

# Micro-caddisflies (Trichoptera: Hydroptilidae) from Bali, Indonesia

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Eight new species of Hydroptilidae in four genera are described from Bali including two species in *Microptila* Ris, one in *Plethus* Hagen, two in *Stactobia* McLachlan, and three in *Chrysotrichia* Schmid. New records are given for *Plethus baliana* (Ulmer), one of the four previously established Balinese micro-caddisfly species.

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## Introduction

Among the caddisflies (Trichoptera) previously described from Bali (Ulmer 1951, 1957) are four species in the family Hydroptilidae. One of these, *Orthotrichia litoralis* (Ulmer, 1951) is known only from Bali, the others occur on other Indonesian islands: *Plethus cruciatus* Ulmer, 1951, is also recorded from Sumatra and *Orthotrichia ranauana* (Ulmer, 1951) and *Plethus baliana* (Ulmer, 1951) both occur on Java and Sumatra. New records are given for *P. baliana*, and one new species in *Plethus* Hagen, 1887, two in *Stactobia* McLachlan, 1880, three in *Chrysotrichia* Schmid, 1958, and two in *Microptila* Ris, 1887, are described, with the latter three genera being recorded from Bali for the first time. Given the wider distributions of three of Ulmer's species, it is probable that the new species also occur beyond Bali. The family is still very poorly known from many parts of Indonesia.

Lotic systems of Bali are under considerable pressure from domestic and agricultural use; undoubtedly their invertebrate faunas have suffered in the past and will continue to do so. Whether or not our present knowledge of the Balinese micro-caddisfly fauna gives a true indication of its original nature, it contributes to an overview of the SE Asian hydroptilid fauna. The generic composition is predictably similar to other parts of SE Asia. Genera represented include *Orthotrichia* which is almost cosmopolitan and is widespread through SE Asia and Australia; *Chrysotrichia* which occurs in southern and SE Asia, China, New Guinea and NE Australia; and *Plethus* which is known from southern Asia, Malaysia, Vietnam and Sulawesi, but no further eastward. Bali is also the eastern-most occurrence for the two basically Palaearctic genera, *Stactobia* and *Microptila*.

Several large gaps in our knowledge of the microcaddisfly fauna of the Malay Archipelago hinder useful presentation of distribution maps or studies of phylogenetic and biogeographical relationships at this stage. Perceptible patterns are emerging and signal exciting studies in the future.

### Methods and depositories

Specimens were all collected using a sweep net, and were prepared for study by the methods of Wells (1990a). Both males and females were collected but, as associations are uncertain, only males are described.

Depositories of the material mentioned in the text are abbreviated as follows:

RMNH - National Museum of Natural History, Leiden.

NTM - Northern Territory Museum of Arts and Sciences, Darwin.

ZMH - Zoological Museum, University of Hamburg, Germany.

### Systematics

#### *Microptila pasak* spec. nov.

(figs 1-2)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg.

Male.— Antennae 19-segmented. Tibial spurs 0, 3, 4. Anterior wing length 2.0 mm. Genitalia, see figs 1, 2. Abdominal segment IX short dorsally, with a pair of setae, digitiform lobes laterally. Dorsal plate apparently reduced to two small apically acute processes separated by a broad concavity. Aedeagus broad-based, distally slender and straight. Subgenital plate broad, membranous, with rounded apicolateral lobes separated by a broad concavity. Inferior appendages, broad, each with a sclerotised apico-mesial peg-like process.

Remarks.— The known species of *Microptila* (Ris 1897; Mosely 1948; Schmid 1960; Olah 1989) are rather uniform in appearance. The two Balinese species conform closely but are unique in having broad, apically excavated subgenital plates. *M. pasak* is distinguished from *M. taji* spec. nov., by the apical peg on the inferior appendages.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *pasak* - peg, referring to the peg on the inferior appendages.

