

***Sororsenexa*—New Genus (Diptera: Empididae: Hemerodromiinae) from Australia**

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ABSTRACT. *Sororsenexa*, new genus (Insecta: Diptera: Empididae: Hemerodromiinae), is described from Australia. The genus is monotypic with *Sororsenexa macalpinei* n.sp. its type species. Systematic relationships with other Hemerodromiinae are discussed and a key to Australian genera of the tribe Chelipodini presented.

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The Empididae subfamily Hemerodromiinae comprises small predatory flies with characteristically inflated raptorial forelegs. Most of the 17 extant genera and 453 species currently described have been assigned to two monophyletic tribes, Hemerodromiini and Chelipodini, although the systematic position of some genera remains uncertain (Plant, 2011). However, many taxa remain undescribed at both species and genus levels, particularly in moist tropical and southern temperate forests. In Australia a single species *Chelipoda biroi* (Bezzi, 1904) is known (Smith, 1989) but judging from museum collections, a rich fauna of Hemerodromiini and Chelipodini is present, especially in the eastern mountain ranges and in Tasmania.

Several undescribed Australian Hemerodromiinae were included in a recent phylogenetic appraisal of the subfamily (Plant, 2011). One of these (designated GENAU[C] in that study) was considered to belong in Chelipodini but showed rather weak support as the sister-group of the rest of the tribe. It exhibits several important apomorphies including

having only a single row of short specialized setae beneath the front femur, an apicoventral spine on the front tibia, vein Sc fading not long after the branch point of Rs and especially the termination of the costa shortly beyond the apex of the wing and there can be little doubt that the taxon warrants generic status. The present work describes this taxon as a new genus comprising a single new species.

Materials and methods

Specimens used in this study were borrowed from or deposited in the Australian Museum, Sydney, Australia and National Museum of Wales, Cardiff, UK. The general morphological terms of McAlpine (1981) and antennal nomenclature of Stuckenberg (1999) were employed and interpretation of genitalic homology followed Cumming *et al.* (1995) and Sinclair (2000). Maceration of genitalia was performed in hot (90°C) lactic acid (85% v/v).

Taxonomy

Sororsenexa n.gen.

Figs 1–7.

Type species: *Sororsenexa macalpinei* n.sp., here designated.

Etymology. The generic name is a contraction of the Latin *soror* (sister) and *senex* (old person) in reference to the putative basal sister group relationship between *Sororsenexa* and the remaining Chelipodini. The genus is feminine.

Diagnosis. A characteristic genus of the Empididae subfamily Hemerodromiinae (Fig. 1) with raptorial forelegs widely separated from the midlegs. *Sororsenexa* can be distinguished from other Hemerodromiinae by the combination of characters (*a*) costa not circumambient, continued a short way only beyond apex of wing, (*b*) vein R_{4+5} forked, (*c*) front femur with a single ventral row of short specialized setae (denticles) and more or less lacking posteroventral or anteroventral rows of stronger “normal” setae on either side, (*d*) uniserial acrostichal setae well developed if small along entire length between anterior of scutum and front of prescutellar depression, (*e*) setulae present (if small) on laterotergite.

Description. (Description based on holotype and paratypes owing to shrinkage and distortion affecting all specimens). Head large, in dorsal view (Fig. 2) at least as wide as thorax and half its length; somewhat dorsoventrally compressed (at least in female, male specimens are distorted). Eyes with anterior ommatidia enlarged in both sexes; crena (eye notch) absent. Face short, hardly as long as three basal antennal segments, narrow, no wider than scape is long, narrower in male, parallel sided. Mouth cavity apparently deeply recessed, abruptly receding from frons ventrally (possibly a distortion artefact due to shrinkage on drying but present in all type specimens). Frons very broad triangular, margins almost linear; 2 pairs of weak marginal setae behind antenna and much stronger pair near margin just behind level of posterior ocellus. Ocellar tubercle hardly developed with one strong and one weak pair of setae. Vertex with 2 or more strong setae more or less contiguous with line of smaller stout postocular occipital setae which become finer on lower occiput; some distinct setae on posterior occiput and behind mouth and some longer setae lateral to mouth opening. Antenna with scape almost bare; pedicel hardly longer than wide with subapical circlet of setae; postpedicel globose, covered with minute setulae and a few longer hairs subapically; stylus somewhat longer than basal antennal segments combined, tapering, micropilose, slightly swollen basal article and bristle-like apical mechanoreceptor present. Proboscis rather stout, apically pointed, as long as head is deep, directed vertically downwards. Palpus very small, almost globular, micropilose with 2–3 long fine setae.

