



A new species of *Aphelocheirus* (Hemiptera: Heteroptera: Aphelocheiridae) from southern India

ROBERT W. SITES¹, M. ARUNACHALAM² & S. SUNDAR²

¹Enns Entomology Museum, Division of Plant Sciences, University of Missouri, Columbia, Missouri 65211, USA.

E-mail: sitesr@missouri.edu

²Sri Paramakalyani Centre for Environmental Sciences, Manonmaniam Sundaranar University, Alwarkurichi-627412, Tamilnadu, India

Abstract

A new species of *Aphelocheirus* (Hemiptera: Heteroptera: Aphelocheiridae) inhabiting riffles of a stream in Kerala state in southern India is described. *Aphelocheirus kaygieyess* n. sp. is diagnosed by widely separated hemelytra and the pattern of dark maculation on the vertex. This species is compared to other Indian species of *Aphelocheirus*. Seven species of *Aphelocheirus* are known now from India.

Key words: *Aphelocheirus*, Aphelocheiridae, Nepomorpha, Heteroptera, new species, lotic, India

Introduction

Aphelocheiridae is a family of predominantly tropical aquatic bugs that is restricted to the Old World. With 89 described species, the family achieves its greatest diversity in Southeast Asia and the number of species in tropical areas further westward is dramatically fewer. For example, 15 species are known from Thailand (Sites 2006), whereas only 6 species are known from India (Thirumalai 2007, 2008) and 5 from mainland Africa (La Rivers 1971).

The known Indian fauna of *Aphelocheirus* includes four species of the nominate subgenus, *Aphelocheirus*, and two of the subgenus *Micraphelocheirus*. Characteristics of the known species in India were summarized and compared in the recent excellent treatment by Thirumalai (2008). Presented here is the description of the seventh species in the genus from India.

Material and methods

Photographs of the type locality identified as L-1139 are available in a Locality Image Database via a link from the internet site of the Enns Entomology Museum, University of Missouri. All measurements are given in millimeters. Length of the body is measured from the anterior margin of the head to the posterior margin of the abdomen, width across abdominal segment III. Abdominal segment numbers are expressed as Roman numerals.

Systematics

Aphelocheirus kaygieyess n. sp.

Figs. 1–6

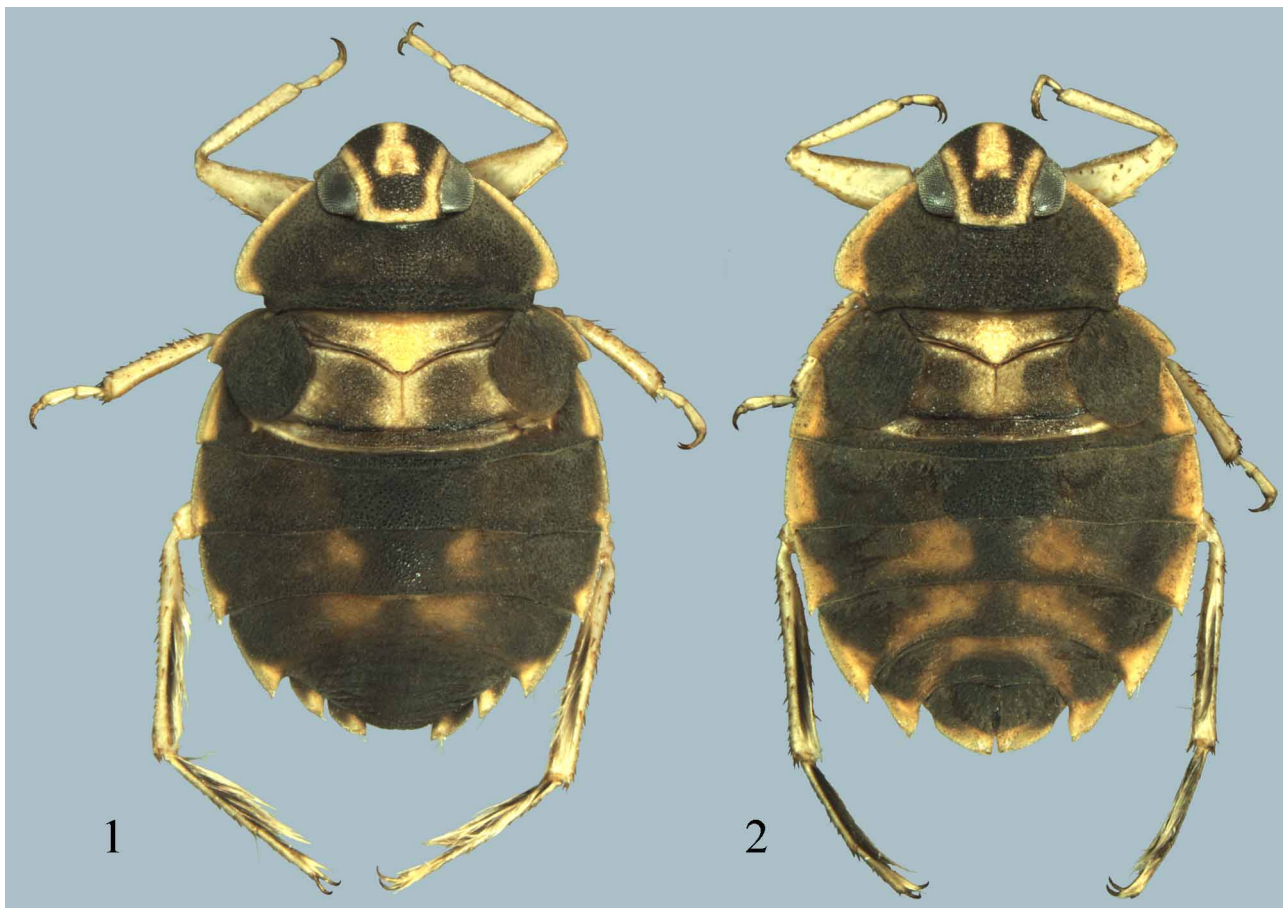
Description. Brachypterous male. Size (n=1): Length, 7.84 mm. Width, 5.20 mm. Maximum width across abdominal segment III. Overall appearance ovate (Fig. 1), flattened. Dorsally, mostly dark brown with highly contrasting yellow meso- and metanota and areas on head. Ventrally, mostly yellowish.