#### *Microptila taji* spec. nov.

(figs 3-4)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg. Paratypes: 3 ♂♂ (NTM), same data as holotype; 1 ♂ (RMNH), Bali, Bali Barat, Sg. Pancoseming, N of Desa Batuagung, near Negara, 6.xii.1991, A. Wells and C. v. Achterberg.

Male.— Antennae 18-segmented. Tibial spur formula 0, 3, 4. Anterior wing length 1.3-1.6 mm. Genitalia, see figs 3, 4. Abdominal segment IX short mid-dorsally. Dorsal plate short, membranous, apically truncate. Aedeagus broad at base, tapered towards apex. Subgenital plate broad, with a steep-sided apico-mesial concavity, a small transverse sculpturing medially. Inferior appendages irregular in shape, with a stout spur-like process mesially on the inner margin.

Remarks.— Distinguished from *M. pasak* by the mesial sclerotised spur on the inferior appendages.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *taji* - spur, referring to the spurs on the inferior appendages.

### ***Plethus baliana* (Ulmer, 1951)**

*Plethotrichia baliana* Ulmer, 1951: 65. Holotype: (ZMH), ♂, Bali, Tamatanda near Baturiti, 14.vi.1929.  
*Plethus baliana*; Marshall, 1979: 168.

Material.— 5 ♂♂ (NTM, RMNH), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg.

Remarks.— This species is easily recognised by the patches of jet black androconia between abdominal segments V-VI and VII-VIII. Similar scent organs are described by Schmid (1958) for several Sri Lankan species but have not been found in other SE Asian congeners.

Distribution.— Bali (Baturiti, Bali Barat); Java; Sumatra.

### ***Plethus berbulu* spec. nov.** (figs 5-6)

Material.— Holotype: ♂, (NTM), Bali, Bali Barat, Sg. Pancoseming, N of Batuagung, near Negara, 5.xii.1991, A. Wells and C. v. Achterberg.

Male.— Antennae 18-segmented. Tibial spurs 0, 2, 4. Anterior wing length 1.4 mm. Abdomen without specialised scent areas. Genitalia, see figs 5, 6. Abdominal segment IX with a longitudinal mesial band covered in dense tiny hairs; apicolateral margins extending beyond inferior appendages. Dorsal plate rounded, membranous. Aedeagus stout, dilated distally, tapered towards apex. Subgenital process short, spur-like. Inferior appendages longer than wide, almost parallel sided, densely hairy.

Remarks.— *Plethus*, like *Microptila* is a rather conservative genus, with the chief differences between species being the shape of the inferior appendages. *P. berbulu*, however, is readily distinguished from *P. baliana* by absence of areas of androconia on the abdomen.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *berbulu* - hairy, in reference to the hairy abdomen.

### ***Stactobia bersisik* spec. nov.** (figs 7-9)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Pancoseming, N of Batuagung, near Negara, 6.xi.1991, A. Wells and C. v. Achterberg. Paratype: 1 ♂ (NTM) same data as for holotype.

Male.— Wings mottled, tufts of long scales on mid-tarsus, scattered dark scales

on legs and abdomen, most abundant posteriorly. Antennae 17-segmented. Tibial spurs 1, 2, 4. Anterior wing length 1.5-1.6 mm. Genitalia, see figs 7-9. Abdominal segment IX stout, with short apicolateral lobes. A stout, posteriorly directed process apico-mesially on sternite VII. Dorsal plate tapered, membranous. Aedeagus (fig. 8) short, slender proximally, dilated and almost beak-like distally. Subgenital plate divided to form tapered membranous processes. Inferior appendages in form of a pair of sclerotised ridges. Internally a pair of elongate spines arise from hinged apodemes.

Remarks.— Except for the presence of the unusual hinged spines, this species closely resembles *S. keluk* spec. nov. Similar genitalic structures occur in a Bornean species, *S. takuk* Wells and Huisman, 1993, placed in the *nielsenii* species group, to which *C. bersisik* is also referred.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *bersisik* - having scales, in reference to the abundance of scales on the legs and abdomen.

