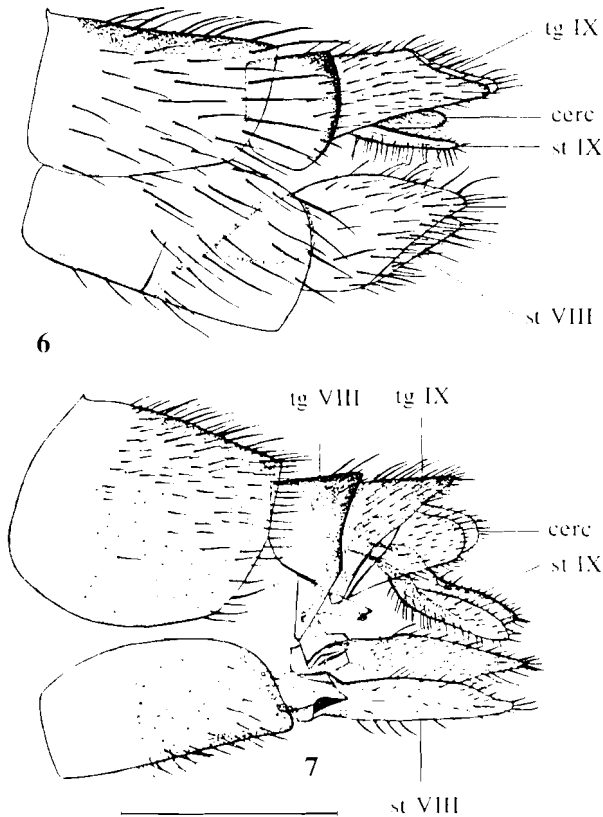
Very similar to male except in respect of antennal and genital characters. Antennae (Fig. 2) with 11 flagellomeres, only the first 8 with



Figs 2-3: Female antennae of *Platyceridion* species. - 2: *P. talaroceroides* (SESTOR-WILHE, 1921); - 3: *P. edax* spec. nov. Scale = 0.5 mm.



Figs 4-5: Male genitalia of *Platyceridion talaroceroides* (SESTOR-WILHE, 1921). - 4: dorsal view of gonocoxiti, gonostyli and aedeagus; - 5: dorsal view of tergite 9 and cerci. Scale = 0.5 mm.



pectinations, which are relatively shorter than in the male, flagellomere 9 with a short apical process, 10-11 without; flagellomeres 9-11 about equal in length and together as long as pectination on flagellomere 8. Abdominal coloration as male, with segment 7 onwards including short ovipositor (Figs 6, 8-9) dark brown. Tergite 9 broad basally, deeply bilobed apically and distinctly longer than cerci.

Figs 6-7: Lateral view of female abdominal segments 7-8 and ovipositor of *Platyceridion* species. - **6:** *P. talaroceroides* (Senior-White, 1921); - **7:** *P. edax* spec. nov. Abbreviations: cerc = cercus; st = sternite; tg = tergite. Scale = 0.5 mm.

Material: Holotype: ♂ (in poor condition, lacking antennae and most legs); **Sri Lanka:** Suduganga, 30.iii.1918, on window, R. Senior-White (Natural History Museum, London).

Other material: Sri Lanka: Suduganga, 7.vii.1922 1 ♀; 20.iv.1923 1 ♀; 3.x.1921 ♀; 22.ix.1921 2 ♀ ♀; 6.vi.1922 1 ♀; 30.x.1922 1 ♀; 18.xi.1924, on window, 1 ♀ (all R. Senior-White; Natural History Museum, London); Peradeniya, 17.ii.1913 1 ♀ (A. R. Currie; Natural History Museum, London); Peradeniya, shaded ravine, 22.ii.1974 1 ♀ (P. J. Chander; Muséum national d'Histoire naturelle, Paris); Matale, in laboratory, 25.iii.1925 1 ♀ (no collector name, poor condition; Muséum national d'Histoire naturelle, Paris).

