New hydroptilid caddisfly species from southern Sulawesi (Insecta: Trichoptera: Hydroptilidae)

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Key words: Trichoptera; Hydroptilidae; Sulawesi; new species; *Chrysotrichia*; *Niuginitrichia*; *Hydroptila*; *Orthotrichia*; new records; *Hydroptila*; *Hellyethira*; *Oxyethira*; *Orthotrichia*; taxonomy.
Six new species of micro-caddisfly (Trichoptera: Hydroptilidae) are described from southern Sulawesi in the genera *Chrysotrichia* (1 species), *Niuginitrichia* (1, being the first record of *Niuginitrichia* outside New Guinea), *Hydroptila* (1) and *Orthotrichia* (3). The faunal list for Sulawesi is increased further by addition of a second widespread SE Asian species of *Oxyethira* and three other species of *Orthotrichia*; and distributions of several species previously recorded from the island are extended. Thirty-one hydroptilid species in eight genera are now recorded for Sulawesi; a ninth genus is listed, but solely on the basis of larvae.
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Introduction

A general pattern of low genus-level endemism accompanied by high species richness for some genera is emerging from studies on the caddisfly family Hydroptilidae (Trichoptera) of the Malay/Indonesian archipelago and the Philippines to New Guinea and Australia. The Sulawesi fauna is considered to be depauperate compared with other parts of the Oriental Region, but to have a large number of endemic species (Moss & Wilson, 1998). Data on Hydroptilidae support this contention. The range extension to Sulawesi here reported for *Niuginitrichia* Wells, previously considered to be a New Guinea endemic (Wells, 1990b), corroborates the perception for genera, at the same time, raising to nine the number of genera reported for Sulawesi. The perception of high species endemism is supported with description here of six new endemic species, bringing the total to 24, or 77% of the 31 species now listed (see Checklist) for Sulawesi. Among the 31 species, are four described from elsewhere in SE Asia, and recorded here for Sulawesi for the first time. In addition, ranges of four Sulawesi endemic species are extended.

This study involves a small part of the collection of micro-caddisflies in the Natural History Museum, Leiden (RMNH), collected at lights in southern Sulawesi (Sulawesi Tenggara). Primary types are mounted on slides, following the methods of Wells (1990a).

Systematics

Chrysotrichia watuwila spec. nov.
(figs 1, 2)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, Sungai Mokowu, 19.x.1989, R. de Jong & J. Huisman.

Diagnosis.— This species most closely resembles *C. trisula* Wells, 1993, from Bali and *C. trifida* Mey, 1998, from the Philippines, having a similar trident-shaped aedeagus. It differs from both species in the form of the inferior appendages, which are fused with a pair of broadly rounded lateral lobes, between which a median rounded lobe is produced posteriorly.

Description.— Antennae 18-segmented. Tibial spurs 0,2,4. Anterior wing length, 1.3 mm. Genitalia as in figs 1, 2. Abdominal segment IX with setate apico-lateral angles. Dorsal plate (tergite X) bilobed, membranous. Aedeagus stoutest medially, at point where it branches to form what looks superficially like a trident-shaped structure, but the apices of each lateral 'prong' are further divided. Inferior appendages fused, broadly lobed apico-laterally, with a short median lobe projecting posteriorly.

Distribution.— Type locality only, southern Sulawesi.

Etymology.— Named for the mountain on which it was taken, Gunung Watuwila.

Remarks.— Several more or less distinct groups can be recognised in *Chrysotrichia*, but no clear pattern emerges. For the present this species can be grouped with *C. trifida*, which Mey (1998) grouped with another Philippines species, *C. tabonensis* Mey, 1998, and the Sulawesi species *C. tigacabanga* Wells, 1990.

Niuginitrichia sulawesica spec. nov.
(figs 3–5)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, Sungai Mokowu, 19.x.1989, R. de Jong & J. Huisman.

Diagnosis.— Closely resembling *Niuginitrichia kurukut* Wells, 1990, from lowland Papua New Guinea, near Port Moresby, but differing from that species in having the apex on tergite IX only very slightly produced, rather than produced in a triangular lobe, and in having the aedeagus far longer.

