

Linzer biol. Beitr.	38/1	935-952	21.7.2006
---------------------	------	---------	-----------

Taxonomic revision of the Australasian *Hydrocanthus* SAY 1833, with description of two new species (Coleoptera: Noteridae)

M. TOLEDO & L. HENDRICH

Abstract: The Australasian species of the genus *Hydrocanthus* SAY 1833 (Coleoptera: Noteridae) are revised. All the three previously recognised species from the Oriental realm and Australia (*Hydrocanthus indicus* WEHNCKE 1876, *H. australasiae* WEHNCKE 1876 and *H. waterhousei* BLACKBURN 1888) are re-described and two species (*H. balkei* sp.n. from Irian Jaya, Indonesia and *H. pederzanii* sp.n. from NE Queensland) belonging to the *grandis* group (GUIGNOT 1959) are described as new. The Australian *H. australasiae* and *H. waterhousei* are distributed all over the tropical and subtropical north of Australia, and the latter is herewith recorded for the first time from Western Australia. *Hydrocanthus pederzanii* has a very restricted distribution in NE Queensland, and *H. balkei* is only known from the type locality and represents the first record of the genus in New Guinea. Important species characters (median lobes, parameres and colour patterns) are illustrated. A key to all species is provided. The known distribution and ecology of each species is briefly outlined. Lectotypes are here designated for *H. indicus* and *H. australasiae*. The total number of described species in the genus *Hydrocanthus* is now 53.

Key words: *Hydrocanthus*, Noteridae, new species, New Guinea, Australia, taxonomy, zoogeography, lectotype designations.

Introduction

Hydrocanthus SAY 1833 is one of the most speciose genera within the water beetle family Noteridae, being widespread in the tropics of the whole World. According to NILSSON & VONDEL (2005) 51 species are known. The genus is sharply divided into two lineages, geographically isolated and formally named as subgenera: *Hydrocanthus* s.str. (junior-synonym = *Guignocanthus* YOUNG 1985, after MILLER 2001) with 18 species in the Americas, and *Sternocanthus* GUIGNOT 1948 (junior-synonym = *Allocanthus* GUIGNOT 1947) with 33 species in the Old World tropics and Australian Region (NILSSON & VONDEL 2005). *Sternocanthus* itself is very homogeneous with many species in tropical Africa and Madagascar, whereas in tropical Asia and Australia were known to occur only for three species: one – *H. indicus* WEHNCKE 1876 – widespread in the Indian Region, and two – *H. australasiae* WEHNCKE 1876 and *H. waterhousei* BLACKBURN 1888 – from northern Australia. No data were known for New Guinea. Although cited in many different recent publications (e.g. SATÔ 1972, ROCCHI 1976, WATTS 1985, WATTS 2001, TOLEDO 2003), these three species have neither been illustrated nor yet keyed together.

Newly collected material from Australia and New Guinea (Irian Jaya) by Michael Balke,

Martin Baehr (Munich), Fernando Pederzani (Ravenna) and the junior author, gives us the opportunity to describe two additional species of this genus, together with the first record for New Guinea. Some characters of these new species, shared with *H. australasiae* and *H. waterhousei*, generate interesting ideas concerning the biogeography and origin of Australasian *Sternocanthus*.

Material and Methods

Specimens mentioned in this work are deposited in several collections which are abbreviated in the text as follows:

ANIC.....	Australian National Insect Collection, Canberra, Australian Capital Territory, Australia
CHB.....	Dr. Lars Hendrich collection, Berlin, Germany (property of NMW)
FPR.....	Fernando Pederzani collection, Ravenna, Italy
GWV.....	Prof. Dr. Günther Wewalka collection, Vienna, Austria
JSL.....	Jaroslav Šťastný collection, Liberec, Czech Republic
MTP.....	Mario Toledo collection, Parma, Italy
NHMB.....	Naturhistorisches Museum Basel, Switzerland
NMW.....	Naturhistorisches Museum Wien, Vienna, Austria
MNHN.....	Muséum National d'Histoire Naturelle, Paris, France
OLML.....	Oberösterreichische Landesmuseen Linz, Austria
PMB.....	Paolo Mazzoldi collection, Brescia, Italy
ZRC.....	Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore
NME.....	Naturkundemuseum Erfurt, Germany

This study is based on the examination of 373 specimens, most of them deposited in NMB, NMW, CHB and MTP. Type specimens were re-examined for all problematic species; lectotypes are designated to ensure taxonomic stability.