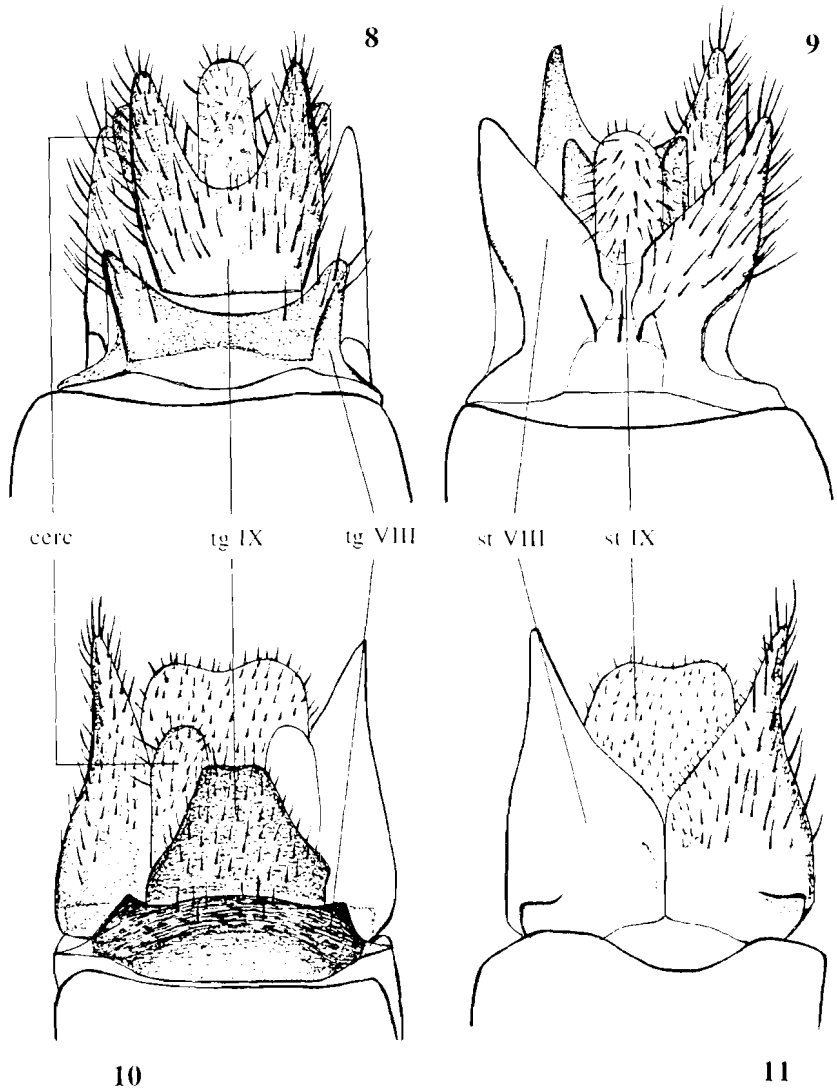
Platyceridion edax spec. nov.

(Figs 3, 7, 10-11, 12-17, 18-25, 26)

Female

Recognition: Mainly yellow, generally paler in coloration than *talaroceroides* and without any dark markings on abdominal segments 1-6; segment 7 and ovipositor very dark brown by contrast and more prominent than in *talaroceroides*. Wing length 4.5 mm.

Head yellow with dark brown patch around ocelli. Palpi with intermediate segments thickened and apical segment slender as in *talaroceroides*. Antennae (Fig. 3) pale basally, progressively darkened apically and pectinations are brownish; flagellum 12 segmented, the basal 9 flagellomeres with pectinations, which are relatively shorter than those in *talaroceroides*.



Figs 8-11: Ovipositors of female *Platyцерidium* species. - 8-9: *P. talaroceroides* (SEIXOR-WHITE, 1921); - 8: dorsal; - 9: ventral; - 10-11: *P. edax* spec. nov.; - 10: dorsal; - 11: ventral. Abbreviations: cerc = cercus; st = sternite; tg = tergite. Scale = 0.5 mm.