***Stactobia keluk* spec. nov.**  
(figs 10, 14)

Material.— Holotype: ♂ (NTM), Bali, Tributary of Yeh Balian, nr Batungsel on Antosari - Pengastulan Road, 30.xi.1991, A. Wells and C. v. Achterberg.

Male.— Body and legs without specialised scales. Abdominal sternite VII with stout, posteriorly directed mesial process. Antennae damaged. Tibial spurs 1, 2, 4. Anterior wing length 1.7 mm. Genitalia, see figs 10, 14. Dorsal plate membranous, broad-based, tapered distally. Aedeagus stout, irregularly expanded distally, rounded apically. Subgenital plate in form of pair of elongate tapered processes. Inferior appendages reduced, sclerotised, anterior margins curved.

Remarks.— In all respects except the absence of paired spines arising internally, this species resembles *S. bersisik*, and is referred to the *nielsenii*-group.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *keluk* - curved, for the ventral margins of the inferior appendages.

***Chrysotrichia trisula* spec. nov.**  
(figs 11, 16)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg.

Male.— Wings without patches of androconia. Antennae 18-segmented. Tibial spurs 0, 2, 4. Anterior wing length 1.2-1.3 mm. Genitalia, see figs 11, 16. Dorsal plate subquadrate, membranous. Aedeagus elongate, slender proximally, expanded in distal quarter, then divided deeply with three spines on each side of the longer ejaculatory tube. A membranous sheath around the aedeagus may represent the subgenital plate.

Inferior appendages set well into sternite IX, stout, short, converging apicomesially.

Remarks.— The form of the aedeagus and general arrangement of genitalic structures places this species in the *berduri* species group, although the inferior appendages are less reduced than in other members of the group. It is readily distinguished from the two other Balinese species by the short inferior appendages and divided trident-like aedeagus.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *trisula* - trident, referring to the form of the aedeagus.

***Chrysotrichia piring* spec. nov.**  
(figs 12, 15)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg. Paratypes: 1 ♂ (RMNH), same data as holotype; 1 ♂ (NTM), Bali, Bali Barat, Sg. Pancoseming nr Negara, 6.xii.1991, A. Wells and C.v. Achterberg.

Male.— Wings without patches of androconia. Antennae 18-segmented. Tibial spurs 0, 2, 4. Anterior wing length 1.1-1.2 mm. Genitalia, see figs 12, 15. Abdominal segment IX short mid-ventrally, lobes bearing paired setae at apico-lateral angles. Dorsal plate short, membranous. Aedeagus elongate with several close-pressed spines subapically. Subgenital plate pale, shallowly divided distally. Inferior appendages short, curved, sclerotised distally.

Remarks.— Distinguished from other members of the genus by the form of the subgenital appendages, and from other Balinese species by the undivided nature of the aedeagus. The male genitalia of *C. bulat* closely resemble those of a West Malaysian species, *C. pisau* Wells and Huisman, 1993, in the *hatnagola* species group, differing only in proportions of structures.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *piring* a disk, - referring to the rounded appearance of the genitalia in ventral view.

***Chrysotrichia terpisaduri* spec. nov.**  
(figs 13, 17)

Material.— Holotype: ♂ (NTM), Bali, Bali Barat, Sg. Bandangung, N of Medewi, 10.xii.1991, A. Wells and C. v. Achterberg. Paratypes: 7 ♂♂ (NTM, RMNH), same data as holotype.

Male.— Fore wings with patches of black androconia. Antennae 18-segmented. Tibial spurs 0, 2, 4. Anterior wing length 1.2-1.3 mm. Genitalia, see figs 13, 17. Dorsal plate, short, membranous. Aedeagus slender, divided in distal half to form two widely divergent spines each of which separates again to form three smaller spines, ejaculatory duct shorter than spines. Subgenital plate same length as inferior appendages, narrow, apically truncate. Inferior appendages almost parallel at base, divergent distally.

