

**BRACHYRADIA, A NEW GENUS OF THE TRIBE EXECHIINI
(DIPTERA: MYCETOPHILIDAE) FROM THE ORIENTAL AND
AUSTRALASIAN REGIONS**

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ABSTRACT. — *Brachyradia*, new genus, is proposed and described for two new species of the tribe Exechiini (Diptera: Mycetophilidae) from the Oriental and Australasian regions. The type species, *Brachyradia asiatica*, new species, is described from Thailand, Malaysia, and Indonesia (Sulawesi), and a second species, *Brachyradia australis*, new species, from Indonesia (Sulawesi) and Papua New Guinea. The systematic position of the new genus and the zoogeography of the tribe Exechiini are discussed. The new genus shows closest affinities with *Brevicornu* with interconnections towards *Cordyla*, *Neallodia*, and *Anatella*. As the latter genera have been considered among the most primitive taxa of the tribe, *Brachyradia* may generate new and interesting questions about polarities of characters, direction of morphological transformations, and the zoogeographical origin of the Exechiini genera.

KEY WORDS. — fungus gnats, Sciaroidea, new genus, taxonomy, zoogeography

INTRODUCTION

The mycetophilid tribe Exechiini is a well-defined and rather uniform group of small to medium sized, mostly slender and long-legged fungus gnats (Diptera: Mycetophilidae: Mycetophilinae). The tribe, as far as we know, is most species rich in the Holarctic region. It was first defined by Edwards (1925) to include five European genera described by Winnertz (1864), viz. *Allodia*, *Anatella*, *Brachypeza*, *Exechia*, and *Rymosia*. Edwards (1932) added *Neallodia* and Lane (1946) added *Boraceomyia*, both with a few known species from South America. Tuomikoski (1966) revised the tribe by splitting Winnertz' genera into a number of new genera and subgenera, reinstating *Brevicornu* described from New Zealand by Marshall (1896), and he also included *Cordyla* described by Meigen (1803) and placed in the sister tribe Mycetophilini by Edwards (1925). Half of Tuomikoski's 12 subgenera are now regarded as separate genera (Kjærandsen, 2005; Rindal & Søli, 2006; Rindal et al., 2007), including *Synplasta* described from Australia by Skuse (1890), which Matile (1987) had synonymised with the subgenus *Gymnogonia* of Tuomikoski (1966). Apart from those changes

no new genera have been added after Tuomikoski's revision and the definition of the tribe has remained stable.

The tribe currently comprises 19 genera and approximately 700 recognised species. The group is cosmopolitan, reaching its highest species diversity in the Holarctic (see Kjærandsen et al., 2007), but it is apparently strongly underreported from tropical areas. In the Oriental and Australasian Regions, named species of only 8 genera have been reported (cf. Bechev, 2000; Ševčík, 2001). However, Tuomikoski (1966) already noted the existence of undescribed species of 12 Exechiini genera in Burma, and most of the genera of the tribe appear to occur in the Oriental region (JŠ & JK, unpublished data).

While studying extensive Oriental and Australasian material of fungus gnats from various collections, we found two undescribed species clearly belonging to the tribe Exechiini that could not be assigned to any known genus. Here we describe these new species, propose and describe a new genus for them, and, based on morphological characters, discuss their affinities and probable systematic position in relation to other genera of the tribe.

MATERIAL AND METHODS

The material was collected by means of Malaise and light traps, and by sweep-netting. A total of 29 males and 9 females were examined. The females were associated with males according to their common occurrence in the sample and similarity of appearance. The specimens were either pinned with cleared terminalia placed in a microvial with glycerol (holotypes), mounted on slides in Canada balsam as described by Kjærandsen (2006), or stored in ethanol (paratypes).

The type material is deposited in the collections with the following abbreviations:

BMHC = Bishop Museum, Honolulu, USA

HNHM = Hungarian Natural History Museum, Budapest, Hungary

JSOC = Collection of Jan Ševčík, Ostrava, Czech Republic

MZLU = Museum of Zoology, Lund University, Sweden

NHRS = Naturhistoriska Riksmuseet, Stockholm, Sweden

QSBG = Queen Sirikit Botanic Gardens, Chiang Mai, Thailand

SMOC = Silesian Museum, Opava, Czech Republic

The morphological terminology principally follows Søli (1997) with modifications and additions by Kjærandsen (2006). Approximate body lengths were measured on specimens stored in ethanol while wing lengths (from base of distal median plate) were measured on slide-mounted specimens. Colour photographs of the type specimens are available at Fungus Gnats Online web site (Ševčík & Kjærandsen, 2011).

TAXONOMY

Brachyradia, new genus

Type species. — *Brachyradia asiatica*, new species

Gender. — Feminine

Etymology. — The generic name refers to the very short radial vein R_1 of the wing.

Diagnostic characters. — Small compact fungus gnats (body length 2–3 mm, wing length 1.3–2.1 mm) of the tribe Exechiini with mainly yellowish body (Fig. 1A, B), habitually similar to *Brevicornu*, *Cordyla*, and *Neallodia* but possessing a unique combination of modified wing venation, modified palps, shape of thoracic sclerites and terminalia. Wing vein R_1 very short (Fig. 1D–F), ending in costa in basal half of wing. Anepisternum (Fig. 1C) bare, subsquare with almost horizontal lower margin. Palpomere III (Fig. 2A–E) enlarged, forming a triangular shield over base of palpomere IV that is attached at the middle of the ventral surface. Tergite IX of male terminalia (Figs. 2G, 3C, 4C) strongly reduced, medially divided and devoid of setae. Female terminalia (Figs. 3D, 4D) short oviscapt, with two-segmented cercus.

