

NOTERIDAE:

Review of the species occurring east of the Wallace line

(Coleoptera)

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Abstract

The Noteridae (Coleoptera) east of the Wallace line are reviewed. Three new species and one new subspecies are described: *Canthydrus ater* sp.n. (Ceram, Bacan, ?Sangihe), *C. occultus* sp.n. (West New Guinea), *Neohydrocoptus distans* sp.n. (Fiji, Wallis & Futuna), and *N. subfasciatus major* ssp.n. (West New Guinea). The *Canthydrus serialis* species group is erected. *Notomicrus punctulatus* FAUVEL, 1903 is resurrected from synonymy with *N. tenellus* (CLARK, 1863).

Lectotypes are designated for *Canthydrus bovillae* BLACKBURN, 1890, *C. flammulatus* SHARP, 1882, *C. serialis* FAUVEL, 1883, and *Hydrocanthus semperi* WEHNCKE, 1876.

New faunistic records: *Canthydrus* SHARP, 1882: Moluccas, Solomon Islands, *Neohydrocoptus* SATÔ, 1972: Sulawesi, West New Guinea, Fiji, Wallis & Futuna, *Notomicrus* SHARP, 1882: Sulawesi, Moluccas, Fiji, *Canthydrus angularis* SHARP, 1882: Lombok, *C. ritsemae* (RÉGIMBART, 1880): Sulawesi, *C. semperi* (WEHNCKE, 1876): Sulawesi, Sumatra, *C. serialis* FAUVEL, 1883: Solomon Islands, *Hydrocanthus pederzanii* TOLEDO & HENDRICH, 2006: Australia (Northern Territory), *Neohydrocoptus bivittis* (MOTSCHULSKY, 1859): Sulawesi, *N. subfasciatus subfasciatus* (SHARP, 1882): Sulawesi, New Caledonia and Australia (Northern Territory), *N. subvittulus* (MOTSCHULSKY, 1859): West New Guinea, Sulawesi and Lombok. Noteridae are here recorded for the first time from Sangihe Island, the Moluccas, Fiji, and Wallis & Futuna.

A key to the genera and species is given, together with illustrations of habitus and male genitalia of most taxa.

Key words: Coleoptera, Noteridae, *Canthydrus*, *Hydrocanthus*, *Neohydrocoptus*, *Notomicrus*, *Speonoterus*, Australia, Southeast Asia, Wallace line, new taxa, lectotypes, new records.

Introduction

The burrowing water beetles, Noteridae, are a rather small family of aquatic Adephaga containing about 250 species in 14 genera. They have a pan-tropical range with few species in the temperate areas (DETTNER 2005, NILSSON 2005, JÄCH & BALKE 2008). Noteridae are small to moderately sized beetles (body length: 1.0–8.2 mm). They are characterized by their modified metacoxal process, which often forms a ventral platform, together with the metaventrite (“intercoxal process”) and the prosternal process (“noterid platform”). This situation is most evident in the pronounced ventral flattening of the phylogenetically more derived genera. Other apomorphic characters of the family include the shape of the scape, which appears two-segmented, and the deeply grooved profemur. The protibia is robust, obviously an adaptation for burrowing (BEUTEL & ROUGHLEY 1987, BELKACEME 1991).

Noterids mostly live in sun exposed, stagnant or slowly running aquatic habitats, rich in debris and aquatic vegetation, and with muddy bottom. They are also encountered in rainwater puddles, springs and rarely even in subterranean waters such as cave pools.

The systematics of Noteridae is based mainly on adult morphology, since larvae are known only for some species of few genera. Noteridae were originally treated as a subfamily of Dytiscidae. BERTRAND (1928) and BÖWING & CRAIGHEAD (1931) suggested to raise them to family level on the basis of larval characters. New classifications of Noteridae have been proposed by BEUTEL & ROUGHLEY (1987), BELKACEME (1991), BEUTEL (1997) and, more recently, by NILSSON (2005) and BEUTEL et al. (2006), confirming family status for Noteridae, with *Phreatodytes* UENO being the sister-group of the remaining noterid genera. NILSSON (2005) proposed three subfamilies: Noterinae, Notomicrinae and Phreatodytinae, the latter being represented by one genus only: *Phreatodytes*. Notomicrinae include two genera: *Notomicrus* SHARP and *Speonoterus* (see also BEUTEL et al. 2006). *Speonoterus* is cavernicolous, endemic to Sulawesi, known only from the type locality. Noterinae are subdivided into three tribes: Neohydrocoptini (only containing *Neohydrocoptus* SATÔ), Pronoterini (only containing *Pronoterus* SHARP) and Noterini, containing the majority of the noterid genera.

Here, the noterid fauna east of Wallace's line is treated. The study area roughly stretches from Sulawesi and Lombok to Fiji and Samoa. So far, very few Noteridae were recorded from that area. Most species were reported from Australia and New Guinea (WATTS 2001, TOLEDO & HENDRICH 2006) and three were known from New Caledonia (FAUVEL 1883, 1903, BALFOUR-BROWNE 1939a, 1945).

New material collected recently from different areas east of the Wallace line greatly improves our knowledge of the Noteridae of this part of the world. In the present paper, the known data are summarized, new distribution records are provided, and three new species and one new subspecies are described.

Material and methods

The specimens examined are deposited in the following collections:

CAS	Collection André Skale, Hof/Saale, Germany
CGW	Collection Günther Wewalka, Vienna, Austria
CJS	Collection Jaroslav Štátný, Liberec, Czech Republic
CLH	Collection Lars Hendrich, München, Germany
CMT	Collection Mario Toledo, Parma, Italy
FNCS	Fiji National Insect Collection, Suva, Fiji; H. Waqa
IAC	Institut Agronomique Néo-Calédonien, Pocquereux, New Caledonia; S. Cazères, C. Mille
IRSNB	Institut royal des Sciences naturelles de Belgique, Brussels, Belgium; P. Limbourg
MMUS	Macleay Museum, University of Sydney, Australia; J. Philip
MNB	Museum für Naturkunde, Berlin, Germany; M. Uhlig
MNHN	Muséum national d'Histoire naturelle, Paris, France; H. Perrin
MNHW	Museum of Natural History, Wrocław University, Poland; M. Wanat
NHML	The Natural History Museum, London, U.K. (formerly British Museum of Natural History); C. Taylor
NMP	Národní muzeum v Praze, Czech Republic; J. Hájek
NMW	Naturhistorisches Museum Wien, Austria; M.A. Jäch
SAMA	South Australian Museum, Adelaide, Australia; C.H.S. Watts
USNM	National Museum of Natural History, Washington, DC, USA; W.E. Steiner
ZMUA	Zoological Museum, University of Amsterdam, Amsterdam, The Netherlands; S.A. Ulenberg
ZMUM	Zoological Museum, University of Moscow, Russia
ZSM	Zoologische Staatssammlung, München, Germany; M. Balke

Within *Neohydrocoptus* and *Canthydrus* SHARP most of the species here discussed are very similar or even indistinguishable from each other externally. Therefore only few species are described exhaustively herein; for the remaining species, only the diagnostic characters are discussed. In some species of *Canthydrus* the examination of the median lobe of the aedeagus includes the shape, but also the length ratio of the distal and proximal portion (see Fig. 20). In the descriptions, the terminology for the orientation of the aedeagus follows MILLER & NILSSON (2003). For each species, the aedeagus is described and figured in its anatomical position, with the concave (dorsal) side above and the convex (ventral) side below; thus, what is often named “right” side of the median lobe becomes “left” side and what is named “right” paramere becomes “left” paramere.

The western half of the island of New Guinea, formerly known as Irian Jaya, is here referred to as West New Guinea, which includes the Indonesian Provinces of Papua and Papua Barat (West Papua). The eastern half of the island is the sovereign nation of Papua New Guinea (PNG).

List of Localities (Locs. 2001/NC: leg. Balke & Wewalka)

- Loc. 2001/NC 4** (JÄCH & BALKE 2010: Fig. 8): Dumbéa, 50 m a.s.l., swamp at road to upper course of River Dumbéa, 4.XI.2001. Swampy area and inundated forest, larger shaded pools on red clay, with thick leaf layers, some reeds.
- Loc. 2001/NC 5** (JÄCH & BALKE 2010: Fig. 9): Dumbéa, 150 m a.s.l., upper course of River Dumbéa, 4.XI.2001. Large river, 10–20 m wide and max. 3–4 m deep, slowly flowing, sun exposed, beetles taken from water holes on gravel banks and a ditch on dirt road close to the river.
- Loc. 2001/NC 12** (JÄCH & BALKE 2010: Fig. 12): 13 km north of Koumac, 50 m a.s.l., 7.XI.2001. Between Koumac and Ouégoa, ca. 13 km from Koumac, stream on coral gravel besides road, partly shaded, slowly flowing, richly vegetated, on one side of bridge forming larger pool max. 1 m deep.
- Loc. 2001/NC 20** (JÄCH & BALKE 2010: Fig. 18): 3 km north Pouébo, 10 m a.s.l., 10.XI.2001. Swampy meadow at roadside, large ditch with fouling water, grassy edges, bottom muddy, sun exposed.
- Loc. 2001/NC 29**: 20–30 km west of Poindimié, ca. 350 m a.s.l., 13.XI.2001. Small stream, water almost stagnant, turbid, max. 1 m deep, ground slightly muddy, edges sandy, with clay and with thick mats of vegetation.
- Loc. 2001/NC 42** (JÄCH & BALKE 2010: Fig. 20): 6 km south of Thio, 50 m a.s.l., 17.XI.2001. Swampy area around a fishpond, close to agricultural school, edge with grass and emergent plants.
- Loc. 2001/NC 57**: 8 km N Ouégoa, camping ground, 1 m a.s.l., 10.XI.2001. At beach, at light. Sampled by G. Wewalka only.

Checklist of the species of Noteridae east of the Wallace line

<i>Canthydrus ater</i> sp.n.	Bacan, Ceram, ?Sangihe
<i>Canthydrus angularis</i> SHARP, 1882	SE Asia to Sulawesi and Lombok
<i>Canthydrus bovillae</i> BLACKBURN, 1890	N Australia
<i>Canthydrus ephemeralis</i> WATTS, 2001	N Australia
<i>Canthydrus flammulatus</i> SHARP, 1882	Oriental Region (Burma to Sulawesi)
<i>Canthydrus occultus</i> sp.n.	New Guinea
<i>Canthydrus ritsemae</i> (RÉGIMBART, 1880)	Oriental Region (from India to Sulawesi)
<i>Canthydrus semperi</i> (WEHNCKE, 1876)	Philippines, Sumatra, Sulawesi
<i>Canthydrus serialis</i> FAUVEL, 1883	New Guinea, Solomon Islands, Vanuatu, New Caledonia (? extinct)
<i>Hydrocanthus australasiae</i> WEHNCKE, 1876	N Australia
<i>Hydrocanthus balkei</i> TOLEDO & HENDRICH, 2006	New Guinea
<i>Hydrocanthus pederzanii</i> TOLEDO & HENDRICH, 2006	N Australia
<i>Hydrocanthus waterhousei</i> BLACKBURN, 1888	N Australia

<i>Neohydrocoptus bivittis</i> (MOTSCHULSKY, 1859)	Asia (India and Sri Lanka to Japan and Sulawesi)
<i>Neohydrocoptus distans</i> sp.n.	Fiji, Wallis & Futuna
<i>Neohydrocoptus subfasciatus major</i> ssp.n.	New Guinea
<i>Neohydrocoptus subfasciatus subfasciatus</i> (SHARP, 1882)	N Australia, New Caledonia , Sulawesi
<i>Neohydrocoptus subvittulus</i> (MOTSCHULSKY, 1859)	Oriental Region, New Guinea
<i>Neohydrocoptus</i> sp.	Sulawesi
<i>Notomicrus tenellus</i> (CLARK, 1863) species complex	Southeast Asia, Moluccas, New Guinea, Australia, Solomon Islands, Fiji, Samoa
<i>Notomicrus punctulatus</i> FAUVEL, 1903	New Caledonia
<i>Speonoterus bedosae</i> SPANGLER, 1996	Sulawesi

Key to genera of Noteridae east of the Wallace line

- 1 Protibia distally tapering, ending in a large, apparently single spur, visibly hooked (Fig. 18c). Segment 1 of protarsi longer and broader than others. Prosternal process, metaventricle and metacoxal process covered with dense setae (Figs. 14, 17b). Dorsal microreticulation very fine, meshes hardly discernable, arranged in wrinkles (Fig. 16b). Scutellum never visible externally. Body length at least 2.5 mm 2
- Protibia distally expanded, with two or more visible spurs, not hooked (Fig. 18a–b). Segments 1–4 of protarsi more or less of same size, not different in shape. Ventral surface glabrous or at most with setal punctures on metacoxal process only. Dorsal microreticulation (if visible) uniform, rounded (Fig. 16a). Scutellum concealed or partly visible. Body length often less than 3.0 mm (except *Neohydrocoptus bivittis*, see below) 3
- 2 Metatibia broad and flat, inner apical spur serrulate (Fig. 17a). Prosternal process broad, almost as long as wide (Fig. 17b). Body length: 5.3–7.8 mm *Hydrocanthus*
- Metatibia slender, almost cylindrical, both apical spurs smooth. Prosternal process visibly longer than its width (Fig. 14). Body length: 2.5–4.0 mm *Canthyrus*
- 3 Body length: 1.0–1.6 mm. Metaventricle and metacoxal plates fused together into a single piece (Figs. 12–13). Scutellum partly exposed 4
- Body length: 2.1–3.6 mm. Metaventricle and metacoxal plates divided by a suture (Fig. 15). Scutellum not visible *Neohydrocoptus*
- 4 Eyeless and wingless. Body almost parallel-sided (Fig. 13) *Speonoterus*
- Eyes and wings developed. Body gradually tapering to elytral apex (Figs. 1, 12)..... *Notomicrus*

Notomicrinae

Notomicrus SHARP, 1882

Members of this genus are very small (1.0–1.6 mm long). With respect to other Noteridae they are characterized by fused metaventricle and metacoxal plates (Fig. 12), absence of midgular apodeme (BEUTEL & ROUGHLEY 1987) and a partly exposed scutellum (SPANGLER 1996). The protibiae are expanded apically (Fig. 18a), with a number of straight, not hooked spurs. *Notomicrus* contains eight species in the Americas (YOUNG 1978, NILSSON 2005), plus a not yet defined number of species from Southeast Asia and the Australian Region which need to be revised.

Notomicrus tenellus* (CLARK, 1863) species complexHydroporus tenellus* CLARK 1863: 427.? *Hydroporus politus* MACLEAY 1871: 124.*Notomicrus laevigatus* SHARP 1882: 260.*Notomicrus suturalis* SHARP 1882: 261.*Notomicrus oblongus* ZIMMERMANN 1927b: 16.

For a more complete bibliography see NILSSON (2005: 140).

TYPE LOCALITIES: *H. tenellus*: Indonesia: Java; *H. politus*: Australia: Queensland, Gayndah; *N. laevigatus*: Australia: Queensland, Rockhampton and Brisbane; *N. suturalis*: Australia: Queensland, Rockhampton.

TYPE MATERIAL (not studied): *H. tenellus*: holotype (sex unknown) (NHML); *N. laevigatus*: syntypes (NHML); *H. politus*: syntypes (MMUS); *N. suturalis*: syntypes (NHML).

MATERIAL EXAMINED:

M A L A Y S I A: 8 exs. (CLH): Pahang Province, Lake Cini, lakeside near Rimba Resort, 50 m, 17.IV.1997, leg. M. Balke & L. Hendrich; 1 ex. (NHML): Sabah, Sandakan, S Lokan, IX.1996, leg. A.Y.C. Chung.

P H I L I P P I N E S: 2 exs. (NMW): Luzon, Lagunas, Los Baños, small river, 28.XI.1995, leg. J. Kodada & B. Rigová; 3 exs. (NMW): Mindoro, Puerto Galera, Sabang, 13.XI.1992, leg. M.A. Jäch; 1 ex. (NMW): Central Palawan, Ulangoan River, 18 km NE San Rafael, 6.XII.1995, leg. J. Kodada & B. Rigová.

I N D O N E S I A: 2 exs. (NMW): Sulawesi, S Ujung Pandang, SE Takalar, 2.V.1992, leg. M.A. Jäch "33"; 4 exs. (NMW): Ambon, Hunut, 3.II.1989, leg. M.A. Jäch; 1 ex. (ZSM): W New Guinea, Merauke, 8.X.2006, leg. K. Tindige & S. Prativi.

A U S T R A L I A: 4 exs. (CMT): Northern Territory, Kakadu National Park, Ubirr Rock, freshwater swamp, 20.X.1999, leg. K.B. Miller; 13 exs. (CLH): Northern Territory, Kakadu National Park, Jim Jim Highway, Black Jungle Spring, ca. 30 m, 30.X.1996, leg. L. Hendrich; 1 ex. (NMW): Northern Territory, Timber Creek, 15°39'49"S 130°28'54"E, 23.VII.1998, leg. W. Ullrich; 5 exs. (CLH): Northern Territory, Finnis River 10 km W Batchelor, 43 m, 13°01'27"S 130°57'21"E, 20.VIII.2006, leg. L. & E. Hendrich; 4 exs. (NMW): Queensland, Brookfield, at light, 5.XI.1981, 22.I.1982, leg. J. Sedlacek; 5 exs. (CLH): Queensland, Tuan State Forest near Poona Creek, "water point 9", Scrubby Creek upstream, 20 m, 25°44'44"S 152°51'31"E, 29.IX.2006, leg. L. & E. Hendrich; 8 exs. (CLH): Queensland, Cape Tribulation Road S of ferry station, forest swamp, 16°17'46"S 145°19'12"E, 15.IX.2006, leg. L. & E. Hendrich; 1 ex. (NMW): N Queensland, Richmond, 1917/1918.