Remarks.— *Chrysotrichia terpisaduri* is remarkable for the form of the aedeagus. It is difficult to imagine how it functions. The males can be recognised readily by the

black androconia on the forewings. *C. terpisaduri* is referred to the *hatnagola* group.

Distribution.— Bali (Bali Barat).

Etymology.— Indonesian - *terpisah*, separated, *duri*, spine, - for the spines on the aedeagus.

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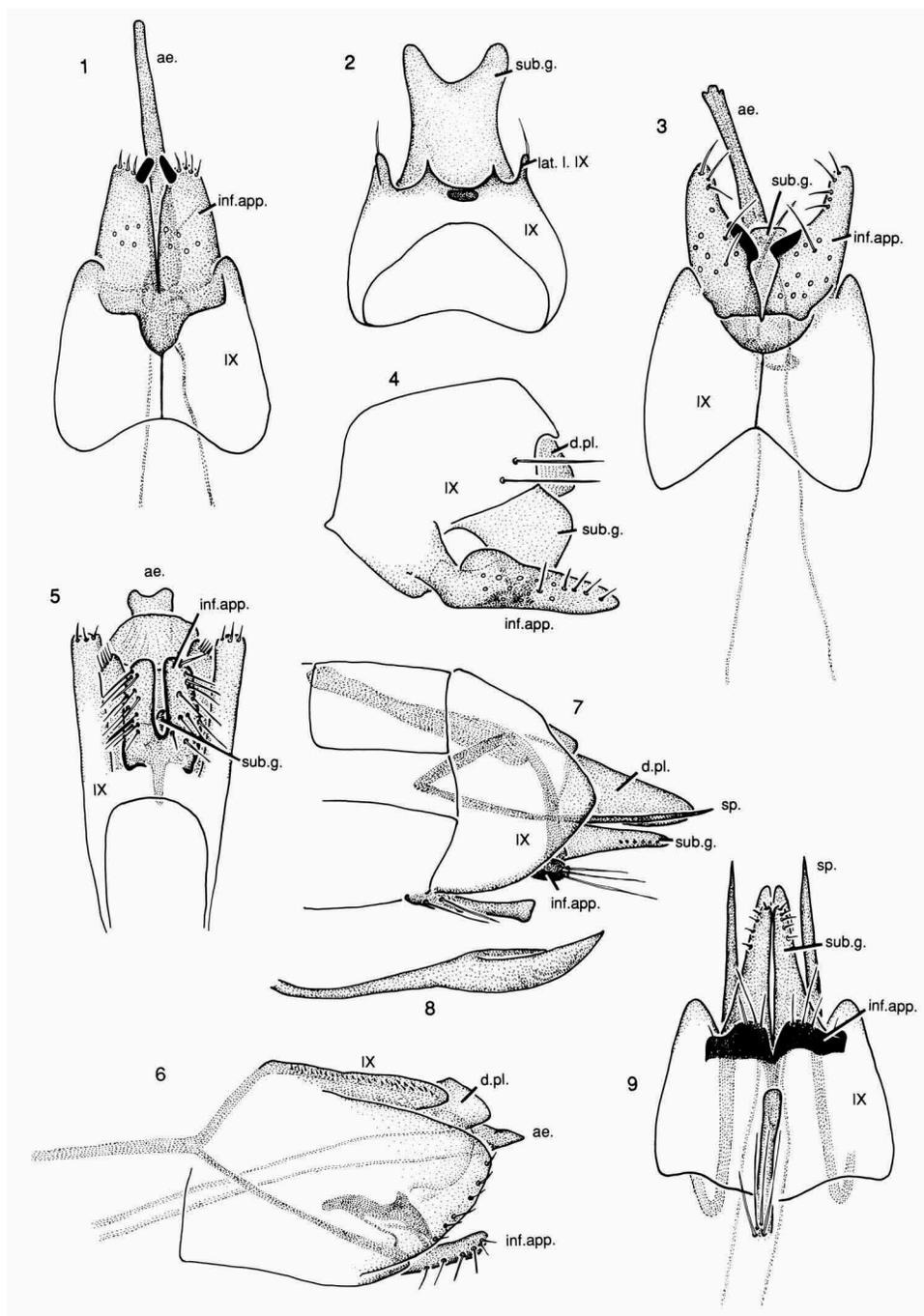
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Figs 1, 2, *Microptila pasak* spec. nov., male genitalia, ventral and dorsal view; figs 3, 4, *Microptila taji* spec. nov., male genitalia, ventral and lateral view; figs 5, 6, *Plethus berbulu* spec. nov., male genitalia, ventral and lateral view; figs 7-9, *Stactobia bersisik* spec. nov., male genitalia ventral view, aedeagus, and male genitalia lateral view. Abbreviations: ae, aedeagus; d. pl., dorsal plate; inf.app., inferior appendages; lat. l. IX, lateral lobe of abdominal segment IX; sp. spine; sub. gen., subgenital plate.

