

## Three new riffle beetle genera from Borneo: *Homalosolus*, *Loxostirus* and *Rhopalonychus*

(Insecta: Coleoptera: Elmidae)

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### Abstract

Three new genera and six new species of Elmidae (Macronychini) are described from Borneo (Sarawak and Brunei): *Homalosolus* gen.n., *Loxostirus* gen.n., *Rhopalonychus* gen.n., *Homalosolus felis* sp.n., *Homalosolus heissi* sp.n., *Homalosolus hospitalis* sp.n., *Loxostirus willi* sp.n., *Loxostirus zelenka* sp.n., and *Rhopalonychus levatorponderis* sp.n. All genera described herein seem to be endemic to Borneo.

**Key words:** Insecta, Coleoptera, Elmidae, Macronychini, new genera, new species, taxonomy, Malaysia, Sarawak, Brunei, Borneo.

### Zusammenfassung

Drei neue Gattungen und sechs neue Arten der Elmidae (Macronychini) werden aus Borneo (Sarawak und Brunei) beschrieben: *Homalosolus* gen.n., *Loxostirus* gen.n., *Rhopalonychus* gen.n., *Homalosolus felis* sp.n., *Homalosolus heissi* sp.n., *Homalosolus hospitalis* sp.n., *Loxostirus willi* sp.n., *Loxostirus zelenka* sp.n. und *Rhopalonychus levatorponderis* sp.n. Alle hier beschriebenen Gattungen sind möglicherweise auf Borneo endemisch.

### Introduction

The elmids fauna of Borneo was virtually unknown until recently. Ten species, all belonging to wide-spread genera (*Ancyronyx* ERICHSON, *Dryopomorphus* HINTON, *Graphelmis* DELEVE, *Potamophilinus* GROUVELLE, *Stenelmis* DUFOUR, *Zaitzeviaria* NOMURA) were recorded from Sarawak and Sabah (see JÄCH 1993, 1994). Only one species, *Stenelmis bosschae*<sup>1</sup> GROUVELLE, was recorded from Kalimantan (Sambas), and no elmids were known from Brunei so far. Thus, the results of several excursions to Sarawak and Brunei carried out by the authors, by Dr. Heiss and Mr. Borchherding between 1993 and 1995 are most surprising as the riffle beetle fauna of Borneo was found to be unexpectedly diverse.

In Sarawak, the authors collected more than 60 species of Elmidae. These belong to the following genera: *Ancyronyx*, *Dryopomorphus*, *Graphelmis*, *Grouvellinus* CHAMPION, *Leptelmis* SHARP, *Potamophilinus*, *Stenelmis*, *Zaitzeviaria*, *Vietelmis* DELEVE, and at least 7 undescribed genera.

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<sup>1</sup> The epithet *bosschae* was incorrectly listed as "*boschae*" by ZAITZEV (1910) and as "*boschai*" by CHUJO & SATO (1964).

The material collected by Heiss and Borchering in Brunei yielded *Potamophilinus* (1 species), *Stenelmis* (ca. 3 species), *Graphelmis* (2 species), *Grouvellinus* (1 species), and an undescribed genus (1 species).

The most remarkable discovery, however, was the fact that at least three of the undescribed genera seem to be endemic to Borneo. These three genera, all belonging to the tribe Macronychini (as defined by JÄCH & BOUKAL 1995) of the subfamily Elminae, are described below. Previously there were no endemic genera of Elminae known from any of the Sunda Islands or the Philippines. Heretofore, the only elm mid genus recorded as endemic to a southeast Asian island was *Jaechomorphus* KODADA (Larinae), described recently (KODADA 1993) from Sumatra.

#### Acronyms:

BML	The Natural History Museum, London [formerly: British Museum (Natural History)]	NMW	Naturhistorisches Museum, Wien
		CKB	Coll. Kodada, Bratislava

#### Acknowledgements

We are especially indebted to E. Heiss for the gift of elmids from Brunei. Thanks are due to W. Zelenka for the habitus illustrations and to J. Stanovsky for technical assistance.

#### *Homalosolus* gen.n.

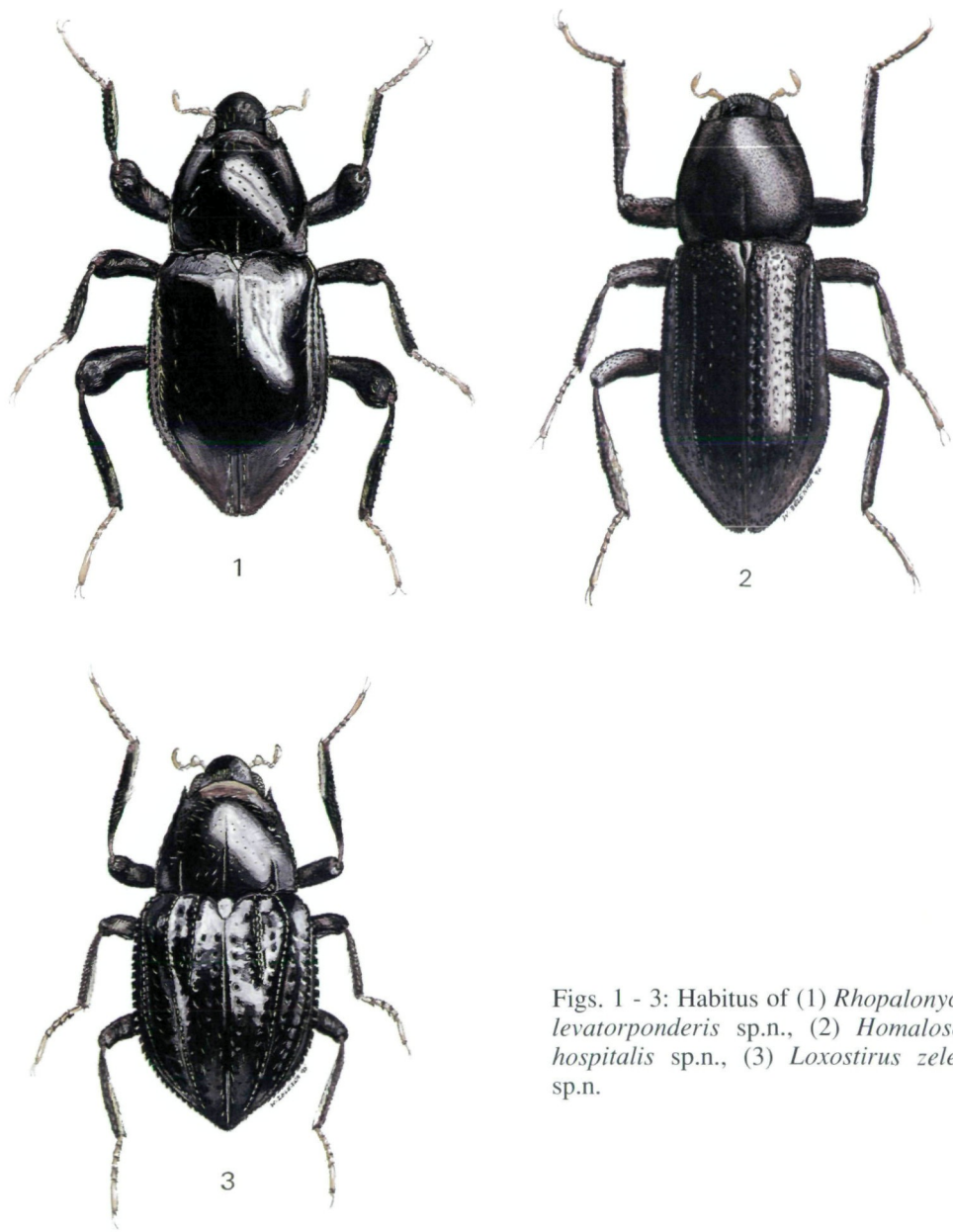
Type species: *Homalosolus hospitalis* sp.n.

**Description:** Body form elongate, subparallel; surface moderately densely covered with short, golden hairs; plastron (Figs. 32, 33) distributed on: head around eyes (plastron hairs on frons very small, hardly discernible at 80x magnification), hypomera, prosternum medio-laterally, epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites, femora, medial parts of tibiae.

Head (Figs. 31, 34) partly retractable. Labrum (Fig. 36) rather glabrous, wider than long; clypeus (Fig. 32) broader than labrum, laterally produced and explanate; clypeus and frons microsculptured and more densely pubescent than labrum; fronto-clypeal suture slightly arched. Eyes small and widely separated, with ca. 30 - 40 facets. Antenna (Figs. 6, 35) 9-segmented. Mandible, maxilla and labium as in Figs. 37 - 39; labial palpus 3-segmented, basal segment very short.