F I J I: 7 exs. (CMT, ZSM): Vanua Levu, 5 km N Savusavu, 5 m, 16.XI.2003, leg. G. Wewalka, M. Balke & K. Koto "Fi 024"; 10 exs. (CMT, ZSM): Kadavu, Vunisea, 10 m, 25.XI.2003, leg. M. Balke & G. Wewalka "Fi032".

DIAGNOSIS: Habitus as in Fig. 1. Very small (total length: 1.0–1.3 mm; maximum width: 0.5 mm); body outline oblong maximum width at base of elytra, lateral sides regularly but strongly tapering towards apex. Dorsal surface smooth, more or less shining; no punctation on elytra, except for a longitudinal series of fine dots, starting from about second fifth of elytral length. Without punctation along sutural line. Microreticulation on elytra absent or more or less strongly impressed. Head and pronotum reddish-yellow, often slightly darkened on front of head and hind and fore margins of pronotum; elytra light chestnut-brown.

Legs, antennae and mouthparts evenly testaceous.

Male: Inner claw of hind tarsi slightly shorter than the outer; last abdominal ventrite ending with a shallow "U" shaped emargination. Genitalia as in Fig. 27.

DISCUSSION: Six species of *Notomicrus* were described from Southeast Asia and the Australian Region. Eventually, all were synonymized with *N. tenellus* by BALFOUR-BROWNE (1939a, 1945), who considered this species to be very wide-spread (Philippines, Malaysia, Singapore, Java, Sumatra, New Guinea, Australia, Solomon Islands, New Caledonia and Samoa). However, the specimens studied here suggest that at least four different species (including *N. punctulatus* from New Caledonia, resurrected herein) are actually merged under the name *N. tenellus*.

Specimens characterized by the missing or only faintly developed dorsal surface reticulation, and by the shape of the male genitalia (see Fig. 27) occur for instance in Australia, Fiji and New Guinea. *Notomicrus politus* is probably the oldest available name for them, with *N. laevigatus* and *N. suturalis* possibly being junior subjective synonyms.

Specimens with distinct elytral reticulation occurring in the Philippines and in Malaysia probably represent two different species, distinguished from each other mainly in the male genitalia. One of these species might be the true *N. tenellus*; however, having not examined the types and the specimens from Sulawesi and Ambon, final conclusions are not drawn at present. A taxonomic revision of the Old World species will be published in the future (Toledo, in prep.).

***Notomicrus punctulatus* FAUVEL, 1903, new status**

Notomicrus punctulatus FAUVEL 1903: 244; ZIMMERMANN 1920: 3.

Notomicrus tenellus CLARK: BALFOUR-BROWNE 1939a: 97; 1945: 112; NILSSON 2005: 140.

TYPE LOCALITY: New Caledonia, Nouméa.

TYPE MATERIAL (not studied): Holotype (sex unknown) (IRSNB).

MATERIAL EXAMINED:

NEW CALEDONIA:

SOUTH PROVINCE: 2 exs. (CGW, NMW): Loc. 2001/NC 5.

SPECIES CONCEPT: The five specimens examined are clearly different from other *Notomicrus* studied. With any probability they should belong to *N. punctulatus* which was described from Nouméa, not far from Dumbéa.

DIAGNOSIS: Small, but visibly larger than the other Southeast Asian and Australian *Notomicrus* (total length: 1.5–1.6 mm; maximum width: 0.5 mm). Body oblong, strongly tapering posteriorly. Dorsal surface, especially on elytra, somewhat dull, due to well impressed reticulation: elytra with somewhat strong, scattered punctation, concentrated mostly on apical second half; longitudinal series of dots of about same size as elytral punctation, starting from base of each elytron. Coloration: elytra light chestnut-brown, pronotum and head testaceous, the latter a bit darkened, labrum yellow, antennae, mouthparts and legs yellow.

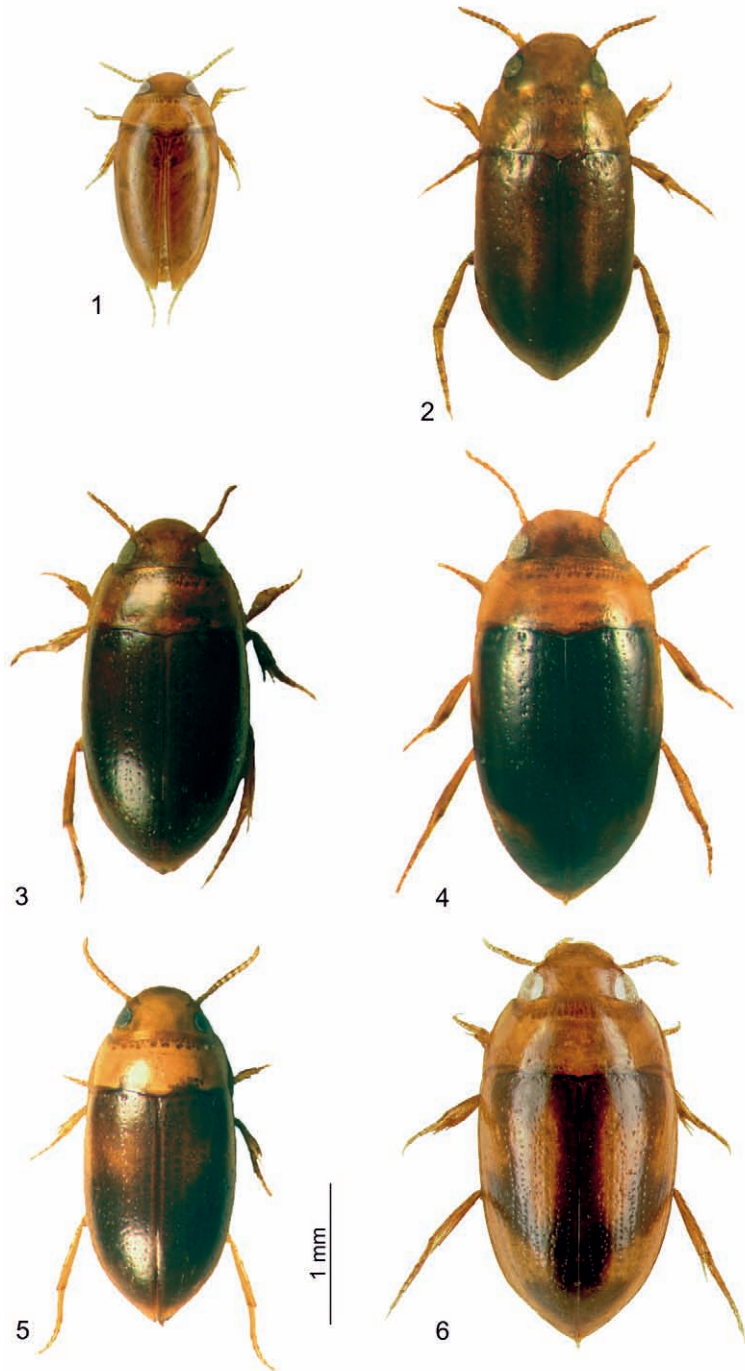
This species can be easily distinguished from the other species of *Notomicrus* by the larger size and the strong punctation of the elytra.

A detailed description will be published in the future (Toledo, in prep.).

DISTRIBUTION (Fig. 65): New Caledonia (so far known only from the surroundings of Nouméa).

***Speonoterus* SPANGLER, 1996**

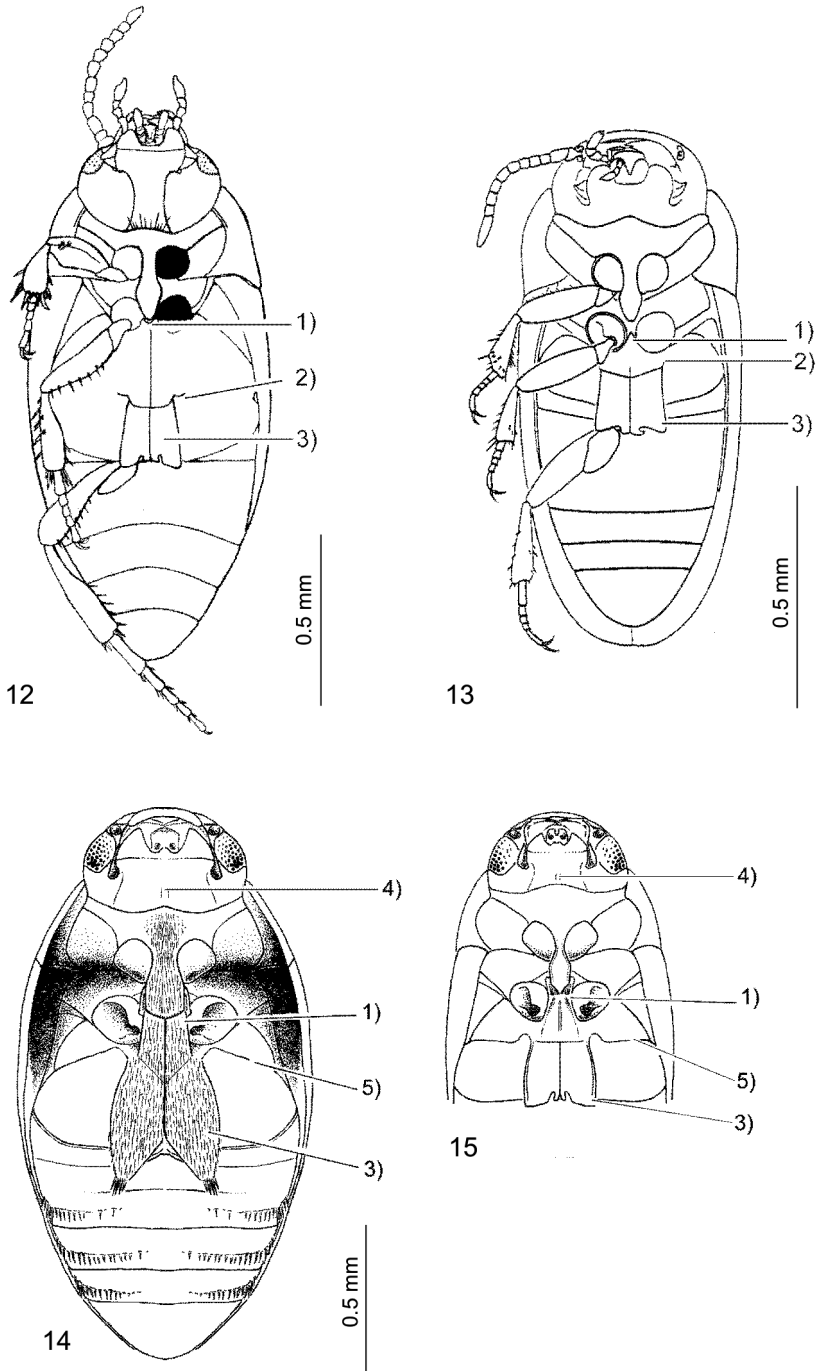
A monospecific genus, based on a very small blind cave-dwelling species from Sulawesi. *Speonoterus* shares with *Notomicrus* the following characters: scutellum in part exposed, metaventre and metacoxal plates fused (Fig. 13) and protibia expanded apically, with straight spurs (BEUTEL et al. 2006). Judging from a SEM photograph in SPANGLER (1996: Fig. 48) the midgular apodeme seems to be missing. This is another character shared with *Notomicrus*.



Figs. 1–6: Habitus of 1) *Notomicrus tenellus* species complex (specimen from northern Australia); 2) *Neohydrocoptus subvittulus* (specimen from West New Guinea); 3) *N. subfasciatus subfasciatus* (specimen from New Caledonia); 4) *N. subfasciatus major*; 5) *N. distans*; 6) *N. bivittis*.



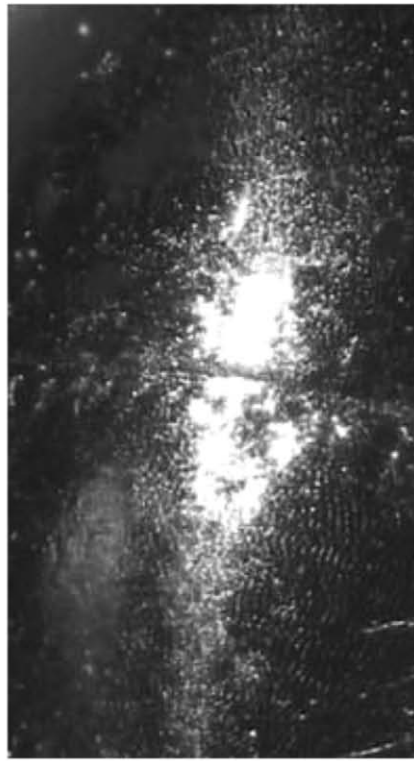
Figs. 7–11: Habitus of 7) *Canthydrus serialis* (specimen from West New Guinea); 8) *C. angularis* (darker specimen from Sulawesi); 9) *C. semperi* (specimen from Sulawesi); 10) *C. ephemeralis*; 11) *C. flammulatus* (specimen from Sulawesi).



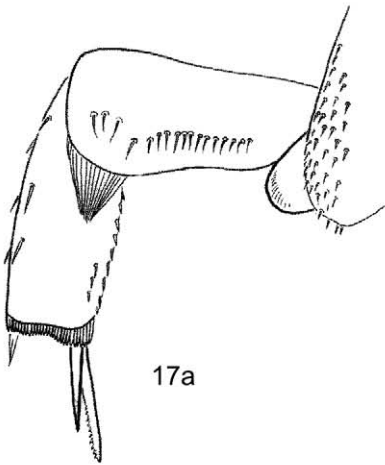
Figs. 12–15: Underside of Noteridae, showing main features (subschematic): 12) *Notomicrus* (modified after BEUTEL & ROUGHLEY 1987); 13) *Speonoterus* (modified after SPANGLER 1996); 14) *Canthydrus*; 15) *Neohydrocoptus* (without abdomen) (the latter two after TOLEDO 2003, modified).
 Explanations: (1) intercoxal process; (2) fused metaventricle and metacoxal plates; (3) metacoxal process (noterid platform); (4) midgular apodeme; (5) suture between metaventricle and metacoxal plates.



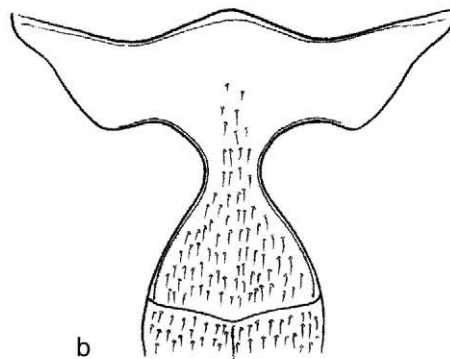
16a



b



17a



b

Fig. 16: Microsculpture (base of pronotum and base of elytron): a) *Neohydrocoptus*; b) *Hydrocanthus*.

Fig. 17: *Hydrocanthus*: a) metatibia; b) prosternal process (after TOLEDO 2003).

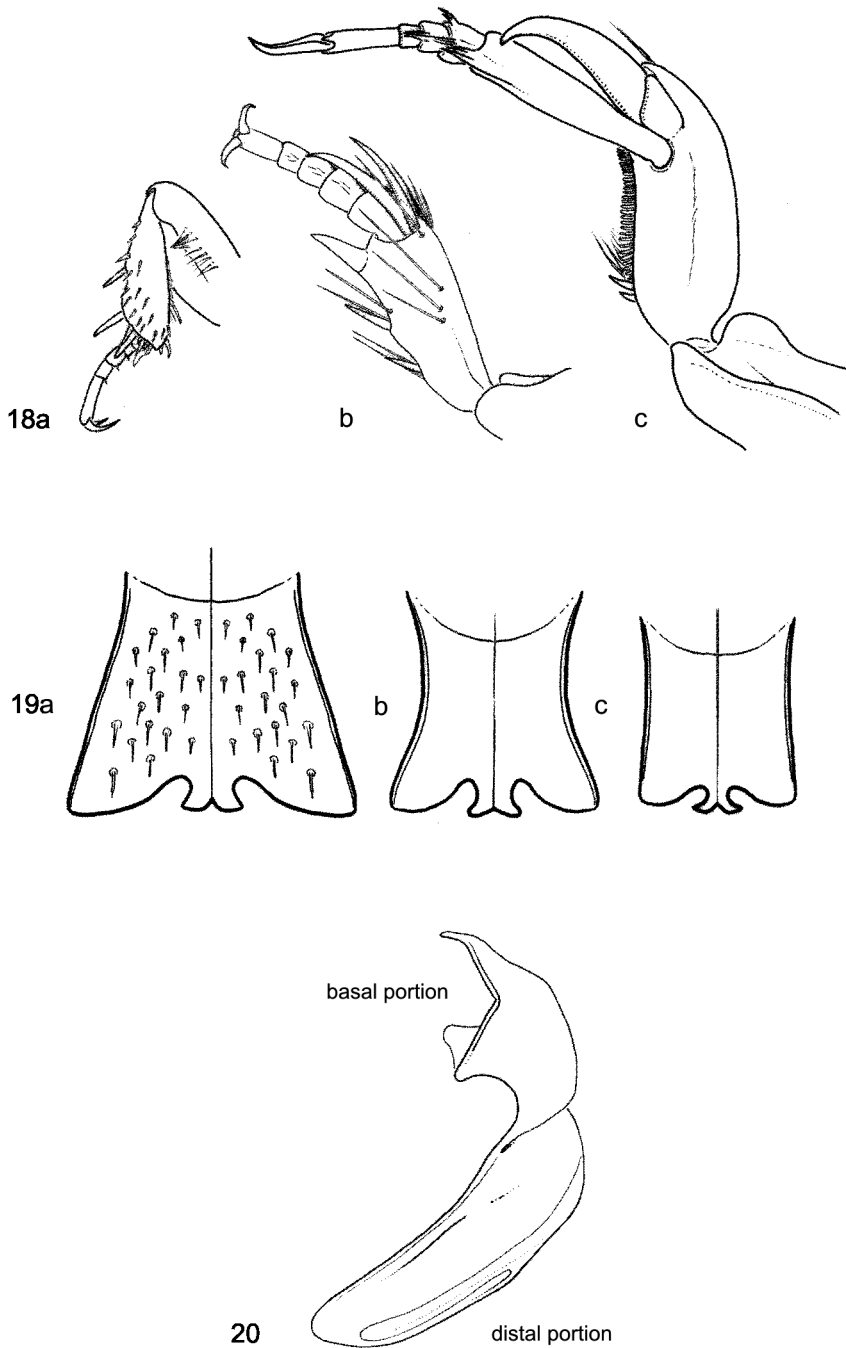


Fig. 18: Foreleg of a) *Notomicrus*; b) *Neohydrocoptus*; c) *Hydrocanthus*.

