

## ***Langkawiana maculata* gen. et sp. n. from Malaysia and its systematic position in the tribe Robsonomyiini (Diptera: Keroplatidae)**

JAN ŠEVČÍK

University of Ostrava, Chittussiho 10, CZ-710 00 Ostrava & Silesian Museum, Tyršova 1, CZ-746 01 Opava, Czech Republic.  
E-mail: sevcikjan@hotmail.com

### **Abstract**

A new genus and species of Keroplatidae (Diptera), *Langkawiana maculata* **gen. et sp.n.**, is described and its systematic position is discussed. The description is based on a male collected at Langkawi Island (Malaysia). Diagnostic characters of the new genus are as follows: the absence of ocelli, membraneous area around cerebral sclerite continues behind compound eyes, both orbital sclerite and frons well developed, short palpomeres, wings with dark bands, relatively long radio-median fusion, tibial trichia arranged in regular rows, reduced spurs on mid and hind tibia, and details on male terminalia. A new phylogenetic analysis of the tribe Robsonomyiini is proposed and a key to genera is presented.

**Key words:** fungus gnats, Sciaroidea, Keroplatidae, Macrocerinae, Robsonomyiini, Oriental region

### **Introduction**

The tribe Robsonomyiini of the subfamily Macrocerinae (Diptera: Keroplatidae) comprises one fossil and 3 recent genera (Matile, 1990): *Kelneria* Matile, 1979, *Robsonomyia* Matile & Vockeroth, 1980, *Micrepimera* Matile, 1990 and *Srilankana* Matile, 1990. Except the fossil *Kelneria* with 4 species (Matile 1979), all the other genera are monotypic and include the following species: *Robsonomyia reducta*, described after two males collected in Canada (Matile & Vockeroth 1980), *Micrepimera punctipennis*, described on the basis of a male collected at Christmas Island in the Indian ocean (Matile 1990) and *Srilankana mirabilis*, described by Matile (1990) after a single male specimen from Sri Lanka.

During a collecting trip to Malaysia in January 2009, I captured a remarkable male specimen of a new species combining characters of all the three above mentioned extant genera of Robsonomyiini and also several characters present in the tribe Macrocerini. That new species is described in this contribution. A new genus is proposed for this species, on the basis of a revised phylogenetic analysis of the tribe.

### **Material and methods**

The type specimen was collected by sweep-netting in a mixed tropical forest near the top of the highest mountain of the Langkawi Island, Gunung Raya. The holotype specimen with cleared terminalia is stored in ethanol and deposited in the collection of the Silesian Museum, Opava, Czech Republic (SMOC). The morphological terminology principally follows that of Matile (1990) and Søli *et al.* (2000).

The phylogenetic analysis is based on 122 morphological characters and their codes used by Matile (1990, pp. 655–656). Characters 123–125 of Matile's matrix referring to female structures were omitted since no females are known for any species of the tribe. The following three characters were added: 123 - ratio of height to width of eye in lateral view (0—less than 1.5, 1—more than 1.5); 124 - orbital sclerite (0—absent, 1

—present); 125 - length of R-M (0—short, 1—long, at least as the stem of M-fork). All known genera of Robsonomyiini and two outgroup genera (*Macrocera* and *Hesperodes*) were included. The data matrix (Tab. 1) was analysed in Winnona (Goloboff 1999). The search parameters used were 'hold100000; hold/1000; mult\*1000; mult\*max\*'. All characters were equally weighed and considered non-additive. The resulted cladograms and character distribution were analysed in Winclada (Nixon 2002). Additional photographs of the type specimen are available at Fungus Gnats Online web site (Ševčík 2009).

### *Langkawiana* gen. n.

Type species: *Langkawiana maculata* sp. n.

**Gender:** feminine.

**Etymology.** The generic name is derived from Langkawi Island.

**Diagnosis.** A relatively small, *Macrocera*-like fungus gnat with elongated abdomen and narrow wings (Fig. 1). Ocelli absent. Eyes relatively narrow. A large cerebral sclerite, separated from the rest of head by distinct membranous area. The membranous area continues behind compound eyes. Orbital sclerite well developed. Frons distinct, in the form of a shallow triangular sclerite with median furrow. Palpus five segmented. Palpomeres short, approximately as long as wide. Wing with apical and median dark band. Sc ending free. Radio-median fusion distinct, as long as the stem of M-fork. Basal portion of media developed. Vein R4 absent. A1 weak but reaching wing margin. Tibial trichia arranged in regular rows. Apical spurs on mid and hind tibia strongly reduced, shorter than tibial diameter. Tergite 9 short, transverse. Gonostylus apically blunt, bearing a single subapical tooth.