Thorax brownish yellow, with distribution of setae as in *talaroceroides*. Scutum with dense long dark bristling above wing bases and more thinly scattered dark setae between this area and scutellum. Scutellum with scattered short setae on disc and irregular row of longer setae on apical margin, the median of these longest and about length of scutellum (so relatively shorter than in *talaroceroides*). Laterotergite with long dark setae, mediotergite bare. **Legs** yellow, with distribution of dark setae as in *talaroceroides*; the longer setae between rows on tibiae relatively shorter, up to a third tibial width in length

(most apparent on tibia 3). Fore first tarsomere about as long as its tibia. Tibial spurs 1:1:1, relatively longer than in *talaroceroides*; that on tibia 1 as long as apical width of tibia, those on 2-3 somewhat less than half length of first tarsomere. **Wings** yellowish with brown patch in cell r_1 and apical part of cell r_3 less extensive than in *talaroceroides*. Venation similar. Vein R_1 more than twice its length beyond tip of R_2 . Costa only extended a quarter distance from tip of R_2 to that of M_1 . Vein M_2 distinctly abbreviated from wing margin, M_1 reaching margin, A_1 a little abbreviated.

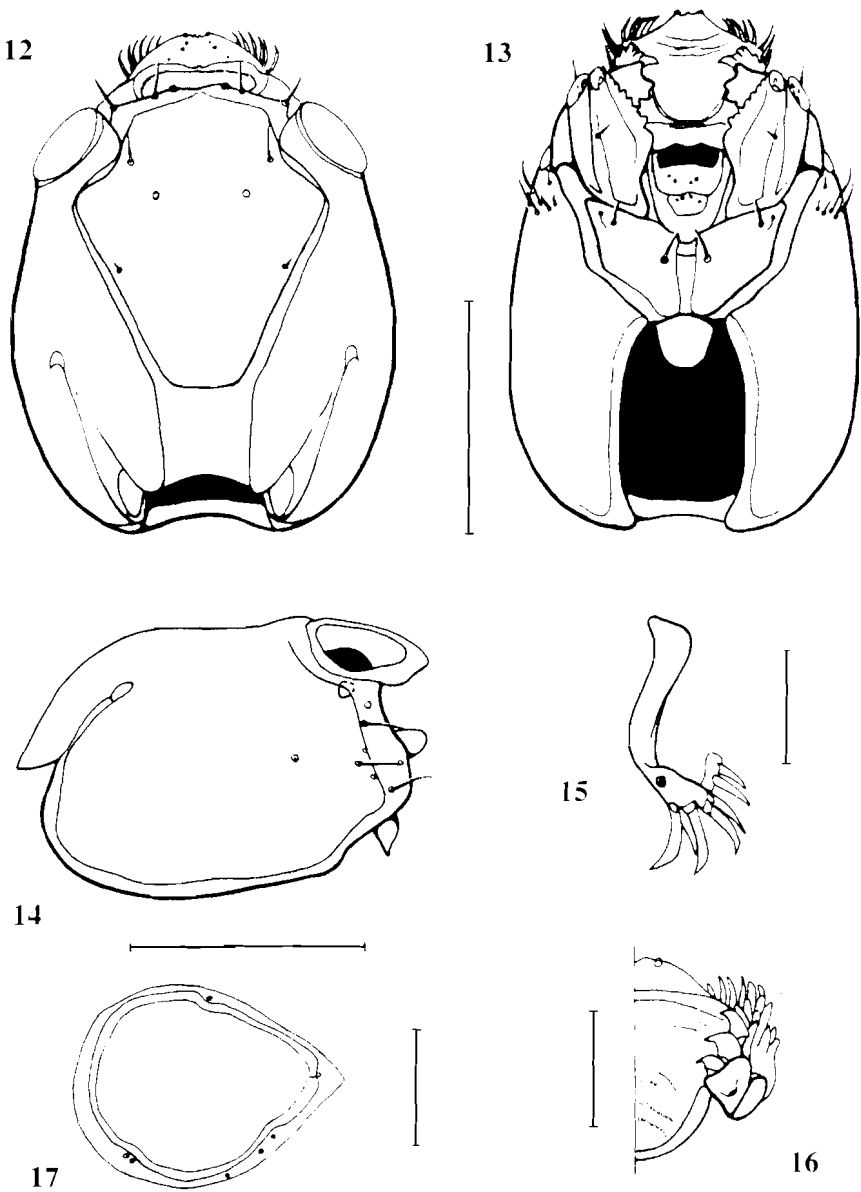
Abdomen more or less cylindrical, pale yellow with apical part from segment 7 onwards strongly contrasted dark brown; bearing short dark setae, longer on apical margins of tergites. Tergite 9 broad basally, gradually narrowed but broadly truncate apically and not bilobed; cerci as long as tergite 9 and protruding a little beyond it (Figs 7, 10-11).

