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A new Indian Ocean species of *Ochterus* from the island of Mauritius (Hemiptera: Heteroptera: Ochteridae)

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Abstract. *Ochterus stysi* sp. nov. is described from the island of Mauritius in the western Indian Ocean. This species is only the second member of the family Ochteridae known from the islands of the Indian Ocean east of Madagascar, and the first recorded from the Mascarene Archipelago. Comparative notes are provided in regard to this new species and *Ochterus seychellensis* Polhemus, 1992, its closest putative relative. Figures are provided of the dorsal habitus and male genitalic structures.

Key words. Heteroptera, Ochteridae, *Ochterus*, taxonomy, new species, Indian Ocean, Mauritius

Introduction

The aquatic Heteroptera biota of the high islands in the western Indian Ocean is imperfectly known. Despite several centuries of intermittent collecting, new species and even genera have been described in the past 20 years from the Seychelles (D. POLHEMUS 1992; J. POLHEMUS 1990; J. POLHEMUS & D. POLHEMUS 1995; ANDERSEN & D. POLHEMUS 2003), and in this paper we add a new endemic species of Ochteridae to the documented biota of Mauritius. This also represents a new family record not only for this island, but for the Mascarene Archipelago as a whole.

Mauritius lies in the western Indian Ocean approximately 900 kilometers east of Madagascar. The island, with an area of 2040 km^2, is a highly dissected edifice representing the eroded remnants of a hotspot volcano, with basalts ranging from 7.8-0.2 millions of years (= My) in age (MACDOUGALL & CHAMALAUN 1969). The general form of the island is that of a half-circle, truncate to the northwest. The center of Mauritius forms an elevated central plateau approximately 550-600 meters high, surrounded by several taller, isolated peaks,

the highest of which is the Piton de la Petite Rivière Noire rising to 828 meters elevation. Rocky streams flow down from this central plateau, and along one of these the new species of Ochteridae described herein was discovered.

Due to its age and proximity to Madagascar, the aquatic Heteroptera biota of Mauritius, and the Mascarene Islands in general, is relatively rich at the family level in comparison to other isolated hotspot islands. With the addition of the new species described here, the documented biota now includes 11 species representing 9 families and 11 genera, including 4 endemic species and 2 endemic subspecies (see Appendix). This may be compared to the documented native aquatic Heteroptera biota of the Hawaiian Islands, with 13 currently described species representing 5 familes and 5 genera, including 1 endemic genus and 11 endemic species, and the documented native assemblage of the Galapagos Islands, which contains 12 currently described species representing 6 families and 7 genera, including 1 endemic genus and 4 endemic species. As such, although the total number of native (versus introduced) aquatic Heteroptera species is similar for all three archipelagoes, Mauritius supports a much higher lineage diversity at the family level due to its proximity to Madagascar and Africa.

In addition to Mauritius, the Mascarene chain also contains the islands of Rodrigues and Reunion, the latter having a maximum geological age of only 2 My, but rising to over 3000 meters elevation. Although Reunion has been barely explored for aquatic Heteroptera, recent discoveries on both Mauritius and the Seychelles would clearly indicate that it has the potential to harbor undiscovered endemic species as well.

Material and methods

All measurements in the descriptions below are given in millimeters. Descriptions of color were made from dry pinned specimens. The dorsal habitus illustration was made using a Wild M3Z stereo dissecting microscope equipped with a camera lucida. Measurements were made using the same instrument equipped with an ocular micrometer calibrated to a millimeter scale. The genitalic illustrations were made using a Leica DM 1000 compound microscope equipped with a camera lucida. CL numbers following locality data refer to codes used by the authors to reference ecological notes and habitat photographs.

The following collection abbreviations are used:

BPBM Bernice P. Bishop Museum, Honolulu, Hawaii, USA;
JTPC John T. Polhemus Collection, Englewood, Colorado, USA.

Taxonomy

Ochterus stysi sp. nov.