**FIGURE 1.** *Langkawiana maculata* gen. et sp. n., male habitus (scale bar 1 mm)

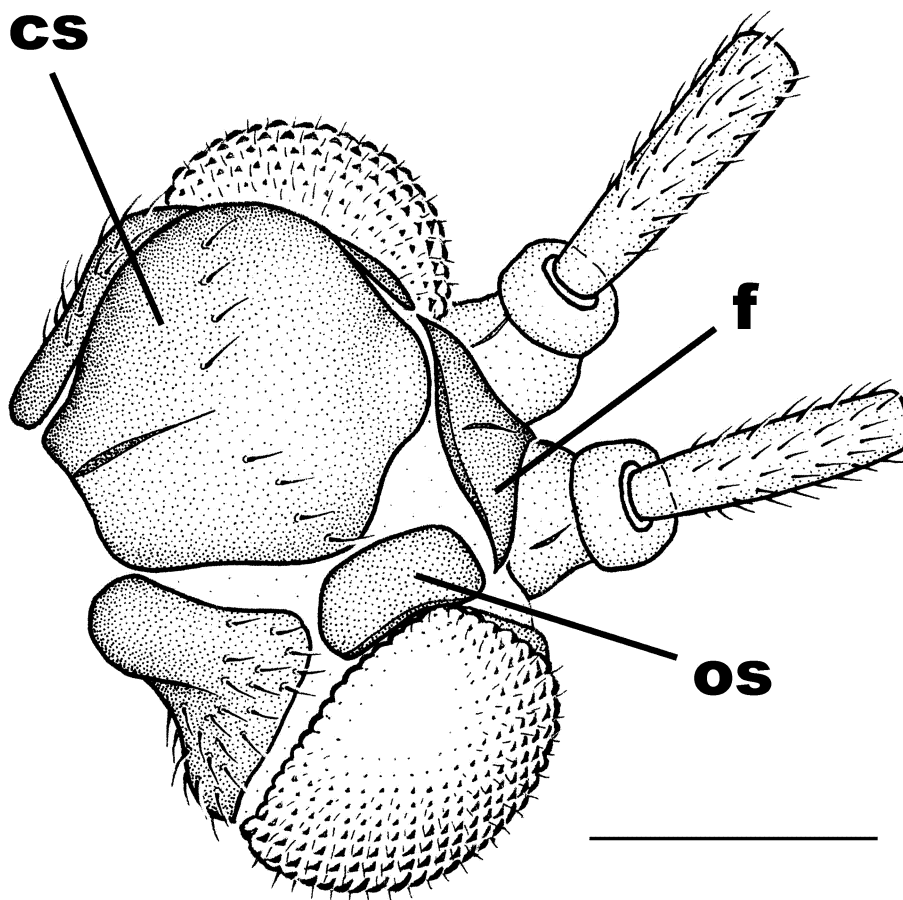
### *Langkawiana maculata* sp. n.

**Type material. Holotype male:** MALAYSIA, Pulau Langkawi, Gunung Raya, mixed forest near the top, 670 m, 31.1.2009, J. Ševčík leg. (SMOC).

**Description. Male.** Body length 3.8 mm.

**Head.** Dark brown. Ocelli absent. Compound eyes relatively narrow, mainly in the upper half, 1.6 times as high as broad in lateral view, shortly pubescent. Cerebral sclerite large, subcircular, with a median longitudinal furrow in posterior half and a transverse row of black setae. Frontally and laterally separated from the rest of head by a broad membranous area (Fig. 2). The membranous area continues behind compound eyes. Orbital sclerite well developed, as a subrectangular longitudinal sclerite separated by membranous area. Frons in the form of a shallow triangular bare sclerite with sagittal furrow (Fig. 2). Antennae with dark setae on each segment, not longer than its diameter. Length of antenna 2.7 mm. Scape and pedicel brownish yellow. Scape slightly longer than wide, pedicel shorter than wide, rounded. Flagellum dark brown (basal two segments paler), cylindrical, tapering towards apex, with 14 flagellomeres, the first 10 flagellomeres 4 to 6 times as long as wide, the apical 4 segments slender and difficult to differentiate. Mouthparts and palpi yellowish, palpomere 2 brown. Palpus five segmented, sparsely covered with setae, two basal palpomeres tiny and fused. Palpomeres 3–5 not much longer than wide, palpomere 3 darker and slightly swollen.