Description. — **Head** (Fig. 2A–C) slightly elongated, subrectangular in frontal view. Compound eyes relatively small, covering about half of the length of head in lateral view. Lateral ocellus touching the eye margin, mid ocellus absent. Frons with several dark setae laterally in front of the ocelli, and several strong setae above the upper eye margin. Occipital furrow absent, frontal furrow short. Face short, with a few setae. Clypeus subrectangular to ovate, covered with short setae. Antenna (Fig. 2F) unmodified, about as long as head and thorax together; flagellum cylindrical with 14 short flagellomeres (F2 about as wide as long then gradually longer towards tip where F14 is 2 times as long as wide). Palp with 4 visible segments (Fig. 2C); palpomere I & II seemingly fused, palpomere III (Fig. 2A, C–E) enlarged, forming a triangular shield over base of palpomere IV that is attached at the middle of the ventral surface, sensory groove placed in basal half with opening on dorsal surface; palpomere V (Fig. 2E) longer than palpomere III+IV together.

Thorax (Fig. 1C) compact and somewhat dorsoventrally compressed; less highly arched than in most Exechiini. Scutum with small decumbent bristles intermingled among small setae, not arranged in distinct lines. Scutellum about as long as wide, its dorsal surface densely covered with dark setae, subapical bristles slightly longer than scutellum. Antepronotum and proepisternum with several dark setae, 3–5 proepisternal bristles. Anepisternum bare, subsquare with almost horizontal lower margin. Mediotergite and preepisternum 2 bare; ventral edge of preepisternum 2 convex, evenly rounded. Laterotergite with several dark bristles. **Wing** membrane covered with microtrichia in regular longitudinal rows; costa and R_{4+5} with dorsal and ventral setae, radial stem and R_1 with dorsal setae only, other veins devoid of setae. Wing venation (Fig. 1D–F) modified: vein sc extremely short, vestigial and ending free; costa distinctly produced beyond R_{4+5} ; vein R_1 very short, ending in costa less than half way from base of dmp to tip of wing; vein ta short, interrupted by a longitudinal fold; stem of M-fork short, 0.8–2.5 times as long as ta (Fig. 1D–F); Cu-fork branching slightly beyond branching of M-fork (Fig. 1D–E) or opposite to it (Fig. 1F); vein M_2 distinctly shortened, breaking between 2/3 and 3/4 its length before wing margin; CuP strong, apically weaker, reaching beyond the point of furcation of M; vein A_1 weak, short; A_2 distinct, not reaching wing margin. **Legs** covered with dark trichia and setae. All coxae with several black setae apically. Hind coxa in basal third with 2–3 fine dark posterolateral bristles. Femora laterally compressed, clothed with numerous dark trichia. All tibiae with numerous small trichia tending to form regular longitudinal rows and with several scattered short bristles. Fore tibia without any special tibial organ. One spur on fore tibia, about half as long as fore tibia; two spurs on both mid and hind tibia, ventral spurs slightly longer than dorsal ones. Hind tarsomere 1 with cluster of enlarged setulae ventrally at base (possibly a sensory organ operating together with spurs). Tarsal claws small, empodium absent.

Abdominal segments (Fig. 1A, B) with dark brown markings along posterior margins. Sternites narrow, with a more or less distinct medial concave fold longitudinally.