Thorax short, hardly longer than deep, narrowed anteriorly in profile. Scutum rather strongly arched anteriorly in lateral view (Fig. 1), prescutellar area more or less flat; quadrate rectangular in dorsal view with postpronotal lobe well defined and slightly protuberant. Fused anepisternum +

katapisternum rather narrowly triangular, in lateral view with longer anteroventral margin more or less linear. Scutellum with posterior margin rounded. Acrostichal setae small but distinct, uniserial extending posteriorly to anterior margin of prescutellar depression; 6–7 dorsocentral setae well developed, becoming longer posteriorly, anterior 1 or 2 setae displaced laterally such that line of dorsocentrals rather curving anteriorly; postpronotal setae long, incurved, strong, with much smaller seta below; 1 long strong seta extending laterally behind postpronotal lobe; 3–4 notopleural setae, lower pair very strong; 1 small supra-alar and stronger postalar setae; 1 strong outwardly directed seta on thoracic “collar”. Laterotergite with 3–4 fine setulae.

Legs rather stout and conspicuously setose. Front coxa rather short and broad, only 4× as long as wide and 0.6–0.7× length of thorax, 1 row of long fine erect setae anteriorly (Fig. 3); mid and posterior coxae with similarly long setae anteroapically and on outer face. Front femur (Fig. 3) stout, evenly inflated 4–5× as long as wide, rather longer than front coxa; line of short stout denticle-like setae ventrally at the base of which are two larger but still stout setae (in females these basal setae often more or less of equal size while in males usually unequally developed); posteroventral row of fine distinct setae widely spaced from line of denticles; anteroventral row of small setulae very weakly developed and inconspicuous; dorsal ciliation of fine setae conspicuous; posterior face with distinct setae, anterior face almost bare. Posterior femur somewhat inflated but only about 0.5 as wide as front femur and slightly longer, distinctly hairy with dorsal and anteroventral series of setae about as long as depth of limb; mid femur more slender with less conspicuous but still strong setae throughout and rather stronger posteroventral series of setae.

Front tibia about 0.8× length of front femur, geniculate basally; small sharply pointed curving apical spine (Fig. 3) arising from slight ventral swelling juxtaposing with basal setae of femur when limb is reflexed; ventral row of numerous short rather spine-like adpressed setae. Mid and posterior tibiae about as long as their corresponding femora, conspicuously setose but setae not as long as depth of limb except dorsally on posterior tibia. All tarsi with segments 1–4 progressively shorter, second segment of front leg not shorter than third.

Abdomen with scattered fine hair like setae longest on posterior margins of sternites and tergites. Male terminalia (Figs 4–5) reflexed to more or less vertical position; hypandrium and epandrium separate; hypandrium large, rather oblong quadrate appearing somewhat keel-shaped in posterior (Fig. 5) or ventrolateral aspects, left and right lobes narrowly separated by weakly sclerotized area posteriorly (usually visible only after maceration) and bearing some long marginal setae; epandrium smaller than hypandrium, flattened ovate with numerous long setae from apex of which rather pointed leaf like subepandrial process emerges dorsally. Cercus projected vertically along anterodorsal margin of epandrium, narrow and rather strap-like in profile but viewed from in front (Fig. 6) inwardly curved with numerous small stout setae apically on inner face. Distal section of phallus strongly reflexed anteriorly when not withdrawn into sinusoidal phallic sheath; sheath strongly reflexed posteriorly on distal part.