Head. Yellow with broad, dark brown V-shaped marking extending from vertex to anterior margin; arms of V broadening anteriorly. Head coarsely tuberculate; greatest width at anterolateral corners of eyes, 2.08 mm; with sparse, very short setae and group of slightly longer setae near posteromedial corner of eye. Head length 1.80 mm. Eyes black, divergent anteriorly, lateral margins subtly sinuate with concavity in anterolateral 1/3. Interocular distance between anteromedial corners of eyes 1.44 mm, between posteromedial corners of eyes 1.00 mm. Eye length 1.14 mm. Head extends anteriorly in front of eyes 0.38 mm. Ventrally, yellowish. Antennae pale, 4-segmented. Ratio of antennal segment lengths: 5-10-13-19. Beak yellowish in basal quarter, orange-brown distad, shining, attaining middle of mesocoxae (not including protruding stylets). Three visible beak segment lengths: 0.12, 2.08, 0.76 mm.

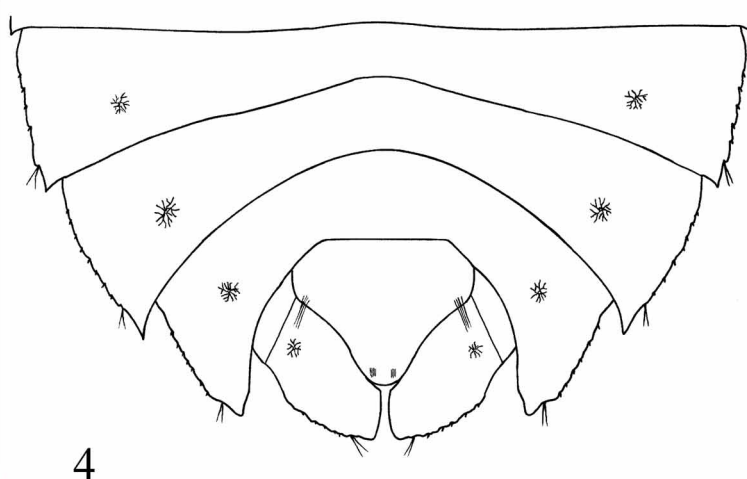
Thorax. Pronotum dark brown with narrow yellow lateral band; coarsely tuberculate; sparse, very short setae throughout; posterior margin nearly straight, with pronounced notch 1/5 distance from lateral margin to midline; pronotum width 4.12 mm, length 1.12 mm. Scutellum shallowly triangular; yellow; slight dark infuscation laterally; coarsely tuberculate; anterior margin straight, posterior apex broadly rounded; length 0.84 mm, width 2.84 mm. Wings tuberculate with longitudinal rugosity near anteromedial margin, dark brown, lighter at embolar margin; posterolateral corners produced; evenly rounded posteriorly; widely separated medially; distance of separation 2.20 mm; wing width 1.60 mm, length 1.44 mm (width measured at lateral production). Prosternum carinate at midline. Propleuron yellow brown; inner margin with notch ~90 degrees; posteromedial corner sharply acuminate, directed ventromedially. Mesepimeron and mesosternum yellowish, sparsely covered with recumbent setae. Mesosternum with large, well-developed mid-ventral tumescence. Posterior surface of tumescence oriented in dorsoventral plane, with longitudinal carina; surface of tumescence sparsely covered with recumbent setae. Metepisternum mostly pruinose with scattered recumbent setae. Metaxyphus yellow, posterolateral margins concave, posterior apex acuminate. Legs yellowish. Mesal surface of all coxae and trochanters with short setae; lateral surface shining. Coxae with dense row of stout elongate setae on mesoapical margin. Claws paired, dark yellow, gently curved, tips orange-brown, with distinct basal tooth. Lengths of profemur, protibia, tarsomeres 1–3: 2.00, 1.68, 0.12, 0.28, 0.40 mm. Arolium of propretarsus $\frac{3}{4}$ length of claws, of mesopretarsus $\frac{1}{2}$, of metapretarsus short. Pro- and mesotrochanter through tarsus with thick brush of light yellow setae on mesal faces. Mesotibia with stout peg-like setae on outer margin and apex with comb of 4–5 stout setae. Lengths