Description.— ♂. Length of anterior wing, 1.7 mm. Antennae damaged. Genitalia as in figs 3–5. Tergite IX dorsally with apex scarcely produced. Dorsal plate (tergite X) rounded, membranous. Aedeagus elongate, about 4.5x length of sternite IX. Subgenital plate sclerotised, hook-like in lateral view. Inferior appendages more or less triangular in ventral view, broad-based, convergent distally with apices rounded.

Distribution.— Type locality only, southern Sulawesi.

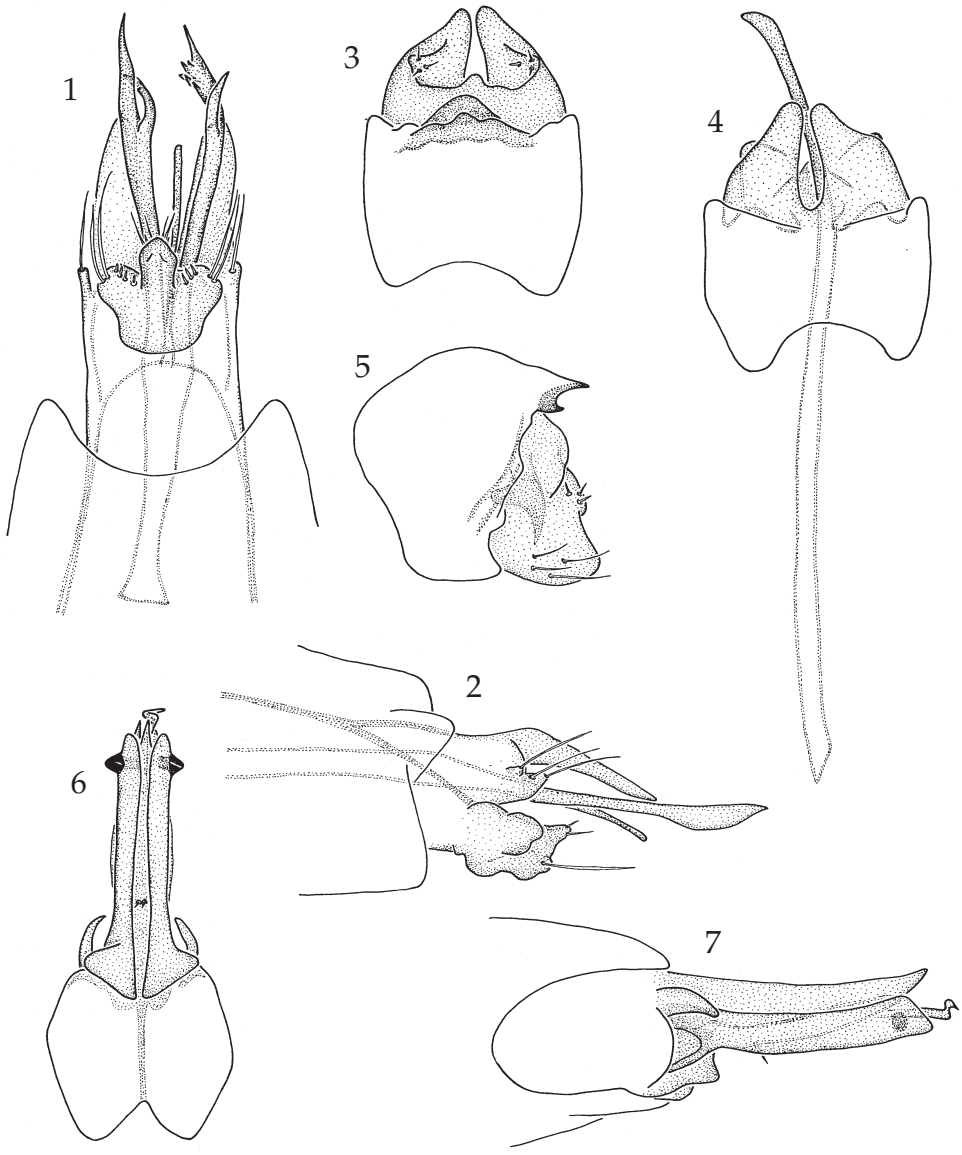
Etymology.— Named for the island of Sulawesi.