Male

Unknown.

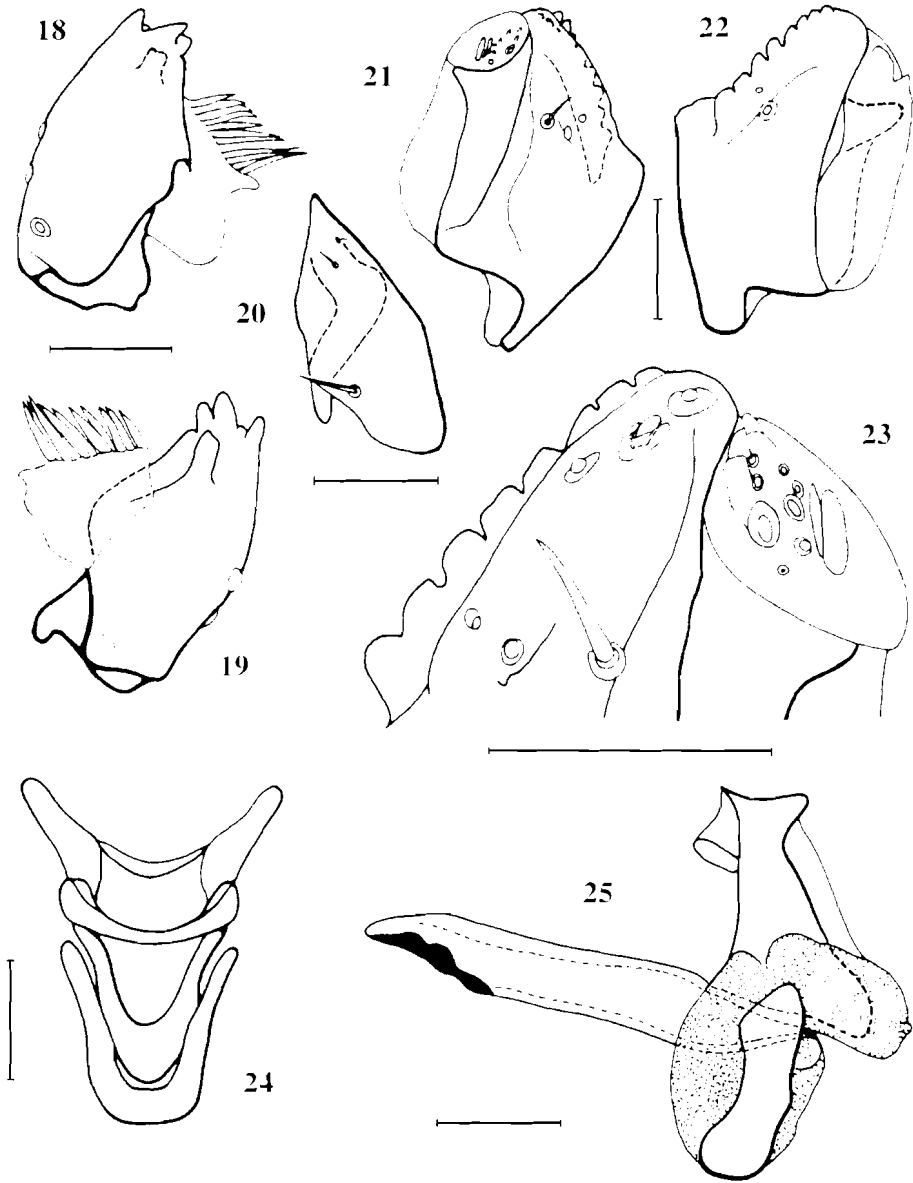
Larva (apparently mature): length 15-17 mm, cylindrical, vermiform, propneustic.