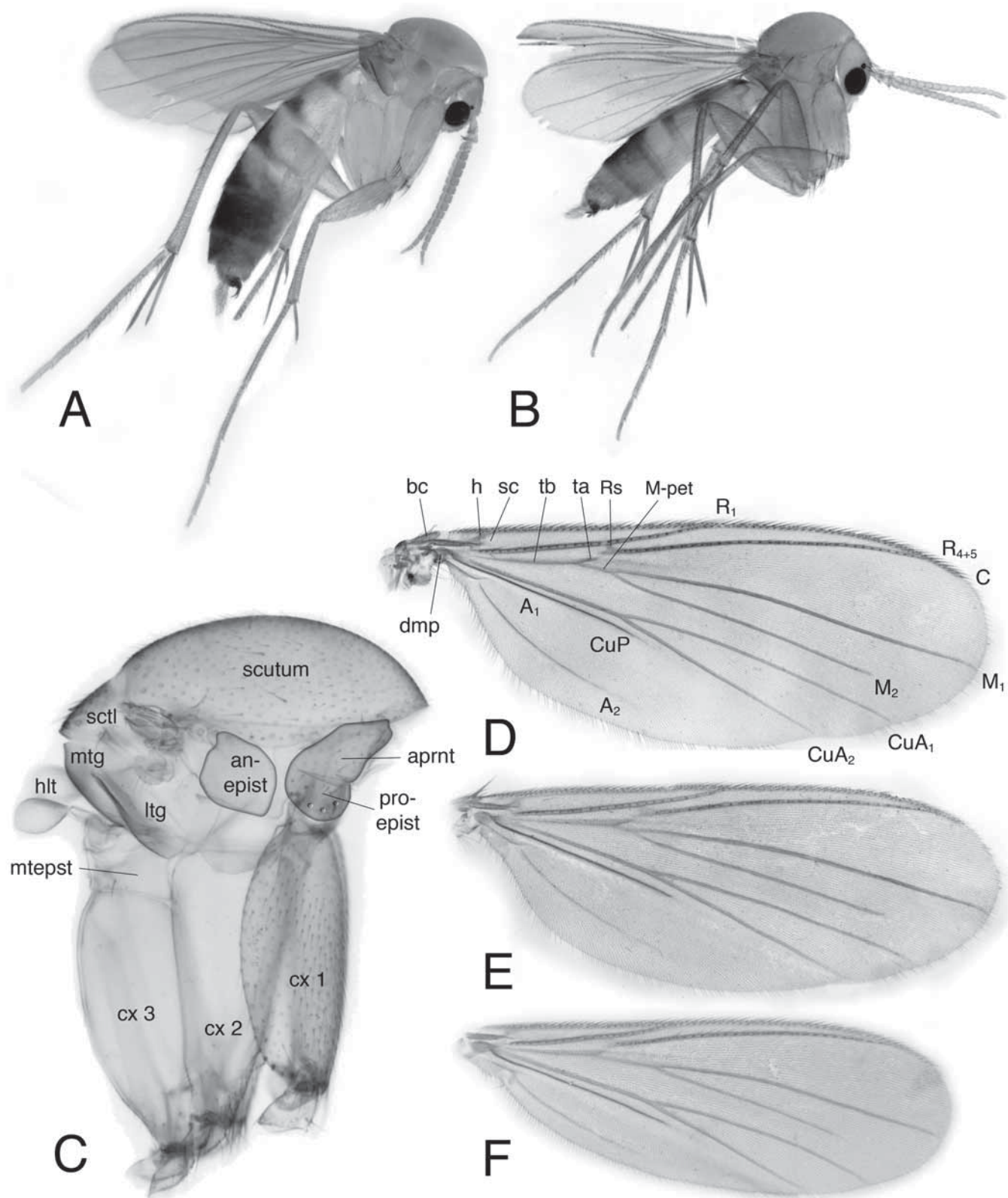


Fig. 1. Morphology of adult *Brachyradia*, new genus. Photos of whole (moderately bleached) specimens in alcohol (A, B) and cleared and slide-mounted parts (C–F). (A) Habitus of *B. asiatica*, new species; (B) habitus of *B. australis*, new species; (C) thorax with coxae of *B. australis*, new species, enlarged in lateral view. The shape of anepisternum and propleurites is enhanced. (D) Wing of male *B. asiatica*, new species; (E) wing of large female *B. australis*, new species; (F) wing of small male *B. australis*, new species. Abbreviations: A₁ = anterior anal vein; A₂ = posterior anal vein; anepist = anepisternum; aprnt = antepronotum; C = costa; CuA₁ and CuA₂ = anterior branch of cubitus; CuP = posterior branch of cubitus; cx 1 = forecoxa; cx 2 = midcoxa; cx 3 = hindcoxa; dmp = distal median plate; h = humeral; hlt = halter; ltg = laterotergite; M-pet = petiole of media; M₁ and M₂ = branches of media; mtg = mediotergite; mtepst = metepisternum; proepist = proepisternum; R₁ = anterior branch of radius; R₄₊₅ = posterior branch of radius; Rs = radial sector; sc = subcosta; sctl = scutellum; ta = anterior transversal (= crossvein rm); tb = basal transversal.