For the orientation of male aedeagus, we have followed the criteria proposed in MILLER & NILSSON (2003) for rotated structures in Hydradephaga. Therefore for each species, the aedeagus is described and figured in its fundamental anatomical position, with the concave (dorsal) side above and convex (ventral) side below; thus, what is often named "right" side of the median lobe becomes "left" side of the median lobe and what is named "right" paramere becomes "left" paramere and vice versa.

Additional Afrotropical species of *Hydrocanthus* (*Sternocanthus*) studied

- H. (Sternocanthus) colini* ZIMMERMANN – Niger.
- H. (Sternocanthus) fabiennae* BAMEUL – Madagascar.
- H. (Sternocanthus) ferruginicollis* RÉGIMBART – Malawi, Namibia.
- H. (Sternocanthus) funebris* FAIRMAIRE – Zimbabwe, Malawi.
- H. (Sternocanthus) gracilis* KOLBE – Madagascar.
- H. (Sternocanthus) grandis* (CASTELNAU) – Ivory Coast.

- H. (Sternocanthus) klarae* GSCHWENDTNER – Guinea, Gabon.
 –*H. (Sternocanthus) micans* WEHNCKE – Namibia, Malawi.
 –*H. (Sternocanthus) mocquerysi* RÉGIMBART – Namibia.
 –*H. (Sternocanthus) paludicola* GUIGNOT – Malawi.
 –*H. (Sternocanthus) wittei* GSCHWENDTNER – Niger.

Taxonomy

All members of the genus *Hydrocanthus* show the derived characters of the tribe Hydrocanthini, to which they belong, and can be distinguished by the large and wide prosternal process, metafemora and metatibiae broad, these latter with the longer apical spur serrulate, and male eighth sternite with a long and bifid distal process. Typical are also the size, larger than most other noterids, the uniform dorsal coloration (never marked: at most pronotum and head paler than elytra, or the latter marmorate in some Neotropical species) and the body shape more or less elongate.

Hydrocanthus (Sternocanthus) grandis group (GUIGNOT 1959)

Hydrocanthus (Sternocanthus) balkei sp.n. (Figs 1, 7, 12, 17)

Type locality: Shallow, muddy pool, Kali Bobo (= Bobo River), Paniai Province, Nabire, Irian Jaya, Indonesia.

Type material: Holotype: 1 ♂: "Irian Jaya, Paniai Prov., Nabire, Kali Bobo, 100 m, IX.1990 (IR 91 #10), leg. Balke & Hendrich" (NMW). Paratypes: 11 specimens with same data as holotype (MTP, NMW); 14 exs.: "W-Neuguinea/Paniai Prov. Nabire – Kali Bobo / IR 10, 19., 20. & 26.9.90 leg. Balke & Hendrich" (CHB, MTP, OLML).

Diagnosis: Black, poorly iridescent, almost matt. Laterally quite convex; dorsal outline oval, broad near the shoulders, quite strongly tapering toward the elytral apex (Fig. 1).

Description: Holotype: total length: 6.4 mm; total length without head: 5.7 mm; maximum width: 3.0 mm. Paratypes: total length: 5.65-6.6 mm; total length without head: 5.15-5.9 mm; maximum width: 2.75-3.0 mm.

Head: brownish-black, dorsal surface with an impressed microreticulation of small, rounded meshes hardly arranged in wrinkles, together with very few sparse and fine dots. Underside and labrum dark brown, antennae and mouthparts reddish-brown.

Pronotum: pitch-black; dark-reddish toward lateral sides; without iridescence; lateral sides rounded, with bead strong and in relief, gradually narrowed to the base; anterior bead quite strong. Dorsal surface marked with wrinkles of meshes that are quite well distinguished but less so than on head.

Elytra: pitch-black, poorly iridescent, surface almost dull; maximum width behind the base, at about the first sixth of their length; lateral side, seen in lateral view, poorly concave at the shoulders. Microreticulation as on pronotum but rather more impressed. Two longitudinal, almost regular, series of dots are well visible, running practically unmodified, up to the elytral apex.