(Figs. 1-5)

Type material. HOLOTYPE: ♂ (macropterous), **MAURITIUS: BLACK RIVER DIST.:** stream 1.2 km. S. of Chamarel, 200 m. [650 ft.], water temp. 22.5° C., 22 October 1986, CL 2232, D. A. Polhemus and J. T. Polhemus (BPBM). PARATYPES: **MAURITIUS: BLACK RIVER DIST.:** 2 ♂♂ 9 ♀♀, same data as holotype (BPBM, JTPC).

Description. Male. General form broadly ovate, body length 4.90, maximum width (across hemelytra) 2.60 (Fig. 1). Coloration dark reddish brown, with scattered pruinose lavender mar-

kings as follows: small, transverse patches along posterolateral sections of pronotum immediately behind eyes; four small irregular patches arranged transversely between anterior and posterior lobes of pronotum; small, longitudinally elongate, semi-triangular patch medially at anterior margin of scutellum; 7-8 small, irregular patches arranged symmetrically on basal halves of clavus and corium; two larger, roughly circular patches laterally on posterior half of embolium; single large, roughly circular patch at posterolateral angle of corium adjoining base of wing membrane; 7 small, irregular patches of varying size scattered on wing membrane. Head shining black; eyes very dark red; anterior margin of clypeus, labrum, and rostrum chestnut brown; anterolateral flanges of pronotum, small transverse patch posteromedially on pronotum, and narrow margin along lateral edge of embolium dark yellow; antennae with segments I and II dull brownish yellow, segments III and IV dark brown; thoracic venter dull pruinose black; legs and abdominal venter yellowish brown; hind tibiae bearing very small dark brown spots at bases of spines.

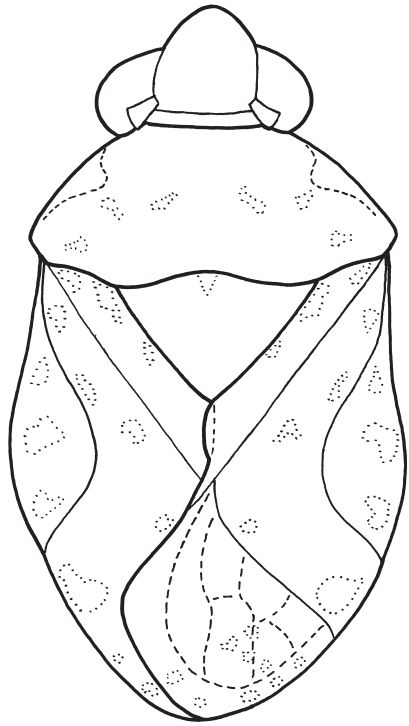
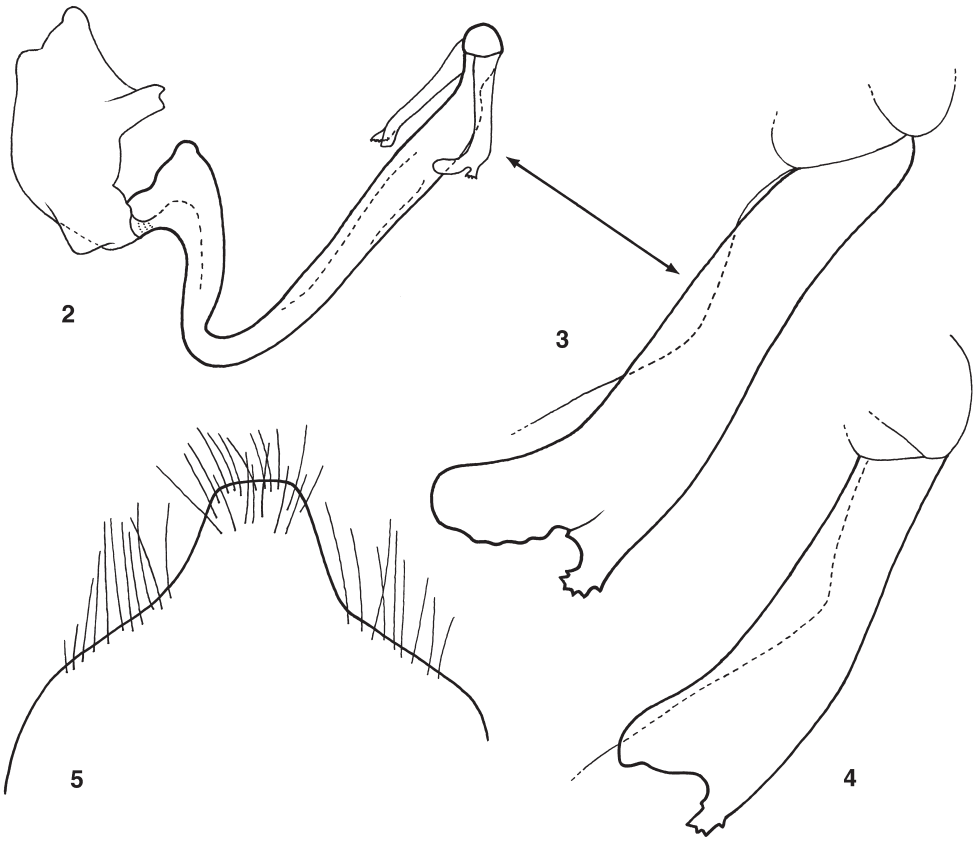