Remarks.— Although this is the only specimen collected in this genus outside New Guinea, the genus may well occur on islands in the Moluccas. We are unaware of any micro-caddisfly collections from that area.

Hydroptila mokowu spec. nov.
(figs 6, 7)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, Sungai Mokowu, 12.x.1989, J. Huisman.

Diagnosis.— A *H. losida*-group species, most closely resembling another Sulawesi species, *Hydroptila tanduka* Wells, 1990 in the general appearance of the ♂ genitalia,



Figs 1-7, ♂, genitalia; 1, 4, 6, ventral aspect; 2, 5, 7, lateral aspect; 3, dorsal aspect. Figs 1-2, *Chrysotrichia watuwila* spec. nov.; figs 3–5, *Niuginitrichia sulawesica* spec. nov.; figs 6-7, *Hydroptila mokowu* spec. nov.

but distinguished easily by the much larger and laterally placed dark sub-apical spurs on the inferior appendages.

Description.— ♂♂ with scent glands beneath post-occipital caps on head, in form of small tufts of androconia. Antennae 22-segmented. Anterior wing length 1.5 mm. Genitalia as in figs 6, 7. Abdominal segment IX with lateral lobes narrow, membra-

nous and apically acute. Dorsal plate (tergite X) bifid, lobes narrow, apically acute, as long as inferior appendages and slightly longer than subgenital plate. Subgenital plate membranous, elongate triangular. Aedeagus slender, hooked apically. Inferior appendages almost uniform cylindrical in all views, in ventral view, apically tapered, a pair of prominent black sub-apical spurs laterally.

Distribution.— Type locality only, southern Sulawesi.

Etymology.— Named for the river beside which the species was collected.

Remarks.— Darkly sclerotised subapical spurs on the inferior appendages are not uncommon in species of *Hydroptila*, although their function is obscure. Particularly in this species where they are lateral in position, they cannot be involved in gripping the ♀, which is the first explanation that comes to mind. In another Sulawesi species much smaller spurs are ventrally placed. That aside, this species is another in the *losida*-group so common in Australia and New Guinea, but less common westwards from Sulawesi.

Hydroptila terbela Wells, 1990

New record.— ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, 12.x.1989, J. Huisman.

Distribution.— Northern and southern Sulawesi.

Remarks.— This species was commonly collected in considerable numbers from lower reaches of several streams in the north during 'Project Wallace' (Wells, 1990a).

Oxyethira campanula Botosaneanu, 1970

New record.— ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 1100 m, Sungai Lalonduwasi,15.x.1989, J. Huisman.

Distribution.— Korea, Borneo, Sulawesi, Sumatra, New Guinea.

Remarks.— This is a new record for Sulawesi, but not at all surprising as *O. campanula*, described from Korea, is one of the very widespread SE Asian species. It shares this attribute with two other *Oxyethira* species, *O. bogambara* Schmid, 1958, and *O. incana* Ulmer, 1907; all three species may have behaviour favourable to widespread dispersal by winds.

Hellyethira litita Wells, 1990

New records.— ♂♂ ♀♀(RMNH), Sulawesi Tenggara, Peg. Boroboro [Boroboro Mountains], 30 km SW Kendari, 200 m, 26.x.1989, J. Huisman; ♂♂, ♀♀ (RMNH), Sulawesi Tenggara, Moramo, Sungai Maramo, 50 m, 16.xi.1989, R. de Jong & J. Huisman.

Distribution.— Northern and southern Sulawesi.

Remarks.— The rivers at the collection sites of this species were somewhat atypical for *Hellyethira*, species of which in Australia are generally filamentous algae feeders in slow streams to lakes and ponds. At the site on Sungai Maramo the rather shallow river flowed over a series of low waterfalls, and at the site on Peg. Boroboro the river bed was bluish clay to sand and some rocks.

Orthotrichia lalonduwasi spec. nov.
(fig. 8)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 1100 m, Sungai Lalonduwasi,15.x.1989, J. Huisman. Paratypes: 2 ♂♂, same data as for holotype.