Figure 1. *Sororsenexa macalpinei* n.sp., male habitus.

Female abdomen bluntly tapered apically, cercus about 2× as long as wide with long apical setae of equal length and a few shorter marginal setae.

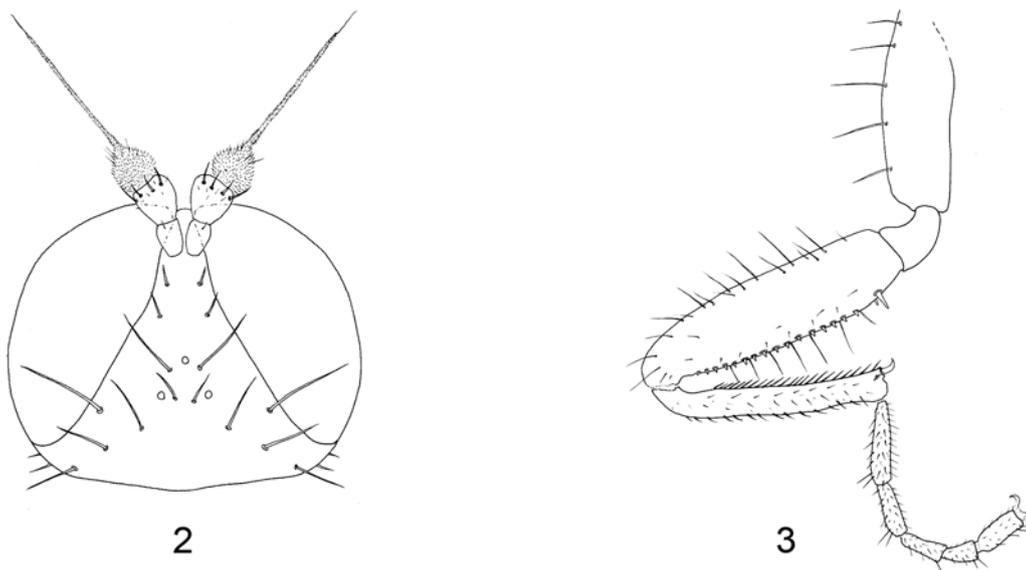
Wing (Fig. 7) rather short and broad, 2.5× as long as widest, apically rounded, anterior and posterior margins almost subparallel, anal lobe very weakly developed. Vein C strong to wing tip, fading thereafter and completely absent along posterior margin. Vein Sc present, free, reaching almost to C but very weak beyond level of branching of Rs; crossvein h present. Rs short, originating at about 0.25 from base of wing, diverging narrowly from R₁. R₂₊₃ long, ending in distal 0.3 of wing. R₄₊₅ forked and diverging at angle of 60–65° with R₅ ending near wing tip. Median vein linear, fork M₁₊₂ absent. CuA₁ linear, fading near wing margin. Cell br rather narrow, truncately pointed apically, longer than cells bm or cup. Cell cup closed, apically rectangular, A₁ strong continued for short distance beyond end of cup. Costal bristle strong.

Sororsenexa macalpinei n.sp.

Figs 1–7

Type material. HOLOTYPE ♂, AUSTRALIA: Royal National Park near Sydney, NSW, 13 Aug. 1971, D.K. McAlpine (Australian Museum). Paratypes 7♂♂, 8♀♀, same data as holotype; 3♂♂, 3♀♀, Calga, Hawkesbury Distr., NSW, 29.9.1956, D.K. McAlpine (9♂♂, 10♀♀, Australian Museum; 1♂, 1♀, National Museum of Wales).

