After a long period of neglect, the helotrephid subfamily Helotrephinae has seen a recent flurry of taxonomic activity. The genus *Helotrephes* was reviewed by Zettel & Polhemus (1998), and further new species were subsequently described by Nieser & Chen (1999), and by Zettel (2000a, 2000b, 2001b). This genus is now thought to be reasonably well known, with only a few additional undescribed species remaining in collections. The genus *Hydrotrephes*, by contrast, contains many undescribed species distributed throughout Southeast Asia, the Malay Archipelago, and the Philippines. Polhemus (1997) provided the first review of this genus in nearly a half-century, and additional new species were subsequently described by Zettel (1998, 2000b, 2001a), Nieser & Chen (1999) and Kovac & Papáček (2000). The genus *Heterotrephes* also occurs in Southeast Asia, with one species from Taiwan (Zettel did not formally recognize *Heterotrephes* from Borneo, but says in litt. that the *Hydrotrephes mirus* group belongs with that genus), while the genus *Esakiella* is known only from Africa and Madagascar.

In the present paper we add a fourth genus, *Ascetotrephes* gen. n., to the known helotrephine fauna of Southeast Asia. The species in this new genus are generally larger in overall size than those of the other three genera found in the region, and are to date known only from Borneo and Peninsular Malaysia.

All measurements are given in millimeters. Specimen repository abbreviations are as indicated in the acknowledgments. Type repositories are as indicated under each species; paratypes are in the collections of the Smithsonian Institution, Washington, D.C. (USNM); Naturhistorisches Museum, Vienna (NHMW); and the J. T. Polhemus Collection, Englewood, Colorado (JTPC).

**Ascetotrephes** gen. n.

Type-species: *Ascetotrephes mesilau* Polhemus & Polhemus, sp. n.

**Description**

Very similar to *Hydrotrephes*, *Heterotrephes* and *Helotrephes* in general facies. Size large, 3.03 to 3.50 mm long, 2.38 to 2.61 mm wide. Body oval, widest across base of cephalonotum, body strongly convex dorsally; not flat ventrally, but head strongly declivant anteriorly and protruding ventrally; both costal...
margin of hemelytra and lateral cephalonotal carina sinuate in lateral view. Head and pronotum fused into a cephalonotum, the separating suture discernable medially but evanescent laterally. Eyes elongate, embedded dorsolaterally in cephalonotum, scarcely raised above surface, with many ommatidia; not visible ventrally. Ocelli absent. Antennae set in a recess, visible only in ventral view, two segmented. Labrum broad, truncate, not triangular. Lora (= mandibular plates; subgenae of Esaki & China 1928), well defined, acuminate anteriorly. Rostrum with four segments, reaching between middle coxae; proportion of segments and shape similar to *Hydrotrephes* first segment short, arising between well developed lateral lora; second segment very short, appearing telescoped into first; third segment longer, tapering; fourth segment longest, slender, surpassing apex of prosternal carina. Prothorax fused with head both dorsally and ventrally, anterior margin strongly sinuate (figs. 1-3); cephalonotum very large, approximately as long as the remainder of the body along the dorsal midline; lateral margins not curved evenly in dorsal view, posteriorly slightly wider than hemelytra; lateral carina sharp, curving beneath eye, reaching onto anterior portion of head. Pronotal plate broad, sculptured, narrowed anteriorly, without prominent incision (notch) at eye level; genal plate narrow (figs. 6, 7). Propleural plate inwardly broad, truncate, with distinct narrow carina. Scutellum large, triangular, apex surpassing middle of abdomen. Hemelytra well developed, covering entire abdomen, without venation or a trace of claval suture and clavulus weakly delimited in brachypterous form, claval suture and clavulus well developed in macropterous form, membrane consisting of sclerotized flap overlapping when forewings are closed (figs. 4, 5); female without costal lobe. Scutellum, hemelytra finely rugulose, set with tiny alveoli (figs. 4, 5), each with one slender seta. Pro-, meso-, and metasterna and first two visible abdominal sternites (II-III) each with a pronounced median carina; prosternal carina large (not shown); mesosternal carina much smaller and lower than prosternal carina; metasternal carina well developed, of variable height; abdominal carinae well developed, shape variable (figs. 12, 17, 23).