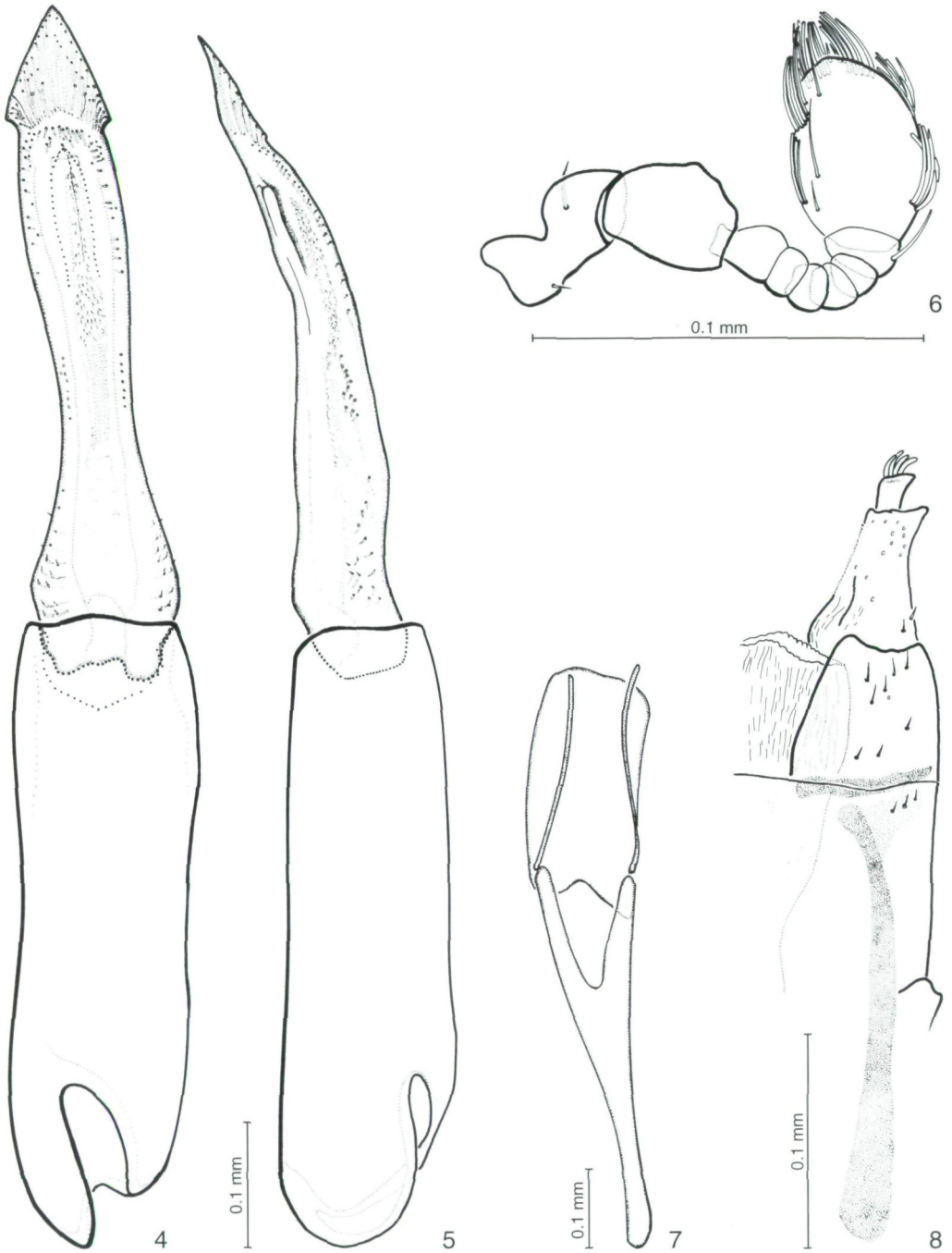
Pronotum (Fig. 40) slightly wider than long, widest in basal half, slightly more distinctly and sinuously constricted towards apex than towards base; posterior angles rectangular or slightly obtuse, anterior angles distinctly acuminate produced anteriad; sub-lateral grooves absent; disc regularly convex, with a very shallowly or moderately deeply impressed, longitudinal, median groove; lateral margin more or less smooth, only very narrowly explanate.

Scutellum subtriangular. Elytra (Figs. 43, 44) elongate, subparallel, evenly constricted in apical third; distinctly punctate-striate in basal 0.6; punctures well impressed; intervals 5 and 7 granulately carinate, a few raised granules may be present in the basal half of interval 8, a faint carina (much less prominent than those on intervals 5 and 7) is present on interval 3 in one species of which we have seen only one female; lateral margin only narrowly explanate, saw-toothed; epipleura progressively narrowing from base to



Figs. 1 - 3: Habitus of (1) *Rhopalonychus levatorponderis* sp.n., (2) *Homalosolus hospitalis* sp.n., (3) *Loxostirus zelenka* sp.n.

apex. Hind wings present in one of the three species (*H. heissi* sp.n.) only: hind wing venation (Fig. 13) reduced; medial vein absent; anal vein short, not furcate apically. Prosternum (Fig. 41) distinctly produced anteriorly; disc laterally bordered by a carina in caudal half; prosternal process longer than broad, lateral margin rimmed and bordered by a sublateral groove, apex subtruncate. Mesosternum (Fig. 42). Metasternum (Fig. 42) variable; disc with numerous coarse punctures, impressions and gibbosities of



Figs. 4 - 8: *Homalosolus hospitalis* sp.n., (4) aedeagus, dorsal aspect, (5) same, lateral aspect, (6) antenna, (7) spiculum gastrale, ventral aspect, (8) ovipositor, ventral aspect.



various size, or disc rather flat with irregular coarse punctation; median longitudinal groove usually very shallow and inconspicuous.

Legs moderately long; surface of tibiae and femora rather densely covered with small granules; femora (Fig. 45) with golden setae on inner surface; tibiae (Fig. 46) with cleaning fringes; claws (Fig. 48) simple.

Abdomen (Figs. 49 - 55) with five ventrites; admedian carinae of first ventrite well developed and complete; anterior margin of first ventrite grooved and rimmed laterally; posterior angles of second ventrite feebly produced, posterior angles of third and fourth ventrite distinctly produced; fifth ventrite slightly emarginate apically.

Aedeagus (Figs. 4, 5, 9 - 11): Long and slender; penis without fibula, corona or ventral sac; its apex characteristically arrowhead-like; ejaculatory duct with comparatively few spines; parameres absent; phallobasis long and cylindrical.

Ovipositor (Fig. 8, 15, 56, 57): Terminal segment short, asymmetrical, latero-apical angle produced, with moderately long apical sensilla. Preterminal segment rather short; apico-lateral angle moderately to strongly produced laterad; distal sclerite approximately as long as proximal sclerite, mesally pubescent. Basal segment longer than preterminal segment.

Sexual dimorphism: Anterior angles of intercoxal process of first ventrite of ♂ more distinctly upturned than in ♀, bearing a conspicuous, setiferous tubercle (Fig. 51).

**Differential Diagnosis:** Obviously, *Homalosolus* is related to *Eonychius* JÄCH & BOUKAL (9-segmented antennae, small eyes, general appearance, etc.) from southeast China. It can be distinguished from *Eonychius* by a number of deviating characters: 1) lack of sublateral pronotal grooves or carinae, 2) lack of a distinct carina on the eighth elytral interval, 3) shape of posterior angles of abdominal ventrites, 4) aedeagus, 5) ovipositor, and 6) sexual dimorphism.

**Distribution:** So far known only from Borneo (Sarawak and Brunei).

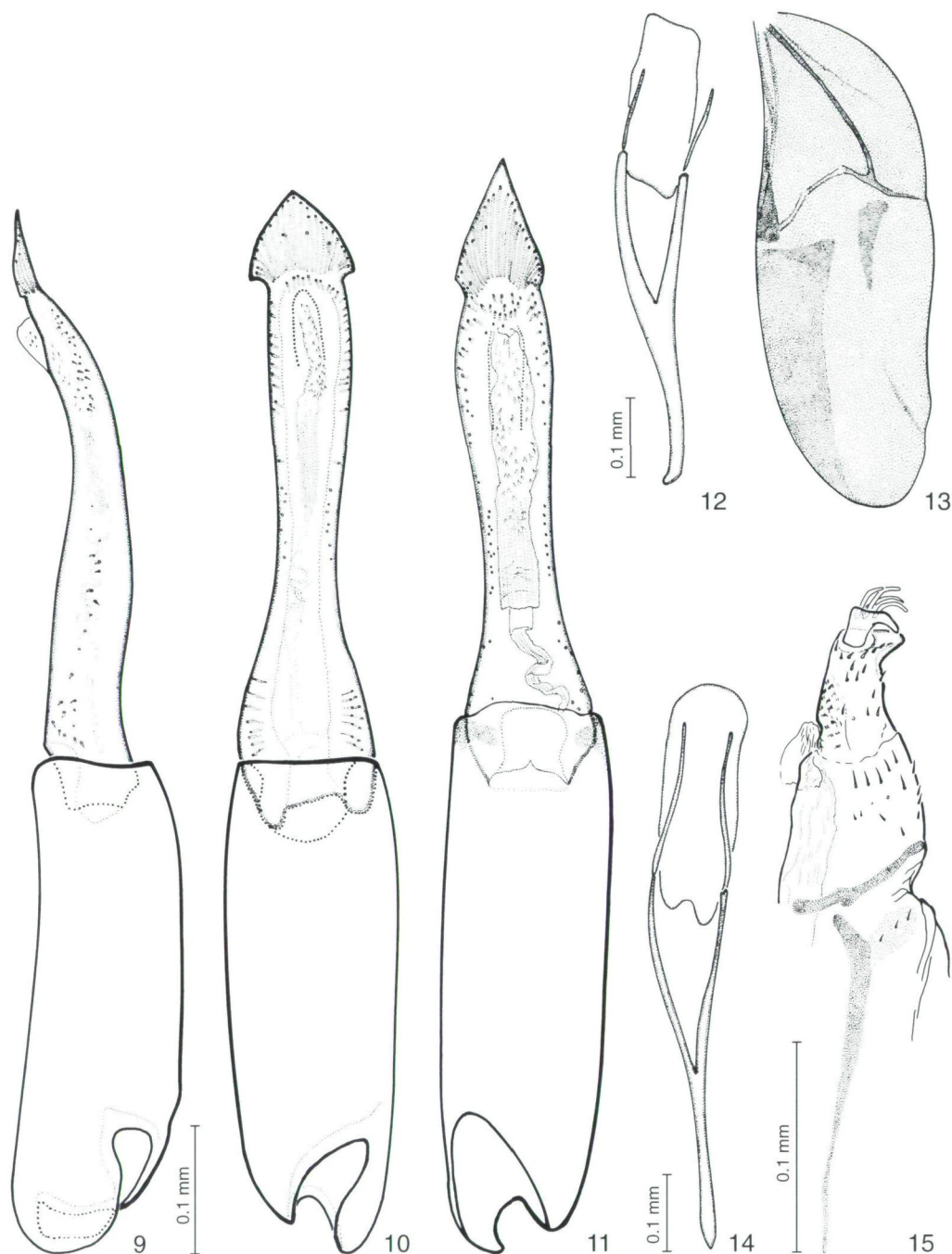
**Etymology:** "homalo-" (Greek: even, uniform) and "-solus" (from *Indosolus*, another genus of Macronychini); referring to the uniform habitus (pronotal impressions more or less obsolete, elytral carinae inconspicuous) which contrasts the peculiar genital morphology of both sexes.