Description. Length 1.0–1.1 mm (♂), 1.1–1.3 mm (♀); wing 1.3–1.4 mm. Head black rather thickly and uniformly covered with silvery grey dust. Male antenna yellow, postpedicel not contrasting with basal segments, stylus black. Female antenna darker, postpedicel blackish contrasting with somewhat paler basal segments. Mouthparts yellowish with apex of proboscis black. Setae brownish in male, blackish



Figures 2–3. *Sororsenexa macalpinei* n.sp. (2) female head, dorsal; (3) male anterior leg, anterior aspect.

in female, rather paler on lower occiput near mouth cavity.

Thorax with ground colour of scutum and scutellum varying from dark yellow to almost black, generally paler in males but always heavily obscured by silvery grey dusting which in certain lights can appear blackish along median line or along line of dorsocentral setae on scutum; pleura somewhat paler and rather less strongly but uniformly dusted; all setae dark yellowish brown.

Legs yellow to yellowish brown, apical two segments of tarsi vaguely darker; all setae yellowish but front tibia with apical spine and front femur with ventral denticles and ventrobasal setae shining black.

Abdomen dark brown with similarly coloured or slightly paler setae; thinly but uniformly greyish dusted including hypandrium and epandrium. Subterminal segments progressively narrower than anterior segments in female, similarly sized in male.

Wings faintly tinged brownish yellow, veins yellow to yellowish brown, halter dirty yellow.

Etymology. The specific name honours David McAlpine who has collected all known specimens of *S. macalpinei*.

Comments. The precise collection localities were not recorded but the collector considers both known sites to have been a mixture of scattered eucalypts and sclerophyll heath. All specimens were taken in August or September which are cool months of the austral late winter and early spring.