**Thorax.** Mostly dark brown. Scutum with two rows of dorsocentral setae and laterally with prealar and postalar setae. Scutellum dark brown, with a row of fine subapical setae, without long apical bristles. Mediotergite and laterotergite bare, dark brown. Anepisternum all brown, with black setae on its upper half, slightly excavated on the upper half of hind margin. Preepisternum 2 (katapisternum of Matile 1990) bare, dark brown with its upper third pale. Anepimeron (mesepimeron of Matile 1990) mostly brown, apparently fusing with preepisternum 2 but well separated from laterotergite (Fig. 3). Haltere yellowish, slightly longer than the first abdominal tergite.



**FIGURE 2.** *Langkawiana maculata* gen. et sp. n., head from above (scale bar 0.2 mm); cs = cerebral sclerite, f = frons, os = orbital sclerite

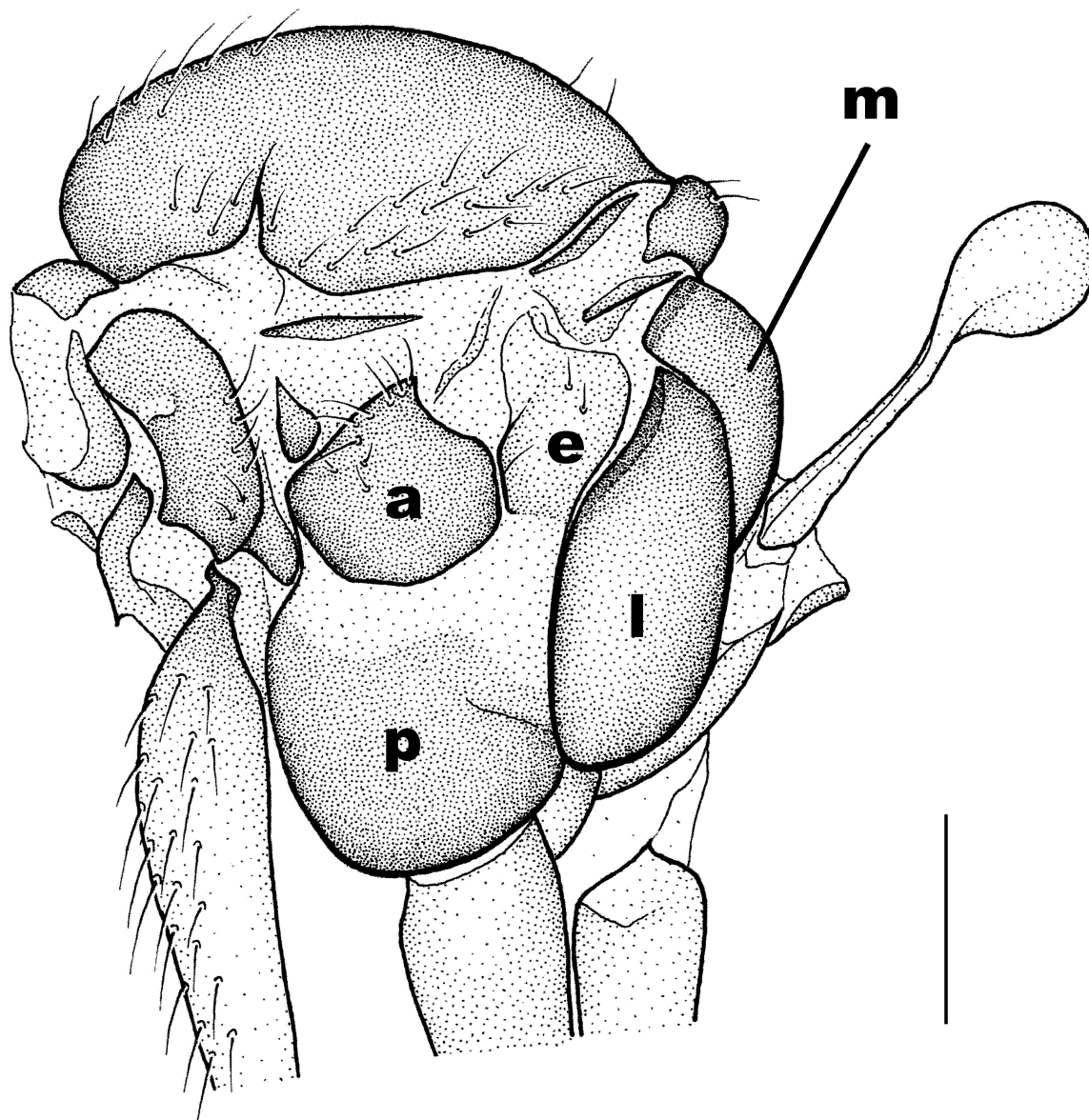


FIGURE 3. *Langkawiana maculata* gen. et sp. n., thorax in lateral view (scale bar 0.2 mm); a = anepisternum, e = anepimeron, p = preepisternum 2, l = laterotergite, m = mediotergite

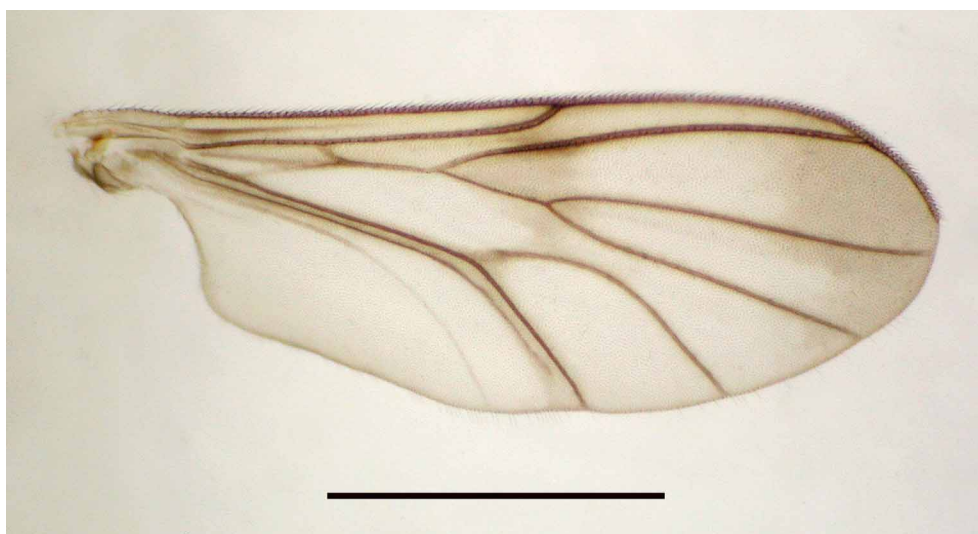


FIGURE 4. *Langkawiana maculata* gen. et sp. n., right wing (scale bar 1 mm)