### *Homalosolus hospitalis* sp.n.

**Type Locality:** River, ca. 6 m wide, meandering through degraded primary forest near the village of Pa Ukat, ca. 5 km E Bario [or Bareo], ca. 1000 m a.s.l., Kelabit Highlands, northern Sarawak, Borneo, Malaysia.

**Type Material:** **Holotype** ♂ (NMW): "MAL., Sarawak 1993 Kelabit HL, 5km E Bario Pa Ukat, 27.2., 1000m leg. M. Jäch (15)"; **Paratypes** (NMW, CKB, BML): 24 exs., same label data as holotype; 1 ex.: "MAL., Sarawak 1993 Kelabit HL, Umg. Bario 26.2., ca. 1000m leg. M. Jäch (14)"; 4 exs.: "MAL., Sarawak 1993 Kelabit HL, 5km E Bario Pa Ukat, 1.3., 1000m leg. M. Jäch (17)"; 10 exs.: "MAL., Sarawak 1993 Kelabit HL, Bareo Pa Ukat, 27.2., 1000m leg. H. Zettel (12)"; 2 exs.: "MAL., Sarawak 1993 Kelabit HL, Umg. Bario 28.2., 1000 - 1200m leg. M. Jäch (16)".

**Diagnosis:** Habitus (Fig. 2). Length (pronotum + elytra) 1.8 - 2.0 mm; width 0.8 - 0.9 mm. Colour dark brown to almost black; labrum, mouth parts, and antennae usually paler yellowish brown, legs reddish brown.



Figs. 9, 10, 12: *Homalosolus felis* sp.n., (9) aedeagus, lateral aspect, (10) same, dorsal aspect, (12) spiculum gastrale, ventral aspect.

Figs. 11, 13, 14, 15: *Homalosolus heissi* sp.n., (11) aedeagus, dorsal aspect, (13) hind wing, (14) spiculum gastrale, ventral aspect, (15) ovipositor, dorsal aspect.

Anterior fourth of pronotum rather smooth, with only a few, small, superficially impressed punctures and a few, minute granules; remaining areas very densely punctate (punctures very small) and microreticulate, mat; disc moderately convex; base steeply declivitous; median groove inconspicuous, very shallow, reaching from base to about anterior 0.35.

Scutellum smooth and glabrous. Elytra subparallel, evenly convex in cross section, evenly tapering in apical 0.3; elytral striae straight, punctures rather small, but deeply impressed, separated by 1 - 2 puncture diameters; non-carinate intervals flat and smooth, subbasally with some inconspicuous granules.

Fifth abdominal ventrite with a pair of shallow, subapical impressions; apex emarginate.

Aedeagus (Figs. 4, 5): Penis approximately as long as phallobasis, constricted near basal third; apex rather elongate.

Spiculum gastrale robust (Fig. 7).

Ovipositor as in Fig. 8.

**Distribution:** All specimens were collected in the Kelabit Highlands, northern Sarawak, Borneo, Malaysia.

**Etymology:** "hospitalis" (Latin: hospital, friendly); referring to the remarkable hospitality of the people of the Kelabit Highlands which harshly contrasts the hostile, head hunting habits of some of the people of the Bornean lowland.

### *Homalosolus felis* sp.n.

**Type Locality:** Stream, ca. 5 m wide, at Baan Gong Sikog Waterfall, ca. 40 km S Kuching, southern Sarawak, Borneo, Malaysia.

**Type Material:** Holotype ♂ (NMW): "MAL., Sarawak 1993 40km S Kuching, 17.2. Baan Gong Sikog Wasserf. leg. M. Jäch (3)". Paratype ♀ (NMW): "MAL., Sarawak 1993 80km S Kuching, 17.2. Kampung Ana Rais leg. M. Jäch (4)".

**Differential Diagnosis:** Length (pronotum + elytra) 1.8 mm; width 0.7 mm.

Externally, *Homalosolus felis* differs from *H. hospitalis* only in the smaller size and in the narrower, less deeply impressed, median metasternal groove.

Aedeagus (Figs. 9, 10): Penis longer than phallobasis, more distinctly sinuous than in *H. hospitalis* (lateral aspect); apex significantly shorter than in *H. hospitalis*.

Spiculum gastrale (Fig. 12) narrower, its arm longer than in *H. hospitalis*.

**Distribution:** So far known only from southern Sarawak.

**Etymology:** "felis" (Latin: cat), a noun in apposition; referring to the capital of Sarawak, Kuching (Malay: cat) which is not far from the type locality.

### *Homalosolus heissi* sp.n.

**Type Locality:** Kuala Belalong, Brunei, Borneo.

**Type Material:** Holotype ♂ (NMW): "BRUNEI Temburong Kuala Belalong S - 195, VII/95 leg. Borchherding". Paratype ♀ (NMW): same locality data as holotype.

**Differential Diagnosis:** Length (pronotum + elytra) 2.1 mm; width 0.9 mm.

Externally, *Homalosolus heissi* sp.n. differs from *H. hospitalis* only in the cross section of the median, metasternal groove, which is V-shaped in *H. felis* but U-shaped in *H. hospitalis*.

Both specimens of *H. heissi* are fully winged.

Aedeagus (Fig. 11): very similar to that of *H. hospitalis*; apex of penis slightly more elongate, base of penis less distinctly widened.

Spiculum gastrale (Fig. 14) narrow.

Ovipositor as in Fig. 15. Latero-apical angles of terminal and preterminal segment strongly produced, beak-like.