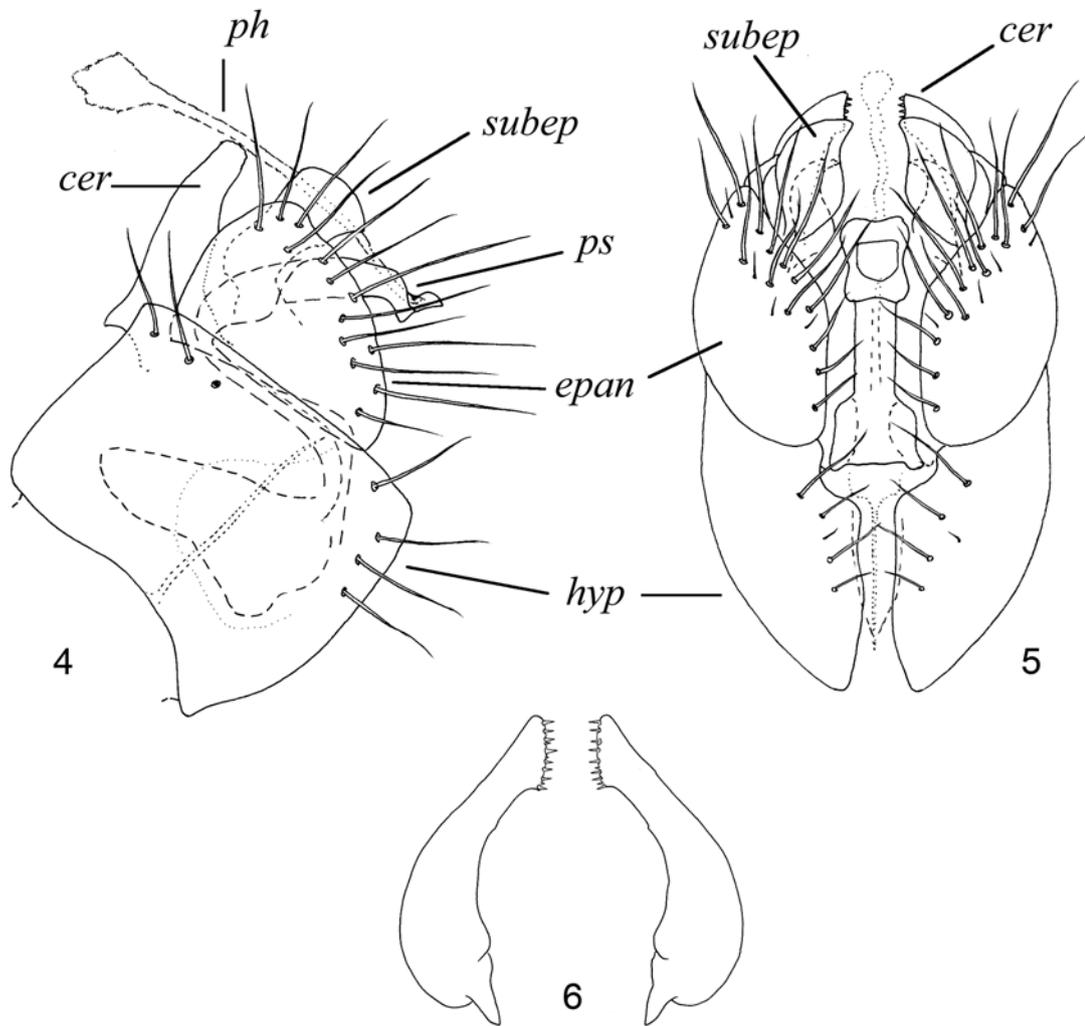
Discussion

A recent cladistic analysis of Hemerodromiinae recovered *Sororsenexa* subtending a sister-group relationship between *Anaclastodeton* Plant and the rest of the tribe Chelipodini (Plant, 2011). *Sororsenexa* exhibits several apomorphies important in the Chelipodini including the costa fading beyond the apex of the wing, front tibia with a strong apicoventral spine and only a single row of short denticles beneath the front femur without any closely adjacent

anteroventral or posteroventral spine-like setae. In all other Hemerodromiinae the costa is circumambient and the ventral row of denticles is biserial, at least in part, on either side of which are obvious strong spine-like setae. Although a well-developed tibial spine is present in some Hemerodromiini genera, it is otherwise absent in Chelipodini. *Sororsenexa* is also the sole member of the Chelipodini in which the plesiomorphic conditions of forked R_{4+5} and well-developed acrostichal setae are retained. The South American genus *Chelipodozus* Collin, formally included in Chelipodini but now considered *incertae sedis* in Hemerodromiinae (Plant, 2011) also has R_{4+5} forked. In *Chelipodozus* however cell dm is present and cup is apically rounded. The wings of all previously described Hemerodromiinae are long and narrow (usually at least 3× long as wide) and the relatively short and broad wings of *Sororsenexa* appear to be unique characters of the genus. The absence of a crena (eye notch) in *Sororsenexa* is a highly diagnostic character as it is present in almost all Empididae and is a conspicuous feature in all other described Hemerodromiinae.

Sororsenexa shares two important apomorphies with *Anaclastodeton*; the loss of the fork in vein M_{1+2} and loss of crossvein dm-cu, although the latter in particular is subject to much homoplasy in Hemerodromiinae (Plant, 2011). Both these genera retain a plesiomorphic elongate second tarsal segment on the front leg, a condition otherwise characteristic of Hemerodromiini and the most basal Hemerodromiinae genera *Afrodromia* Smith and *Drymodromia* Becker. *Anaclastodeton* however exhibits two highly distinctive and unique apomorphies; loss of the basal article of the antennal stylus and greatly enlarged, bilobed male cerci (Plant, 2010; 2011).

The single known species of *Sororsenexa* has only been collected from two localities in the Sydney Basin, New South Wales, Australia but further collecting will be required to establish if it is truly endemic to this area or merely overlooked, perhaps on account of its unusually small size or it emerging during the cooler winter months when collecting efforts are much less frequent.



Figures 4–6. *Sororsenexa macalpinei* n.sp. male genitalia: (4) lateral view; (5) posterior view; (6) cerci in dorsal view. Abbreviations: *cer*, cercus; *epan*, epandrium; *hyp*, hypandrium; *ph*, phallus; *ps*, phallic sheath; *subep*, subepandrial process.