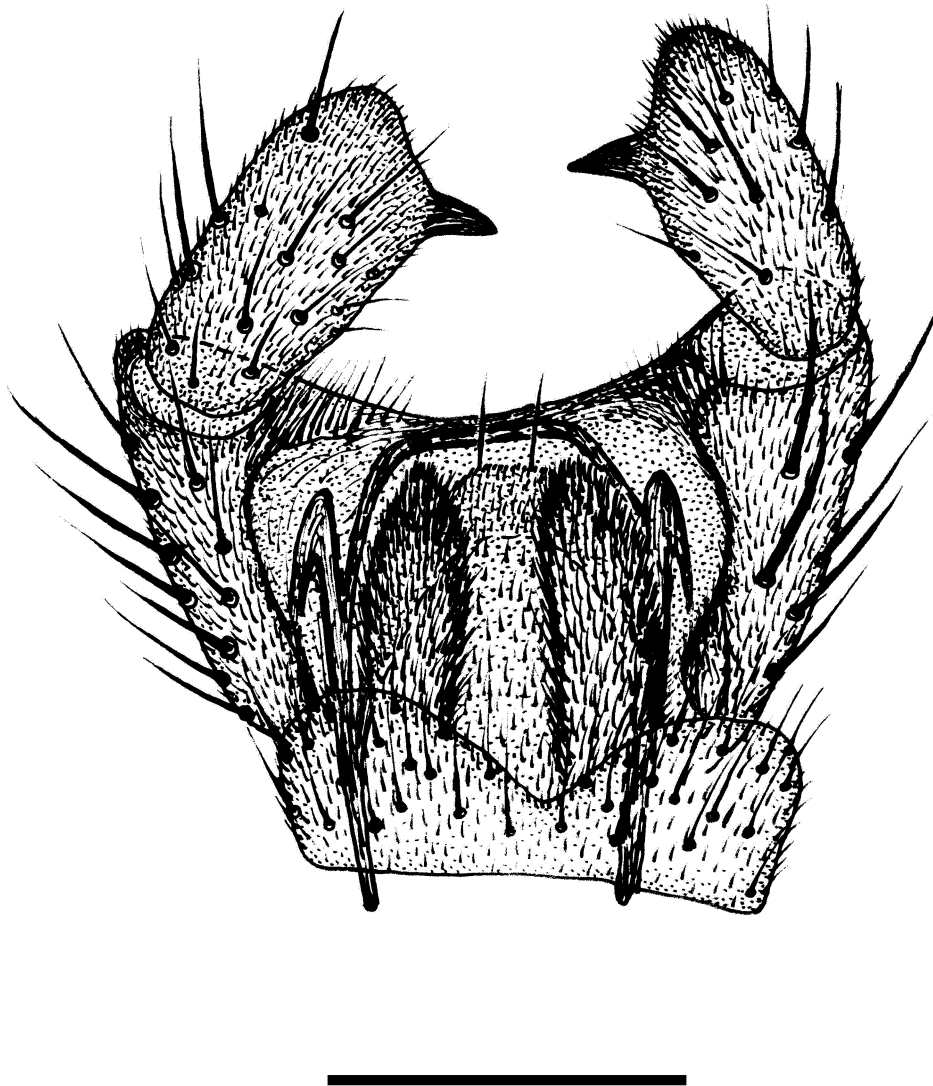


FIGURE 5. *Langkawiana maculata* gen. et sp. n., male terminalia, dorsal view (scale bar 0.1 mm)

**Wing.** Hyaline, its membrane covered with microtrichia, without macrotrichia. Tip of wing darkened. A distinct dark band through the middle of wing (Fig. 4). Wing length 2.55 mm. Wing width 0.95 mm. Ratio of length to width 2.68. Costa produced beyond R5 to 4/5 of the distance of the tips of R5 and M1. Costa and radial veins covered with macrotrichia. Sc ending free. Radio-median fusion distinct, as long as the stem of M-fork. Basal portion of media developed. CuA1 approaching CuA2 in the middle of wing. CuP fold-like, dark and distinct, almost reaching wing margin. Vein A1 less distinct, but reaching wing margin. Anal angle of wing relatively acute. Alula absent.

**Legs.** Mostly yellowish brown, covered with dark trichia. Fore coxa brownish yellow, mid and hind coxa darkened. C1 covered with setae mainly on front and hind side, C2 with several setae at apical third and C3 with a longitudinal row of posterolateral setae, shorter than the width of coxa. Hind coxa widens towards its base. Femora sparsely clothed with fine dark trichia, not longer than maximum width of femur. Mid and hind femur darkened, mainly towards the apical part. All tibiae with numerous trichia about as long as tibial diameter, tending to form more or less distinct dense rows. The apex of fore tibia widened, without distinct anteroapical depressed area. Fore tibia with one apical spur, as long as maximum tibial diameter. Two remarkably small spurs present on both mid and hind tibia, shorter than tibial diameter and resembling tibial setae. Tarsal claws simple.



**FIGURE 6.** *Langkawiana maculata* gen. et sp. n., internal male terminalia, dorsal view (T9 removed)

**Abdomen.** Tergite 1 all dark brown, apically pointed. T2-T7 pale with a wide dark apical band. Sternite 1 dark, S2-S7 mostly yellowish, with narrow dark apical band. Segment 8 all dark. Length of abdomen 2.6 mm.

**Terminalia.** Light brown. Length of terminalia 0.3 mm. Tergite 9 short, transverse (fig. 5). Caudal margin of gonocoxites evenly rounded, forming a shallow depression. Basiphallus in the form of a dorsal sclerotized bridge, distiphallus basally sclerotized (fig. 6). Gonostylus simple, apically blunt, with a single subapical dark tooth.