Fig. 19: Metacoxal process of a) *Neohydrocoptus bivittatus*; b) *N. subfasciatus*; c) *Neohydrocoptus* sp.

Fig. 20: Main features of median lobe of *Canthydrus* species.

***Speonoterus bedosae* SPANGLER, 1996**

Speonoterus bedosae SPANGLER 1996: 246; NILSSON 2005: 124.

TYPE LOCALITY: Indonesia, South Sulawesi, Malawa, Batu Putih stream, Mananga Cave.

TYPE MATERIAL: **Holotype** ♂ and **paratypes** (2 ♀ ♀) (USNM).

DIAGNOSIS: See also the key and the generic characters. Very small (total length: 1.1 mm; maximum width: 0.5 mm), eyeless. Integument pale. Natatory setae on tarsi missing. Body shape almost parallel-sided. Male genitalia as in Fig. 28.

DISTRIBUTION: Known only from the type locality.

Noterinae**Neohydrocoptini*****Neohydrocoptus* SATÔ, 1972**

Neohydrocoptus SATÔ 1972: 144 (subgenus of *Hydrocoptus* MOTSCHULSKY, 1853).

Hydrocoptus auct., nec MOTSCHULSKY 1853 (= junior synonym of *Hydroporus* CLAIRVILLE, see NILSSON et al. 1989).

DIAGNOSIS: Body length: 2.2–3.0 mm (in the Oriental and Australian Regions), somewhat elongate. Dorsal surface covered by microreticulation of polygonal, rounded cells. Maxillary and labial palps conical, truncate distally, not bifid. Elytra with impressed and more or less well defined, longitudinal series of dots; coloration testaceous, reddish or chestnut-brown, often with paler markings more or less developed on elytra. Underside glabrous in most species, otherwise with setal punctation on metacoxal process; prosternal process lanceolate, bordered and strongly narrowed between coxae. Metacoxal process (“noterid platform”) with lateral expansions more or less developed, depending on species; interlaminar bridge somewhat exposed on hind side (Figs. 15, 19), thus, articulation with trochanter in part visible. Protibiae apically expanded, with acuminate and straight spurs, at most curved but not hooked.

Males with slightly modified inner protarsal claws; median lobe of aedeagus in species from Southeast Asia and the Australian Region with elongate and stiff proximal portion, starting from a heavy, robust base and widened apically.

DISTRIBUTION: Afrotropical Region (incl. Madagascar), Oriental and Australian Regions. Few species occur in the Palearctic Region. First record of the genus for Sulawesi, W New Guinea, Fiji, and Wallis & Futuna.

Neohydrocoptus is wide-spread and speciose in the Old World. Only one species, *N. subfasciatus* (SHARP), was recorded east of the Wallace line so far. FAUVEL (1883, 1903) cited a single specimen of an unnamed species of *Hydrocoptus* from New Caledonia which he sent for study to David Sharp. Unfortunately, this specimen got lost in the postal service!

Key to species and subspecies of *Neohydrocoptus* east of the Wallace line

- 1 Prosternum grooved along entire length, up to prosternal process. Lateral sides of metacoxal process straight, diverging posteriorly; surface covered by deep setal punctures (Fig. 19a). Hind margin of pronotum with a dimple on each side, composed of large dots somewhat fused together. Body length: 3.0–3.7 mm. Reddish patterns on elytra sharply contrasting. Wide-spread from India to Japan and Sulawesi ***bivittis***
- Prosternum flat, at most bordered between last procoxal third. Lateral sides of metacoxal process curved, otherwise straight but subparallel; surface smooth, without punctures (Fig.

- 19b–c). Hind margin of pronotum at most with isolated dots. Body length: 2.0–3.0 mm. Elytra unicolored or with paler patterns less defined 2
- 2 Lateral sides of metacoxal process straight, subparallel (Fig. 19c). Median lobe of aedeagus robust and short (Fig. 34). Sulawesi sp. indet.
- Lateral sides of metacoxal process curved, concave (Fig. 19b). Median lobe of aedeagus more slender (Figs. 30–33) 3
- 3 Hind margin of pronotum with larger and more impressed dots near angles. Each elytron, normally with a longitudinal yellow stripe in middle (Fig. 2). Median lobe of aedeagus without torsion before the apex; base without step (Fig. 33). Oriental Region, New Guinea...
..... *subvittulus*
- Hind margin of pronotum without large dots, at most few, small, isolated ones. Elytra unicolored brown or with irregular pale markings, not forming a longitudinal stripe (Figs. 3–5). Median lobe with a visible torsion on left side, before apex; base with a step, more or less well developed (Figs. 30–32) 4
- 4 Step on base of median lobe of aedeagus poorly pronounced, although well visible (Fig. 32; but see also *N. subfasciatus*). Fiji, Wallis & Futuna *distans*
- Step on base of median lobe very pronounced (Figs. 30–31). Distribution different 5
- 5 Body length: 2.7–3.0 mm. W New Guinea *subfasciatus major*
- Body length: 2.4–2.5 mm. Sulawesi (?), northern Australia, New Caledonia
..... *subfasciatus subfasciatus*

***Neohydrocoptus bivittis* (MOTSCHULSKY, 1859)**

Hydrocoptus bivittis MOTSCHULSKY 1859: 44.

Hydrocoptus bivittis var. *mysorensis* GUIGNOT 1954: 198.

For a more complete bibliography refer to NILSSON (2005: 92).

TYPE LOCALITY: Burma.

TYPE MATERIAL (not studied): Syntypes (ZMUM).

MATERIAL EXAMINED:

INDONESIA: 1 ex. (NHML): North Sulawesi, Dumoga-Bone National Park, site 7, 490 m, Tumpah transect, 9.–11.II.1985, leg. J.D. Holloway, “R. Ent. Soc. London, Project Wallace, B.M. 1985-10”; 2 exs. (NMW): Central Sulawesi, 33.7 km SE Palu, 01°08'S 120°03'E, 800 m, 19.XII.1994, leg. J. Haft “4”; 1 ex. (NMW): Central Sulawesi, 45 km SE Palu, 01°11'S 120°08'E, 19.XII.1994, leg. J. Haft “5”.

DIAGNOSIS: Largest species of the genus. Each side of fore margin of pronotum with dimple.

Habitus as in Fig. 6. Elongated oval, somewhat convex. Total length: 3.0–3.7 mm; maximum width: 1.7–2.0 mm. Surface shining. Head and pronotum completely reddish or with a wide, dark band on hind margin of pronotum and/or a thinner one along fore margin. Elytra black or blackish-brown, laterally with a wide reddish or yellowish band, expanded toward disc at about middle of elytral length and towards last fourth; a more or less developed, longitudinal reddish line always visible on disc, often together with an oblique, smaller one, on proximal third. Dorsal microreticulation quite shallow, visible only at higher magnification. Series of dots on elytra fine but impressed, quite regular. Underside yellowish; prosternum grooved along its entire length, up to prosternal process; metacoxal process triangular, more expanded posteriorly, covered by setal punctation (Fig. 19a). Legs, antennae and mouthparts yellowish.

Male: Median lobe of aedeagus elongate, thin, without torsion before the apical expansion; left paramere elongate and narrow (TOLEDO 2003: Fig. 23).

VARIABILITY: Quite variable in size, body width, and color pattern. Dark bands on pronotum missing in some specimens.

DISTRIBUTION (Fig. 57): Wide-spread in Asia: Japan (Honshu), China (Guangdong, Hainan), Taiwan, India, Sri Lanka, Bangladesh, Burma, Vietnam, Thailand, Malaysia, Singapore, Indonesia (Java, Sulawesi). First record for Sulawesi.

***Neohydrocoptus distans* sp.n.**

TYPE LOCALITY: Fiji Islands, Vanua Levu, Nakula, 5 km N Savusavu, 10 m, swampy meadow.

TYPE MATERIAL: **Holotype** ♂ (NMW): “FIJI: Vanua Levu, Nakula, 5 km N Savusavu, 10m, 17.xi.2003, leg. Wewalka, Balke & Koto, FI 25”.

Paratypes: 9 exs. (CGW, ZSM): same data as holotype; 1 ex. (CGW): Fiji, Vanua Levu, base of Mt. Dalaikoro, 100 m, 14.XI.2003, leg. G. Wewalka, M. Balke & K. Koto “FI 20”; 10 exs. (CGW, CMT, FNCS, NMW, ZSM): Fiji, Vanua Levu, 5 km N Savusavu, 5 m, 16.XI.2003, leg. G. Wewalka, M. Balke & K. Koto “FI 24”; 4 exs. (CGW, NMW, ZSM): Fiji, Viti Levu, Rakiraki, Navara, 50 m, 10.XI.2003, leg. G. Wewalka, M. Balke & K. Koto “FI 11”; 1 ex. (NMW): Fiji, Kadavu, Vunisea, 100 m, 24.IX.2003, leg. M. Balke & G. Wewalka “FI 31”; 8 exs. (CGW, NMW, ZSM): Fiji, Kadavu, Vunisea, 10 m, 25.IX.2003, leg. M. Balke & G. Wewalka “FI 32” resp. “FI 032”; 2 exs. (ZSM): Fiji, Nayau, Narocivo, 35 m, 179°02.5'W, 17°58.0'S, 23.XII.2003, leg. K. Koto “FI 33”; 6 exs. (CMT, NMW, ZSM): Lakeba Island, Nukunuku, Dralakaka Creek, 20 m, 178°45.6'W, 18°12.0'S, 21.XII.2003, leg. K. Koto “FI035”.

ADDITIONAL MATERIAL EXAMINED:

W A L L I S & F U T U N A (WALLIS ISLAND): 2 exs. (NMW): Kikila, Tarodiere Sausau, 19.X.2004, leg. N. Mary “ETHYCO”.

DIAGNOSIS: Habitus as in Fig. 5. Total length: 2.2–2.4 mm; maximum width: 1.1–1.2 mm. Very similar to *N. subfasciatus subfasciatus*, but body shape somewhat more elongate, lateral margins of pronotum and elytra straighter, head and pronotum paler. Elytra evenly chestnut-brown, except for testaceous lateral sides and indistinct paler area on shoulders. Longitudinal series of dots slightly more regular than in *N. s. subfasciatus*. Lateral sides of metacoxal process as in the latter.

Male: Median lobe of aedeagus (Fig. 32) in lateral aspect with apical expansion slightly more slender and more gently dilated than in *N. subfasciatus*; base with step visible but much less pronounced than in *N. subfasciatus*. Parameres (Fig. 37) similar to those of *N. subfasciatus* but left paramere with apical, not central, series of short setae on anterior side.

DISTRIBUTION (Fig. 57): Fiji, Wallis & Futuna.

VARIABILITY: The two specimens from Wallis & Futuna are somewhat larger (total length: 2.6 mm, maximum width: 1.2 mm) and less elongate than those from Fiji; the step of the base of the aedeagus is less pronounced (Fig. 32b), hardly visible. At present, I prefer to consider all specimens as conspecific.

HABITAT: Sun exposed swampy areas.

DERIVATIO NOMINIS: The name of this species refers to the fact, that it is the easternmost species of this genus.

***Neohydrocoptus subfasciatus major* ssp.n.**

TYPE LOCALITY: Indonesia, W New Guinea, Nabire, Bobo River.

TYPE MATERIAL: **Holotype** ♂ (NMW): “IRIAN JAYA: Nabire Kali Bobo, 100m IX. 1990 (IR 91 #10), leg. Balke & Hendrich”.

Paratypes: 37 exs. (CMT, NMW): same data as holotype; 22 exs. (CLH, MNB, ZSM): W New Guinea, Paniai Prov., Nabire, Kali Bobo, 19.–26.IX.1990, leg. M. Balke & L. Hendrich “IR 10” [same sample site of the preceding but label differently printed]; 6 exs. (NMW): W New Guinea, Nabire Distr., Wanggar, Kali Bumi, 30.IX.–1.X.1990, leg. M. Balke & L. Hendrich; 58 exs. (CLH, CMT, ZSM): W New Guinea, Paniai Prov., Wanggar, Kali Bumi, 30.IX.–1.X.1990, leg. Balke & Hendrich “IR 14” [most probably same sample site of the preceding but label differently printed]; 1 ex. (NMW): W New Guinea, 30 km S Nabire, Kali Cemara, 150 m, 15.VIII.1998, leg. M. Balke “CEMlux” [Cemara at light]; 7 exs. (NMW): W New Guinea, Paniai Prov., road Nabire-Ilaga, 30 km Pemukiman, 26.VIII.1996, 200 m, leg. M. Balke “96 # 3”; 3 exs. (NMW): W New Guinea, Sentani, Cyclops Mts., 400 m, 8.–9.VIII.1992, leg. M. Balke “5”.

DIAGNOSIS: Habitus as in Fig. 4. Total length: 2.7–3.0 mm; maximum width: 1.3–1.4 mm. Differing from nominal subspecies by larger size and somewhat more oblong body shape, sides of elytra and pronotum more straight; often with hardly visible lateral angle between elytra and pronotum. Head and pronotum paler than in *N. s. subfasciatus*, usually with a brownish nebulosity on pronotum. Reddish-yellow head and pronotum and dark elytra providing a sharply bicolored impression; reddish patterns on elytra as in *N. s. subfasciatus*, but often more defined although very variable in expanse. Longitudinal series of dots on elytra more impressed. Lateral sides of metacoxal process as in *N. s. subfasciatus*, but with latero-apical expansions slightly more developed.

Male: Median lobe of aedeagus and parameres (Figs. 31, 36) not differing substantially from nominal subspecies, except for larger size.

DISTRIBUTION (Fig. 57): At present known only from the north coast of West New Guinea.

HABITAT (Fig. 59): See below, under *Canthydrus serialis*.

DERIVATIO NOMINIS: The name of this subspecies refers to its comparatively large size.

Neohydrocoptus subfasciatus subfasciatus (SHARP, 1882)

Hydrocoptus subfasciatus SHARP 1882: 261; BRANDEN 1885: 14; ZIMMERMANN 1920: 4; WATTS 1985: 27; LAWRENCE et al. 1987: 326; LARSON 1993: 61, 1997: 273.

Neohydrocoptus subfasciatus (SHARP, 1882): WATTS 2001: 61; NILSSON 2005: 95.

“*Hydrocoptus* sp.” sensu FAUVEL 1883: 336; FAUVEL 1903: 244 (New Caledonia, Grande Terre, Nouméa, Anse Vata).

TYPE LOCALITY: Australia, Rockhampton, Queensland.

TYPE MATERIAL (not studied): Syntypes (probably in NHML).

MATERIAL EXAMINED:

I N D O N E S I A: 2 exs. (NHML): North Sulawesi, Dumoga-Bone National Park, site 7, 490 m, Tumpah transect, 9.–11.II.1985, leg. J.D. Holloway / R. Ent. Soc. London, Project Wallace, B.M. 1985-10.

A U S T R A L I A: > 300 exs. (CLH, CMT): Northern Territory, Kakadu National Park, Ubirr Camping area, ca. 30 m, black light, 27.–28.X.1996, leg. L. Hendrich; 22 exs. (CMT): same, Ubirr Rock, freshwater swamp, 20.X.1999, leg. K.B. Miller; 1 ex. (CLH): Northern Territory, Georgetown Billabong, 750 m E Jibiru, 30 m, 12°40'716"S 132°55'861"E, 29.VIII.2006, leg. L. & E. Hendrich; 1 ex. (CLH): Queensland, 15 km S Agnes Water, entrance Errimulla National Park, 15 m, 24°15'193"S 151°49'222"E, 25.IX.2006, leg. L. & E. Hendrich; 1 ex. (CLH): New South Wales, 23 km SE Grafton, Pillar Valley Creek, 21 m, 29°45'364"S 153°07'352"E, 14.X.2006, leg. L. & E. Hendrich.

N E W C A L E D O N I A:

NORTH PROVINCE: 3 exs. (MNHV): River Néhoué, 15 m, 20°25.2'S 164°13.3'E, 8.I.2007, leg. M. Wanat & R. Dobosz (public camp site, night collecting & beating).

7 exs. (CGW, ZSM): Loc. 2001/NC 12; 14 exs. (CGW): Loc. 2001/NC 20; 1 ex. (ZSM): Loc. 2001/NC 29; 2 exs. (NMW): Loc. 2001/NC 57.

SOUTH PROVINCE: 1 ex. (IAC): La Foa, 32 m, mercury vapour lamp, III. 2007, leg. N. Degallier; 2 exs. (ZSM): Dumbéa, Pond, Road RM4, 1 km E of Road RT1, 22°9'S 166°27'E, 6.IX.2008, leg. A. Gervais “T1”.

3 exs. (CGW): Loc. 2001/NC 4; 10 exs. (CGW, CMT, NMW): Loc. 2001/NC 42.