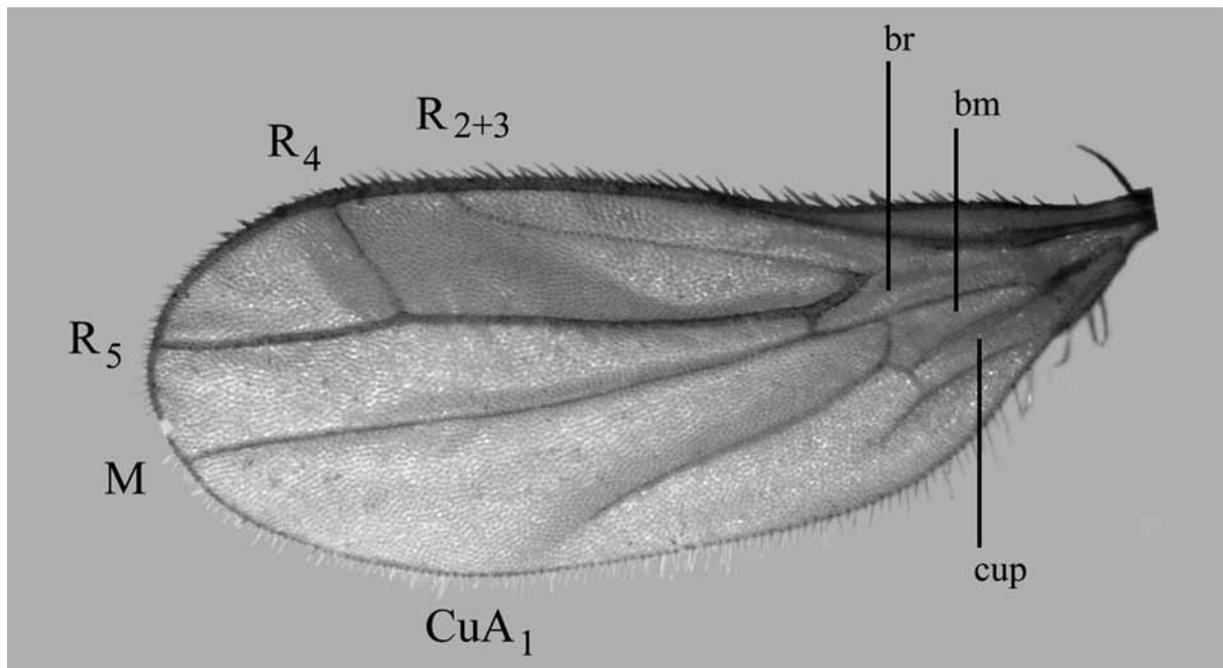


Figure 7. *Sororsenexa macalpinei* n.sp. male wing showing nomenclature of major veins and cells.

Key to Australian genera of Chelipodini

The following key is tentative as undescribed genera are almost certainly present in Australia and local forms of *Chelipoda* are subject to considerable but unstudied variation, especially in wing venation.

- 1 Vein C fading a short distance beyond apex of wing; R_{4+5} forked; eye notch (crena) absent *Sororsenexa* n.gen.
- Vein C circumambient, continued (if sometimes weakly) around posterior margin of wing; R_{4+5} linear; eye notch (crena) present and distinct 2
- 2 Crossvein dm-cu absent (cell dm absent); long veins R_{2+3} , R_{4+5} , M and CuA_1 unbranched; second tarsal segment of front leg longer than third segment; antenna lacking basal article to stylus; male cercus bilobed with upper lobe greatly enlarged and apically broadened *Anaclastoctedon* Plant
- Crossvein dm-cu usually present (cell dm closed); second tarsal segment of front leg shorter than or at most as long as third segment; antennal stylus with basal article; male cercus otherwise *Chelipoda* Macquart

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