Head more than twice as long as wide (13:6), ovoid, antennae in antero-lateral position (Figs 12-14). Occipital foramen dihedral at 90° . Clypeofrontal apotome pentagonal, clypeolabral suture entire. Clypeofrontal suture very weak, the clypeal area narrow, widely interrupted on median line, bearing a pair of round sensillae close to the median line and two pairs, inner and outer, of fine setae. Frontal area bearing two pairs of setae close to the margin: one at level of antennal angle and one somewhat posterior to the middle of sclerite; one pair of round sensillae closer to the median line, at level of anterior third. Coronal suture not sclerotised. Genae convex, not closely approximated ventrally at level of maxillary cardo. Posterior incisions small and not very deep. Postoccipital carinae strongly marked, but narrow. Genae with four sensillae and three long fine setae on or close to the strengthening of oral margin and one close to middle at anterior quarter (Fig. 14). Antennae small, oval, three very slight emarginations for minute sensillae (Fig. 17), dorsal and ventral phragma well developed, the former more than the latter (Fig. 14). Antennal base distinct from gena only anteriorly. Stemmata very small, partly covered by strengthening of oral margin. Tentorial posterior bridge present, narrow, anterior tentorial arms present, thread-like (Fig. 13). Labrum (Figs 15-16) with labral sclerite narrow, weakened and narrower on dorsal median line, without lateral setae. Two pairs of dorsal sensillae close to the median line, one pair of outer sensillae; L7 small, sub-apical. Tormae short and well sclerotised, one preapical round sessile sensilla. Four simple premandibular sclerotised dorsal teeth, followed by two very weakly sclerotised teeth, difficult to distinguish from the lateral digitations of labrum. No lateral labral lobes. Mandibles (Figs 18-19) forming a three-sided pyramid. Ventral face smoothly indented, bearing a deep basal pore. Outer face with two rounded sensillae. Dorsal face with a strong preapical tooth. Prostheca large, bearing 10 transparent, simple setae. Incisor lobe with three strong apical teeth and a smaller inner tooth. Maxillae (Figs 20-23) with cardo oblique, a little wider than long, bearing one inner long seta and two much smaller setae in the outer anterior angle (Fig. 20); a strong inner apophysis articulated with the prelabral sclerite. Maxillar suture dividing the stipes weakly marked. Sensorial area of the palpifer bearing 10 sensillae, two large and club-like, one large and ring-like, the others smaller and circular; apex with four indistinct obtuse digitations (Fig. 23). Galeolacinia with eight teeth. A long median seta and two median circular pits, three apical sensillae, the middle one with a club-like centre, the two lateral rounded (Fig. 23). Maxil-



Figs 12-17: *Platyceridion edax* spec. nov., larva. - 12: head, dorsal; - 13: head, ventral; - 14: head, lateral; - 15: torus, lateral; - 16: labrum, left half, frontal; - 17: antenna, lateral. Scales: 12-14 = 0.2 mm; 15-17 = 0.05 mm.

lary apophysis very short. Labium-hypopharynx (Figs 24-25) has hypopharyngean lobe bearing two short rows of denticulations. Hypopharyngeal sclerite thick, posterior bridge U-shaped, well sclerotised, wider ventrally. Hypopharyngeal sclerite (cadre) thin and well sclerotised. Prelabial sclerite U-shaped, the basis not distinctly separated from the



Figs 18-25: *Platyceridion edax* spec. nov., larva. - 18: mandible, ventral; - 19: mandible, dorsal; - 20: maxillary cardo, ventral; - 21: maxillary stipes, ventral; - 22: maxillary stipes, dorsal; - 23: apex of maxillary stipes, ventral; - 24: labium-hypopharynx, lateral; - 25: hypopharyngeal sclerites, frontal. Scales = 0.05 mm.

rest of the sclerite, the branches of the V without expansions. Labial lobe with 8 small circular sensillae distributed in two groups.