DIAGNOSIS: Habitus as in Fig. 3. Total length: 2.40–2.50 mm; maximum width: 1.15–1.25 mm. Body elongate, with lateral sides of elytra and pronotum slightly but regularly rounded: pronotum and elytral outlines continuous.

Head: Reddish or reddish-yellow, clypeal outline acutely rounded. Dorsal surface with distinct and impressed microreticulation of rounded, polygonal cells; no dots visible. Antennae and mouthparts reddish-yellow.

Pronotum: Same color as head, microreticulation similar; dots grouped along fore margin and, often, few scattered ones along hind margin. Lateral beads broad.

Elytra: Chestnut-brown, lateral sides paler; two, somewhat confused, faded areas, one subbasal and one subapical, both starting from lateral side; this being most developed coloration pattern in this species, some specimens sharing less variegate or even unicolored brown elytra. Longitudinal series of dots quite impressed and regular, often together with few larger elements close to series or in some interseries.

Venter: Evenly reddish-yellow. Prosternum wide before coxae. Metacoxal process with lateral sides visibly concave. Legs reddish-yellow.

Male: Ventral aspect of median lobe of aedeagus (Fig. 29a) straight and abruptly bent in a kind of hook, just after apical half; lateral aspect (Fig. 30) with visible torsion on left side, before apex; the latter expanded in a wide curve; base with strong step. Left paramere (Fig. 35) with narrow, pointed apex and a small, central tuft of setae on anterior side.

VARIABILITY: The specimens from Sulawesi are externally identical with the Australian ones, however, the median lobe has the basal step less pronounced (Fig. 30b), thus resembling *N. distans* (see below). Specimens from New Caledonia often have almost unicolored brownish elytra.

DISTRIBUTION (Figs. 57, 65): Sulawesi, northern Australia (Northern Territory, Queensland), New Caledonia. First record for Sulawesi, Northern Territory and New Caledonia.

HABITAT (Fig. 63): According to LARSON (1993) a lentic species; in Queensland collected mostly from dense and rotten vegetation, at margins of reservoirs and ponds. Attracted to light.

Neohydrocoptus subvittulus (MOTSCHULSKY, 1859)

Hydrocoptus subvittulus MOTSCHULSKY 1859: 43.

? *Methles sternalis* SEIDLITZ 1887: 78.

Hydrocoptus vittatus SHARP 1882: 262.

Neohydrocoptus subvittulus (MOTSCHULSKY, 1859): NILSSON 2005: 95 (bibliography).

TYPE LOCALITIES: *Hydrocoptus subvittulus*: India and Sri Lanka (Colombo); *H. vittatus*: North India and Malaysia (Sarawak, Borneo); *Methles sternalis*: Syria.

TYPE MATERIAL (not studied): *Hydrocoptus subvittulus*: Syntypes (ZMUM). *Hydrocoptus vittatus*: syntypes (NHML). *Methles sternalis*: syntypes (not located in ZSM, M. Balke, personal communication).

MATERIAL EXAMINED:

S R I L A N K A: 42 exs. (CMT): Sinharaja Forest National Park, 7.I.1993, leg. B. Rautenstrauch.

I N D O N E S I A: 2 exs. (NMW): North Sulawesi, E Gorontalo, 25.IV.1992, leg. S. Schödl "23"; 1 ex. (NMW): same data, leg. M.A. Jäch; 4 exs. (NMW): Southeast Sulawesi, Kendari Airport, 30 km W of Kendari, 11.–14.II.1994, leg. M. Štrba & I. Jeniš (one of these specimens, a female, looks externally similar to *N. subvittulus* but it is much larger therefore may belong to another species); 1 ex. (NMW): Lombok, Suranadi, 3.II.1988, leg. M.A. Jäch "14"; 9 exs. (CLH, CMT): W New Guinea, Baliem Valley, Wamena, Minimocave, 1600 m, 1.IX.1990, leg. M. Balke & L. Hendrich.

DIAGNOSIS: Habitus as in Fig. 2. Total length: 2.3–2.5 mm; maximum width: 1.1–1.2 mm. Body oblong, lateral sides of pronotum straight in distal half, as lateral sides of elytra in proximal half, leaving a poorly pronounced but discernable angle between pronotum and elytra. Head and pronotum reddish-yellow, elytra darker, each one, normally, with a more or less distinct yellow longitudinal stripe in middle and paler lateral margin. Hind margin of pronotum, more or less close to angles, normally with few (1–5) closely grouped large dots. Lateral sides of metacoxal process as in preceding species.

Male: Ventral aspect of median lobe of aedeagus (Fig. 29b) gently sinuate; in lateral view (Fig. 33), basally narrow, gradually enlarged to apex; both left and right sides smooth, without visible torsion before apex. Base without step. Left paramere (Fig. 38) rounded apically, with denser tuft of setae.

VARIABILITY: The New Guinea specimens, compared with topotypic specimens (Sri Lanka), are slightly larger in size, and darker and duller, due to a more impressed reticulation; specimens from Sulawesi are also dull, often with elytral stripes missing. In fact, *N. subvittulus* is very variable and it might be a complex of several very closely related species.

DISTRIBUTION (Fig. 57): Wide-spread in Asia: ? Iraq (yet to be confirmed), Pakistan, Nepal, India, Bangladesh, southern China, Japan (Ryukyu Islands), Sri Lanka, Andaman Islands, Burma, Vietnam, Malaysia (Sarawak), Singapore, Indonesia (Java, Sumatra, W New Guinea). First record for Sulawesi, Lombok and New Guinea (and thus the Australian Region).

Neohydrocoptus sp.

MATERIAL EXAMINED:

I N D O N E S I A: 1 ex. (NMW): North Sulawesi, Tasek Ria, W Manado, 13.IV.1992, leg. M.A. Jäch (6); 19 exs. (NHML): Central Sulawesi, near Morowali, Ranu River area, 27.I.–20.IV.1980, leg. S.L. Sutton & C.J. Rees “B.M. 1980-281”; 1 ex. (NMW): Central Sulawesi, 33.7 km SE Palu, 800 m, 01°08'S 120°03'E, 19.XII.1994, leg. J. Haft (4); 2 exs. (NMW): Southeast Sulawesi, Rawa Aopa NP, Aopa village, 8.–10.II.1994, leg. M. Štrba & I. Jeniš; 3 exs. (CMT): South Sulawesi, 20 km NE Bantimurung, at light, 30.III.1999, leg. S. Bečvář & P. Zabransky; 1 ex. (NMW): South Sulawesi, SE Takalar, S Ujung Pandang, 2.V.1992, leg. S. Schödl “33”.

DIAGNOSIS: Total length: 2.3–2.5 mm; maximum width: 1.1–1.2 mm. Body oval, elongate, with lateral sides of elytra and pronotum slightly but visibly rounded. Dorsal coloration testaceous on head and pronotum; elytra reddish-yellow, gradually paler on discal area. Microreticulation fine on whole surface, but somewhat impressed and well visible. No punctuation on fore margin of pronotum except for two groups composed by one or two isolated dots on each side. Series of dots on elytra quite regular, fine but well visible: third one composed by two or three files, irregularly arranged on proximal half of elytra. Lateral sides of metacoxal process straight or almost so.

Male: Median lobe of aedeagus (Fig. 34) thicker, shorter and more robust than in all preceding species, with a visible subapical torsion. Left paramere (Fig. 39) regularly rounded on hind side, sharply pointed at apex and with a tuft of long setae on ventral side; right paramere (Fig. 39) broadly triangular, acuminate on hind angle.

VARIABILITY: Two different kinds of elytral sculpture have been observed in this species: most specimens from Sulawesi are quite shiny, due to a less impressed reticulation; series of dots are quite larger, more impressed and arranged in visibly regular files, especially the external ones; elytra chestnut-brown, with paler discal area hardly distinct. Specimens seen from Bantimurung (southern Sulawesi) have a duller elytral surface, with a deeply impressed reticulation; series of dots fine and less impressed, more irregularly arranged; elytral coloration darker,

usually with the yellow area on the disc more distinct. Male genitalia are identical. More material is needed to better understand the variability within this species.

DISTRIBUTION (Fig. 57): Indonesia (Sulawesi).

Noterini

Canthydrus SHARP, 1882

DIAGNOSIS: Body length: 2.5–4.0 mm, body form very convex, strongly flattened ventrally. Dorsal surface shining, black, yellow or variegate in coloration, covered by a fine wrinkly reticulation. Prosternal process flat, triangular, visibly longer than wide; together with metaventricle and metacoxal process densely setose (Fig. 14). Metafemora with ventro-apical tuft of setae. Metatibia elongate, with apical spurs smooth, not serrate. Protibia ending with large hooked, apparently single spur. Males with few circular sucking hairs on first article of pro- and mesotarsi. Median lobe of aedeagus broad and flat laterally, right side concave and right processes of base strongly elongate and twisted distally. Left paramere somewhat blunt, more or less triangular, with distinct, apical tuft of setae.

Canthydrus is the most speciose noterid genus of the Old World with more than 60 taxa described, occurring mainly in the tropics. In the Australian/Pacific Region it is represented by very few species, most of them very similar (*Canthydrus serialis* group), delineated by the following characters: comparatively large (body length: 3.0–4.0 mm), very convex lateral outline, sides of elytra visibly curved in proximal portion (less pronounced in *C. ater*); dorsal outline regularly oval, gently tapering toward the apex; dorsal surface less shining with respect to most other *Canthydrus* species, due to a somewhat coarser sculpture on pronotum and elytra, together with shallow, irregular scratches scattered on the surface; strong punctures on elytra arranged in quite irregular series. Coloration evenly black or black-brown, except of yellowish pronotal hind angles and, normally, a reddish, submedial spot more or less developed on each elytron (in *C. bovillae*, one or two additional reddish markings can occur also at the elytral base). Median lobe of aedeagus simple in shape, more or less elongate (blunt in *C. occultus* sp.n.), rounded apically; left paramere triangular, rounded or truncate apically. The Australian *C. ephemeralis* deviates to some extent (see below) and it might therefore belong to a separate group.

Key to *Canthydrus* species east of the Wallace line

- 1 Dorsal coloration evenly testaceous or reddish-yellow. Body length: 2.2–2.5 mm. Southeast Asia, Sulawesi *ritsemae*
- At least elytra black, with or without paler markings. Body length: 2.5–4.0 mm 2
- 2 Head and pronotum completely reddish, at most with a thin darker band along basal margin of pronotum. Elytra black with extended reddish markings in subbasal, submedial and lateral position (Figs. 11, 26). Wide-spread in southern Asia, Sulawesi *flammulatus*
- Head and pronotum black, only labrum, clypeus and hind angles of pronotum paler. Elytra black, paler markings small or missing 3
- 3 Body shape, in lateral view, only hardly convex, lateral sides of elytra not strongly concave (Figs. 24–25). Average body length: 2.5–3.2 mm 4
- Body shape, in lateral view, very convex, lateral sides of elytra more or less strongly concave (Figs. 21, 23). Body length: 2.9–4.0 mm 5
- 4 Elytra completely black, without traces of paler markings (Figs. 9, 25). Median lobe of aedeagus rounded at tip (Fig. 45). Philippines, Sumatra, Sulawesi *semperi*

- Each elytron with two distinct paler spots (Figs. 10, 24): one subbasally and the other medially. Median lobe of aedeagus pointed at tip (Fig. 44). Northern Australia *ephemeralis*
- 5 Median lobe of aedeagus elongate, apex more bulky than in other species (Fig. 46). Left paramere (Fig. 54) with dense group of setae in apical half. Head yellow on frons and clypeus. Oriental Region, eastwards to Sulawesi and Lombok *angularis*
- Median lobe of aedeagus elongate or broad, not expanded apically. Left paramere with just an apical tuft of setae. Head dark on front, paler only on clypeus. Moluccas to New Caledonia 6
- 6 Distal and basal portion of median lobe of aedeagus almost of same length; distal portion short but regularly curved from base to apex (Fig. 43). Body shape more elongate and less convex (Fig. 22); average body length: 3.6–4.0 mm. Moluccas (Bacan, Ceram), ?Sangihe *ater*
- Distal portion of median lobe of aedeagus elongate, distinctly longer than basal portion (Figs. 40, 42), otherwise distal portion very broad, sinuate on dorsal side (Fig. 41). Body shape shorter and more convex (Fig. 21); average body length: 2.9–3.6 mm. Not occurring in the Moluccas 7
- 7 Distal portion of median lobe of aedeagus very broad, almost oval, strongly sinuate on dorsal side (Fig. 41). Submedial spots on elytra always invisible. W New Guinea *occultus*
- Distal portion of median lobe elongate, almost parallel, tapering apically, not or at most slightly sinuate in dorsal side (Figs. 40, 42). Spots on elytra normally present, sometimes hardly visible or missing 8
- 8 Narrowed apex of median lobe of aedeagus starting at about 1/3 of its length, distinctly but gently sloping (Fig. 42). Coloration normally brown to black, submedial spots on elytra large and somewhat irregular. Often some subbasal marking also visible. Northern Australia *bovillae*
- Narrowed apex of median lobe of aedeagus starting at about 1/5 of its length, more abruptly sloping (Fig. 40). Coloration deep-black, submedial spots only visible on elytra, normally smaller and more regularly rounded; sometimes missing. W New Guinea, Solomon Islands, Vanuatu, New Caledonia *serialis*

Canthydrus angularis SHARP, 1882

Canthydrus angularis SHARP 1882: 277.

Canthydrus bakeri PESCHET 1921: 693; TOLEDO 2008: 56 (synonym of *angularis*).

Canthydrus morsbachi (WEHNCKE, 1876) (misinterpr.): NILSSON 2005: 97.

Canthydrus guttula (AUBÉ, 1838) (misident.): RÉGIMBART 1892: 980, 1899: 247.

For a more complete bibliography see TOLEDO (2008: 56).

TYPE LOCALITIES: *Canthydrus angularis*: Singapore; *Canthydrus bakeri*: Philippines (Luzon, Laguna, Los Baños).

TYPE MATERIAL: *Canthydrus angularis*: **Lectotype** ♂ (NHML) designated by TOLEDO (2008); *Canthydrus bakeri*: syntypes (MNHN, IRSNB).

MATERIAL EXAMINED:

INDONESIA: 44 exs. from Sulawesi and Lombok have been studied by TOLEDO (2008).

NOMENCLATURE: This species was previously and erroneously synonymized with *Canthydrus morsbachi*, while *C. bakeri* was treated as valid species from Borneo, Laos, W New Guinea, Philippines, Sulawesi, Timor and possibly Taiwan (NILSSON 2005). A recent revision confirmed that the names *C. angularis* and *C. morsbachi* are not synonyms, and *C. bakeri* is recognized as a dark form of *C. angularis*, and synonymized with the latter (TOLEDO 2008). All records of *C. bakeri* therefore refer to *C. angularis*. This applies also at least for most citations of *C. morsbachi*, except for specimens from India and Sri Lanka, where *C. angularis* does not seem to occur (see TOLEDO 2008).

DIAGNOSIS: Habitus as in Fig. 8. Total length: 3.0–3.8 mm; maximum width: 1.6–2.0 mm. Large, very convex, sides of pronotum strongly rounded in lateral view, sides of elytra concave

proximally, similar to *C. serialis* but even more accentuated (Fig. 23). Populations occurring east of the Wallace line share almost completely black coloration, except yellow clypeus and part of frons, testaceous hind angles of pronotum and two submedial yellow or reddish-yellow spots on elytra; additionally, subbasal elytral markings are often more or less clearly visible.

Externally this species is very similar to *C. serialis* and related species but the aedeagus (Fig. 46) and the left paramere (Fig. 54) are very distinctive.

DISTRIBUTION (Fig. 58): In the current concept, this species occurs in Southeast Asia (south of China and Burma, eastwards to Sulawesi and Lombok), while its presence in India and Sri Lanka is most doubtful. Records of *C. angularis* (namely *C. guttula*) for New Guinea and Timor by RÉGIMBART (1892, 1899) also need confirmation.

Canthydrus ephemeris WATTS, 2001

Canthydrus ephemeris WATTS 2001: 61; NILSSON 2005: 99.

TYPE LOCALITY: Australia, Northern Territory, 5 km SE Mount Borradaile Station.

TYPE MATERIAL (not studied): **Holotype** ♂ (SAMA).

MATERIAL EXAMINED:

A U S T R A L I A: 13 exs. (CLH, CMT): Northern Territory, Litchfield National Park, Florence Falls Rain-forest Walk, 120 m, 13°06'705"S 130°47'220"E, 4.XI.1996, leg. L. Hendrich; 4 exs. (CLH): Northern Territory, Litchfield National Park, Creek near Wangi Falls, 191 m, 13°11'221"S 130°43'327"E, leg. L. & E. Hendrich; 5 exs. (CLH): Northern Territory, Litchfield National Park, Shady Creek, Florence Falls, 92 m, 13°06'116"S 130°47'195"E, 20.VIII.2006, leg. L. & E. Hendrich.

DIAGNOSIS: Habitus as in Figs. 10, 24. Total length: 2.5–3.1 mm; maximum width: 1.3–1.6 mm. Smaller and more elongate than *Canthydrus angularis*; less convex, lateral side of elytra (in lateral view) poorly concave. Color patterns distinctive: one medial and one subapical paler spot on each elytron, instead of submedial and (rarely) subbasal spot as in other species of the Australian Region. Median lobe and left paramere also distinctive (Fig. 44), former short and blunt, acuminate apically; latter more elongate, pointed at tip, with setal tuft along apical third of inner margin (Fig. 52). In the original description, WATTS (2001) described also the more robust shape of metatarsi as a diagnostic character, with respect to the sympatric *C. bovillae*. I here confirm that this character is useful also in respect to *C. serialis*, *C. occultus* and *C. ater*, all of them having slender metatarsi.