of mesofemur, mesotibia, tarsomeres 1–3: 2.00, 1.68, 0.16, 0.32, 0.40 mm. Meso- and metafemora with scattered, stout setae throughout. Metafemur with sparse swimming hairs on distal half of posterior margin. Metatibia with stout erect setae on anteroventral and posteroventral margins, apex with circlet of stout spines, scattered stout spines elsewhere on outer margin, long brushes of pale swimming hairs on posteroventral and posterodorsal margins. Metatarsal segments with both series of swimming hairs continuing from metatibia, hairs dark basally on segment 2, mostly pale on segment 3, scattered stout setae on outer margin. Tarsal segment 1 inconspicuous. Lengths of metafemur, metatibia, tarsomeres 1–3: 2.52, 2.92, 0.12, 1.48, 0.88 mm.

Abdomen. Dark brown with narrow yellow lateral strip on terga II–V, yellow more pronounced in posterolateral corner of all visible segments; paired yellow areas medially on terga IV and V. Terga tuberculate, with scattered erect setae throughout. Abdominal scent gland openings evident as concave inflections of posterior margin of tergum III, 1/4-distance to lateral margin from midline. Posterolateral corner of segment II squared; III–V acuminate with progressively larger, broadly triangular spines; VI–VII produced and bluntly pointed. Ventrally, medium yellowish-brown with dark infuscation laterally, with scattered recumbent setae throughout. Sterna generally pruinose throughout. Hydrostatic sensory organ 4/5 distance from midline of sternum II to lateral margin. Spiracular rosettes on sterna II–VII 3/4 distance from midline to lateral margin; those on VI–VII reduced. Sternum III with small posteromedial protuberance. Peglike setae absent from abdominal sternal midline. Posterior margins of sternum V asymmetrical, deeply concave to left of midline; sternum VI with pronounced rounded lobe slightly to left of midline; sternum VII broadly produced at midline; sternum VIII slightly concave. Genital capsule light yellow, apex broadly pointed.

Genitalia. Pygophore with apical processes between parameres asymmetrical, with apex of left process oblique, mesal surface excavate beneath to accommodate right apical process; right apical process shorter, gently rounded apically, lateral margin straight (Fig. 3). Left paramere with mesal surface acetabular to accommodate left apical process of pygophore. Right paramere lanceolate (in dorsal view), apex pointed, with brush of brown setae on lateral surface. Phallosome of aedeagus broad basally (concealed behind apical processes of pygophore), distal visible part slender, curved to right (Fig. 3), endosoma expanded, lightly sclerotized, rastate.



FIGURES 1–2. Habitus of *Aphelocheirus kaygieyess* n. sp. (1) male, (2) female.



FIGURES 3–4. *Aphelocheirus kaygieyess* n. sp. (3) male genital capsule with aedeagus and parameres, (4) ventral aspect of posterior abdominal segments of female.