Legs short, hind legs longest (fig. 1); coxae and femora stout; tibiae shorter than femora in anterior two pairs, subequal to or longer than femora in posterior pair (fig. 1); tarsal formula 1:1:2, all tarsi with two equal length claws. All coxae set with short to
medium length setae; middle trochanters beneath with a dense tuft of very long, slender, curved setae, usually appressed in dry specimens. Anterior and middle femora beneath each set with two rows of stiff erect setae. Anterior and middle tibia and tarsi set with stout recumbent spines. Posterior tibia and first tarsal segment thickly set beneath with very long soft setae (swimming hairs), the tibia also with a number of stout spines. Posterior femur distally with a distinct ridge, oriented to contact serrations on the costal margin of the hemelytra, forming a stridulatory mechanism (as described by Polhemus 1994).

Male genital segments modified, twisted strongly to the left. Female sternite VII (subgenital plate) prominent, at least slightly asymmetrical, shape species diagnostic (figs. 11, 16, 22).

Etymology
The generic name Ascetotrephes is derived from Greek asceto, curiously wrought, plus Greek, trephes, eater; gender, masculine.

Distribution
Borneo and the Malay Peninsula (fig. 24).

Comparative notes
Ascetotrephes gen. n. is most closely related to the genus Hydrotrephes China and Heterotrephes Esaki and Miyamoto, but may be separated from the latter two by the generally larger size (body length 3.0-3.5 mm); lack of a distinct notch in the pronotal plate at eye level (shared with Hydrotrephes yangae Zettel, which is 3.45 mm long); the slightly more depressed body shape (compared with Hydrotrephes, Heterotrephes...
and Helotrephes, see Zettel 2000b, figs. 79, 80); at least slightly asymmetrical female subgenital plate (sternite VII); and especially the very narrow genal plate anterad of the eye (figs. 6, 7). Ascetotrephes also resembles some species of the genus Helotrephes Stål, which contains some equally large-sized taxa. However all species of Helotrephes have abdominal carinae ventrally on segments IV and V, or IV-VI, which are lacking in Ascetotrephes. In addition, all Helotrephes species have a well developed notch in the pronotal plate, and a relatively wide genal plate, characters not exhibited by Ascetotrephes.

Zettel (2000b) included the manuscript name ‘Ascitotrephes’ (sic) in his key to the Helotrephidae of Borneo.

**Ascetotrephes mesilau** sp. n.
(figs. 8–12, 24)

Material examined. – Holotype, brachypterous male, MALAYSIA: Sabah [Borneo], Mesilau River at Kundesan, 1 Aug. 1985, CL 2021, J. T. & D. A. Polhemus (USNM). – Paratypes (all brachypterous unless noted): MALAYSIA, Sabah [Borneo]: 2 males, 2 females, 3 immatures, same data as holotype (JTPC, USNM); 5 males, 1 macropterous male, 5 females, Keningau Hwy. at km. 62, small streams and bogs, 6 Aug. 1985, CL 2035, J. T. and D. A. Pohemus (JTPC, USNM; 1 male, 1 female in ZRCS); 1 male, Liwagu River, N. of Kundesan, 915 m. (S8), 16-17 Aug. 1972, W. L. and J. G Peters (JTPC); 1 male, Liwagu River at Liwagu Cave, SE of Kinabalu Nat. Park HQ, 1525 m. (S7), 14-15 Aug.
Description

Body length 3.11-3.50 mm., width across base of cephalonotum 2.33-2.44 mm.

Color (brachypterous form): Ground color brown to deep brown, with scattered yellowish or light brown markings. In some specimens cephalonotum and scutellum mostly translucent, revealing underlying structure. Base of scutellum with a transverse deep brown stripe. Hemelytra dull brown, faintly shining; costal margins broadly yellowish; region of distal wing locking device (pseudo-membrane), scattered markings on corium, scutellum, transverse mid-region of cephalonotum, yellowish. Venter uniformly dark, ventrolateral margins of hemelytra, cephalonotum light brown to leucine. Legs yellowish brown, rostrum, antennae dark.