Diagnosis.— Most closely resembling *O. indica* Martynov, 1935 (see also Oláh 1989), from India and Vietnam, but differs in having the dorsal process on the inferior appendages and other structures in the genitalia asymmetric, and in having two small sclerotised digitate processes midventrally.

Description.— ♂. Antennae elongate, damaged, >29-segmented. Anterior wing length, 3.1 mm. Genitalia as in fig. 8. Abdominal segment IX with a pair of stout, unequal dorso-lateral spines. Dorsal plate (tergite X) irregular in shape, membranous, but with a stout sclerotised spur directed laterally at right apical angle. Inferior appendages with a pair of unequal ventral lobes laterally, medially a pair of short sclerotised digitate processes, dorsal process asymmetric, strongly curved from right to left. Paramere a straight slender spine.

Distribution.— Type locality only, high altitude, southern Sulawesi.

Etymology.— Named for the river at which the specimens were collected.

Remarks.— Although this ♂ is large and has genitalia resembling those of *aberrans*-group species (Wells, 1982), it is not placed in that group as the aedeagus is more gracile and not curved as is usual in *aberrans*-group species.

Orthotrichia kabaenica spec. nov.
(figs 9, 10)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, P. Kabaena, 4 km S Tankeno, Sungai Lakambula, 300 m, 5.xi.1989, R. de Jong & J. Huisman. Paratypes, 7 ♂♂ (RMNH), same locality and collectors as holotype, 4.xi.1989.

Diagnosis.— Distinguished by the prominent sclerotised apico-lateral angles of abdominal segment VIII and short, broad overall form of the inferior appendages and associated structures. In the development of the lateral angles of abdominal segment IX into setate processes, this species could group with *O. luonga* Oláh, 1989, and *O. indica*, but these structures are shorter and stouter in *O. kabaenica* spec. nov..

Description.— ♂. Antennae 29-segmented. Anterior wing length 2.4 mm. Abdominal segment VII with a ventral brush of stout setae and segment VIII with stout, sclerotised apico-lateral lobes bearing dense long setae. Genitalia as in figs 9, 10. Abdominal segment IX with a pair of short, irregularly curved dorsal spines. Dorsal plate (tergite X) membranous, rectangular. Inferior appendages more or less symmetrical, wider than long, with apices convergent, laterally produced in a digitate, apically setate lobe; dorsal process asymmetric, longer on left and with a bulge to inner side of seta. Paramere a short straight spine.

Distribution.— Type locality only, southern Sulawesi.

Etymology.— Named for the island on which it was collected.

Orthotrichia tinggi spec. nov.
(fig. 11)

Material.— Holotype ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 1100 m, Sungai Lalonduwasi, 15.x.1989, J. Huisman.

Diagnosis.— In the widely divergent dorsal processes on the inferior appendages, this species resembles *O. lentigo* Wells, 1984 and *O. urimica* Wells, 1984 from Papua New Guinea and *O. suteri* Wells, 1979 from northern Australia. It differs from all three, however, particularly in the shape of the inferior appendages, and in having a strong slightly curving left dorsal spine on abdominal segment IX.

Description.— ♂. Antennae damaged. Anterior wing length 2.0 mm. Genitalia as in fig. 11. Abdominal segment IX with a slightly curved left dorso-lateral spine. Dorsal plate (tergite X) irregular in shape, membranous. Inferior appendages symmetrical, heavily sclerotised, apices convergent, acute, dorsal process symmetrical, lobes widely separated, digitate, strongly curved. Paramere a slender curved spine.

Distribution.— Known only from the type locality.

Etymology.— Indonesian for high — tinggi, denoting the high altitude at which the specimen was collected.

Remarks.— In overall form, the ♂ genitalia of this species conform with many Australian Region *Orthotrichia* species, rather than with the Oriental Region forms from Borneo and West Malaysia (see Wells & Huisman 1993).

Orthotrichia berberang Wells & Malicky, 1997

New Records.— 2 ♂♂ (RMNH), Sulawesi Tenggara, Moramo, Sungai Sena, 50 m, 15.xi.1989, R. de Jong & J. Huisman; 2 ♂♂ (RMNH), Sulawesi Tenggara, P. Kabaena, Batuawa, 11.xi.1989, Sungai Lebokmea, R. de Jong & J. Huisman.