DISTRIBUTION (Fig. 58): Northern Australia (Northern Territory, Western Australia).

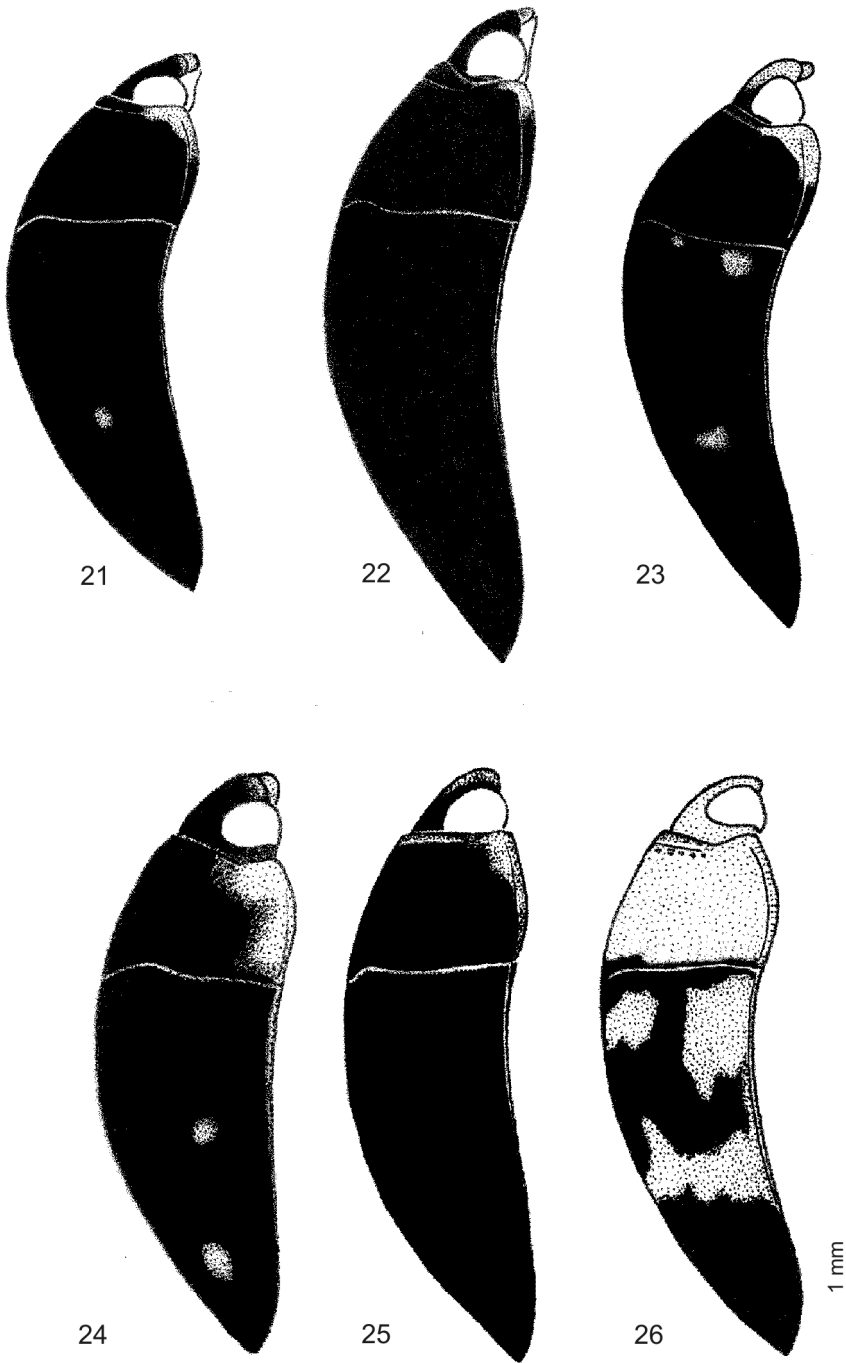
HABITAT (Fig. 61): According to WATTS (2001) and Lars Hendrich (personal communication) this species occurs in ephemeral or seasonal, slow flowing streams and pools with substrate of sand and rocks, with accumulation of debris.

Canthydrus flammulatus SHARP, 1882

Canthydrus flammulatus SHARP 1882: 278; BRANDEN 1885: 16; BAER 1886: 103; RÉGIMBART 1888: 609, 1889: 149, 1891: 538, 1895: 343, 1899: 247; ZIMMERMANN 1919: 118, 1920: 13, 1927a: 9; CSIKI 1938: 125; GUIGNOT 1956: 60; VAZIRANI 1977: 5; ROCCHI 1986: 33; HENDRICH & YANG 1999: 257; NILSSON 2005: 99.

TYPE LOCALITY: Thailand, Bangkok.

TYPE MATERIAL: Four syntypes labelled "Bangkok, Siam". **Lectotype** ♂ (by present designation) (NHML): "Cotype [yellow bordered, circular label, added subsequently] \ Siam \ Sharp Coll. 1915-313 \ Canthydrus flammulatus, Shp. Co-type [Sharp (?) hw.]". **Paralectotypes:** 3 ♀♀ (NHML), same data except for one bearing red bordered, circular label "Type" and last label as follows "Type 481 flammulatus Bangkok [Sharp hw.]". Lectotype and paralectotypes with author's red designation labels.



Figs. 21–26: Habitus in lateral schematic outline of 21) *Canthydrus serialis*; 22) *C. ater*; 23) *C. angularis*; 24) *C. ephemeralis*; 25) *C. semperi*; 26) *C. flammulatus*.

DOUBTFUL SYNTYPES: 1 ex. (IRSNB) labelled “2821 \ Siam, Coll. Chevrolat, Det Sharp 82 [rectangular label with black frame, printed, with “Siam” hw.] \ elegantulus Chevr., Siam [fold piece of paper hw. by Chevrolat?] \ Canthydrus elegantulus Chev. [rectangular label hw. by ?] \ Sharp tev. [test.?: illegible, retouched with ink on printed “det.”] 1882: Canthydrus flammulatus Sharp [hw. by the same hand as the preceding] \ Type [printed in red on rectangular label with black frame]”. 1 ex. (IRSNB): same kind of labels, handwritten by the same hand as the preceding specimen, labelled: “2821 \ Coll. Chevrolat, det Sharp 82 [rectangular label with black frame] \ Hydrocanthus pictus Mots... [the remaining two words illegible, hw. by Motschulski (?) on fold piece of paper] \ Hydrocanthus pictus Motsch. [hw.] \ Sharp tev. [illegible, same situation as for the preceding specimen] 1882: Canthydrus flammulatus Sharp [hw.] \ Type [printed in red on rectangular label with black frame]”.

It is not clear whether these two specimens should be considered syntypes of *C. flammulatus*. A third specimen stands in the same collection, also numbered “2821”, labelled in a similar way, but with “Cochinchin Coll. Fleuteaux [= Fleutiaux] \ Coll. Séverin, Détermin. Régimb. 1890 \ Canthydrus flammulatus Sharp, Cochinchin [fold, hw. paper] \ Régimbart det., 1890: Canthydrus flammulatus Shp” and with no type label.

Syntypes from the second locality mentioned in the original description (“Celebes, Makassar” [= Sulawesi, Ujung Pandang]), may be housed in the NHML, but have not been traced.

ADDITIONAL MATERIAL EXAMINED:

I N D O N E S I A: 4 exs. (NMW): North Sulawesi, Gorontalo, Lake Limboto, 25.IV.1992, leg. S. Schödl “21”; 5 exs. (CJS): Central Sulawesi, Environments of Pendolo, Lake Poso, 9.X.2001, leg. J. Štátný; 6 exs. (NMW): Southeast Sulawesi, Rawa Aopa National Park, Aopa vill., 8.–10.II.1994, leg. M. Štrba & I. Jeniš; 3 exs. (NMW): South Sulawesi, S Ujung Pandang, SW of Takalar, 2.V.1992, leg. S. Schödl “33”.

I have seen also specimens from other parts of Indonesia (Kalimantan, Siberut) and from the following countries: Burma, Thailand, Laos, Vietnam, Malaysia, Singapore.

DIAGNOSIS: Habitus as in Figs. 11, 26. Total length: 2.7–3.0 mm; maximum width: 1.4–1.5 mm. Regularly oval, somewhat elongate, elytral apex quite narrowed. Body convex as in preceding species. Head and pronotum reddish-yellow, elytra black with four markings in subbasal and submedial position.

Head: Completely reddish-yellow. Dorsal microreticulation fine and shallow. Antennae and mouthparts testaceous.

Pronotum: Completely reddish yellow except for fine, darker line along basal margin. Lateral sides (in lateral view) not strongly rounded. Cells of dorsal microreticulation very fine, hardly discernable, somewhat arranged in wrinkles.

Elytra: Black, with weak metallic sheen; each elytron with subbasal reddish \cap -shaped marking, a waved submedial band and a third, elongate one, along lateral sides. The latter (in lateral view) just slightly concave proximally. Dorsal microreticulation even less discernable as on pronotum. Longitudinal series of dots scattered and poorly impressed on proximal half, with only inner more or less regular; stronger and closer on distal half.

Venter: Black from mesepisterna to abdominal ventrites; prosternum, proepisterna, hypomera and epipleura yellow; prosternal and metacoxal processes dark brown. Legs reddish.

Male: Median lobe of aedeagus (Fig. 47). Left paramere (Fig. 55) elongate, with apex almost acuminate.

DISCUSSION: *Canthydrus flammulatus* belongs to a group of mainly Oriental species, characterized by completely pale pronotum and reddish or orange markings on elytra; *C. flammulatus* is the only member of this group known to cross the Wallace line.

DISTRIBUTION (Fig. 58): Wide-spread in the Oriental Region: Indonesia (Sumatra, Siberut, Java, Kalimantan, Sulawesi), Laos, Burma, peninsular Malaysia, Singapore, Thailand, Vietnam.

Canthydrus ritsemae* (RÉGIMBART, 1880)Hydrocanthus ritsemae* RÉGIMBART 1880: 213.*Canthydrus flavus* (MOTSCHULSKY, 1855): RÉGIMBART 1889: 150 (misident.).*Canthydrus javanus* WEHNCKE 1883: 149.*Canthydrus pseudoflavus* ROCCHI 1986: 31.

For a more complete bibliography see NILSSON (2005: 106).

TYPE LOCALITY: Indonesia, West Sumatra, Solok Selatan, Lubok Gadang.

TYPE MATERIAL: Lectotype ♂ (MNHN) designated by WEWALKA (1992: 806).

MATERIAL EXAMINED:

INDONESIA: 30 exs. (NHML): Central Sulawesi, near Morowali, Ranu River area, 27.I.–20.IV.1980, leg. S.L. Sutton & C.J. Rees “B.M. 1980-281”; 8 exs. (CLH): Central Sulawesi, Tonusu near Tentana, Lake Poso, 21.–26.IV.1994, leg. R. Gerstmeier, M. Hiermeier & T. Romig.

DIAGNOSIS: Body length: 2.2–2.5 mm; maximum width: 1.1–1.3 mm, elongate, poorly convex. Coloration completely testaceous-reddish, at most slightly obscured on elytra. For description and illustrations of habitus and aedeagus refer to WEWALKA (1992: 806) and TOLEDO (2003: 77).

This species might be confused only with *C. flavus* (MOTSCHULSKY, 1855), belonging to the same species group and also wide-spread in SE Asia but apparently less common, not yet found to occur east of the Wallace line; *C. flavus* is slightly larger than *C. ritsemae* and it usually shares a paler submedial spot on each elytron, nevertheless only the comparison of aedeagi provides a safe identification (see WEWALKA 1992, TOLEDO 2003).

DISTRIBUTION (Fig. 58): India, Nepal, Bangladesh, Burma, China (Guangdong, Hong Kong, Hainan), Thailand, Vietnam, Malaysia, Singapore, Indonesia (Sumatra, Java, Kalimantan, Sulawesi: first record).

Canthydrus semperi* (WEHNCKE, 1876)Hydrocanthus semperi* WEHNCKE 1876: 223.*Canthydrus semperi* (WEHNCKE, 1876): SHARP 1882: 275; BRANDEN 1885: 18; BAER 1886: 103; RÉGIMBART 1899: 247; ZIMMERMANN 1920: 13; VAZIRANI 1977: 8; HUA 2002: 34; NILSSON 2005: 108.*Hydrocanthus auritus* RÉGIMBART 1877: lxxix; WEHNCKE 1883: 149 (syn. of *C. semperi*).*Hydrocanthus auritus* RÉGIMBART 1878: 359 (homonym, preoccupied by *Hydrocanthus auritus* RÉGIMBART, 1877).TYPE LOCALITIES: *H. semperi*: Philippines (Luzon); *H. auritus* Philippines (Luzon, Manila).

TYPE MATERIAL: *H. semperi*: **Lectotype** (sex unclear, specimen too damaged for dissection, may be ♂), by present designation (MNHN): glued on a small, pointed card, labelled “Semper \ Luzon [both small, rectangular labels, bordered, Wehncke hw.]”. **Paralectotype** ♂ (MNHN): glued on card as lectotype, unlabelled, except for a very small, plain, rectangular label. Lectotype and paralectotype with author’s red designation labels. *H. auritus*: syntypes in MNHN, not studied.

ADDITIONAL MATERIAL EXAMINED:

INDONESIA: 4 exs. (CMT): West Sumatra, Payakumbuh, Harau Valley, I.1991, collector unknown; 3 exs. (NHML): North Sulawesi, Dumoga-Bone National Park, site 6, 300 m, Tumpah transect, 7.–8.II.1985, leg. J.D. Holloway “R. Ent. Soc. London, Project Wallace B.M. 1985-10”; 2 exs. (NHML): same, site 4, 300 m, Tumpah transect, 3.–5.II.1985; 1 ex. (NHML): same, Toraut bank, site 2, 200 m, 29.–31.I.1985; 3 exs. (NHML): same, site 1, 2000 m, new base camp site, 27.–28.I.1985; 1 ex. (NMW): Central Sulawesi, Lake Poso, 01°47'955"S 120°31'622"E, 6.–7.II.1997, leg. J. Haft “PO 02”; 10 exs. (NMW): South Sulawesi, Bantimurung, NE Ujung Pandang, 28.IV.1992, leg. S. Schödl “25”; 4 exs. (CMT): S Sulawesi, 20 km NE Bantimurung, at light, 30.III.1999, leg. S. Bečvář & P. Zabransky; 2 exs. (NMW): South Sulawesi, Malino, Takapala waterfall, 30.IV.1992, leg. S. Schödl “29”; 1 ex. (NMW): South Sulawesi, N Bulukumba, 12.V.1992, leg. Schödl “35”; 4 exs. (NMW): South Sulawesi, Bantaeng – Bulukumba, 2.V.1992, leg. S. Schödl & M.A. Jäch “36”; 6 exs. (NMW): South Sulawesi, Malino – Manipi, 700 m, 1.V.1992, leg. Jäch “31”; 2 exs. (NMW): South Sulawesi, SE Takalar, S Ujung Pandang, 2.V.1992, leg. Schödl “33”; 1 ex. (NMW): South Sulawesi, Malino area, E Ujung

Pandang, 29.IV.1992, leg. S. Schödl "27"; 4 exs. (NMW): Southeast Sulawesi, Rawa Aopa National Park, Aopa village, 8.–10.II.1994, leg. M. Štrba & I. Jeniš.

PHILIPPINES: 5 exs. (IRSNB): "Antipolo [?] Simon, 11151, *Canthydrus semperi* Wehn. Det. Régimbart M. 1890"; 15 exs. (IRSNB): "Manille, *Hydrocanthus auritus* Régimbart"; 2 exs. (NMW): Luzon, Laguna Prov., Lucban – Luisiana, water buffalo wallow, 24.XI.1992, leg. M.A. Jäch "13".

DIAGNOSIS: Habitus as in Figs. 9, 25. Total length: 2.9–3.5 mm; maximum width: 1.5–1.7 mm. Regularly oval, somewhat elongate, less convex than *C. angularis*, slightly more convex than *C. ephemeralis*. Coloration black, head and hind angles of pronotum more or less faded.

Head: Black, reddish-yellow on clypeus and most of front, dark around and behind eyes. Surface covered by very fine microreticulation. Antennae and mouthparts testaceous.

Pronotum: Black, hind angles yellowish, often extended to first half of lateral sides. Lateral sides (in lateral view) poorly rounded. Surface with fine microreticulation of irregular cells arranged in wrinkles, together with some shallow scattered grooves.

Elytra: Black, without visible markings. Lateral side (in lateral view) of each elytron just slightly concave proximally. Surface as on pronotum, grooves however absent or faint. Longitudinal series of dots not strongly impressed and somewhat irregular, specially on proximal half.

Venter: Black, yellowish on proepisterna and hypomera. Legs unicolored reddish-brown.

Male: Median lobe of aedeagus in shape of an almost regular curve (Fig. 45). Left paramere (Fig. 53) broad, with apex roundly narrowed and apical tuft of short setae.

DISCUSSION: The body shape and aedeagal features suggest a closer relationship with *C. luctuosus* (AUBÉ, 1838) from India and *C. antonellae* TOLEDO, 2003, from southern China.

DISTRIBUTION (Fig. 58): Philippines, Indonesia: first record (Sumatra, Sulawesi)

Canthydrus serialis species group

Canthydrus ater sp.n.

TYPE LOCALITY: Indonesia, northern Ceram, Wahi area.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Indonesia 1989 leg. Jäch 12 / Ceram, 12.2, Umg. Wahi".