Structure (see generic description; only additional
Details provided here: Cephalonotum shining, convex, set with shallow pits on posterior half, in dorsal view (of entire insect) broader than long (2.44: 1.22), not produced above rostrum anteriorly, lateral margins evenly curved from base to apex of head except for projecting lateral carinae. Pronotal plate broad, raised anteriorly near eye, with broad shallow indentation, almost identical to that of A. keningau (fig. 6). Antennal segment 1 short; segment two longer, flattened with a brush of setae anteriorly; distally with a few stout erect setae. Eye length: width, 0.61: 0.33. Interocular distance 1.39. Rostral segments 1 and 2 extremely short; lengths of rostral segments 3 and 4: 0.44, 0.36. Scutellum shining, in some specimens appearing alveolate due to underlying structure or pigmentation visible through translucent cuticle; set with tiny shallow pits, each pit apparently set with one stubby seta, sometimes each surrounded by a roughly circular transparent region appearing as an alveolus; length: width = 1.66: 1.66. Hemelytra opaque, faintly rugulose, set with shallow pits each bearing a long silky seta; distal locking tab (pseudomembrane) on right hemelytron of usual form. Hind wings reduced to small membranous strips. Ventral carinae of thorax and abdomen as in fig. 12. Leg armature as in generic description; anterior and middle claws about one third as long as tarsi; hind claws less than half as long as tarsal segment 2 (0.14: 0.30).

Genitalic structures: Male phallotheca sharply bent distally, tip flattened and sharply angled (fig. 10); right paramere broad, expanded distally (fig. 9); left paramere broad, expanded basally, distally narrowing, bent, tip sharply curved (fig. 8). Female subgenital plate (ventrite VII) diagnostic, tongue shaped (fig. 11).

Macropeterous form: Very similar in most respects to the brachypterous form, but possessing a claval suture and well developed clavulus; coloration much darker, most specimens blackish brown with only sparse lighter markings, hemelytra usually opaque.

Etymology
The species name is a noun in apposition, and refers to the type locality, the Mesilau River on the flank of Mt. Kinabalu.

Distribution
Known from the mountains of Sabah and Sarawak in northwestern Borneo (fig. 24).

Comparative notes
A. mesilau is most confidently separated from A. keningau by the differences in the male and female genital structures, and the ventral carinae; otherwise, the two species are quite similar.

In addition to their geographic provenance, the is-
and scutellum mostly translucent, revealing underlying structure. Base of scutellum with a transverse deep brown stripe. Hemelytra dull brown, not shining; costal margins distally broadly yellowish; region of distal wing locking device (pseudo-membrane), scattered markings on corium, scutellum, transverse mid-region of cephalonotum, yellowish (fig. 3). Venter uniformly dark, ventrolateral margins of hemelytra, cephalonotum light brown to leucine. Legs yellowish brown, rostrum, antennae dark.

Structure (see generic description; only additional details provided here): Cephalonotum shining, convex, set with shallow pits on posterior half, in dorsal view (of entire insect) broader than long (2.55: 1.33), not produced above rostrum anteriorly, lateral margins evenly curved from base to apex of head except for projecting lateral carinae. Pronotal plate broad, raised anteriorly near eye, with broad shallow indentation (fig. 6). Antennal segment 1 short; segment 2 longer, flattened with a brush of setae anteriorly; distally with a few stout erect setae. Eye length: width, 0.55: 0.28. Interocular distance 1.50. Rostral segments 1 and 2 extremely short; lengths of rostral segments 3 and 4: 0.44, 0.28. Scutellum shining, in some specimens appearing alveolate due to underlying structure or pigmentation visible through translucent cuticle; set with tiny shallow pits (fig. 5), each pit apparently set with one stubby setae, sometimes each surrounded by a roughly circular transparent region appearing as an alveole; length: width = 1.66: 1.55. Hemelytra opaque, faintly rugulose, set with shallow pits each bearing a long silky seta; distal locking tab (pseudomembrane) on right hemelytron of usual form. Hind wings reduced to small membranous strips. Ventral carinae of thorax and abdomen as in fig. 17. Leg armature as in generic description; anterior and middle claws about one third as long as tarsi; hind claws less than half as long as tarsal segment 2.

Figs. 18–23. Ascototrephes edmundsorum, structural details. – 18–19, Male left paramere, two views; 20, male right paramere; 21, male phallotheca; 22, female subgenital plate; 23, abdominal carinae, lateral view.

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(0.16: 0.37). Genitalic structures: Male phallotheca sharply bent distally, tip flattened and curved (fig. 15); right paramere sculptured, broadened distally (fig. 14); left paramere with a broad laminar flap basally, distally narrow, bent, tip curved (fig. 13). Female subgenital plate (ventrite VII) diagnostic, asymmetrical, tapering distally, apex truncate (fig. 16).