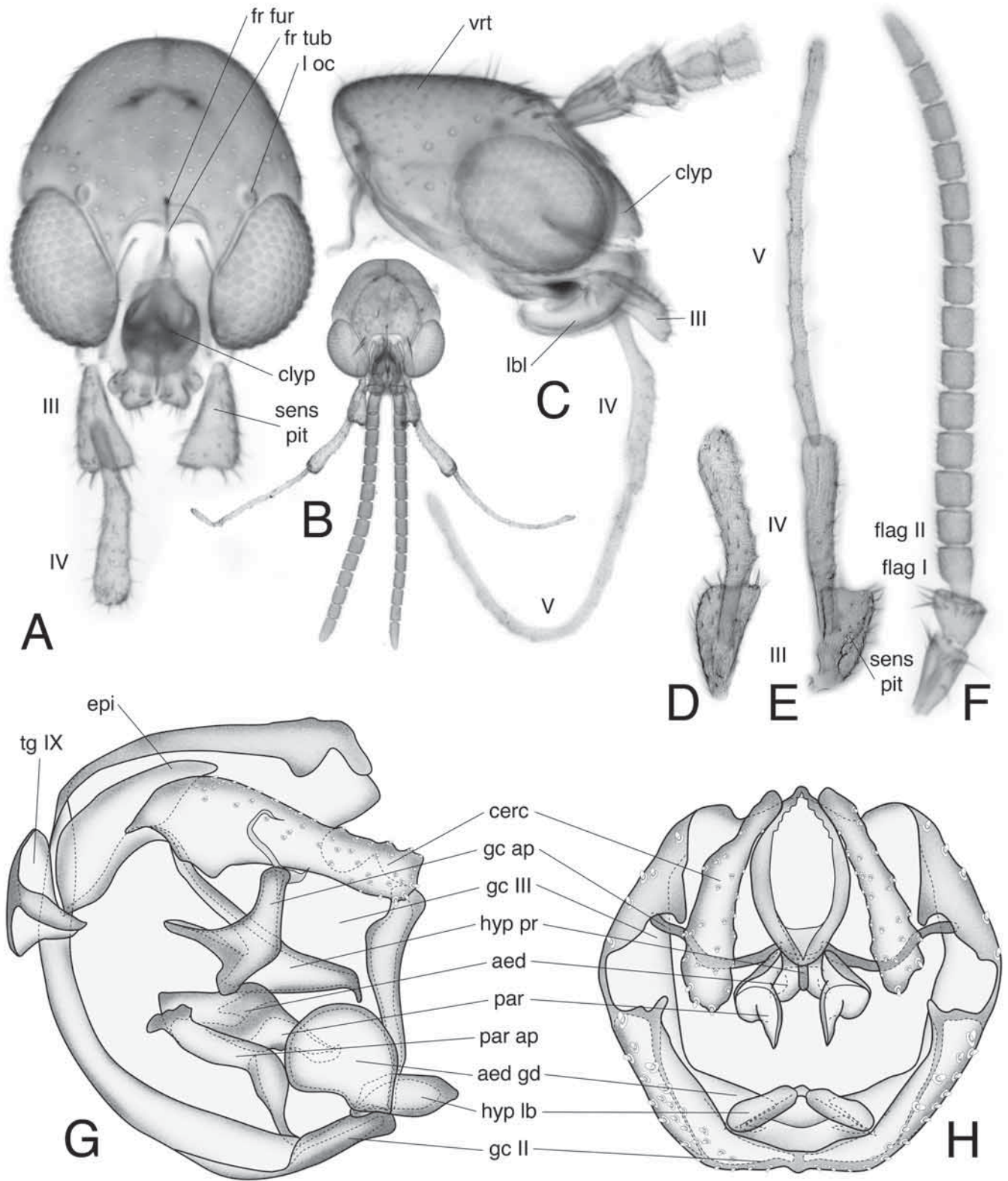


Fig. 2. Morphology of adult *Brachyradia*, new genus. Photos (A–F) and illustrations (G–H) of cleared and slide-mounted parts. (A) Head of *B. asiatica*, new species, in dorsal view with antennae removed; (B) ditto with whole antennae and palps; (C) head of *B. australis*, new species, in lateral view; (D) palp segment III–IV of *B. australis*, new species, enlarged in dorsal view; (E) palp segment III–V of *B. australis*, new species, enlarged in lateral view; (F) antennae of *B. australis*, new species, enlarged in lateral view; (G) internal organs of male terminalia of *B. asiatica*, new species, lateral view with gonostyles removed; (H) internal organs of male terminalia of *B. australis*, new species, caudal view with gonostyles removed. Abbreviations: aed gd = aedeagal guide; aed = aedeagal apparatus; cerc = cercus; clyp = clypeus; epi = epiproct; fr fur = frontal furrow; fr tub = frontal tubercle; gc ap = gonocoxal apodeme; gc II = section II of gonocoxite; gc III = section III of gonocoxite; hyp pr = hypoproct; hyp lb = hypandrial lobe; l oc = lateral ocellus; par = paramere; par ap = parameral apodeme; sens pit = sensory pit; tg IX = tergite IX; vrt = vertex.

Male terminalia (Figs. 2G, H, 3A–C, 4A–C) small; tergite IX strongly reduced, medially divided, devoid of setae; proctiger enlarged, narrowly connected to tergite IX, cerci large, epiproct distinct, hypoproct large, downcurved, with pointed apex; gonocoxite ventrally with deep v-shaped anterior emargination and wide shallow posterior emargination, open dorsally; hypandrial lobe well developed, bulbous; aedeagal guides retracted into gonocoxite; gonocoxal apodemes strongly sclerotized; aedeagal apparatus with pair of pointed parameres and apodemes connecting to gonocoxite. Gonostylus (Figs. 3B, 4B) with five distinct branches; dorsal branch large, lanceolate; dorsointernal branch bulbous, detached from dorsal branch, with a few strong setae; medial branch elongated, sclerotized, apically dilated, devoid of setae; ventral branch narrow elongated, with setae mostly confined to basal half; internal branch knob-like, with pair of strong setae apically; anterior branch vestigial or absent, striated internal cushion absent.

Female terminalia (Figs. 3D, 4D) short oviscapt, with tergite VII and IIX deeply retracted into segment VI; tergite VII small, with strongly sclerotized marginal sutures; cercus two-segmented, both segments short ovate; gonocoxite VIII with triangular apex in lateral view, apex with a few strong bristles; gonapophysis VIII thin, hyaline; gonapophysis IX triangularly tapered, sclerotized, with pair of small setae on tip.

***Brachyradia asiatica*, new species**

(Figs. 1A, D, 2A, B, G, 3A–D)

Type material. — **Holotype male:** THAILAND, Chiang Mai, Doi Suthep NP, 31 Oct.2004, No. 11, along a forest brook, coll. L. Papp & M. Földvári (HNHM, pinned).

Paratypes: 1 male: THAILAND, Nakhon Ratchasima, Khao Yai NP, evergreen forest near Tiger Trail, 14°27.511'N, 101°22.408'E, 760 m, Malaise trap, 19–26 Jun.2007, coll. Pong Sandao, T2229 (in QSBG); 1 male, 1 female: Kamphaeng Phet, Mae Wong NP, Chong Yen, 16°5.968'N, 99°6.472'E, 1306 m, Malaise trap, 3–10 Sep.2007, coll. Chumpol Piluk & Aram Inpuang, T2812 (JSOC); 1 male: Prachuab Khiri Khan, Khao Sam Roi Yot NP, Nursery, 12°7.58'N, 99°57.478'E, Malaise trap, 6–13 Jul.2008, coll. Amnad & Yai, T3035 (QSBG); 2 males, 1 female: Chiang Mai, Doi Chiang Dao NP, Nature trail, 19°24.278'N, 98°55.311'E, 491 m, Malaise trap, 10–24 Mar.2008, coll. Songkran & Apichart, T3155, T3156 (MZLU [-JKJ-SPM-058443-45, all on slides]); 2 males, 4 females: MALAYSIA, Selangor, Ulu Gombak, University of Malaya Field Study Centre, 800 ft, Malaise trap, 22 Feb. – 21 Mar.1997, coll. H. Hippa, M. Jaschhof & B. Viklund (NHRS); 1 male: INDONESIA, South Sulawesi, Tana Toraja, Rantepao, 21–23 Jan.2010, Malaise trap, coll. J. Ševčík (JSOC).

Diagnosis. — On average, slightly larger than *B. australis*, with darker abdominal tergites. Distinct diagnostic characters are found in the detailed shape of the terminalia. In lateral view the male gonostylus (Fig. 3B) has straight dorsal branch, curved ventral branch, and dilated but not distinctly T-shaped medial branch; the hypandrial lobe (Fig. 3A) is small; and the cerci (Fig. 3C) are rectangular. The female terminalia (Fig. 3D) have rounded posterior margin of tergite VI.

Etymology. — The specific name refers to the occurrence of this species in Asia.