Paratypes: 12 exs. (NMW, CMT): same data as holotype; 4 exs. (NMW, CMT): Ceram, Pasohari – Kaloha, 0–300 m, 13.II.1989, leg. S. Schödl "11"; 1 ex. (NMP): Ceram, Solea, 12 km E Wahi, 17.I.–6.II.1997, leg. J. Horák; 1 ex. (NMP): Ceram, Unit O, 35 km E Pasahari, 24.–30.X.1998; 1 ex. (CAS): Bacan, 10 km E Labuha, 120 m, 0°38'07"N, 127°34'46"E, 14.I.2006, leg. A. Skale "UWP + plantage LF".

ADDITIONAL MATERIAL EXAMINED:

INDONESIA: North Sulawesi: 2 ♀♀ (ZMUA): Pulau Sangihe, Laine pond, 27.VI.1994, leg. N. Nieser "N9455 Sg."

DIAGNOSIS: Total length: 3.6–4.0 mm; maximum width: 1.9–2.2 mm. This species is larger than the other species of this group (see below), with a bit more elongated body outline; it is less convex and its lateral sides are not so deeply sinuate (Fig. 22), due to the less concave proximal side of each elytron and the poorly rounded pronotal sides. Dorsal surface and coloration as in *C. serialis*, but most of the specimens studied have the submedian spots on elytra missing.

Male: Median lobe of aedeagus (Fig. 43). Left paramere less regularly triangular (Fig. 51), with visibly sinuate ventral side and somewhat truncate apically.

NOTE: The two females from Sangihe Island are very similar to the type material in size, proportions of the body and coloration (both lack the subapical spot). Without the study of males I was however hesitant to include them with the type material.

DISTRIBUTION (Fig. 58): Moluccas: Bacan and Ceram; ? Sangihe.

HABITAT (Fig. 60): In Ceram, this species was collected in swamps in secondary forest.

DERIVATIO NOMINIS: Ater (Latin: black). This species is named in reference to the dark coloration.

Canthydrus bovillae BLACKBURN, 1890

Canthydrus bovillae BLACKBURN 1890: 446; ZIMMERMANN 1920: 10; WATTS 1985: 27; LAWRENCE et al. 1987: 326; LARSON 1993: 60; 1997: 274; WATTS 2001: 63; NILSSON 2005: 98.

TYPE LOCALITY: Australia, Northern Territory.

TYPE MATERIAL: **Lectotype** ♀, by present designation (NHML): glued on white rectangular card with “♀” handwritten, labelled: “Type [NHML circular, orange bordered, label] \ 2766 [handwritten in red ink on old card, cut on one side to make a sort of pointed apex and with traces of old glue: with any probability it is the original card where the specimen has been glued for the first time] \ Australia, Blackburn coll., B.M. 1910-236 [printed on white rectangular label with a red line] \ *Canthydrus bovillae*, Blackb. [handwritten by Blackburn? On larger rectangular label]”. Plus author’s red paralectotype label.

ADDITIONAL MATERIAL EXAMINED:

A U S T R A L I A: 1 ex. (CLH): Northern Territory, Coonjimba Billabong, 1.5 km NW Jabiru East, 28 m, 12°39'678"S 132°54'283"E, 30.VIII.2006, leg. L. & E. Hendrich; 2 exs. (CLH): Queensland, Nardello’s Lagoon, near Mareeba, 29.III.1995, leg. C.H.S. Watts; 3 exs. (CLH): Queensland, 10 km S Mizani, Lake Kinchant, seepage, 48 m, 21°11'580"S 148°53'522"E, 24.IX.2006, leg. L. & E. Hendrich; 3 exs. (CLH, CMT): Queensland, 19 km S Ayr, Bannister Lagoon at Bruce Highway, swamp, 20 m, 19°33'403"S 147°15'078"E, 21.IX.2006, leg. L. & E. Hendrich.

DIAGNOSIS: Total length: 2.9–3.4 mm. Very similar to *C. serialis* (see below), from which it usually can be separated by a somewhat paler coloration. The body is normally brownish-black instead of deep black, with pale area on head more extended and submedian spot more developed and irregular. According to WATTS (2001) specimens of *C. bovillae* sometimes share also two less distinct, light colored areas at the elytral base; this is unique among members of the *C. serialis* group. The median lobe of the aedeagus (Fig. 42) differs from *C. serialis* in the more narrowed tip, gradually tapering from about 1/3 of its length. Left paramere (Fig. 50).

DISTRIBUTION (Fig. 58): Northern Australia (Northern Territory, Queensland). Apparently wide-spread, but not abundant.

HABITAT (Fig. 63): Swamps, billabongs and marshy areas, with vegetation and debris (Lars Hendrich, personal communication). In Queensland collected in the emergent zone of large, shallow irrigation reservoirs (LARSON 1993).

Canthydrus occultus sp.n.

TYPE LOCALITY: Indonesia, W New Guinea, Nabire, Bobo River.

TYPE MATERIAL: **Holotype** ♂ (NMW): “IRIAN JAYA: Nabire Kali Bobo, 100m IX. 1990 (IR 91 #10), leg. Balke & Hendrich”.

Paratypes: 14 exs. (NMW): same data as holotype; 19 exs. (CLH, CMT): W New Guinea, Paniai Prov., Nabire, Kali Bobo, 19.–26.IX.1990, leg. M. Balke & L. Hendrich “IR 10” [same sample site of the preceding, but label differently printed]; 14 exs. (CLH, CMT): W New Guinea, Paniai Prov., Wanggar, Kali Bumi, 30.IX.–1.X.1990, leg. Balke & Hendrich “IR 14”.

DIAGNOSIS: Total length 3.2–3.6 mm; maximum width: 1.8–2.0 mm. Externally identical to *C. serialis* (see below), except for the constant absence of postmedial spot on elytra.

Male: Median lobe of aedeagus (Fig. 41): distal portion very broad, widely rounded apically and with convexity on dorsal side. Left paramere (Fig. 49) more slender than in *C. serialis*, elongate, with apex thin and rounded.

This species is always collected together with *C. serialis* from which it is difficult to separate externally. *Canthydrus occultus* lacks the submedial elytral spot and this character is apparently constant. However, many specimens of *C. serialis* from West New Guinea share the tendency towards a reduction of the elytral spot, being even absent in some specimens. This makes a safe identification difficult without the examination of the aedeagus, and females with unspotted elytra obviously cannot be attributed to one of the species morphologically with certainty. I dissected all completely black males and most of those with spotted elytra. Spotted specimens are always *C. serialis*. Black specimens are mostly *C. occultus*, but I have found also few completely black *C. serialis*. Based on the examination of elytral spots and aedeagi, *C. occultus* appears to be always less numerous than *C. serialis*, with a ratio close to 1/3 for each collection site examined.

DISTRIBUTION (Fig. 58): West New Guinea.

HABITAT (Fig. 59): See under *C. serialis*.

DERIVATIO NOMINIS: *Occultus* (Latin): hidden. The name refers to the difficulty to separate this species from *C. serialis*.

Canthydrus serialis FAUVEL, 1883

Canthydrus serialis FAUVEL 1883: 336; FAUVEL 1903: 245; ZIMMERMANN 1920: 13; BALFOUR-BROWNE 1939b: 463; GUIGNOT 1939: 181; 1956: 51; NILSSON 2005: 108.

Canthydrus guttula (AUBÉ 1838: 410); RÉGIMBART 1892: 980; 1899: 247 (misident.).

Canthydrus bakeri PESCHET 1921: 693 (partim).

TYPE LOCALITY: New Caledonia, Grande Terre, Nouméa, Anse Vata.

TYPE MATERIAL: **Lectotype** ♂ (by present designation) (IRSNB): small label, handwritten by Fauvel: "Anse Vata marais ... [illegible: ?Juill.]", glued on pink, rectangular, IRSNB label: "Coll. R. I. Sc. N. B., Nouvelle Calédonie, ex Coll. Fauvel, rec. Savès" [all printed except for the latter, handwritten] \ small label, handwritten by Fauvel "Canthydrus serialis Fv.l.", glued on white, rectangular, label: "Coll. et. det. A. Fauvel" \ rectangular, white label with "Syntype" printed in red ink and bordered by a thin, black, frame; plus the author's red lectotype label.

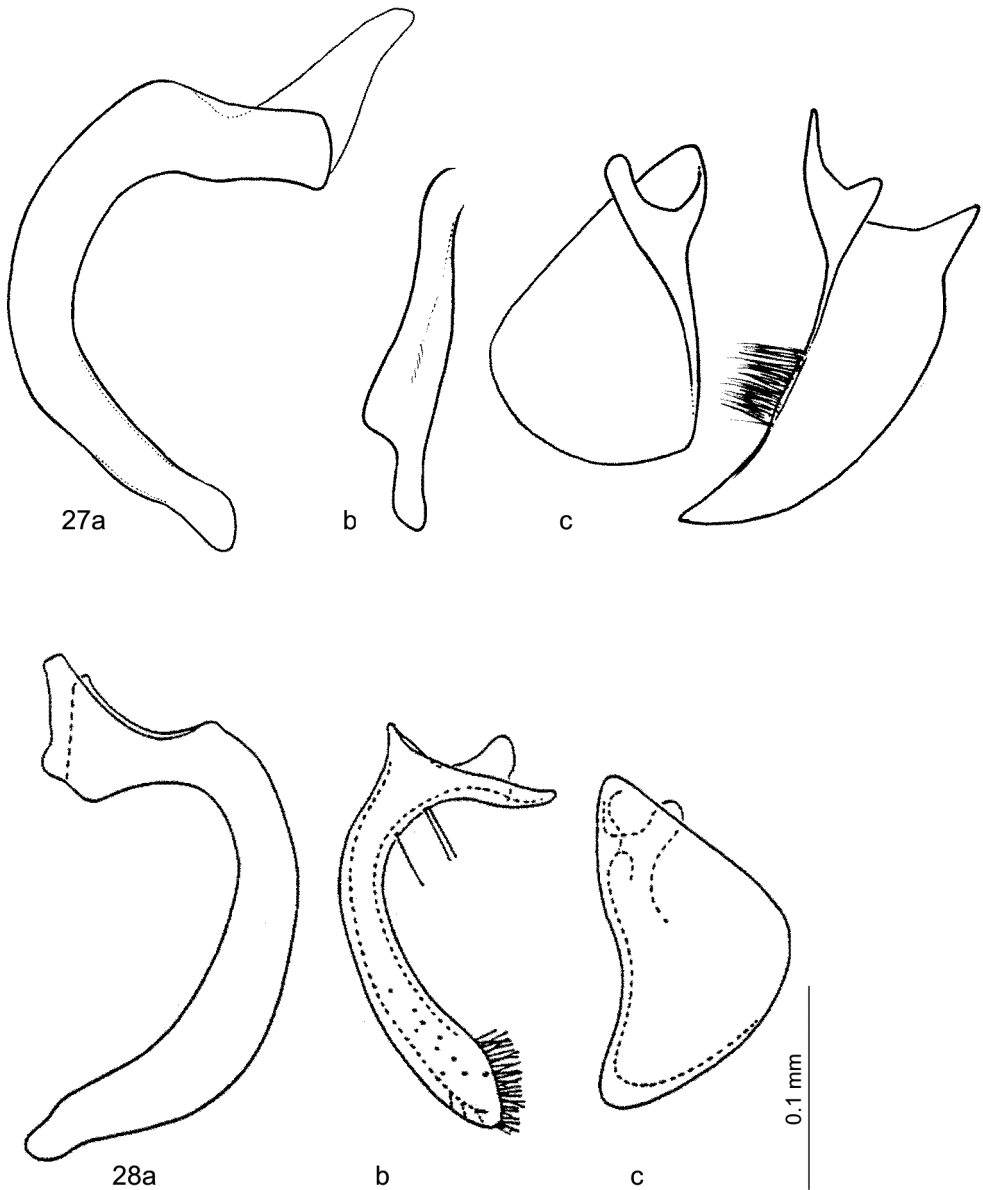
Paralectotypes: 2 exs. (IRSNB): same data and labels as lectotype, but written directly on IRSNB pink and white labels respectively as follows: "Coll. R. I. Sc. N. B., Nouvelle Calédonie, ex Coll. Fauvel [printed], Marais Anse Vata, Juliet, rec. Savès [subsequently handwritten] \ Coll. et. det. A. Fauvel, R. I. Sc. N. B. 17.479 [printed], *Canthydrus serialis* Fv.l. [hw.]".

ADDITIONAL MATERIAL EXAMINED:

I N D O N E S I A: 37 exs. (NMW, CMT): W New Guinea, Nabire, Kali Bobo, 100 m, IX.1990, leg. M. Balke & L. Hendrich "IR 91 #10"; 119 exs. (CLH): W New Guinea, Nabire, Kali Bobo, 19.–26.IX.1990, leg. M. Balke & L. Hendrich "IR 10" [same sample site of the preceding but label differently printed]; 50 exs. (CLH, NMW): W New Guinea, Nabire, Wanggar, Kali Bumi, 30.IX.–1.X.1990, leg. Balke & Hendrich "IR 14"; 5 exs. (NMW): W New Guinea, road Nabire – Ilaga, Pemukiman, 200 m, 26.VIII.1996, leg. M. Balke "96 # 3"; 2 exs. (NMW): W New Guinea, Fak-Fak District, Lake Yamur area, ca. 50–100 m, IV.1998, leg. M. Balke.

S O L O M O N I S L A N D S: 8 exs. (NMW, CMT): Guadalcanal, surroundings of Tutumu, Honiara, 12.IX.1994, leg. J. Haft.

DIAGNOSIS: Habitus as in Figs. 7, 21. Total length: 3.0–3.6 mm; maximum width: 1.6–2.0 mm. Comparably large; convex, regularly oval, hardly shining; coloration black, apex of hind angles of pronotum paler, submedial red spot (often hardly visible) on each elytron.



Figs. 27–28: Male genitalia of 27) *Notomicrus tenellus* species complex (specimen from Australia): a) lateral view (left side) of median lobe, b) apex of median lobe (ventral view), c) parameres; 28) *Speonoterus bedosae*: a) lateral view (right side) of median lobe of aedeagus, b) parameres (after SPANGLER 1996, modified).

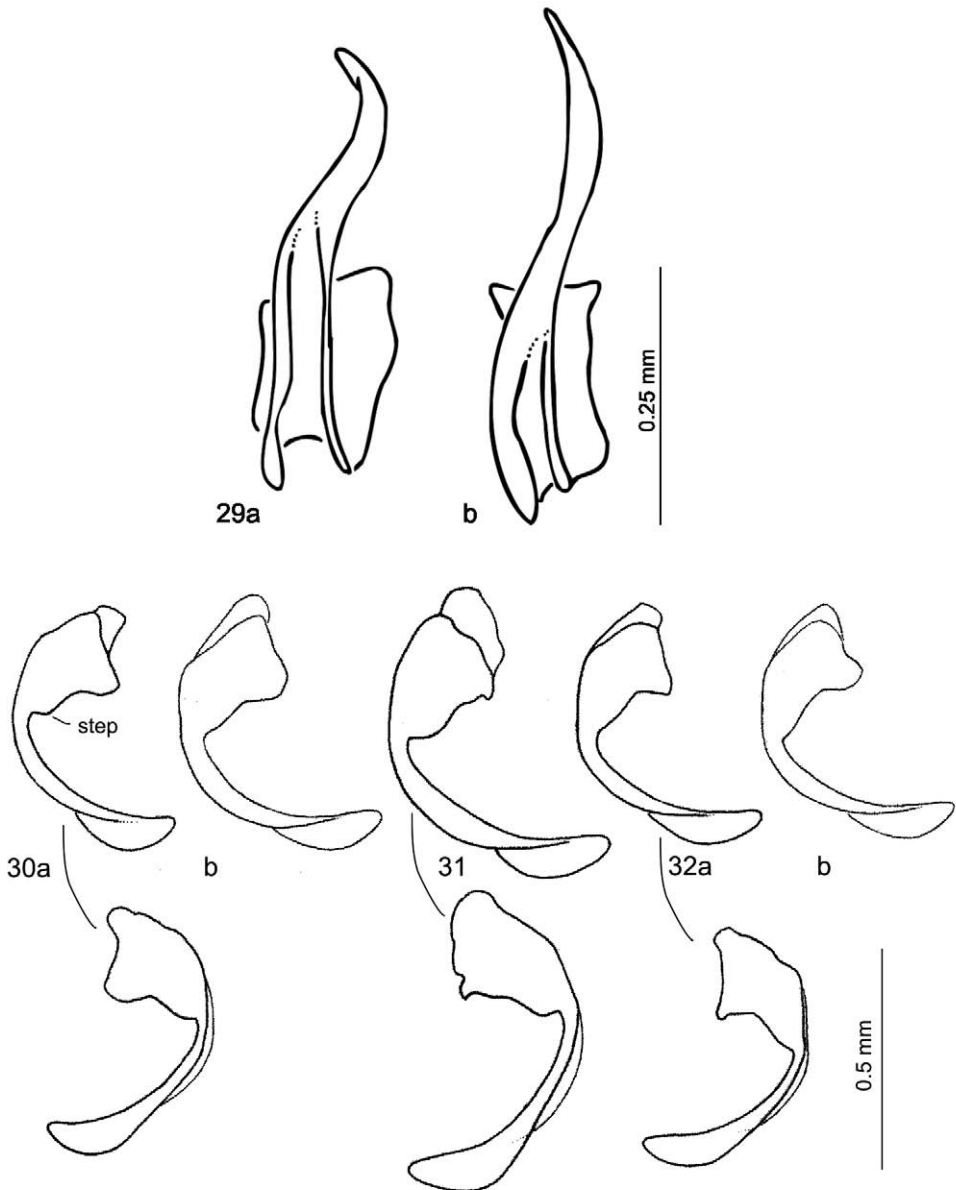
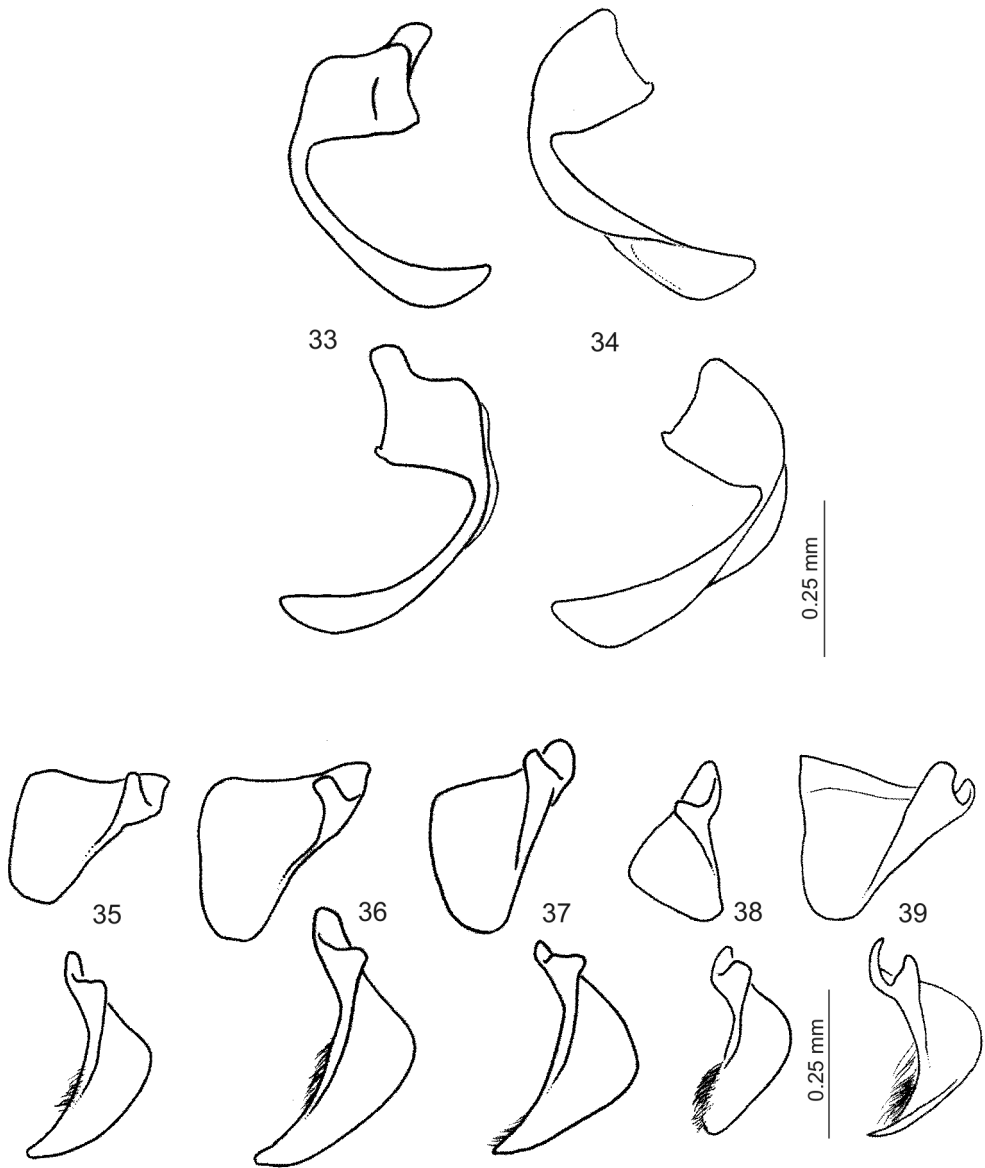