Fig. 1. *Ochterus stysi* sp. nov., male, dorsal habitus, with stippling indicating distribution of pale markings on dorsum. Appendages omitted.

Head glabrous, length (along midline as measure from directly above) / width (across eyes) = 0.50/1.70, angled downward at 45° when viewed laterally; vertex with numerous striae; eyes large, protruding, projecting posterolaterally beyond vertex; antennae with segments I and II short, globose, segments III and IV slender, filiform, lengths of segments I-IV = 0.10, 0.20, 0.40, 0.30; rostrum long, length = 2.90, exceeding hind coxae and extending onto base of abdominal venter.

Pronotum length (midline) / width = 1.10/2.50, bearing numerous small pruinose punctations, every punctation bearing a very short pale seta; anterior collar prominent, flat; anterolateral margins explanate, well demarcated from disk; calli barely tumescent; posterior margin multisinuate, posteriorly concave centrally above base of scutellum. Scutellum triangular, length / width = 0.90/1.30, weakly tumescent, bearing numerous small pruinose punctations centrally plus a double row of slightly larger, more closely spaced punctations along lateral margins, each punctation bearing a tiny, pale seta. Hemelytra long, attaining tip of abdomen, with corium, clavus and embolium well defined, surfaces set with scattered pruinose punctations, each punctation bearing a tiny, pale seta; anterolateral embolar margin narrowly explanate; length of clavus along outside margin 1.80; membrane venation evident, defining 6 closed cells.



Figs. 2-5. Indian Ocean *Ochterus* Latreille, 1802 species, male genitalia, structural details. 2-3, 5 – *Ochterus stysi* sp. nov. 2 – male genitalia; 3 – appendix of male right paramere; 5 –pygophore, caudal tip. 4 – *Ochterus seychellensis* D. Polhemus, 1992, appendix of right male paramere.

Ventral surface of thorax smooth and pruinose, bearing patches of long, upright, gold setae along the inner margins of the meso- and metepisterna; scattered tiny, dark punctations present on pro-, meso-, and metaepisterna; abdominal venter covered with very short, fine, appressed gold setae, this setal covering interrupted by ovate glabrous patches surrounding spiracles laterally on paratergites. Legs with all segments covered by short, fine, recumbent gold setae; all coxae bearing long, gold setae ventrally; fore and middle femora each with a very long, erect gold setae ventrobasally, remainder of ventral margins bearing moderate length, upright, gold setae; hind femur broadly and gently bowed downward when viewed laterally; anterior and middle tibiae bearing numerous short, bristly gold setae, these setae becoming more numerous distally; fore and middle tibiae with a few longer semi-erect spine-like setae on posterior margins; hind tibia with double longitudinal row of scattered large, erect, gold spines; all tibiae with transverse rows of spines at distal ends; claws gold, gently

curving, arolia long, exceeding length of claws when viewed laterally. Lengths of leg segments as follows: fore femur / tibia / tarsal 1 / tarsal 2 = 1.20/1.20/0.10/0.10; middle femur / tibia / tarsal 1 / tarsal 2 = 1.50/1.20/0.20/0.10; hind femur / tibia / tarsal 1 / tarsal 2 / tarsal 3 = 1.60/2.10/0.05/0.30/ 0.20.