Description. — **Male:** Body length 2.6–3.0 mm. Wing length 1.95–2.08 mm. **Colouration** overall brownish yellow. Head, all antennal segments, mouthparts and palpi yellowish. Scutum and pleurites uniform yellowish brown, halter brownish yellow. Wings hyaline, membrane unmarked. Legs all yellowish. Abdomen yellowish with brown markings; tergites I–IV with a dark posterior triangular marking, tergite IV darkened also laterally, tergite V all blackish brown, tergites VI–VIII mostly brown. All tergites and sternites covered with pale setae. Terminalia yellowish brown, ventral lobes of gonostylus sclerotized, blackish brown. **Terminalia** (Figs. 2G, 3A–C) with proctiger narrowly connected to the reduced tergite IX, enlarged with distinct pointed epiproct and large internal hypoproct with pointed, downcurved apex. Cerci long rectangular, with angular corners apically. Gonocoxite with small bulbous hypandrial lobe; aedeagal guides large, rounded, retracted into gonocoxite. Aedeagal apparatus with sclerotized apodeme connecting to gonocoxite. Gonostylus (Fig. 3B) with five distinct branches; dorsal branch long rectangular, setose on outer surface, inner surface with some setae ventrally and apically; dorsointernal branch bulbous, sclerotized, with a few strong setae medially and a strong bristle subapically; medial branch elongated, sclerotized, apically moderately dilated, devoid of setae; ventral branch long narrow, rectangular in ventral view, gently curved in lateral view, with setae scattered on basal half, one small stiff seta apically; internal branch long subtriangular, with pair of strong setae apically; anterior branch vestigial or absent.

Female: Body length 2.4–2.5 mm. Wing length 1.65–1.95 mm. **Colouration** similar to male. **Terminalia** (Fig. 3D) short oviscapt, with tergite VII and IIX deeply retracted into segment VI. Tergite VI widely but shallowly excavated dorsally, forming rounded, weakly crenulated posterior margin, marginal setae long. Cercus 2 narrow ovate, without constricted base. Gonocoxite VIII with two apical bristles much stronger than the rest. Gonapophysis VIII narrow, hyaline.

Variation. — We found a certain variation in the length of the M-petiole (even between left and right wing of same specimen) that sometimes makes the point of furcation of M opposite to that of Cu-fork, sometimes distinctly before it.

Biology. — Unknown

***Brachyradia australis*, new species**

(Figs. 1B, C, E, F, 2C–F, H, 4A–D)

Type material. — **Holotype male:** PAPUA NEW GUINEA, SE, Mamai Pltn., E of Port Glasgow, 150 m, 16 Feb.1965, coll. R. Straatman, light trap (BMHC, pinned).

Paratypes: 1 male: INDONESIA, South Sulawesi, Tana Toraja, Tilangga, 10 km S of Rantepao, 970 m, 23 Jan.2010, J. Ševčík leg. (JSOC); 18 males, 3 females: PAPUA NEW GUINEA, Madang Province, Halopa village, 600 m, primary rain forest, Oct.–Nov.