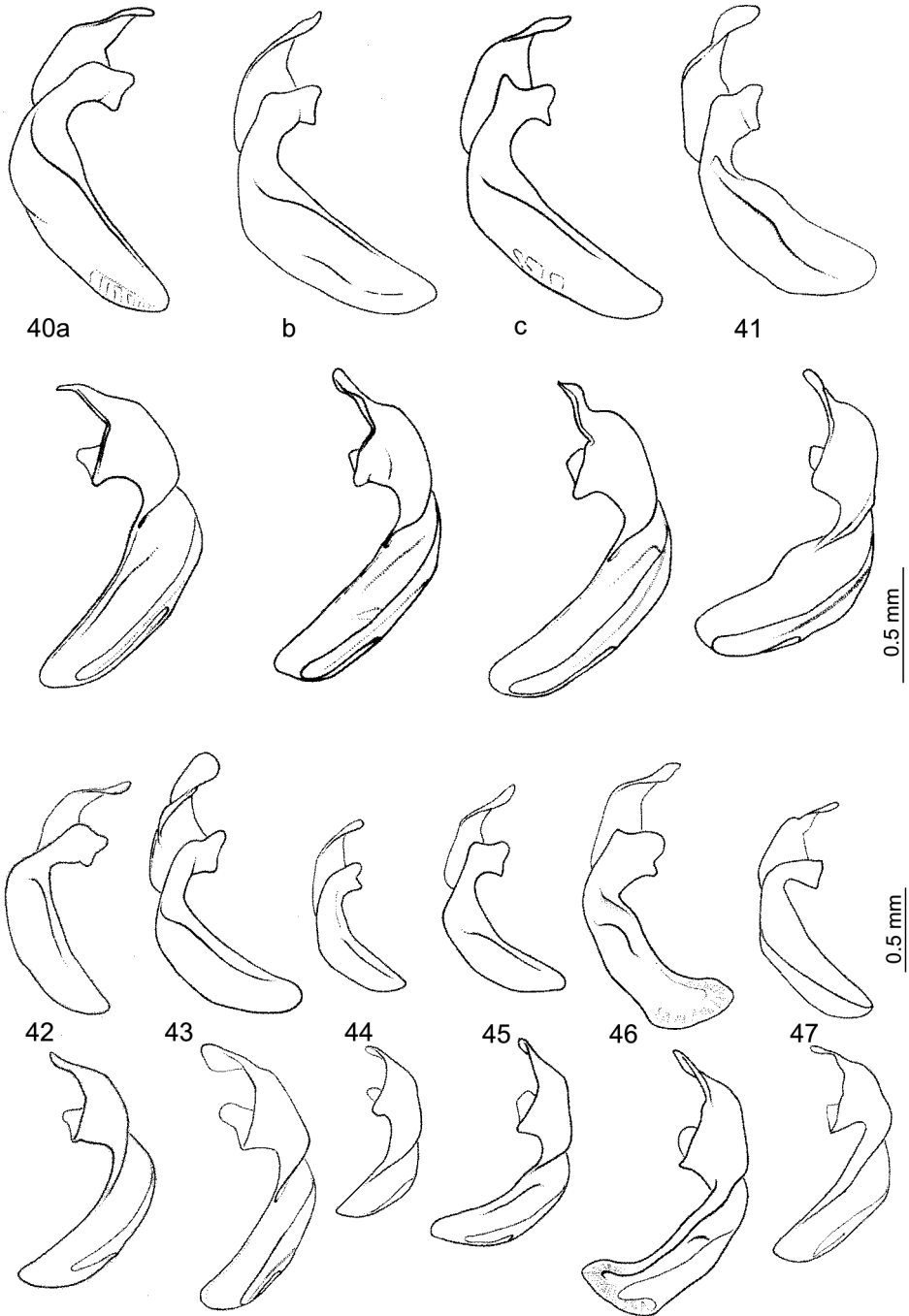
Fig. 29: Ventral view of median lobe of a) *Neohydrocoptus subfasciatus*; b) *N. subvittulus*.

Figs. 30–32: Lateral view (left side above, right side below) of median lobe of 30) *Neohydrocoptus subfasciatus subfasciatus*: a) specimen from Australia, b) specimen from Sulawesi; 31) *N. subfasciatus major*; 32) *N. distans*: a) holotype; b) specimen from Wallis & Futuna.

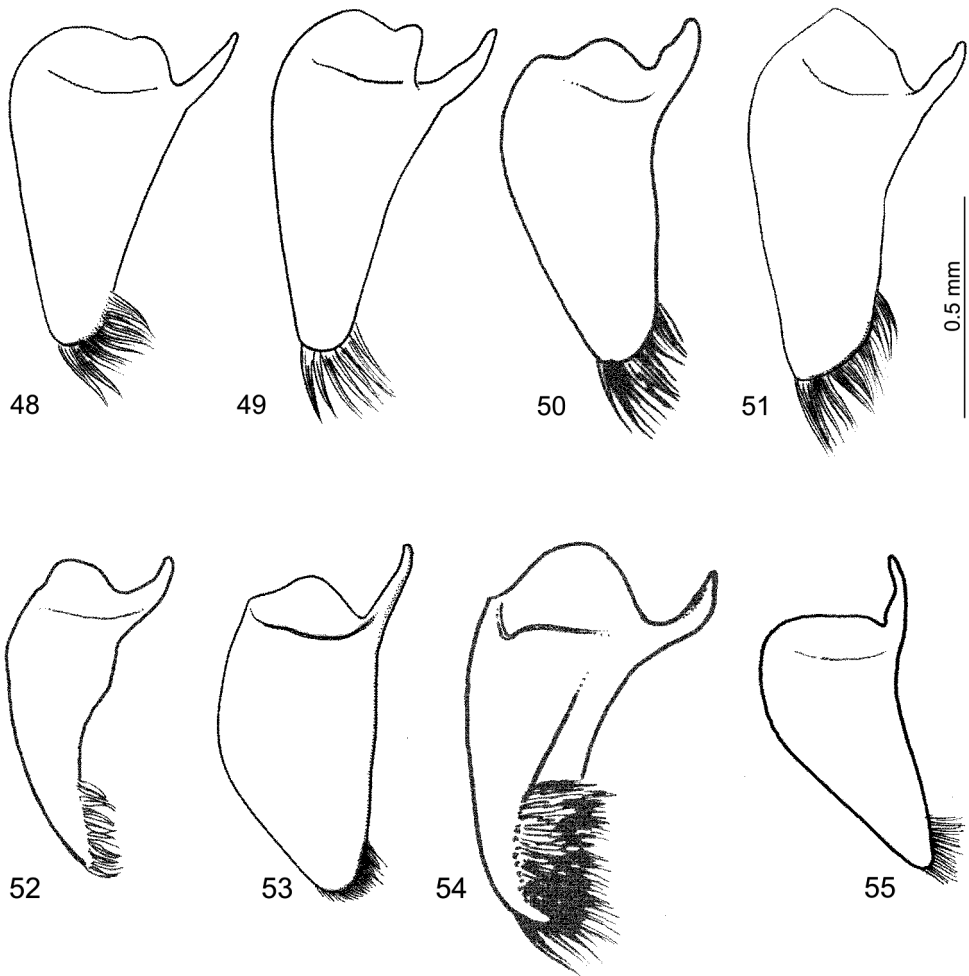


Figs. 33–34: Lateral view (left side above, right side below) of median lobe of 33) *Neohydrocoptus subvittulus*; 34) *N. sp.*

Figs. 35–39: Right (above) and left (below) parameres 35) *Neohydrocoptus subfasciatus subfasciatus*; 36) *N. s. major*; 37) *N. distans*; 38) *N. subvittulus*; 39) *N. sp.*



Figs. 40–47: Lateral view (left side above, right side below) of median lobe of 40) *Canthydrus serialis*: a) lectotype from New Caledonia; b) specimen from West New Guinea; c) specimen from Solomon Islands; 41) *C. occultus*; 42) *C. bovillae*; 43) *C. ater*; 44) *C. ephemeralis*; 45) *C. semperi*; 46) *C. angularis* (specimen from Sulawesi); 47) *C. flammulatus*.



Figs. 48–55: Left paramere of 48) *Canthydrus serialis*; 49) *C. occultus*; 50) *C. bovillae*; 51) *C. ater*; 52) *C. ephemeralis*; 53) *C. semperi*; 54) *C. angularis*; 55) *C. flammulatus*.

Head: Black, labrum and a thin, apical portion of clypeus reddish or reddish-yellow. Surface with somewhat impressed microreticulation of rounded cells; very few, deep dots scattered between eyes. Ventral side pitch-brown or black; antennae and mouthparts testaceous.

Pronotum: Black, hind angles reddish-yellow. Lateral sides (in lateral view) strongly rounded. Dorsal surface covered by an impressed reticulation (finer than on head) of circular cells forming wrinkles. Small and shallow grooves or depressions irregular and sparse, together with few dots, arranged specially along hind margin.

Elytra: Black, normally with submedial circular reddish spot (hardly visible or absent). Lateral side of elytron (in lateral view) strongly concave proximally. Surface as on pronotum, but with grooves more numerous and irregular and with a number of larger dots, more or less deeply

impressed: dots in part irregularly scattered, specially on distal half; in part arranged in more or less regular series on proximal half of each elytron.

Venter: Completely dark brown or black. Apex of last ventrite reddish-brown.

Legs: Reddish-brown, tibiae and femora darkened centrally; meso- and metatarsi dark brown.

Male: Median lobe of aedeagus (Fig. 40) with distal portion visibly more developed than basal portion (ca. 1/4 to 1/3 longer), long and robust, sides subparallel, apex narrowed in a wide curve, starting at about 1/5 of its length. Left paramere (Fig. 48) regularly triangular, apex rounded.

Female: Similar to male; without sucking hairs on pro- and mesotarsi.

DISTRIBUTION (Figs. 58, 65): New Caledonia (type locality), New Guinea, Solomon Islands (Guadalcanal): first record, Vanuatu. To our knowledge, this species has not been collected in New Caledonia since at least 150 years!

HABITAT (Fig. 59): In New Guinea *Canthydrus serialis* was collected together with *C. occultus*, *Hydrocanthus balkei* and *Neohydrocoptus subfasciatus major* in a small shallow and muddy pool formed by different small streams, close to the coast. The locality was in an area that was burnt and cultivated recently (Lars Hendrich, personal communication).

***Hydrocanthus* SAY, 1823**

DIAGNOSIS: Body length moderate to large (from 3 mm in the Neotropical *H. debilis* SHARP to more than 7 mm in the Afrotropical *H. wittei* GSCHWENDTNER); body oblong, rarely strongly convex. Coloration evenly black, brown- or yellow-reddish; head and pronotum often paler than elytra. Elytra never variegate, at most with darker irrorations in some American species. Sternal surface densely setose, as in *Canthydrus*, but setation often more scattered or even absent on prosternal process. Latter very broad, as wide as long, sometimes with depressions or even dimples on its surface. Metafemora with a ventro-apical tuft of setae. Metatibiae broad and flat, external spur serrulate. Protibiae ending in a large, apparently single spur, hooked apically. Maxillary palps with terminal article conical, bifid apically; terminal article of labial palps very broad (triangular in many American species), bifid apically. In the Oriental and Australian species the median lobe of aedeagus more slender than in *Canthydrus*, basal processes unequal in length but not twisted; left paramere elongate, with two, more or less distinct tufts of setae. For a key, descriptions, illustrations and other details of “Australasian” species see TOLEDO & HENDRICH (2006).

DISTRIBUTION: *Hydrocanthus* is a rather speciose genus, divided into two subgenera: *Hydrocanthus* s.str. in the New World and *Sternocanthus* GUIGNOT in the Old World. Most species of *Sternocanthus* occur in the Afrotropical Region. In the Oriental and Australian Regions, five species, all belonging to the subgenus *Sternocanthus*, are recognized (TOLEDO & HENDRICH 2006). One of these, *H. indicus*, is the only member of this genus in the Oriental Region where it is wide-spread, but not yet collected east of the Wallace line. The remaining four species are Australian faunal elements, known from West New Guinea (1 species) and Australia (3 species). All Oriental and Australian *Hydrocanthus* are listed below.

***Hydrocanthus (Sternocanthus) australasiae* WEHNCKE, 1876**

Hydrocanthus australasiae WEHNCKE 1876: 223.

Hydrocanthus (Sternocanthus) australasiae WEHNCKE: TOLEDO & HENDRICH 2006: 939 (revision).

TYPE LOCALITY: Australia, Queensland, Rockhampton.

TYPE MATERIAL: **Lectotype** ♀ (MNHN) designated by TOLEDO & HENDRICH (2006).

DISTRIBUTION: Northern Australia.

HABITAT (Fig. 64): Often in intermittend stream pools, billabongs, and slowly flowing streams.

***Hydrocanthus (Sternocanthus) balkei* TOLEDO & HENDRICH, 2006**

Hydrocanthus (Sternocanthus) balkei TOLEDO & HENDRICH 2006: 937.

TYPE LOCALITY: Indonesia, W New Guinea, Nabire, Bobo River.

TYPE MATERIAL: **Holotype** ♂ (NMW).

DISTRIBUTION: West New Guinea.

HABITAT (Fig. 59): See *Canthydrus serialis*.

[*Hydrocanthus (Sternocanthus) indicus* WEHNCKE, 1876]

Hydrocanthus indicus WEHNCKE 1876: 223.

Hydrocanthus (Sternocanthus) indicus WEHNCKE: TOLEDO & HENDRICH 2006: 942 (revision).

TYPE LOCALITY: “Cochinchina” (southern Vietnam and eastern Cambodia).

TYPE MATERIAL: **Lectotype** ♂ (MNHN) designated by TOLEDO & HENDRICH (2006).

DISTRIBUTION: Wide-spread in the Oriental Region: Sri Lanka, India, Bangladesh, Burma, China (Hong Kong), Cambodia, Laos, Thailand, Vietnam, Malaysia, Singapore, Indonesia (Sumatra, Java, Siberut, Kalimantan). At present not known to occur east of the Wallace line.

***Hydrocanthus (Sternocanthus) pederzanii* TOLEDO & HENDRICH, 2006**

Hydrocanthus (Sternocanthus) pederzanii TOLEDO & HENDRICH 2006: 938.