Distribution.— Sumatra and southern Sulawesi.

Remarks.— This species closely resembles *O. suchiara* Olah from Vietnam and may eventually prove to be synonym of that species. Both species have widely divergent and greatly skewed inferior appendages. The Sulawesi specimens appear to have a more intricate arrangement of the inferior appendages mid-ventrally, than those from Sumatra.

Orthotrichia ditenga Wells, 1990

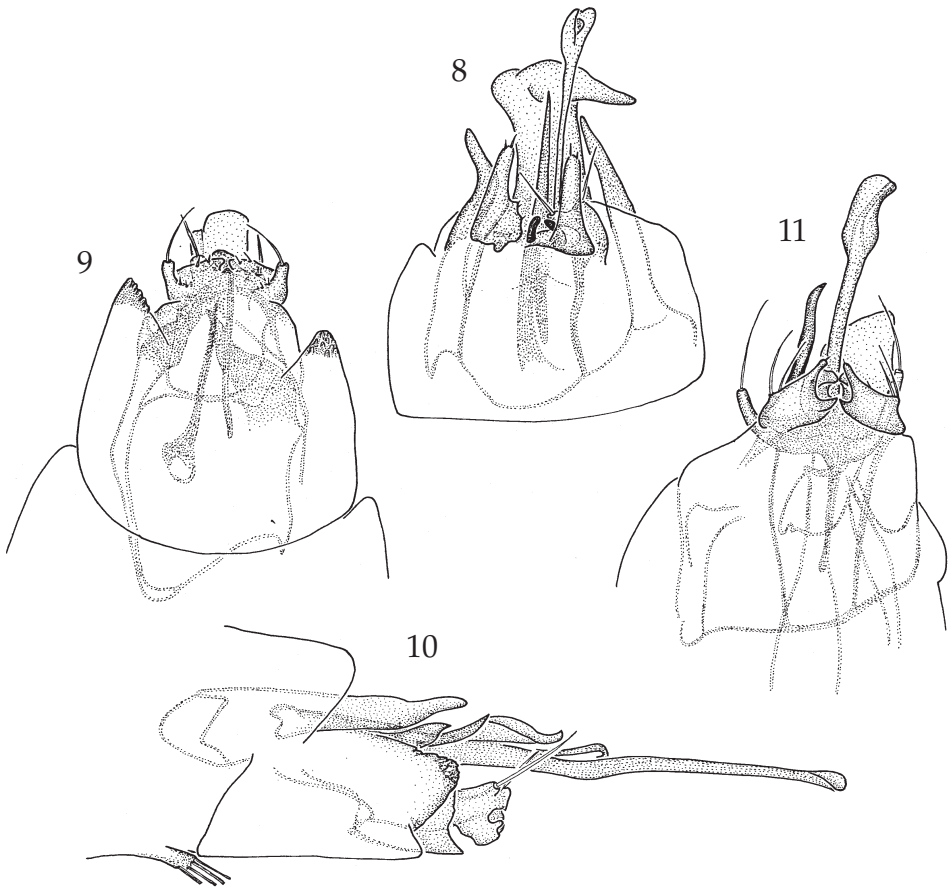
New record.— 3 ♂♂ (RMNH), Sulawesi Tenggara, P. Kabaena, 4 km S Tangkeno, 300 m, 4.xi.1989, R. de Jong & J. Huisman.

Distribution.— Northern and southern Sulawesi.

Remarks.— Previously this species was known from the holotype ♂ only.

Orthotrichia fimbriata Wells, 1991

New record.— 2 ♂♂, ♀ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, Sungai Mokowu, 19.x.1989, R. de Jong & J. Huisman.



Figs 8-11, ♂, genitalia, ventral aspect, but 10 lateral aspect. Fig. 8, *Orthotrichia lalonduwasi* spec. nov.; figs 9-10, *Orthotrichia kabaenica* spec. nov.; fig. 11, *Orthotrichia tinggi* spec. nov.

Distribution.— New Guinea and Sulawesi.