FIGURE 5. Kallar River, the type locality of *Aphelocheirus kaygieyess* n. sp.

Brachypterous female. Size (n=1): Length, 8.16 mm. Width, 5.44 mm. Coloration and setation generally same as for male, except abdominal paired yellowish areas on either side of the midline on terga IV–VI (Fig. 2). Yellow lateral and posterolateral areas of abdominal segments more pronounced. Subgenital plate yellow basally,

brown distally; broadly triangular; sides shallowly concave, gradually converging to broadly-rounded point (Fig. 4); width 1.38 mm, length 1.10 mm; with lateral trichobothria 1/4 distance from externally visible base to apex; recumbent setae throughout; group of long, stout setae just basad of apex on either side of midline. Sternum III without posteromedial protuberance. Posterior margins of sterna IV–V deeply concave and VI straight to slightly concave in middle third (Fig. 4).

Macropterous form. Unknown.

Type material. Holotype, *male*, and paratype, *female*: INDIA: Kerala St., Kallar River, N 08° 42.700, E 77° 07.383, elev 115 m, 15 March 2010, L-1139, riffles of rocky stream, M. Arunachalam, S. Sundar, M. Muralidharan, P. Sivakumar, C. Selvakumar, T. Sivaruban.

Repository. The holotype and paratype are deposited in the Zoological Survey of India.

Etymology. This handsome species is dedicated in honor of Professor Kumbakonam G. Sivaramakrishnan who is known to colleagues and other friends as KGS. The specific epithet is a noun in apposition and a phonetic representation of the initials KGS.

Habitat description. The specimens were collected from shallow riffles (ca. 0.3 m maximum depth) in a clear, swiftly-flowing stream (Fig. 5) with a substratum of loose large rocks and cobble in a sand and gravel matrix (Fig. 6). The type locality was immediately downstream from the Kallar bridge. Runs, pools, erosional areas, and other reaches of the stream were substantially deeper. In the vicinity of the type locality, the stream meanders through forest and open areas, and the canopy was open at the type locality. Goats used the stream at this area.



FIGURE 6. Substrate of Kallar River where *Aphelocheirus kaygieyess* n. sp. was collected.

Diagnosis and comparative notes. This new species clearly is a member of the subgenus *Aphelocheirus*, and in comparison to species of the subgenus *Micraphelocheirus* [*A. (M.) pygmaeus* La Rivers and *A. (M.) signatus* Zettel], it is substantially larger and the abdominal scent glands are closer to the midline than to the lateral margin. Because only a single male specimen was available and the species is easily recognized by other features, the parameres were not removed from the genital capsule for separate illustrations. Maculation of the head easily distinguishes *A. kaygieyess* n. sp. from its described congeners in India. Specifically, the broadly-based, dark, V-shaped marking on the vertex has the arms widening anteriorly to the margin. The dark marking on the vertex of

the other described species consists of a single posterior dark area, sometimes continuing anteriorly only along the midline. Also, the hemelytra are the most widely separated of any species of *Aphelocheirus* s.str. currently known from India. Of the four Indian consubgenera, *A. boukali* Zettel, *A. pradhanae* Zettel, *A. nathani* La Rivers, and *A. narmadaensis* Thirumalai, only the latter two have hemelytra that are widely separated. Of these two species, the posterolateral corners of the pronotum are similar in shape between *A. nathani* and *A. kaygiyess* n. sp. Whereas, in *A. narmadaensis*, the posterolateral corners are sharp and without posterior emargination. Thus, *A. kaygiyess* n. sp. might be most closely related to *A. nathani* of the known Indian fauna.

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References

- La Rivers, I. (1971) Studies of Naucoridae (Hemiptera). *Biological Society of Nevada Memoir*, 2, iii + 120 pp.
- Sites, R. W. (2006 [2005]) New species of *Aphelocheirus* (Heteroptera: Aphelocheiridae) from Thailand. *Natural History Bulletin of the Siam Society*, 53(2), 215–235.
- Thirumalai, G. (2007) A synoptic list of Nepomorpha (Hemiptera: Heteroptera) from India. *Records of the Zoological Survey of India Occasional Papers*, 273, 1–84.
- Thirumalai, G. (2008) *Aphelocheirus* (*Aphelocheirus*) *narmadaensis* sp. nov. (Hemiptera: Nepomorpha: Aphelocheiridae) from Madhya Pradesh, India. *Zootaxa*, 1923, 55–61.