TYPE LOCALITY: Australia, Mitchell Lake, Atherton Tableland, Mitchell Lake.

TYPE MATERIAL: **Holotype** ♂ (NMW).

ADDITIONAL MATERIAL EXAMINED:

A U S T R A L I A: 1 ex. (ZSM): Northern Territory, Kakadu National Park, Burdulba billabong, 15 km SSW Jabirù, 12 m, 12°46'26"S 132°44'86"E, 2.–3.XI.2007, leg. M. Baehr.

DISTRIBUTION: Australia: Queensland, Northern Territory (first record).

HABITAT (Fig. 62): See TOLEDO & HENDRICH (2006). Large swamps and marshy areas.

***Hydrocanthus (Sternocanthus) waterhousei* BLACKBURN, 1888**

Hydrocanthus waterhousei BLACKBURN 1888: 65.

Hydrocanthus (Sternocanthus) waterhousei BLACKBURN: TOLEDO & HENDRICH 2006: 941 (revision).

TYPE LOCALITY: Australia.

TYPE MATERIAL (not studied): **Syntypes** (SAMA).

DISTRIBUTION: Australia: Western Australia, Northern Territory, Queensland.

HABITAT (Fig. 64): More lentic species, often in intermittend stream pools, billabongs, and slowly flowing streams.

DISCUSSION

More than twenty species of Noteridae are now known to occur east of Wallace's line (Figs. 56–58). They all belong to wide-spread genera except for *Speonoterus*, which is endemic to Sulawesi. The species composition is clearly characterized by Australian elements.

Hydrocanthus: This is so far unknown in Wallacea (TOLEDO & HENDRICH 2006). The wide-spread Oriental *H. indicus* is known as far east as Java and Borneo. In the Australian Region, *Hydrocanthus* occurs with four species in New Guinea and Australia.

Canthydrus: Sulawesi (four species) and Lombok (one species), just east of the Wallace line, only have Oriental species. All of them are more or less wide-spread. The Moluccas (Bacan and Ceram), New Guinea, Australia and the arc of islands east of the Coral Sea are inhabited by a group of species apparently endemic to that area. Two females from Sangihe (North Sulawesi) seem to belong to *C. ater*, and represent the northwestern limit of the distribution of the *C. serialis* group.

Records of *C. angularis* from W New Guinea and Timor by RÉGIMBART (1892, 1899) remain to be confirmed. Members of the *Canthydrus serialis* group externally can be confused easily with dark specimens of *C. angularis* which might be the source of the records of this species for the two islands. GUIGNOT's (1939) record of *C. serialis* from New Guinea is confirmed here.

Neohydrocoptus: In Sulawesi and Lombok this genus is represented by wide-spread Oriental species. *Neohydrocoptus subvittulus* has been collected in New Guinea, which represents the easternmost record for this species.

The Australian *N. subfasciatus* was found in NE Sulawesi, which is the western limit of its known distribution. It is a typical Australian element, known from Queensland, New Caledonia and (as a subspecies) from New Guinea.

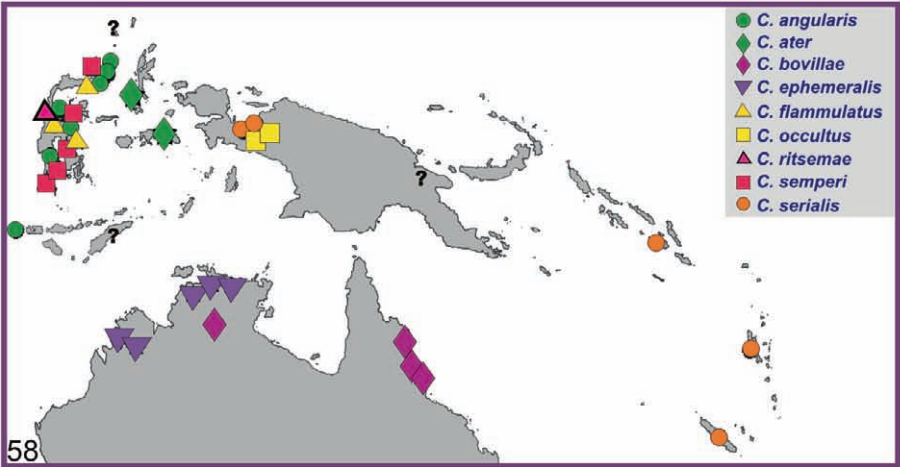
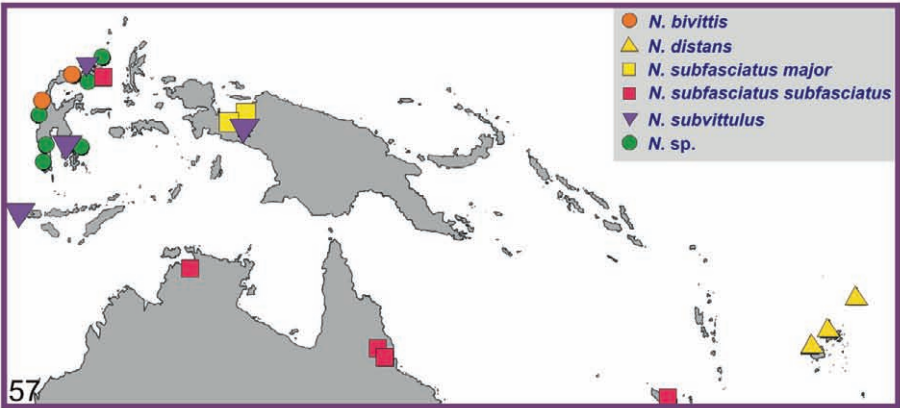
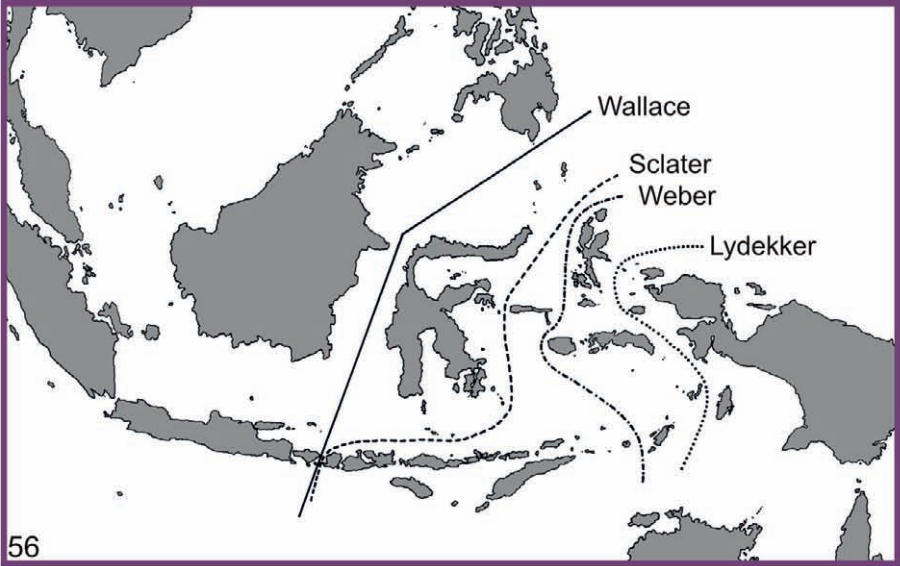
Notomicrus and **Speonoterus:** According to BALFOUR-BROWNE (1939a, 1945), *Notomicrus tenellus* has a very wide distribution in the Oriental and Australian Regions, although quite scattered. I suppose that the synonymies proposed by BALFOUR-BROWNE (1939a, 1945) are in part erroneous, because at least four species seem to cover this range.

Speonoterus, endemic to Sulawesi, is very close to *Notomicrus* and might be a synonym of the latter.

Table 1: Distribution of Noteridae species and subspecies occurring east of the Wallace line.

Island / Region	Number of species	Name of species	Distribution
	(genera)		
Sulawesi	10 (4)	<i>Canthydrus angularis</i>	Oriental
		<i>Canthydrus flammulatus</i>	Oriental
		<i>Canthydrus ritsemae</i>	Oriental
		<i>Canthydrus semperi</i>	Philippines, Sumatra, Sulawesi
		<i>Neohydrocoptus bivittis</i>	Oriental
		<i>Neohydrocoptus subfasciatus</i> s.str.	Sulawesi, Australia, New Caledonia
		<i>Neohydrocoptus subvittulus</i>	Oriental, New Guinea
		<i>Neohydrocoptus</i> sp.	Sulawesi, Laos
		<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
		<i>Speonoterus bedosae</i>	Sulawesi
Sangihe	1	<i>Canthydrus</i> ? <i>ater</i>	Sangihe

Lombok	2 (2)	<i>Canthydrus angularis</i>	Oriental
		<i>Neohydrocoptus subvittulus</i>	Oriental, New Guinea
Ceram	1	<i>Canthydrus ater</i>	Moluccas
Ambon	1	<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
Bacan	1	<i>Canthydrus ater</i>	Moluccas
Timor	1	<i>Canthydrus angularis</i> (to be confirmed)	Oriental
		<i>Canthydrus occultus</i>	New Guinea
		<i>Canthydrus serialis</i>	New Guinea, Solomon Islands, New Caledonia, Vanuatu
New Guinea	6 (4)	<i>Hydrocanthus balkei</i>	New Guinea
		<i>Neohydrocoptus subfasciatus major</i>	New Guinea
		<i>Neohydrocoptus subvittulus</i>	Oriental, New Guinea
		<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
Solomon Islands	2 (2)	<i>Canthydrus serialis</i>	New Guinea, Solomon Islands, New Caledonia, Vanuatu
		<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
		<i>Canthydrus bovillae</i>	Northern Australia
Australia	7 (4)	<i>Canthydrus ephemeralis</i>	Northern Australia
		<i>Hydrocanthus australasiae</i>	Northern Australia
		<i>Hydrocanthus pederzanii</i>	Northern Australia
		<i>Hydrocanthus waterhousei</i>	Northern Australia
		<i>Neohydrocoptus subfasciatus</i> s.str.	Sulawesi, Australia, New Caledoniai
		<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
New Caledonia	3 (3)	<i>Canthydrus serialis</i>	New Guinea, Solomon Islands, New Caledonia, Vanuatu
		<i>Neohydrocoptus subfasciatus</i> s.str.	Sulawesi, Australia, New Caledonia
		<i>Notomicrus punctulatus</i>	New Caledonia
Vanuatu	1	<i>Canthydrus serialis</i>	New Guinea, Solomon Islands, New Caledonia, Vanuatu
Fiji	2 (2)	<i>Neohydrocoptus distans</i>	Fiji, Wallis & Futuna
		<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
Samoa	1	<i>Notomicrus tenellus</i> species complex	Philippines and Malaysia to Fiji and Samoa
Wallis & Futuna	1	<i>Neohydrocoptus distans</i>	Fiji, Wallis & Futuna



Conclusions: When drawing zoogeographical conclusions, one should keep in mind two facts: 1) The genus *Notomicrus* dearly needs revision, I am at present not aware, how many species in fact are included in the *Notomicrus tenellus* species complex. 2) Many parts of the area covered in this study (e.g. the Moluccas) have not been adequately sampled.

As far as one can see from the data available, only few species of Oriental and Australian Noteridae invaded in one way or another their neighbouring zoogeographical realm. Most of the species did not even reach the Moluccas, where *Canthydrus ater* and the “unrevised” *Notomicrus tenellus* species complex are apparently the only noterids.

In Southeast Asia usually only typical Oriental species occur, which are not found east of Sulawesi and Lombok. *Neohydrocoptus subvittulus* is the only confirmed exception (not regarding the “unrevised” *Notomicrus tenellus* species complex), here being first reported from New Guinea. In contrast to the Australian fauna, the noterid fauna of the Sunda Islands (including Sulawesi), the Philippines and the Malay Peninsula is speciose but mostly dominated by wide-spread Southeast Asian species.

The distribution of noterid species occurring east of the Wallace line is summarized in Table 1. Remarkably, Sulawesi has 10 species, more than New Guinea or Australia. This could in part be explained as heritage of the much more speciose Oriental noterid fauna. Smaller islands are usually inhabited by one or very few species. However, New Caledonia has three species, one of them apparently endemic. Two wide-spread Oriental species are known from Lombok. In Ceram and Bacan (and possibly in Sangihe) *Canthydrus ater* is the only noterid known so far. In the Pacific Ocean, Noteridae are known only from Fiji (2 species), Wallis & Futuna (1 species) and Samoa (1 species).

An important result of recent expeditions is the extension of the known distributional ranges for some genera and even the first record of the family for some islands. Two species of *Neohydrocoptus* and one species of *Hydrocanthus* (TOLEDO & HENDRICH 2006) are now reported from New Guinea, while neither genus was known from that island before; *Neohydrocoptus* and *Notomicrus* are here recorded for the first time from Sulawesi. With the inclusion of *C. serialis*, two species of Noteridae are now known from the Solomon Islands. Finally, Noteridae are here recorded from Sangihe Island, the Moluccas (Ambon, Ceram and Bacan), Fiji and Wallis & Futuna for the first time, while they remain unknown from New Zealand.

◀ Fig. 56: Various concepts marking the presumed boundary between the Oriental and Australian Realm.

◀ Fig. 57: Geographical distribution of *Neohydrocoptus* east of the Wallace line: *N. bivittis* (orange circles); *N. distans* (yellow triangles); *N. subfasciatus major* (yellow squares); *N. subfasciatus subfasciatus* (red squares); *N. subvittulus* (purple triangles); *Neohydrocoptus* sp. (green circles).

◀ Fig. 58: Geographical distribution of *Canthydrus* east of the Wallace line: *C. angularis* (green circles); *C. ater* (green diamonds); *C. bovillae* (purple diamonds); *C. ephemeralis* (purple triangle); *C. flammulatus* (yellow triangles); *C. occultus* (yellow squares); *C. ritsemæ* (red triangle); *C. semperi* (red squares); *C. serialis* (orange circles). Question mark in Sangihe (North Sulawesi Province) indicates the females that might belong to *C. ater*; question marks in northern Papua New Guinea and Timor indicate Régimbart’s doubtful records for *C. guttula* (see text).



Fig. 59: Bobo River, Nabire, W New Guinea (Indonesia). Shallow muddy pool in a recently burned and cultivated area, very close to the coast: type locality of *Neohydrocoptus subfasciatus major*, *Canthydrus occultus* and *Hydrocanthus balkei*, collected together with *Canthydrus serialis*.

Fig. 60: Swamp in the surroundings of Wahai, island of Ceram, Moluccas, Indonesia: type locality of *Canthydrus ater*.

Fig. 61: Shady Creek, Litchfield National Park, Northern Territory, Australia: habitat of *Canthydrus ephemeralis*.

Fig. 62: Lake Mitchell, Atherthon Tablelands, northern Queensland, Australia: type locality of *Hydrocanthus pederzanii*.

Fig. 63: Coonjimba Billabong, east Jabiru, Kakadu National Park, Northern Territory, Australia: habitat of *Canthydrus bovillae* and *Neohydrocoptus subfasciatus subfasciatus*.

Fig. 64: Sandy Billabong, Kakadu National Park, Northern Territory, Australia: habitat of *Hydrocanthus australasiae* and *H. waterhousei*.

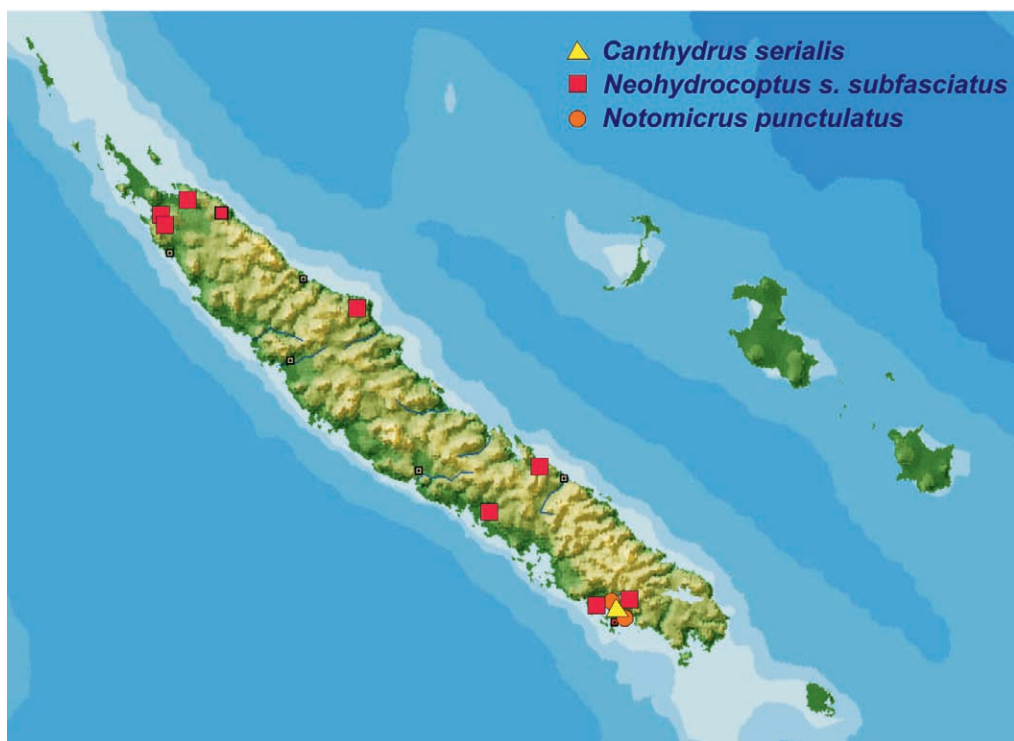


Fig. 65: Geographical distribution of Noteridae in New Caledonia.

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