Underside: dark, reddish-brown, blackened on distal side of abdominal sternites; surface covered by a microreticulation of strong polygonal meshes, smoother on metacoxae and

sternites. Prosternum and prosternal process strongly pubescent, with hair dots on prosternum more closer than on the latter. Punctuation on metasternal and metacoxal plates as on prosternal process. Legs: reddish-brown; metafemora with a row of dots along fore and hind side, the latter being irregular close to the apex.

♂: pro and mesotarsi with suckers, as in all member of the genus. Median lobe of aedeagus (Fig. 7) quite broad, pointed apically, with transverse ridge on left side well visible. Left paramere (Fig. 12) pointed distally; apical tuft of hairs forming a long curl, sharply distinguished from the other hairs.

♀: Similar to ♂, not differing from male externally.

E t y m o l o g y : Dedicated to our friend and colleague Dr. Michael Balke (Zoologische Staatssammlung, Munich, Germany) who collected part of the type material.

H a b i t a t : All specimens were collected in a small, shallow and muddy pool formed by different small streams or ditches, very near the coast. The locality was in a recently burned and cultivated area.

D i s t r i b u t i o n (Fig. 17): Only known from the type locality near Nabire, Irian Jaya. Probably more widespread in the lowlands along the northern coast of New Guinea.

First record of the genus in New Guinea.

***Hydrocanthus (Sternocanthus) pederzanii* sp.n. (Figs 2, 8, 13, 17)**

Type locality: Mitchell Lake, Atherton Tableland, Northern Queensland, Australia.

Type material: Holotype: 1♂: "Queensland, Atherton tableland, Lake Mitchell, 21.XI.1998, F. Pederzani leg." (ANIC). Paratypes: 11 specimens with same data as holotype (FPR, MTP, CHB, PMB); 2♂♂: "Australia, QLD01/19 Mt. Elliott NP, 200m 4.-6.4.2001 M. Baehr" (CHB, ZSM).

D i a g n o s i s : Very large species (the largest in Australasia; comparable in size with some African *Hydrocanthus*), oblong, convex, colouration uniformly black. Dorsal surface weakly iridescent (Fig. 2).

D e s c r i p t i o n : Holotype: total length: 7.6 mm; total length without head: 6.8 mm; maximum width: 3.6 mm. Paratypes: total length: 6.3-7.7 mm; total length without head: 5.8-7.0 mm; maximum width: 3.2-3.7 mm.

Head: brownish-black, dorsal microreticulation as on the preceding species, a little less impressed. Underside and labrum dark brown, antennae and mouthparts reddish.

Pronotum: pitch-black; slightly faded on lateral sides; poorly iridescent; lateral sides rounded, with bead strong and in relief, gradually narrowed to the base; anterior bead quite strong. Dorsal surface with wrinkles of meshes.

Elytra: black, weakly iridescent but more shining than *H. balkei*. Maximum width close to the base; microreticulation as on pronotum but a bit more impressed; two longitudinal series of dots run on elytral surface as on *H. balkei*.

Underside: uniformly brown; surface covered by a sculpture of strong polygonal meshes. Prosternum and prosternal process strongly pubescent; hair dots on prosternum a bit more closer than on prosternal process. Legs: reddish-brown.

♂: Median lobe of aedeagus (Fig. 8) similar as in *H. balkei*, but slender, more regularly tapering toward the apex; transverse ridge on left side less visible. Left paramere (Fig. 13) as in the preceding species, but more rounded at the apex.

♀: Similar to ♂, not differing from male externally.

E t y m o l o g y : Dedicated to our friend and colleague Fernando Pederzani (Ravenna, Italy), who collected most of the type material.

H a b i t a t : The Mitchell Lake is a great shallow lake on the Atherton tableland. According to Pederzani (in litt.) all beetles were collected in very shallow water at the shore, which was sinuate in that place, with emergent water plants. The specimens from Mount Elliott were collected at light (Baehr pers. com).