**Distribution:** So far known only from the type locality.

**Etymology:** Named for Dr. E. Heiss (Innsbruck) for donating the type material.

### *Loxostirus* gen.n.

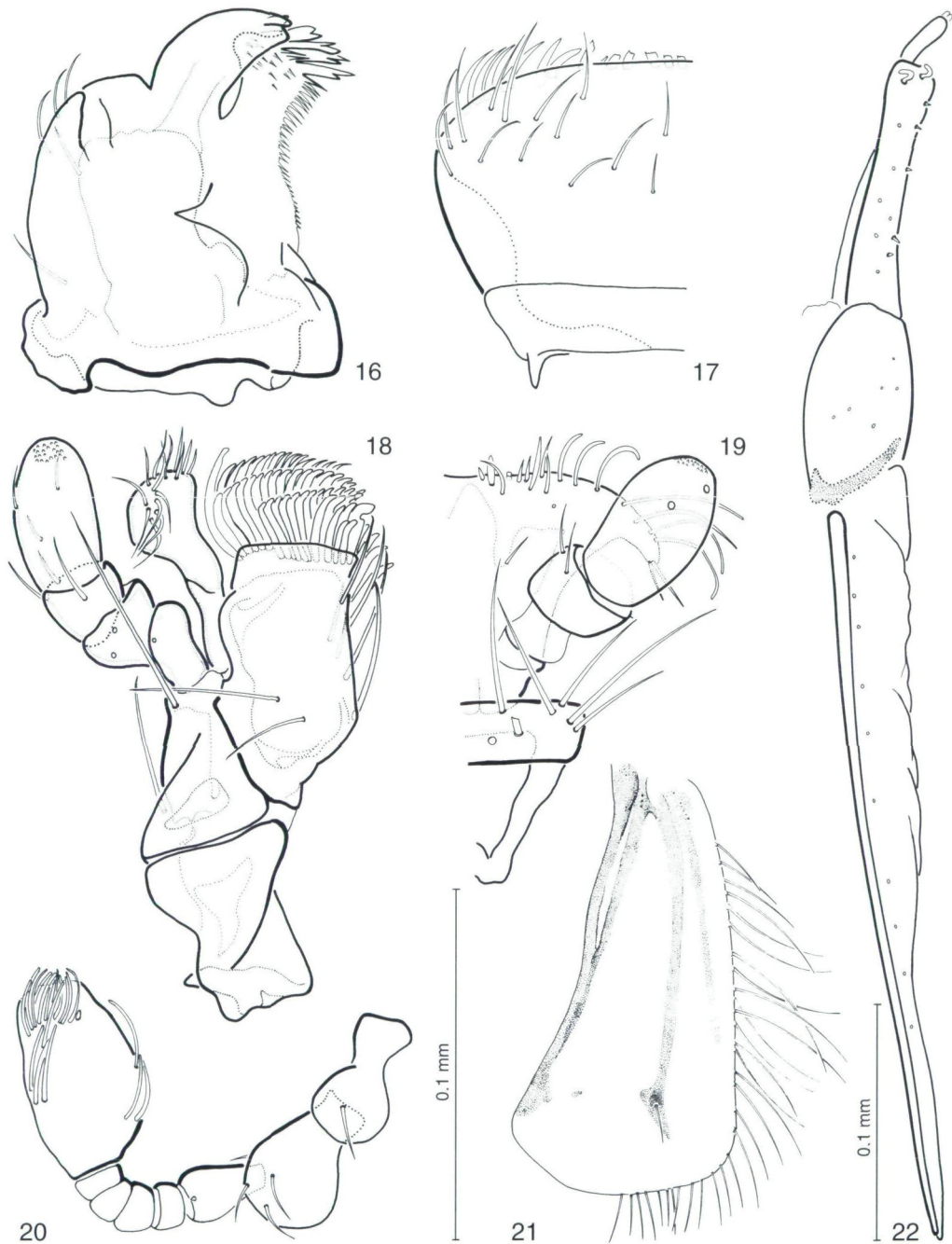
Type species: *Loxostirus willi* sp.n.

**Description:** Body form obovate; surface very sparsely covered with whitish, short, adpressed or semi-erect hairs; plastron distribution<sup>2</sup>: hypomera, prosternum except middle and anterior margin; elytra between lateral margin and sublateral carina (eighth interval), epipleura, lateral parts of meso-, metasternum and coxae, lateral parts of abdominal sternites.

Labrum as in Fig. 17; clypeus wider and slightly shorter than labrum, arcuately produced laterad; fronto-clypeal suture very slightly arcuate, almost straight; eyes well developed, with at least 40 facets; antenna (Fig. 20) eight-segmented, segments 3 - 7 small, terminal segment large and elongate; mandible (Fig. 16) with 2 distinct apical teeth, antero-lateral margin deeply excised, prosthema large and apically densely spinose; maxilla (Fig. 18); maxillary palpi moderately long, four-segmented, last segment rather long and slender, palpifer well-developed, galea two-segmented, basal segment short and thin, apical segment longer, apically widening; labium (Fig. 19), labial palpi two-segmented, ligula wide, umbrella-shaped.

Pronotum slightly wider than long, widest near base, slightly constricted towards base, more distinctly constricted towards apex; lateral margin crenulate, not explanate; antero-lateral parts on each side with a group of very small, inconspicuous, elongate granules which might be connected with a plastron; posterior angles rectangular, anterior angles distinctly acuminate produced anteriorly; sublateral grooves bordered by a sublateral carina, not reaching pronotal middle; disc more or less regularly convex, with a moderately deeply impressed, longitudinal, narrow, median groove extending from base to about apical 0.3.

Scutellum subtriangular. Elytra obovate, rather abruptly, acuminate constricted posteriorly; disc rather flat between fifth intervals, but laterally strongly rounded (in cross section), thus lateral margin not visible in dorsal view (the lateral margin seen from above is in fact the eighth interval); lateral margin not distinctly explanate, distinctly crenulate; elytral striae rather devious: stria 2 and 3 fused and effaced in basal 0.3, stria 1 and (original) stria 4 fused near declivity, stria 4 (and interval 5) conspicuously sinuous and slanting (see Fig. 3); carinae on intervals 3, 5, 7 and 8; all carinae crenulate; carinae on third interval only reaching basal 0.3, remaining ones almost reaching apex; elytral punctures rather large, usually well impressed; epipleura well-developed and moderately wide, abruptly narrowed before apex. Two examined specimens were found to be brachypterous (Fig. 21).



Figs. 16 - 22: *Loxostirus willi* sp.n., (16) mandible, (17) labrum, dorsal aspect, (18) maxilla, (19) labium, (20) antenna, (21) hind wing, (22) ovipositor, ventral aspect.

<sup>2</sup> As we had only few specimens available we refrained from scanning them and we were thus not able to examine the plastron of *Loxostirus* more thoroughly and to confirm the existence of plastron on head and pronotum.

Prosternum distinctly produced anteriorly; prosternal process triangular, its lateral margin more or less distinctly rimmed, its apex acuminate rounded; middle of mesosternum deeply grooved for reception of prosternal process; metasternum rather smooth, disc rather flat, median longitudinal suture moderately deeply impressed, especially near base; disc laterally margined by an incomplete, thick carina; posterior margin of metasternum thickly rimmed along hind coxa; some indistinct impressions along inner side of lateral discal carina and posterior metasternal rim.

Legs moderately long; femora with golden setae on inner surface; tibiae with cleaning fringes; claws simple.

Abdomen with five ventrites; admedian carinae of first ventrite complete; ventrites 3 and 4 distinctly produced postero-laterad.

Aedeagus (Figs. 23 - 26): Long and slender; fibula and corona absent; ventral sac membranous in apical half of the penis; ejaculatory duct laterally bordered by a sclerotized band, ejaculatory duct with small scales and spines; parameres obviously absent; phallobasis very short, cylindrical.

Ovipositor (Fig. 22): Terminal segment moderately long, slender, almost straight. Preterminal segment long and slender; apico-lateral angle with blunt setae; distal sclerite distinctly longer than proximal sclerite. Basal segment ca. twice as long as preterminal.

**Differential Diagnosis:** Externally, the new genus is easily recognized by its slanting fifth elytral interval (see Fig. 3), a unique character within Macronychini. The metasternum is also very typical. *Loxostirus* is obviously related to *Indosolus* BOLLOW. The two genera agree in the following characters: labial palpus 2-segmented; antennae 8-segmented; overall morphology of aedeagus and ovipositor.

**Distribution:** So far known only from Borneo (Sarawak).

**Etymology:** "loxo-" (Greek: oblique, slant) and "-stirus" (Greek: keel); referring to the slanting fifth elytral interval.

### *Loxostirus willi* sp.n.

**Type Locality:** River, ca. 10 m wide, flowing through primary forest, near Rumah Kabau, ca. 25 km E Kapit, southern Sarawak, Borneo, Malaysia.

**Type Material:** **Holotype** ♂ (NMW): "SARAWAK (Borneo), ca 25 km E Kapit III.1994, Kodada leg."; **Paratypes:** 1 ♂ (NMW), same label data as holotype, mounted on the same pin, mutilated following thorough dissections; 2 ♀♀ (CKB), same label data as holotype; 1 ♂ (NMW): "MAL., Sarawak 1993 E Bandar Sri Amman Batang Ai NP, 20.2. leg. M. Jäch (9)".

**Diagnosis:** Length (pronotum + elytra) ca. 1.0 mm; maximum width ca. 0.55 mm.

Colour dark brown to black; labrum, mouth parts, antennae, and anterior margin of pronotum paler yellowish brown; femora, tibiae, and elytral apex reddish brown.

Dorsal surface of head mat, impunctate.

Pronotum smooth, opaque, very superficially punctate; punctures very small (only visible at a magnification of more than 80 x), separated by several puncture diameters; sub-lateral carina sharply ridged medially.



Figs. 23 - 26: aedeagi, (23) *Loxostirus willi* sp.n., ventral aspect, (24) same, lateral aspect, (25) *Loxostirus zelenka* sp.n., ventral aspect, (26) same, lateral aspect.



Scutellum impunctate, smooth and glabrous. Elytra opaque; punctures of elytral striae moderately large, usually well impressed near middle of elytra; carinae very prominent.

Aedeagus (Figs. 23, 24): Penis about six times as long as phallobasis, widest near basal third; apex short.

Ovipositor as in Fig. 22.

**Distribution:** So far known only from southern Sarawak.

**Etymology:** This and the following species are named for Mr. Willi Zelenka, ingenious beetle illustrator.

### *Loxostirus zelenka* sp.n.

**Type Locality:** Small stream, ca. 3 m wide, flowing through degraded primary forest above the village of Arur Dalam, near Bario [or Bareo], ca. 1000 m a.s.l., Kelabit Highlands, northern Sarawak, Borneo, Malaysia.

**Type Material:** **Holotype** ♂ (NMW): "MAL., Sarawak 1993 Kelabit HL, Umg. Bario 26.2., ca. 1000 m leg. M. Jäch (14)"; **Paratypes:** 2 ♀♀ (NMW), same label data as holotype.