Genital segment well retracted into abdomen; subgenital plate with V-shaped indentation medially on posterior margin. Pygophore with caudal tip quadrate, apex transverse, lateral lobes well removed from apex (Fig. 5). Right paramere with head of moderate height, evenly domed and convex; appendices moderately long, apices indented to form two short apical processes, one of these processes large, with tip rounded, the other smaller, with the tip serrate (Fig. 3); paramere shaft stout, broadened distally (Fig. 2).

Female. Similar to male in general structure and coloration, body length 5.40, width 2.80. Head length (along midline as measure from directly above) / width (across eyes) = 0.50/1.55; lengths of antennal segments I-IV = 0.10, 0.20, 0.40, 0.40; rostrum length = 2.80, exceeding hind coxae and extending onto base of abdominal venter. Pronotum length (midline) / width = 1.25/2.60. Scutellum length / width = 0.90/1.40. Hemelytra with length of clavus along outside margin 2.00. Lengths of leg segments as follows: fore femur / tibia / tarsal 1 / tarsal 2 = 1.50/1.20/0.10/0.10; middle femur / tibia / tarsal 1 / tarsal 2 = 1.30/1.50/0.20/0.10; hind femur / tibia / tarsal 1 / tarsal 2 / tarsal 3 = 1.80/2.40/0.05/0.30/0.20.

Differential diagnosis. *Ochterus stysi* sp. nov. may be separated from any other *Ochterus* Latreille, 1802 species presently described from India, Ceylon, Africa or Madagascar by the absence of three irregular or semicircular yellowish spots along the lateral margin of the hemelytron. These spots are present in both *O. marginatus* Latreille, 1804 and *O. caffer* Stål, 1855, but absent in all species so far known from the Mascarene and Seychelles archipelagoes (see key below).

Within the insular Indian Ocean region east of Madagascar, *O. stysi* sp. nov. is the only member of the family Ochteridae currently known from the Mascarene Islands. It may be separated from its most geographically proximal congenor, *O. seychellensis* D. Polhemus, 1992 from the island of Mahe in the granitic Seychelles, by the smaller and less prominent pruinose patches on the hemelytra, particularly on the central corium bordering the clavus; by the dorsal surfaces of the hemelytra which bear scattered pruniose punctations on the clavus, corium and embolium, rather than having only a few very tiny punctations on the embolium as in *O. seychellensis*; and by its larger in overall size (females over 5.0 mm and males over 4.5 mm, versus 4.0 mm and 4.3 mm respectively in *O. seychellensis*).

The male genitalic structures of these two species are also diagnostic. Both share a well developed medial lobe on the pygophore with a broadly truncate apex (compare Fig. 5 with Fig. 2 in Polhemus (1992)), and an apically serrate subapical process on the male right paramere (compare Figs. 3-4). In *O. stysi* sp. nov., however, the apical portion of the right paramere is much larger and more elongate, and has a more broadly rounded apex (compare Figs. 3-4).

Etymology. The name 'stysi' is a patronym honoring our entomological colleague Pavel Štys, who has produced many brilliant insights into the systematics and taxonomy of Heteroptera during his distinguished career.

Ecological notes. The type locality was a rocky upland stream partially shaded by disturbed montane forest. The stream had a moderate gradient, with the bed profile consisting of slow

pools linked by shallow runs and boulder-strewn rapids. The banks consisted of mud and sand, being relatively steep and undercut in some places, but gently sloping in others. It was on exposures of open substrate along these banks that the type series of *O. stysi* sp. nov. was taken.