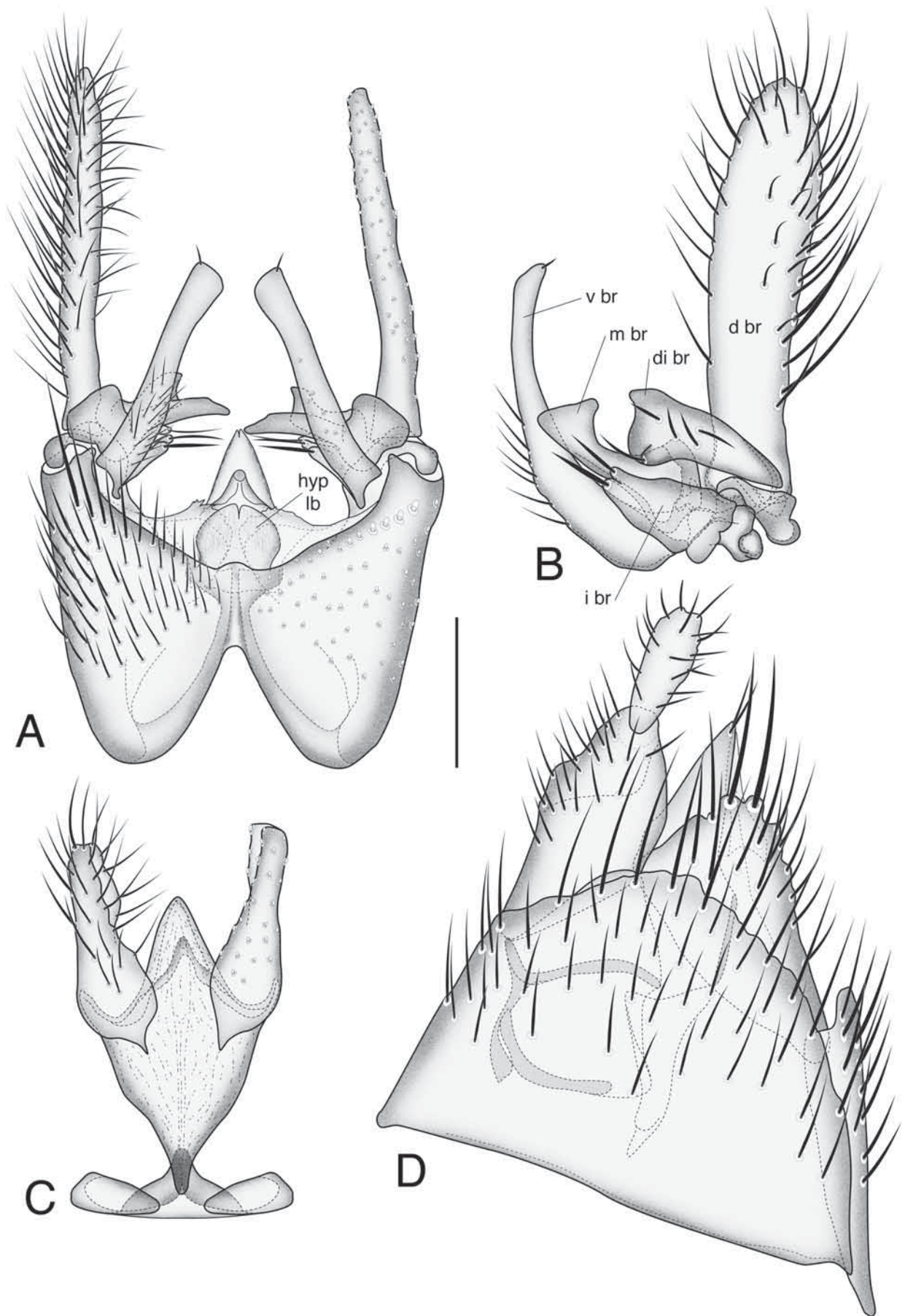


Fig. 3. Terminalia of *Brachyradia asiatica*, **new species**: (A) male terminalia in ventral view; (B) gonostylus in internal view; (C) tergite IX, proctiger and cerci in dorsal view; (D) female terminalia in lateral view. Scale bar = 0.1 mm. Abbreviations: d br = dorsal branch of gonostylus; di br = dorsointernal branch of gonostylus; hyp lb = hypandrial lobe; i br = internal branch of gonostylus; m br = medial branch of gonostylus; v br = ventral branch of gonostylus.

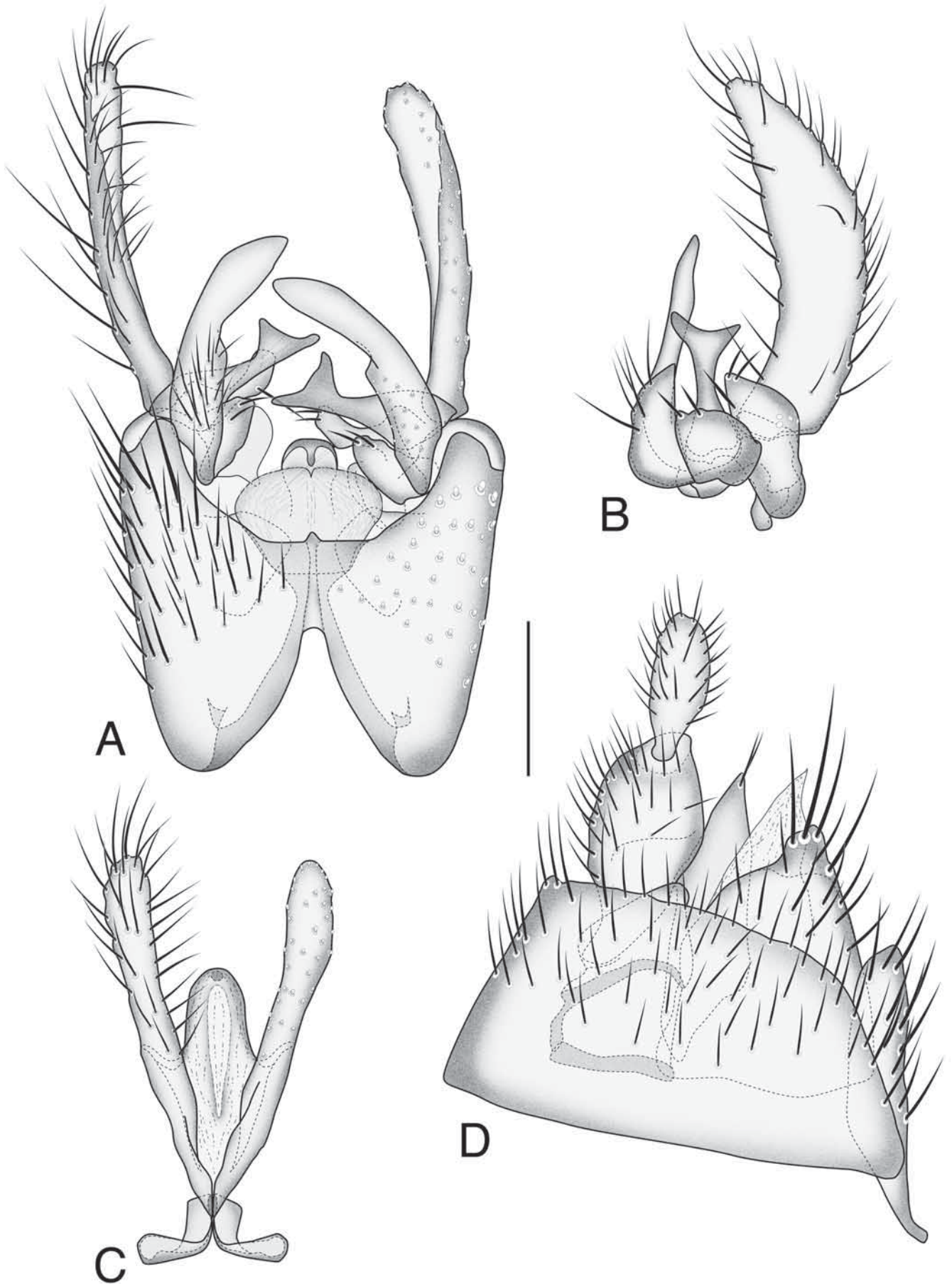


Fig. 4. Terminalia of *Brachyradia australis*, new species: (A) male terminalia in ventral view; (B) gonostylus in internal view; (C) tergite IX, proctiger and cerci in dorsal view; (D) female terminalia in lateral view. Scale bar = 0.1 mm.

2000, coll. L. Čížek, Malaise trap (SMOC, JSOC and MZLU [-JKJ-SPM-058446-51, these 4 males and 2 females mounted on slides]).