**Female.** Unknown.

**Biology.** Unknown. The specimen was captured in the driest climatic season at the island.

**Etymology.** The specific name refers to the markings on wings and abdomen.





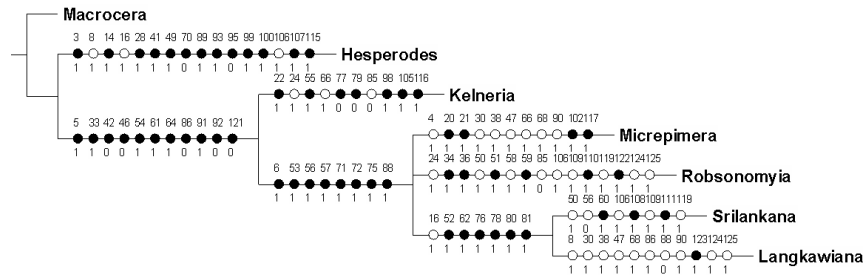


FIGURE 7. Phylogeny of the Robsonomyiini. Strict consensus cladogram of five MPT (125 steps, CI = 74, RI = 53). Black circle = unique synapomorphy, open circle = non-unique synapomorphy.

Discussion

The new genus differs from the related genera in the complex of characters, mainly on head, wings and legs. The structure of head in *Langkawiana* is most similar to that of *Robsonomyia*, mainly due to the extension of membranous area behind eyes and presence of distinct orbital sclerites. The well developed frons in *Langkawiana* is a unique character within the Robsonomyiini, but it is known in *Hesperodes* and more strikingly in *Vockerothia* Matile, 1990 of the tribe Macrocerini.

The absence of ocelli is a rare character state among all fungus gnats, within the Keroplatidae known also in *Hesperodes* and *Vockerothia* (Macrocerinae), and in the recently described genus *Sciarokeroplatus* Papp & Ševčík, 2005, tentatively placed in the separate subfamily Sciarokeroplatinae (Papp & Ševčík 2005). Short palpomeres are considered by Matile (1990) as one of the synapomorphies of the clade comprising *Robsonomyia* and *Srilankana*, while *Micrepimera* has palpomeres more elongated.

Wing venation of *Langkawiana* is similar to that of *Robsonomyia* and *Srilankana*, mainly in the presence of relatively long radio-median fusion and well developed basal cell. The absence of R4 is a synapomorphy of *Langkawiana* and *Robsonomyia*, while this vein is present in *Srilankana*. There is no real connection of CuA1 to CuA2 in *Langkawiana* but the shape of CuA1 suggests that this connection would be rather distally from the wing base, reminding the situation in the Mycetophilidae. Vein A1 in *Langkawiana* is weak as in *Micrepimera* but reaching wing margin as in *Robsonomyia* or *Srilankana*.

Reduced tibial spurs on mid and hind leg are another unusual feature, reported within Sciaroidea for the South American genus of Orfeliini, *Dolichodactyla* Freeman, 1951, of which only a single female is known (Freeman 1951), and for some genera of Macrocerinae (e.g. *Chiasmoneura* De Meijere, 1913, *Vockerothia*, *Micrepimera*, *Srilankana*, see Matile 1990).

The male terminalia of *Langkawiana* differs from those of both *Robsonomyia* and *Srilankana* mainly in the shape of tergite 9 (transverse vs. longitudinal), and from those of *Micrepimera* by the apically rounded gonostyli, longer cerci and different shape of caudal margin of gonocoxites.

Key to genera of Robsonomyiini

- 1 Ocelli absent ..... 2
- Ocelli present ..... 3
- 2 Wings with dark markings, vein R4 absent, A1 weak, orbital sclerite well developed ..... *Langkawiana*
- Wings unmarked, R4 present, A1 strong, orbital sclerite absent ..... *Srilankana*
- 3 Wings with dark markings, antennae with 13 flagellomeres, spurs on mid and hind tibia reduced ..... *Micrepimera*
- Wings unmarked, 14 flagellomeres, all tibial spurs well developed ..... 4
- 4 Membranous area around cerebral sclerite reaching behind compound eyes, Sc ending in R, R4 absent ..... *Robsonomyia*
- Membranous area small, Sc ending in C, R4 present, fossil genus ..... *Kelneria*



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