Remarks.— The finding of a species of *Orthotrichia* in common between New Guinea and Sulawesi is most unusual. Previously known only from the Papua New Guinean type locality at Veicaba in Central Province, this rather distinctive species could be more widespread from New Guinea to Sulawesi. It could be highly vagile, although that would be unusual in an *Orthotrichia* species. Alternatively, its present distribution may be indicative of past geological history.

Orthotrichia garbunga Wells, 1990

New record.— ♂ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, Sungai Mokowu, 19.x.1989, R. de Jong & J. Huisman.

Distribution.— Northern and southern Sulawesi.

Remarks.— This species is recognised by the unusual additional, sclerotised, digitate subapical structures on the left lobe of the dorsal process on the inferior appendages, and the short twisted paramere.

Orthotrichia luonga Oláh, 1989

New record.— ♂, ♀ (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 3 km SW Sanggona, Sungai Mokowa, 200 m, 21.x.1989, R. de Jong & J. Huisman.

Distribution.— Vietnam, southern Sulawesi.

Remarks.— A single specimen is referred tentatively to this Vietnamese species, with which it shares features such as the odd process on the left inferior appendage, and the elongate setose lobes on the apico-lateral angles of abdominal segment IX. The Sulawesi ♂ differs from that figured by Olah (1989) from Vietnam in having two or more long apical setae on the lateral processes of segment IX. However, as these are the only *Orthotrichia* we are aware of that have the single apical process on the inferior appendages, the two are considered to be conspecific. A feature not described by Oláh is the narrow shaft of scales present on the costal margin of the forewing.

Orthotrichia tonjolana Wells, 1990

New records.— ♀ (RMNH), Sulawesi Tenggara, P. Kabaena, 4 km S Tangkeno, 300 m, 4.xi.1989, R. de Jong & J. Huisman; ♂, ♀♀ (RMNH), Sulawesi Tenggara, Moramo, Sungai Moramo, 50 m, 16.xi.1989, R. de Jong & J. Huisman.

Distribution.— Northern and southern Sulawesi.

Remarks.— If this species is correctly referred to the *O. aberrans*-group in *Orthotrichia* (Wells, 1990a), larvae of this species are probably parasitoids, feeding on either hydropsychid or philopotamid caddisfly pupae (Wells, 1992).

Orthotrichia tunjakkana Wells, 1990

New records.— 7 ♂♂ 3 ♀♀, (RMNH), Sulawesi Tenggara, N slope of Gunung Watuwila, 250 m, 11.x.1989, R. de Jong & J. Huisman; 1 ♂ (RMNH), same locality, 12.x.1989, J. Huisman.

Distribution.— Northern and southern Sulawesi.

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Appendix

Checklist of Hydroptilidae from Sulawesi

Stactobiini

Chrysotrichia berduri Wells, 1990
- *limacabanga* Wells, 1990
- *tigacabanga* Wells, 1990
- *watuwila* spec. nov.

Parastactobia kumiskucinga Wells, 1990
Niuginitrichia sulawesica spec. nov.
Scelotrichia licini Wells, 1990
Plethus spec.

Hydroptilini

Hydroptila bengkoka Wells, 1990
- *gurdi* Wells, 1990
- *incertula* Mosely, 1934 (Philippines, New Guinea, Australia)
- *jaruma* Wells, 1990
- *obscura* Wells, 1979 (Borneo, New Guinea, Australia)
- *tanduka* Wells, 1990
- *terbela* Wells, 1990
- *mokowu* spec. nov.

Hellyethira litita Wells, 1990
Oxyethira campanula Botosaneanu, 1970 (Korea, Borneo, Sumatra)
- *incana* Ulmer, 1906 (Java, Sumatra, New Guinea, Australia)

Orthotrichiini

Orthotrichia berberang Wells & Malicky, 1997 (Sumatra)
- *ditenga* Wells, 1990
- *fimbriata* Wells, 1991 (New Guinea)
- *garbunga* Wells, 1990
- *jembatana* Wells, 1990
- *kabaenica* spec. nov.
- *lalonduwasi* spec. nov.
- *luonga* Oláh, 1989 (Vietnam)
- *menarika* Wells, 1990
- *mencenga* Wells, 1990
- *tingga* spec. nov.
- *tonjolana* Wells, 1990
- *tunjukkana* Wells, 1990