**Differential Diagnosis:** Habitus (Fig. 3). Length (pronotum + elytra) ca. 1.2 mm; maximum width ca. 0.65 mm.

*Loxostirus zelenka* agrees with *L. willi* in all major characters (colour, general appearance, morphology of elytra). *Loxostirus zelenka* can be distinguished from *L. willi* by the larger size, by the slightly more distinct pronotal punctation, by the more prominent sublateral pronotal carinae, by the narrower pronotal median groove, and by the aedeagus, which is longer, widest in apical fourth, having a longer apex and a more distinct subbasal constriction (Figs. 25, 26).

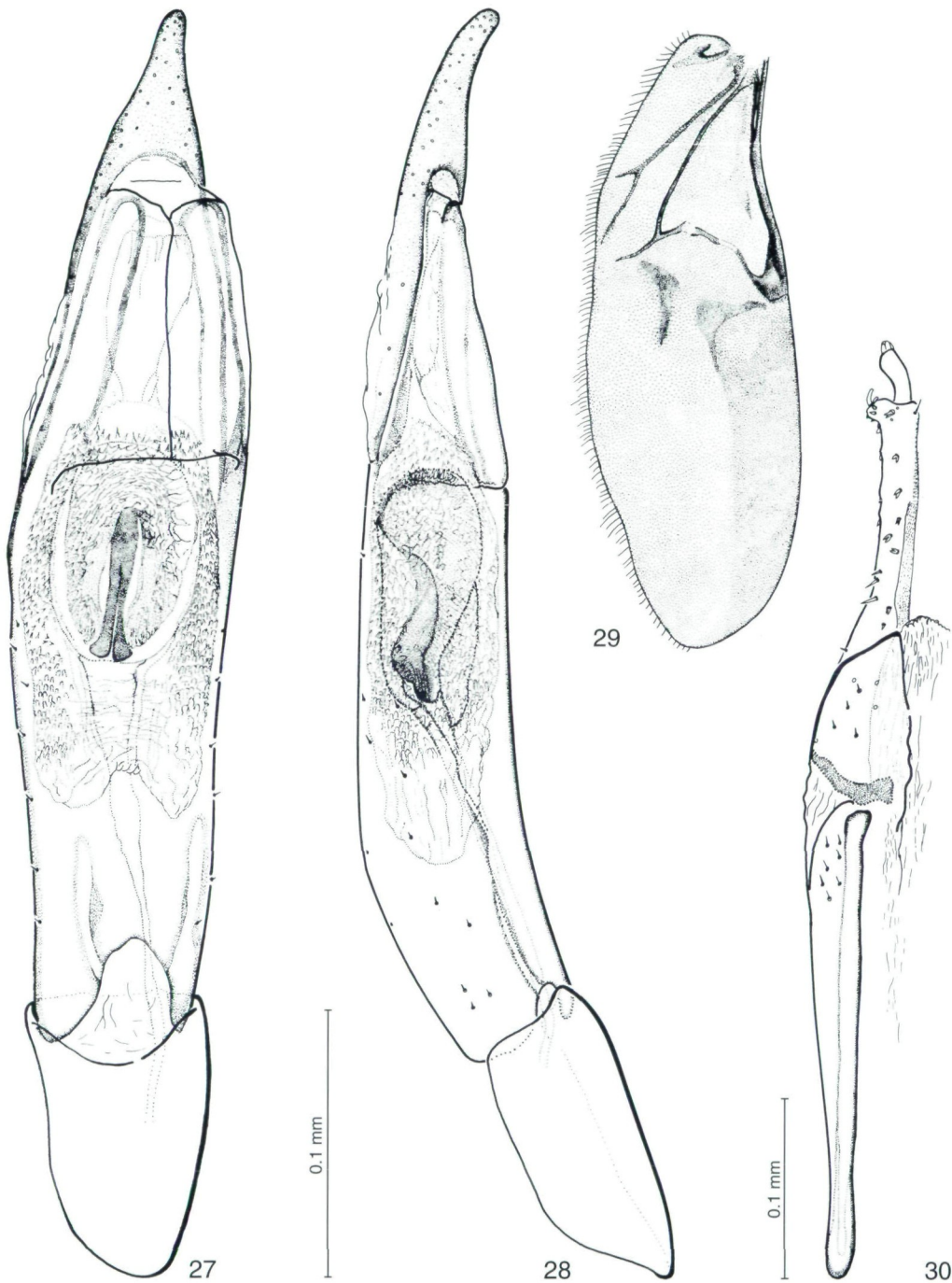
**Distribution:** So far known only from the type locality.

### *Rhopalonychus* gen.n.

Type species: *Rhopalonychus levatorponderis* sp.n.

**Description:** Body form obovate; surface scarcely punctate, smooth; plastron distributed on: vertex, lateral parts of frons, around eyes, elytra between lateral margin and sublateral carina (eighth interval), hypomera, prosternum laterally, epipleura, lateral parts of meso-, metasternum and coxae, lateral portions of all ventrites and posterior margin of ventrites II - III, femora and medial parts of tibiae.

Head (Figs. 58 - 66) partly retractable. Clypeus and frons sparsely covered with adpressed or semi-erect, yellowish, moderately long hairs. Labrum slightly wider than long; clypeus broader and slightly longer than labrum, lateral margin arcuately produced and slightly upturned; fronto-clypeal suture very slightly arched. Antenna (Figs. 61 - 63) 8-segmented, terminal segment large and elongate. Eyes large, with more than 70 facets. Mandible, maxilla and labium as in Figs. 59, 64 - 69; labial palpus 3-segmented, basal segment very short.



Figs. 27 - 30: *Rhopalonychus levatorponderis* sp.n., (27) aedeagus, ventral aspect, (28) same, lateral aspect, (29) hind wing, (30) ovipositor, ventral aspect.

Pronotum approximately as wide as long, widest near basal 0.4; moderately densely covered with comparatively long, semi-erect hairs, usually lacking in old specimens; lateral margin rimmed, narrowly explanate; posterior angles slightly acute, anterior angles more distinctly acute; sublateral grooves absent or vestigial, each marked by a small, shallow impression; disc strongly and regularly convex; median groove vestigial, extending from base to about basal 0.35, very shallow, seen at high magnification only.

Scutellum subtriangular. Elytra (Figs. 73 - 75) widest near middle; lateral margin crenulate to serrate; elytral striae more or less obsolete, rows of very small punctures are found on the "intervals"; all punctures with semi-erect or adpressed, yellowish hairs; intervals 7 and 8 with granulate carinae not reaching elytral apex; carinae with moderately long, semi-erect, yellowish hairs. Hind wing venation (Fig. 29) more or less as in *Cuspidevia* JÄCH & BOUKAL (see JÄCH & BOUKAL 1995: Fig. 5); medial vein absent.

Prosternum (Figs. 70, 71) distinctly produced anteriorly; prosternal process distinctly longer than broad, impressed medially, apex broadly rounded, setose. Mesosternum as in Fig. 72; middle of mesosternum deeply grooved for reception of prosternal process. Suture between meso- and metasternum (Fig. 72) deeply impressed admedially; metasternum with a row of small punctures along posterior margin; metasternal disc laterally bordered by a carina in anterior half; median groove very shallow; lateral parts of anterior margin of metasternum impressed and punctate along mesocoxa.

Legs (Figs. 76 - 78) moderately long; femora with small granules, with golden setae on inner surface; pro- and metafemora strongly enlarged, clavate; mesofemora only moderately enlarged; tibiae more or less rectangular in cross section, with cleaning fringes and with two rows of denticles on outer edges; claws simple.

Abdomen (Figs. 79, 80) with five ventrites; posterior angle of ventrites III and IV distinctly acuminate produced; ventrite V acuminate apically.