Diagnosis. — On average slightly smaller than *B. asiatica*, with paler abdominal tergites. Distinct diagnostic characters are found in the detailed shape of the terminalia. In lateral view the male gonostylus (Fig. 4B) has curved dorsal branch, straight ventral branch, and distinctly T-shaped medial branch; the hypandrial lobe (Fig. 4A) is large; and the cerci (Fig. 4C) are long digitiform. The female terminalia (Fig. 4D) have straight posterior margin of tergite VI.

Etymology. — The specific name *australis* means “southern” in Latin and refers to the occurrence of this species in the southern hemisphere.

Description. — **Male:** Body length 2.0–2.5 mm. Wing length 1.32–1.7 mm. **Colouration** overall brownish yellow and as in *B. asiatica*, except abdominal tergite V yellowish laterally and tergites VI–VIII mostly yellowish. **Terminalia** (Figs. 2H, 4A–C) with proctiger narrowly connected to the reduced tergite IX, less enlarged with retracted epiproct, large internal hypoproct very hyaline centrally (Fig. 2H), with rounded apex and downcurved digitate process. Cerci long slender, with round corners apically. Gonocoxite with large bulbous hypandrial lobe; aedeagal guides small, retracted into gonocoxite. Aedeagal apparatus with weakly sclerotized apodeme connecting to conocoxite. Gonostylus (Fig. 4B) with five distinct branches; dorsal branch long, narrow blade-shaped, sigmoid in lateral view, setose on outer surface, inner surface with rather few setae; dorsointernal branch bulbous, sclerotized, with pair of strong setae apically and a strong bristle subapically; medial branch elongated, sclerotized, apically distinctly dilated into a T-shape with acute corners, devoid of setae; ventral branch long narrow, gently incurved with spoon-shaped apical half in ventral view, straight in lateral view, with scattered setae on basal half, devoid of seta apically; internal branch short subquadrangular, with pair of strong setae apically; anterior branch vestigial or absent.

Female: Body length 2.3–3.0 mm. Wing length 1.50–1.90 mm. **Colouration** similar to male. **Terminalia** (Fig. 4D) short oviscapt, with tergite VII and IIX deeply retracted into segment VI. Tergite VI short, with straight posterior margin; marginal setae short. Cercus 2 ovate, with constricted base. Gonocoxite VIII with three apical bristles somewhat stronger than the rest. Gonapophysis VIII broad, hyaline.

Variation. — In this species we found even more variation in proportions of their wing venation (Fig. 1E–F): The M-petiole varies between 0.8 and 2.5 times as long as crossvein ta , that again sometimes makes the point of furcation of M opposite to that of Cu-fork, sometimes distinctly before it. Small specimens (Fig. 1F) tend to have longer M-petiole accompanied by vein R_1 being proportionally shorter, costa produced proportionally longer beyond R_{4+5} , and vein M_2 proportionally more shortened. This variation does not appear to be associated with sexes or locality.

Biology. — Unknown

DISCUSSION

Systematic position of the new genus. — The monophyly of the tribe Exechiini as treated by Tuomikoski (1966) was recently confirmed by both morphological (Rindal & Sjøli, 2006) and molecular studies (Rindal et al., 2007, 2009a, 2009b), and the proposed new genus is clearly a member of the tribe by having the following characters: occipital furrow absent, frontal tubercle narrow and pointed, lateral ocelli touching eye margin, anepisternum bare, anepimeron bare, microtrichia on wings arranged in regular rows, small bristles on legs, fine tibial setae arranged in regular rows, empodium rudimentary, male terminalia with well developed hypandrial lobe and gonostylus divided into five distinct branches (anterior branch reduced).

The internal generic classification and phylogenetic history of the tribe Exechiini, however, is far from settled (Rindal et al., 2007, 2009a, 2009b) and identification keys to genera are largely resting on classical Meigenian and Winnertzian characters in the wing venation, which is where *Brachyradia* most markedly deviates from all known genera. When using the key to Palaearctic genera provided by Sjøli et al. (2000), it runs directly to *Anatella* due to the extension of costa beyond the apex of R_{4+5} . Rindal & Sjøli (2006) considered a produced costa as an apomorphy within the subfamily Mycetophilinae but in the context of the entire family Mycetophilidae or even the Bibiomorpha it is a plesiomorphy (cf. Amorim & Rindal, 2007). If that character is ignored *Brachyradia* runs to *Exechia* s.l. when point of furcation of CuA lies beyond level of point of furcation of M, or, when point of furcation of CuA lies opposite to level of point of furcation of M, to *Rymosia* due to vein Sc ending free. However, both in general appearance and in numerous other characters the new genus is clearly different from all those genera. It comes much closer to *Brevicornu* and *Cordyla*, which share several features such as having a similarly small and compact body, the tendency to shorten branches of fork veins and a generally similar outline of the male terminalia including reduced and medially divided tergite IX and heavily sclerotized ventral and internal branches of the gonostylus. A shortened M_2 is also found in most species of *Cordyla*, *Neallodia* and in one European *Brevicornu* species, *B. serenum* (Winnertz, 1864).

The affinity of *Brachyradia* to *Brevicornu* lies partly in its general appearance, having small decumbent scutal bristles intermingled among smaller setae and in the male terminalia, which has a bulbous hypandrial lobe not unlike seen in several species of *Brevicornu*. The peculiar structure of the third palpomere appears to be a synapomorphy for *Brachyradia*. Interestingly however, *Brevicornu serenum*, a rather small species of the genus, also has a tendency to have triangular palp segment III with segment IV attached subapically, but it is much less developed compared to those of the new genus. A similar apical extension of palpomere 3 is also found in certain totally unrelated genera such as *Manota* described by Williston (1896) and *Ectrepesthoneura* described by

Enderlein (1910) (see Sjøli, 1997), notably both genera with comparatively small species.