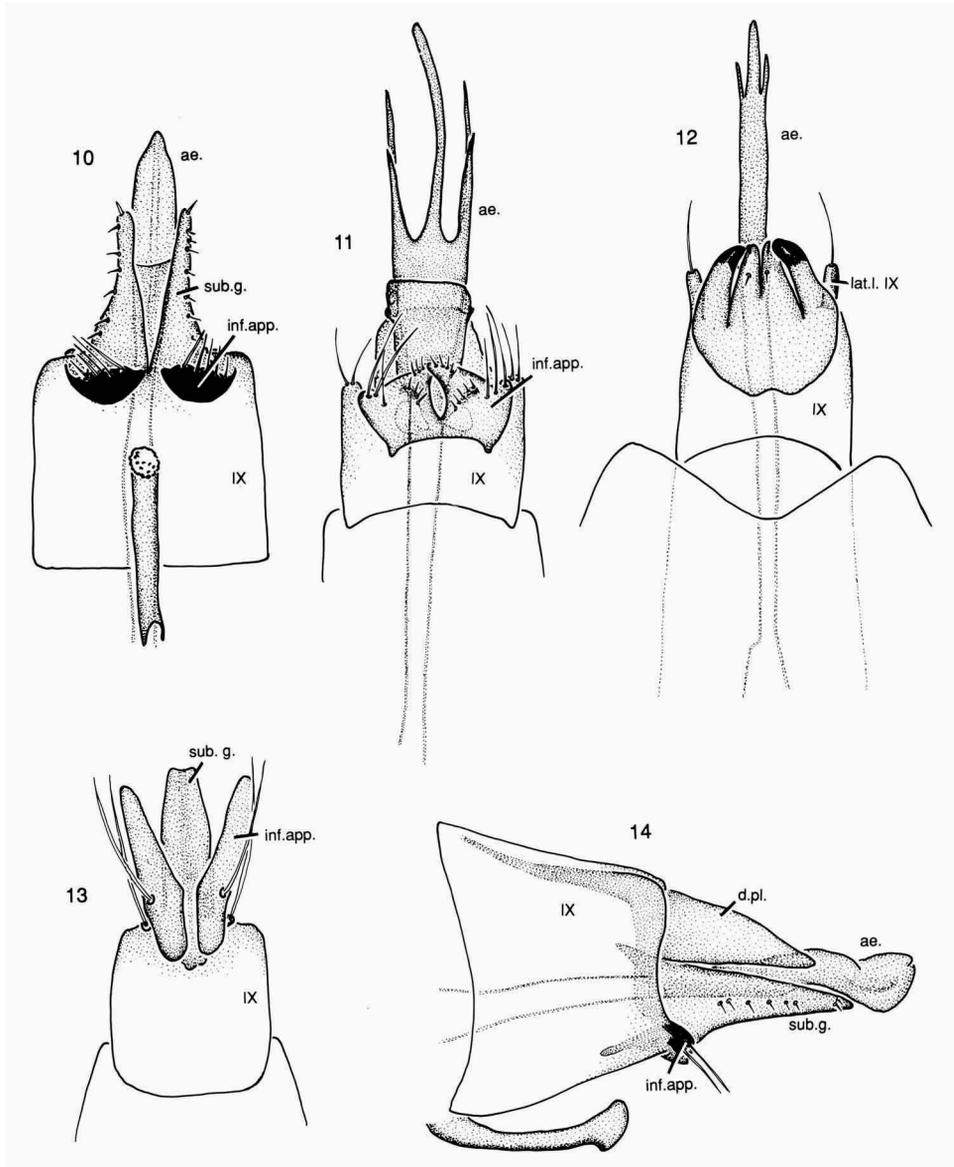


Fig. 10, *Stactobia keluk* spec. nov., male genitalia, ventral view; fig. 11, *Chrysotrichia trisula* spec. nov., male genitalia, ventral view; fig. 12, *Chrysotrichia piring* spec. nov., male genitalia, ventral view; fig. 13, *Chrysotrichia terpisaduri* spec. nov., male genitalia, ventral view; fig. 14, *Stactobia