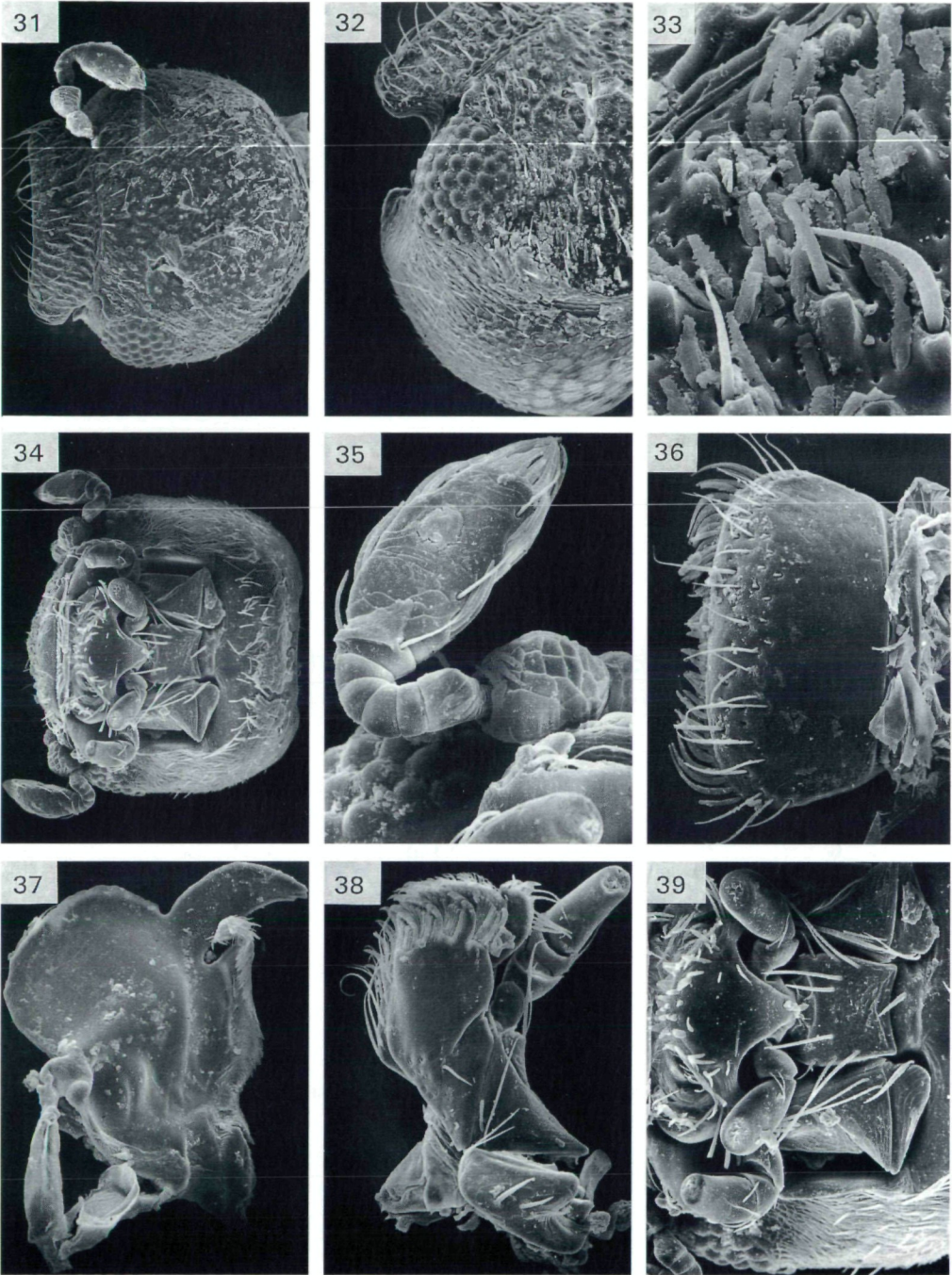
Aedeagus (Figs. 27, 28): Long and slender; fibula and corona absent; ventral sac present; ejaculatory duct with distinct sclerotizations; parameres absent; phallobasis short and cylindrical.

Ovipositor (Figs. 30, 81): Terminal segment long and slender, slightly curved. Preterminal segment long and slender; apico-lateral angle dilated, with few blunt, short setae; distal sclerite approximately twice as long as proximal sclerite, mesally pubescent. Basal segment about as long as preterminal segment.

**Differential Diagnosis:** *Rhopalonychus* is a very distinctive genus. It resembles *Cuspidevia* superficially by the clavate femora, by the smooth body surface, and by the elytral setation. The two genera differ significantly in the body shape, elytral carinae, elytral apices, metasternum, aedeagus, and in several additional, less apparent characters.

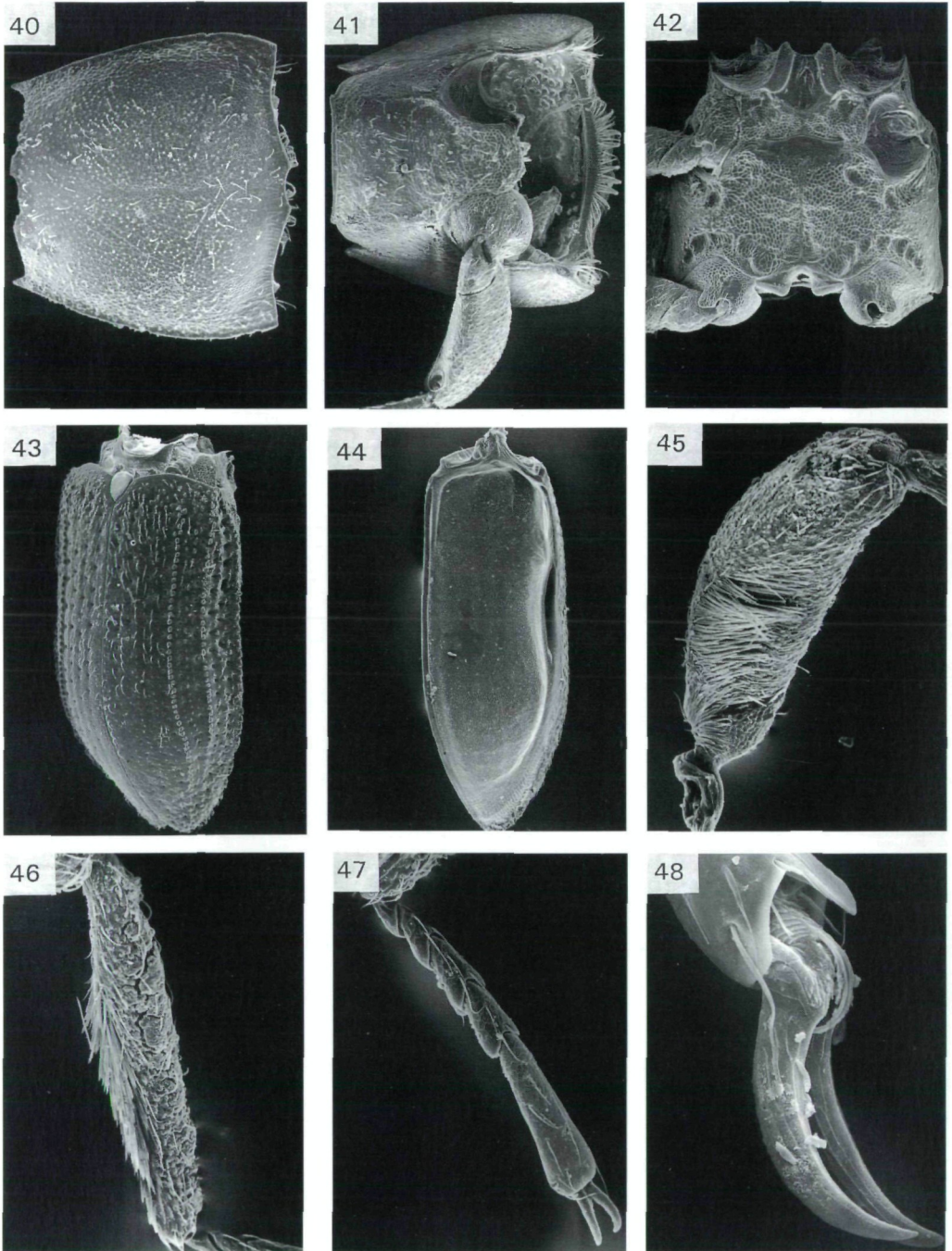
**Distribution:** So far known only from Sarawak.

**Etymology:** "Rhopal-" (Greek: club), referring to the club-shaped femora; and "-onychus"; referring to the type genus of the tribe (*Macronychus*).



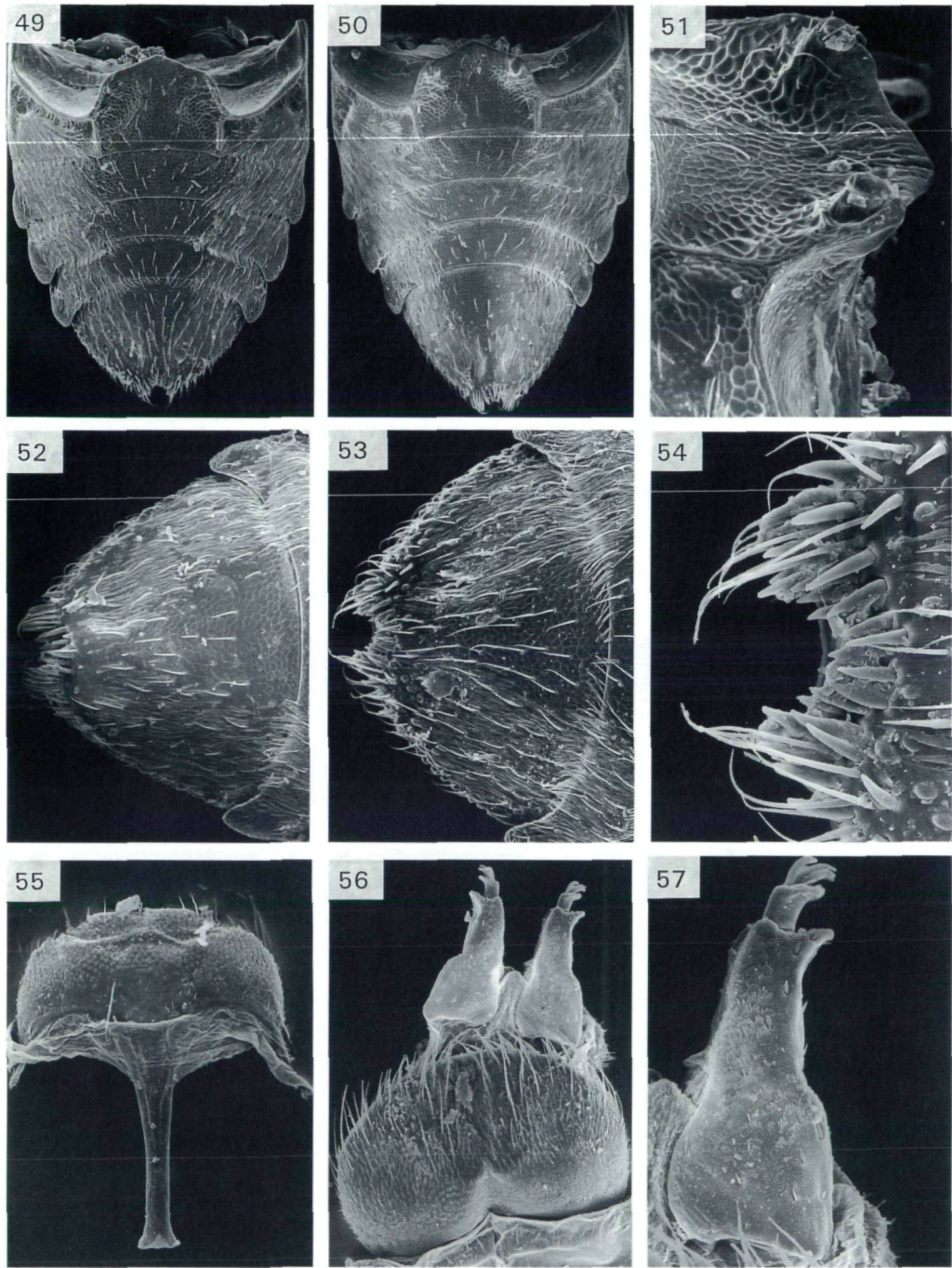
Figs. 31 - 39: *Homalosolus hospitalis* sp.n., (31) head, dorsal aspect, (32) same, enlarged, (33) plastron on frons, (34) head, ventral aspect, (35) antenna, ventral aspect, (36) labrum, dorsal aspect, (37) mandible, (38) maxilla, (39) labium.