Thoracic segments cylindrical, a little higher than long: I: 2.5:2; II: 3.2:2.5; III: 3.7:2.5. A ventral simple fold in the first third of I and in the last third of II-III. Prothoracic

spiracles present, very small but open and followed by a short trachea (Fig. 26). Ventrally, each thoracic segment bears an anterior zone of very minute spinules. On ThI, a pair of microsetae stands basad to this zone, one each side of the median line and on the same level, but close to the outer margin of the spinule zone, stands on each side a minute circular sensory pit. There is a similar pit in the same position on ThII-III, but no setae have been observed.

Abdominal segments with minute transverse folds, only visible after treatment by potassium hydroxide. Two anal lobes. No particular sensorial areas have been observed in optical microscopy.

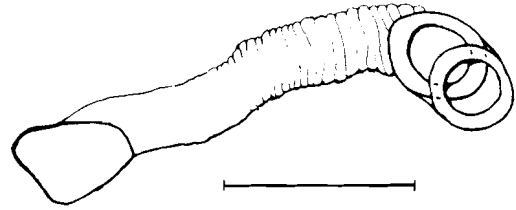


Fig. 26: *Platyцерidion edax* spec. nov. Prothoracic spiracle of larva. Scale = 0.05 mm.

Etymology: from *edax*, Latin for gluttonous or greedy, referring to the voracious feeding behaviour of the larvae.

Material: Holotype: ♂, Sri Lanka, Rat. Dist., Induruwa Jungle, Gilimule, 06° 40' N, 80° 26' E, 18-20.VI.1999, ex internode of *Humboldtia laurifolia*, collectors K. V. KROMBEIN, P. B. KARIYARAJA, A. W. NORDEN and B. NORDEN (to be deposited in U.S. National Museum of Natural History, Washington, U.S.A.). Larvae: same data, 27 specimens.

Larval biology and behaviour

Nothing is known of the early stages and biology of *P. talaroceroides*. The early stages of *P. edax* were obtained from internodes of *Humboldtia laurifolia*, which were inhabited by various Hymenoptera. As indicated above, a full account of the study involved is being published elsewhere (KROMBEIN et al., in press).

It was found that the predatory larvae of *P. edax* will feed on any insects present in the situation, including the brood of any solitary bees or wasps that may be nesting here. However, they are primarily myrmecophilous. These internodes were inhabited by colonies of several species of ants and as many as 50 ant heads and other sclerotised parts resulting from this feeding activity were found in an internode inhabited by a single larva of *P. edax*.

The internodes range in length from 3.2 to 6.3 cm and the internal cavity occupies most of their length. The woody outer wall is 0.3 to 0.7 mm thick and the entrances to the internodes are circular to elliptical in shape with width to length measurements ranging from 1.1 x 1.1 to 1.1 x 1.8 mm. The female of *P. edax* might oviposit on the inner wall of the internode close to the entrance, but could also "shoot" its eggs through the holes. The Malayan myrmecophilous *Truplaya* has been observed to do (KOVAC & MATILE 1999). *Keroplatus* females also project their eggs, sometimes from far away, onto the hymenium of bracket fungi. Nothing in the structure of the ovipositor enables a choice to be made between these alternatives: the ovipositor of *Platyцерidion* species shows no particular structure adapted to this behaviour.

Discussion

The reader is referred to MATILE (1997a) and KOVAC & MATILE (1997) for a discussion of the predatory habits of the larvae of Keroplatidae. It is to be noted that in recent years three myrmecophagous species belonging to the tribe Orfeliini have been reported. From an optimisation of the attributes of the family on the cladogram of this tribe, MATILE (1997a) has deduced that cryptobiosis (epibiont larvae living in obscure and water saturated cavities) and predation were the plesiomorphic state of the family. Very few larvae of Orfeliini are known: this is obviously linked with this cryptobiontic habit.

Acknowledgements

We are indebted to Karl KROMBEIN for bringing this interesting species to our notice and for the opportunity to publish its description. The authorities of the Natural History Museum, London, are to be thanked for the loan of material of *P. talarocemides*.

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