Other aquatic Heteroptera taken at the type locality included *Mascarenisalda mametiana* (Drake, 1953) (Saldidae), *Mesovelia vittigera* Horváth, 1895 (Mesoveliidae), *Hydrometra mameti* Poisson, 1951 (Hydrometridae), *Limnogonus cereiventris* Signoret, 1862 (Gerridae), *Laccotrephes annulipes* (La Porte), 1833, *Ranatra grandocula* Bergroth, 1893 (Nepidae), and undescribed species of both *Rhagovelia* Mayr, 1865, and *Microvelia* Westwood, 1834 (Veliidae).

Biogeographic notes. The endemic Ochteridae of the Mascarene and Seychelles archipelagoes represent an interesting biogeographical anomaly. In particular, they show little structural resemblance to any species occurring in geographically proximal continental regions such as Africa or India that might be considered logical source areas for overwater colonization. Extensive aquatic surveys by the authors across the length and breadth of Madagascar in 1985 similarly failed to reveal any *Ochterus* species that might represent close relatives to *O. stysi* or *O. seychellensis*. The only other centers of significant diversification for this family lie in New Guinea, Australia, and South America, which are far removed from the Indian Ocean islands.

Although their origins are obscure, we consider it likely that further species of endemic Ochteridae will be discovered in the Mascarenes, particularly on the high, rugged island of Reunion which lies approximately 200 km to the southwest of Mauritius. They should be searched for on open sand bars, moist earthen banks, or damp bedrock faces adjacent to streams at elevations between sea level and 1000 meters.

Key to the Indian Ocean species of *Ochterus*

1. Hemelytra usually with three irregular or semicircular yellowish spots along lateral margin (sometimes overlain with pruinose); Europe, Africa or Asia. 2
– Hemelytra without yellowish spots along lateral margin, but with irregular pruinose spots (sometimes weakly formed); Seychelles or Mascarene islands. 3
2. Male paramere shaft essentially cylindrical; upper frons coarsely striate, similar to lower frons; widespread in southern Europe, Africa and Asia. .... ***O. marginatus*** Latreille, 1804
– Male paramere shaft flattened, lamellate laterally; upper frons finely striate, more so than lower frons; Southern Africa and Madagascar. ..... ***O. caffer*** Stål, 1855
3. Posterior part of endocorium with obvious punctations; Mauritius. ...***O. stysi* sp. nov.**
– Posterior part of endocorium without, or with very weak punctations; Seychelles. ....***O. seychellensis*** D. Polhemus, 1992

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This is a research contribution from Colorado State University, where JTP is adjunct faculty, and with which the Colorado Entomological Institute is affiliated.

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Appendix.

Checklist of aquatic Heteroptera currently recorded from the Mauritius

Endemic taxa marked with an asterisk (*).

GERROMORPHA

GERRIDAE

**Halobates tethys* Herring, 1961

Limnogonus cereiventris Signoret, 1862

HERMATOBATIDAE

Hermatobates djiboutiensis Coutiere & Martin, 1901

HYDROMETRIDAE

**Hydrometra mameti* Poisson, 1951

MESOVELIIDAE

Mesovelia vittigera Horváth, 1895

VELIIDAE

**Halovelia mauricensis* Andersen, 1989

Microvelia sp. indet.[1)]

Rhagovelia infernalis Butler, 1876 [2)]

[1)] More than one species of *Microvelia* may be represented by the material at hand.

[2)] Although previously recorded in the literature under the name *Rhagovelia infernalis*, the *Rhagovelia* species found on Mauritius is in fact a distinct, undescribed taxon, which will be treated by the authors in a subsequent publication.

NEPOMORPHA

CORIXIDAE

**Sigara alluaudi mauricensis* Poisson, 1965

GELASTOCORIDAE

Nerthra rugosa (Desjardins, 1837)

NEPIDAE

Laccotrephes annulipes (La Porte, 1833)

Ranatra grandocula Bergroth, 1893

NOTONECTIDAE

Anisops ciliata Stål, 1863

Anisops pellucens grandis Poisson, 1937

**Anisops vitrea mauricensis* Poisson, 1945

Enithares concolor (Fieber, 1852)

OCHTERIDAE

**Ochterus stysi* sp. nov.

LEPTODOMORPHA

SALDIDAE

**Mascarenisalda mametiana* (Drake, 1953)