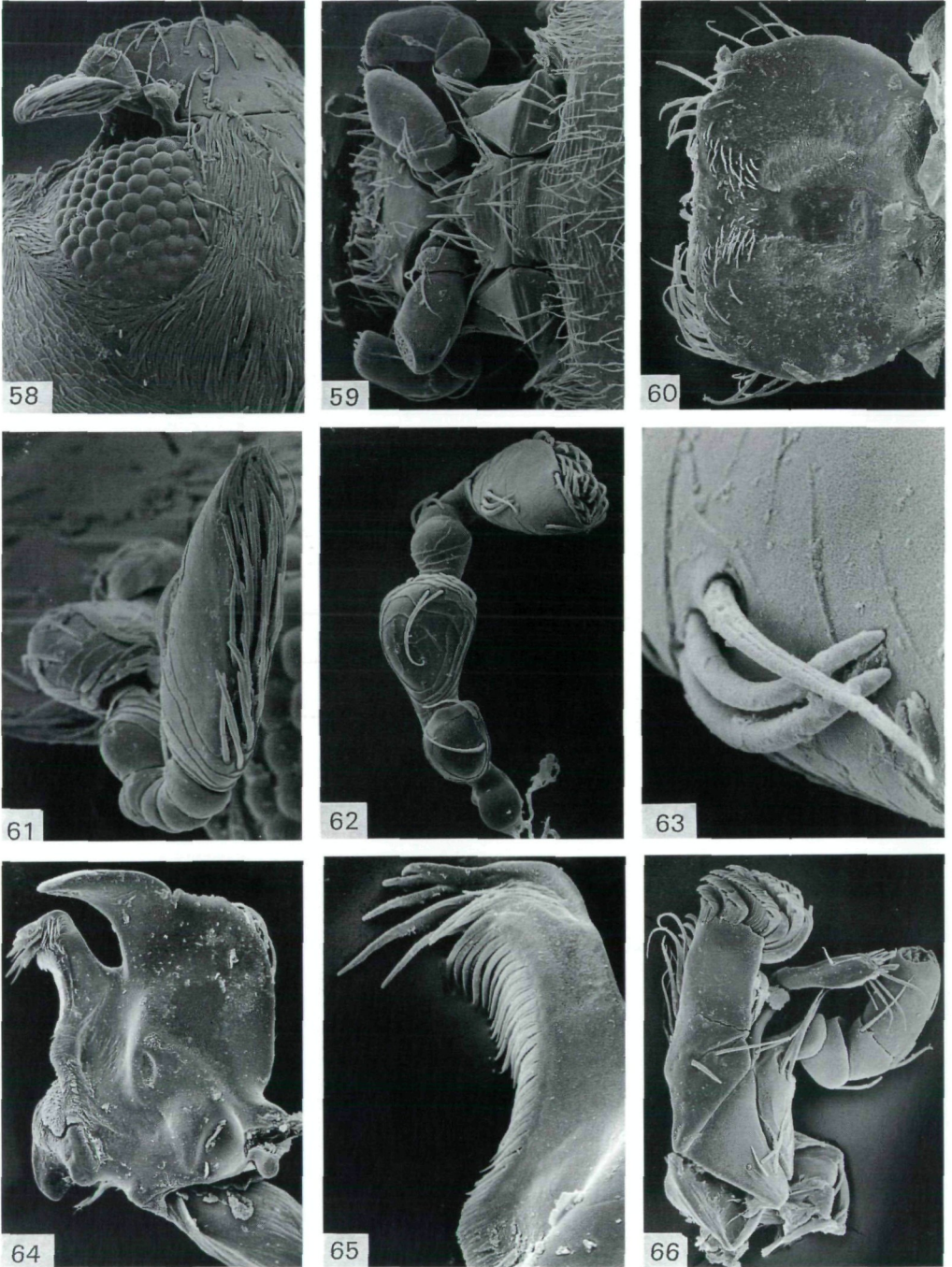
Figs. 40 - 48: *Homalosolus hospitalis* sp.n., (40) pronotum, (41) prothorax, ventral aspect, (42) meso- and metasternum, (43) elytra, latero-dorsal aspect, (44) elytron, ventral aspect, (45) profemur, inner side in lateral aspect, (46) protibia, lateral aspect, (47) protarsus, latero-dorsal aspect, (48) metatarsal claws, ventro-lateral aspect.





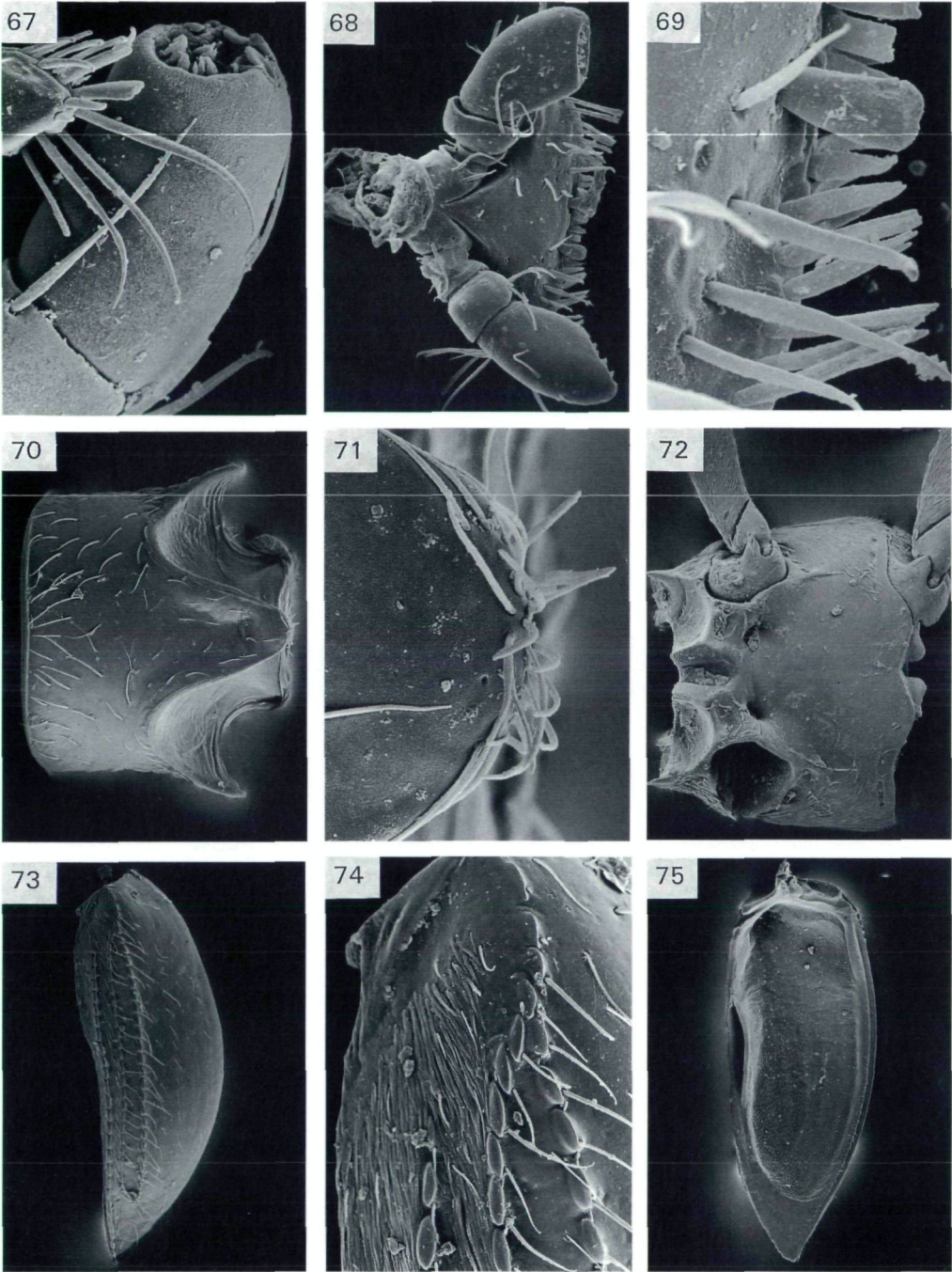
Figs. 49 - 57: *Homalosolus hospitalis* sp.n., (49) abdomen, female, (50) abdomen, male, (51) abdominal intercoxal process, male, latero-dorsal aspect, (52) ventrite V, male, (53) ventrite V, female, (54) apex of ventrite V, female, (55) female sternite VIII, (56) tergite VII and ovipositor, dorsal aspect, (57) ovipositor, dorsal aspect.