The similarity to *Cordyla* lies in the compact and compressed body with elongated subrectangular head, short flagellomeres, subsquare anepisternum, and male terminalia with reduced tergite IX and gonostylus without anterior branch or internal striated cushion. *Brachyradia* fits well between *Brevicornu* and *Cordyla* in the trend towards dorsoventral compression of the thorax, which according to Tuomikoski (1966: 192) is initiated in *Brevicornu* and *Brachypeza* and culminates in *Cordyla*. In *Cordyla*, the third palpomere is swollen to encompass an enlarged sensory groove and organ but in *Brachyradia* the groove is small, ovate, and situated in the basal half, just as in *Brevicornu*.

The females of *Brachyradia* differ both from *Brevicornu*, *Cordyla*, and *Neallodia* in lacking flatten or swollen basal segments of the flagellum and also in having markedly less oviscapt female terminalia. In this way, they resemble females of *Allodia* and *Exechia*.

It may be argued that the aberrant palpus, wing venation and characters of the male terminalia found in *Brachyradia* are merely reductions due to their small size and therefore represent species with a more recent apomorphic specialisation confined to an Oriental lineage. In such a case, *Brachyradia* might be considered a specialised recent offshoot of *Brevicornu* and render the latter paraphyletic. However *Brevicornu* ranks among the most widespread Exechiini genera with some 80 described species and a near cosmopolitan distribution including the Oriental region and they form a homogenous group looking much the same all over the world. It would require a total breakdown of the classical Winnertzian character system to force the two new species into *Brevicornu* or *Cordyla*, and this situation appears to be typical for some of the genera of fungus gnats that have been diagnosed based on European species (for a similar discussion about *Dziedzickia* Johannsen, 1910, see Ševčík et al., 2011). The established character system corresponds well with characteristics of both male and female terminalia and works well in the Holarctic region, but not always so in the tropics. The terminalia in both sexes of *Brachyradia* does not fit to *Brevicornu*, nor to *Cordyla* and certainly not to *Anatella*. Pending more convincing phylogenetic hypotheses and a better overview of the tropical Exechiini fauna, we therefore find it justified to erect a new genus for these aberrant taxa. A parallel can be drawn to the so called 'Heterotricha-group' where once someone dared to put name on a number of enigmatic, putatively primitive fungus gnats (Chandler, 2002), fruitful studies and discussions on the phylogeny of the group were initiated (e.g. Chandler, 2002; Jaschhof, 2004; Hippa & Vilkamaa, 2006; Amorim & Rindal, 2007).

Often when new tropical taxa are added, they are smaller in body size than their Holarctic counterparts. This may result in a breakdown of classical diagnostic characters due to reductions and changed body proportions. Examples can be found in the following two Neotropical genera of Exechiini, the only other non-Palaeartic Exechiini genera described so far. *Boraceomyia* could be considered an apomorphic offshoot

of *Exechiopsis* (and thus make the latter a junior synonym like considered by Tuomikoski, 1966:178). Species of this genus are comparatively smaller and some have reduced wing venation (Cu-fork sometimes absent) and at the same time have extremely elongated and highly specialised male genitalia. *Neallodia* also has varying wing venation and could be considered an apomorphic offshoot to *Cordyla* where the swollen third palpal segment is secondary reduced. We have seen material from tropical regions with several similar examples of small *Exechia* and *Exechiopsis* "lookalikes" with reductions and altered body proportions. This general trend is reported also for other groups. Sæther & Andersen (1996) discussed parallel reductive trends towards the tropics observed in several genera of Chironomidae, some of which were considered to be of old Gondwanian origin.

Until morphological or molecular studies enlighten the evolution of the tribe Exechiini with better support for character transformations it is impossible to judge if the trends observed in *Brachyradia* represent apomorphic parallel reductions of more recent origin or older evolutionary trends tracing back to the origin of the tribe Exechiini. We find it interesting that *Cordyla* and *Anatella* have been hypothesized to be among the most primitive genera of the tribe (Rindal & Sjøli, 2006; Rindal et al., 2007). With closely associated *Neallodia* in the Neotropical region and *Brachyradia* in the Oriental and Australasian regions these could represent early offshoots of the Exechiini rather than a more recent migration to the tropics.

Zoogeographical remarks. — The new genus appears to be confined to the Oriental region and surrounding tropical islands, including New Guinea. It has not turned up in studied collections from Japan, Korea, Bhutan and Nepal (JK, pers. obs.). The mycetophilid fauna of Papua New Guinea, as far as is known, apparently comprises more Oriental than strictly Australian elements (JŠ, pers. obs.). For example, Ševčík & Hippa (2010) recorded two Oriental species of the Metanepsiinae also from Papua New Guinea while there is no indication that this subfamily occurs also in Australia or New Zealand. A similar situation is found in case of *Sticholeia* described by Sjøli (1996), *Eumanota* described by Edwards (1933), and other mycetophilid genera.

Interestingly, both the new species of *Brachyradia* occur in Sulawesi, while in Thailand and Malaysia only *B. asiatica* and in New Guinea only *B. australis* are found. Although little is published about the mycetophilid fauna of Sulawesi, our unpublished data (based mainly on sampling from northern, central, and south-western Sulawesi) suggest relatively low endemism, at least at the genus level, and close affinities to the faunas of New Guinea, Borneo, and continental Asia (see also Hippa & Ševčík, 2010). This would be in contrast to many other groups of insects where a high degree of endemism at Sulawesi has been reported (e.g., Monk & Butlin, 1990; Dvorak & Bocak, 2009). However, the affinity of the local insect fauna to both New Guinea and the Oriental region has repeatedly been demonstrated (e.g., New, 2002; Bocák & Yagi, 2010). *Brachyradia* may play a role in solving this puzzle, but only further sampling combined with continued

phylogenetic analyses will reveal the pattern of distribution of the tribe Exechiini in these areas and which parts of the fauna may have originated there or migrated more recently from other regions.

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