keluk* spec. nov., male genitalia, lateral view. Abbreviations as for figs 1-9.

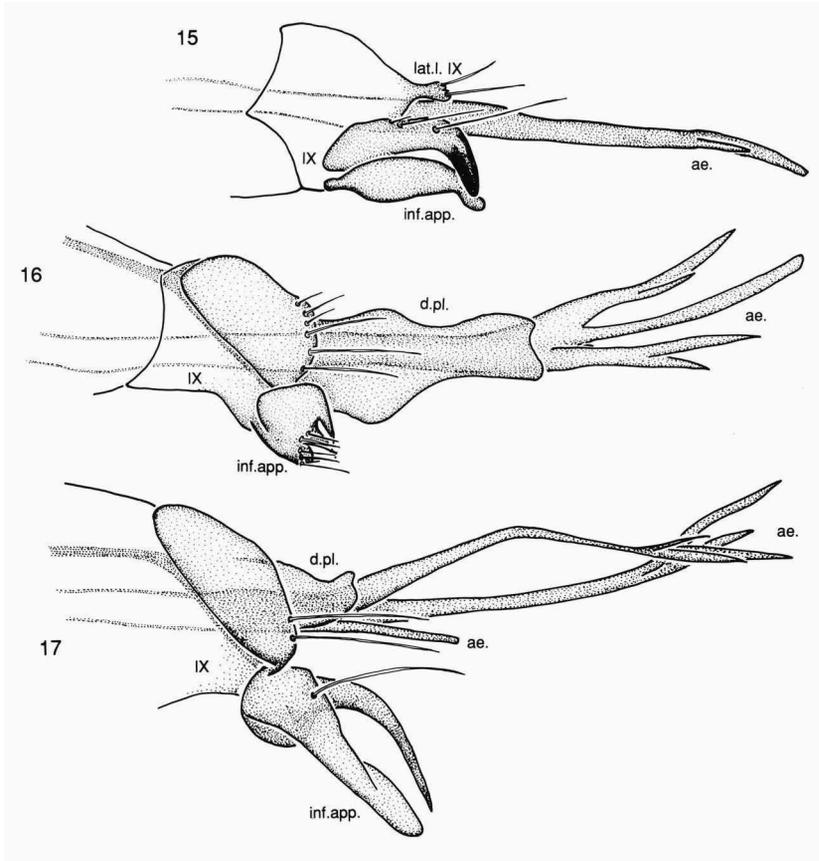


Fig. 15, *Chrysotrichia piring* spec. nov., male genitalia, lateral view; fig. 16, *Chrysotrichia trisula* spec. nov., male genitalia, lateral view; fig. 17, *Chrysotrichia terpisaduri* spec. nov., male genitalia, lateral view. Abbreviations as for figs 1-9.