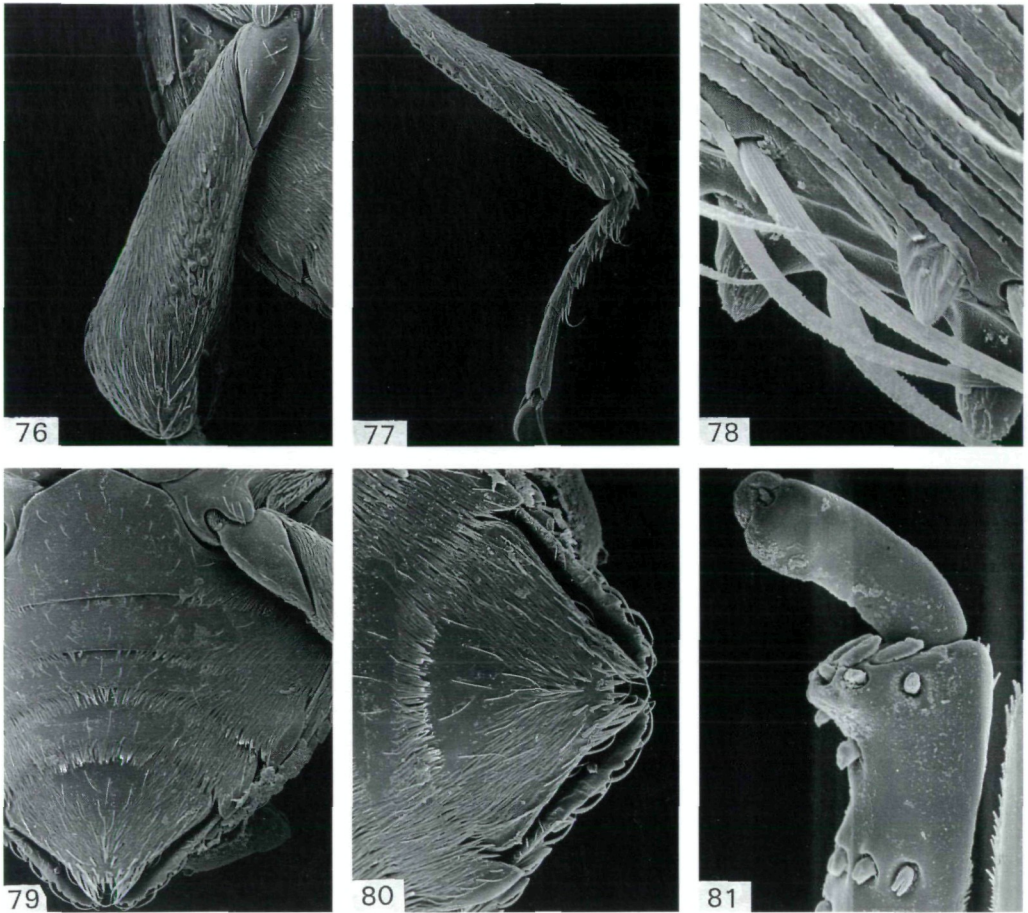


Figs. 58 - 66: *Rhopalonychus levatorponderis* sp.n. (58) head, latero-dorsal aspect, (59) labium and hypostomal region, ventral aspect, (60) labrum, ventral aspect, (61) antenna, lateral aspect, (62) same, frontal aspect, (63) terminal antennomere, subbasal cluster of sensilla, (64) mandible, (65) prostheca, (66) maxilla.





Figs. 67 - 75: *Rhopalonychus levatorponderis* sp.n., (67) apical segment of labial palpus, (68) labium, mentum removed, (69) anterior margin of ligula, (70) prosternum, (71) apex of prosteral process, (72) meso- and metasternum, (73) elytron, lateral aspect, (74) elytron, antero-lateral portion, (75) elytron, ventral aspect.



Figs: 76 - 81: *Rhopalonychus levatorponderis* sp.n., (76) metafemur, ventral aspect (77) metatibia, lateral aspect, (78) metatibial plastron, (79) abdomen, (80) ventrites IV and V, (81) ovipositor, apical portion.

*Rhopalonychus levatorponderis* sp.n.

**Type Locality:** River, ca. 10 m wide, flowing through primary forest near Rumah Kabau, ca. 25 km E Kapit, southern Sarawak, Borneo, Malaysia.

**Type Material:** **Holotype** ♂ (NMW): "SARAWAK (Borneo), ca 25 km E Kapit III.1994, Kodada leg."; **Paratypes** (NMW, CKB): 8 exs., same data as holotype; 7 exs.: "Sarawak (Borneo) ca 40 km SE Kapit 3.1994, leg. J. Kodada"; 2 exs.: "MAL., Sarawak 1993 E Bandar Sri Amman Batang Ai NP, 19./20.2. leg. M. Jäch (7)"; 4 exs.: "MALAYSIA, Sarawak Mulu NP, Long Iman 4.3.1993 leg. M. Jäch (20)"; 6 exs.: "MAL., Sarawak 1993 Kelabit HL, Umg. Bario 26.2., ca. 1000 m leg. M. Jäch (14)".

**Diagnosis:** Habitus (Fig. 1). Length (pronotum + elytra) 1.2 - 1.6 mm; width 0.6 - 0.8 mm. Specimens from higher altitudes (e.g. Kelabit Highlands) larger than those from lower altitudes (e.g. type locality).

Colour dark brown to black; labrum, mouth parts, antennae, tarsi, anterior margin of pronotum and elytral apex usually paler yellowish brown.

Pronotum smooth and glabrous, only sparsely punctate; punctures very small, separated by several puncture diameters; lateral margin evenly or slightly sinuously arched.

Elytra short, sinuously acuminate apically. Elytral punctures very small, smaller than those of pronotum, visible at high magnification only. Elytral disc convex, smooth and glabrous. Carina of seventh interval extending from shoulder to apical 0.15; carina of eighth interval slightly shorter, reaching apical 0.2.

Aedeagus (Figs. 27, 28): Ejaculatory duct intricately folded in repose, with numerous spines and sclerotizations; penis tapering apically, more than 3 times as long as phallobasis.

Ovipositor as in Fig. 30.

**Distribution:** This species is widely distributed in Sarawak.

**Etymology:** "levare" (Latin: to elevate, to lift) and "pondus, -eris" (Latin: weight); freely translated: weightlifter; referring to the conspicuously enlarged femora.

### References

- CHUJO, M. & SATO, M. 1964: 12. Family Elmidae. - In T. KIRA & T. UMESAO (eds.): Nature and Life in Southeast Asia, Vol. III. - Kyoto: Fauna and Flora Research Society, pp. 195-196.
- JÄCH, M.A. 1993: *Ancyronyx* (Coleoptera: Elmidae) - The Spider Riffle Beetle of the Malaysian Forest Rivers. - Nature Malaysiana 18 (3): 86-89.
- JÄCH, M.A. 1994: A taxonomic review of the Oriental species of the genus *Ancyronyx* ERICHSON, 1847 (Coleoptera, Elmidae). - Revue suisse de Zoologie 101 (3): 601-622.
- JÄCH, M.A. & BOUKAL, D.S. 1995: Elmidae: 2. Notes on Macronychini, with description of four new genera from China (Coleoptera). - In M.A. JÄCH & L. Ji (eds.): Water Beetles of China. - Wien: Zoologisch-Botanische Gesellschaft in Wien and Wiener Coleopterologenverein, pp. 299-323.
- KODADA, J. 1993: *Jaechomorphus*, a new riffle beetle genus from Sumatra (Coleoptera: Elmidae: Larinae). - Entomological Problems 24 (2): 1-17.
- ZAITZEV, Ph.A. 1910: Pars 17. Dryopidae, Cyathoceridae, Georyssidae, Heteroceridae. - In S. SCHENKLING (ed): Coleopterorum Catalogus. - Berlin: W. Junk, 68 pp.