**Etymology**

The species name is a noun in apposition and refers to the Keningau region of Sabah, in which this species occurs.

**Distribution**

Known from the mountains of Sabah in northwestern Borneo (fig. 24).

**Comparative notes**

See notes under *A. mesilau*.

**Habitat**

Small rocky streams in the mountains of Sabah.

**Ascetotrephes edmundsorum** sp. n.

(figs. 1, 2, 4, 7, 18-24)


– Paratypes (all brachypterous unless noted):

**Description**

Body length 3.05-3.44 mm., width across base of cephalonotum 2.39-2.61 mm, general habitus as in fig. 1.

Color (brachypterous form): Ground color brown to deep brown, with extensive irregular yellowish or light brown markings. In some specimens cephalono-
tum and scutellum mostly translucent, revealing underlying structure. Base of scutellum mostly yellowish. Hemelytra mostly light colored, faintly shining; dark markings more extensive basally; region of distal wing locking device (pseudo-membrane), scattered markings on corium, scutellum, transverse mid-region of cephalonotum, yellowish (fig. 1). Venter mostly brown, ventrolateral margins of hemelytra, cephalonotum light brown to leucine. Legs, antennae yellowish brown, rostrum darker.

Structure (see generic description; only additional details will be added here): Cephalonotum shining, convex, rugulose, set with shallow pits on posterior half, in dorsal view (of entire insect) broader than long (2.39: 1.22), not produced above rostrum anteriorly, lateral margins slightly produced and carinate behind eyes, otherwise evenly curved from base to apex of head. Pronotal plate broad, sharply raised anteriorly near eye, without significant indentation (fig. 7). Antennal segment 1 short; segment two longer, flattened with a brush of setae anteriorly; distally with a few stout erect setae. Eye length: width, 0.50: 0.33. Interocular distance 1.50. Rostral segments 1 and 2 extremely short; lengths of rostral segments 3 and 4: 0.22, 0.39. Scutellum shining, in some specimens appearing alveolate due to underlying structure or pigmentation visible through translucent cuticle; set with tiny shallow pits, each pit apparently set with one stubby seta, sometimes each surrounded by a roughly circular transparent region appearing as an alveole; length: width, 1.44: 1.50. Hemelytra opaque, faintly rugulose, set with shallow pits (fig. 4) each bearing a long silky seta; distal locking tab (pseudomembrane) on right hemelytron of usual form. Hind wings reduced to small membranous strips. Ventral carinae of thorax and abdomen as in fig. 23. Leg armature as in generic description; anterior and middle claws about one third as long as tarsi; hind claws about half as long as tarsal segment 2 (0.13: 0.28).

Genitalic structures: Male phallotheca sharply bent distally, tip flattened and curved (fig. 21); right paramere slender, not broadened distally (fig. 20); left paramere with a laminar flap basally, distally abruptly narrowed, bent, tip shaped as a crochet hook (figs. 18, 19). Female subgenital plate (ventrite VII) extending slightly posteriorly (fig. 22).

Macropterous form: Very similar in most respects to the brachypterous form, but possessing a claval suture and well developed clavulus; coloration much darker, most specimens blackish brown with only sparse lighter markings, hemelytra usually opaque.

**Etymology**

This species is dedicated to George and Christine Edmunds, the original collectors, in recognition of their...
many contributions to the study of aquatic insects.

Distribution
Known from peninsular Malaysia (fig. 24).

Comparative notes
Ascetotrephes edmundsorum is known only from peninsular West Malaysia. See the comparative notes under A. mesilau for a detailed discussion of characters separating the three known species.

An unusually high proportion of macropterous individuals are present in the available material of A. edmundsorum; in most species of helotrephids macropters are rare or unknown. The macropterous morph is easily recognized by the presence of a claval suture, a well developed clavulus anterolaterally on each hemelytron, and usually much darker coloration. The hemelytra of the macropterous morph ordinarily are opaque, thus the underlying structure such as large alveoles are not visible as they are in the usually more translucent hemelytra of the brachypterous morph (fig. 4). These prominent alveoles, when visible, appear at first glance to be a surface structure, but examination in oblique light reveals that externally each is represented only by a small slender seta set in a small pit; they are weakly diagnostic for species (A. edmundsorum, fig. 4; A. keningau, fig. 5).
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