D i s t r i b u t i o n (Fig. 17): North-eastern Queensland, Australia. In hilly regions from Mitchell Lake in the north to Mt. Elliott National Park near Townsville in the south. This species seems to be quite rare and localised. The two specimens known from Mt. Elliot are smaller (6.3-6.4 mm; 5.8-6.0 mm without head) compared with the series from Mitchell Lake (7.3-7.7 mm; 6.7-7.0 mm without head).

N o t e s : The two new species, *H. balkei* and *H. pederzanii*, seem to be more closely related respect to the other Australian species of *Hydrocanthus*, due the similar reticulation of dorsal surfaces, the punctuation of prosternum and prosternal process and the shape of median lobe of aedeagus. They both have – apparently – isolated and pointlike distributions (Fig. 17); such distributions give the appearance to be relict and this, together with their closeness, might suggest a common origin from an ancestor with a wider distribution, later broken up and speciated into the extant species.

***Hydrocanthus (Sternocanthus) australasiae* WEHNCKE 1876 (Figs 3, 9, 14, 18, 19, 20)**

Hydrocanthus australasiae WEHNCKE 1876: 223 (orig. descr.).

Hydrocanthus australasiae WEHNCKE 1876 - SHARP 1882: 279; BRANDEN 1885: 18; ZIMMERMANN 1919: 118; 1920: 14; WATTS 1985: 27; LAWRENCE et al. 1987: 327; LARSON 1993: 60; 1997: 273; WATTS 2001: 61; 2002: 51-55.

Hydrocanthus (Sternocanthus) australasiae WEHNCKE 1876 - BAMEUL 1994: 362; NILSSON & VONDEL 2005: 114.

Type locality: Rockhampton, Queensland, Australia.

Type material: Lectotype: Female (MNHN), here designated: glued on small, triangular card, labelled: "Daemel [small, white, rectangular, black bordered label, handwritten] / Nov Holld [= Nova Hollandia] Rockhampton [slightly larger, rectangular, mauve label, black bordered, handwritten]". Paralectotypes: 9 exs. (MNHN) unlabelled.

M a t e r i a l e x a m i n e d : AUSTRALIA: Northern Territory: 1 ex.: Northern Territory, Kakadu N.P., Jim Jim Falls camping area, 60 m, 26-27.XI.1996, S13°16.218' E132°49.276', L. Hendrich leg. (CHB); 1 ex.: Northern Territory, Kakadu N.P., Arnhem Hwy, 12 km WNW Jabiru, ca. 50 m, 29.XI.1996, S12°37.937' E 132°38.134. L. Hendrich leg. (CHB); 16 exs.: Fogg Dam/Darwin, 30.VIII.1986, S. Kiener leg. (NHMB). Queensland: 10 exs.: N Queensland, 20 km E of Normanton, II.1996, at light, S. Lamond leg. (CHB); 15 exs.: N Queensland, 20 km E of Normanton, I.1996, at light, riverside (CHB); 10 exs.: Cape York, VI.1993, leg. Uhler (GWW); 10 km S Tully, S Innisfajl, 30 m, 25.I.1993, G. Wewalka leg. (12 exs. GWW, FPR). Western Australia: 1 ex.: W Australia, Shire of Wyndham, E Kimberley, Gibb River Road, creek 10 km W Bindoola Creek, 13.VI.1999, L. Hendrich leg., WA 5/105 (CHB); 1 ex.: Shire of Derby, W Kimberley, Gibb River Road, Manning Gorge, 400 m, 20.-21.VI.1999, L. Hendrich leg., WA 18/118 (CHB); 1 ex.: Shire of Wyndham, E Kimberley, Gibb River Road, King Edward River Crossing, 280 m, 15.VI.1999, Hendrich leg., WA 10/110 (CHB); 10 exs.: Shire of Wyndham, East Kimberley, Mitchell Plateau, Little Mertens Falls, 300 m, 15.VI.1999, Hendrich leg., WA 11a/111a (CHB, MTP); 17 exs.: Shire of Derby - West Kimberley, Gibb River Road, Galvans Gorge, 420 m, 21.VI.1999, Hendrich leg., WA 19/119 (CHB); 1 ex.: Shire of Wyndham, East Kimberley, Mitchell Plateau, Port Warrender Road / Kalumburu Road, Lowya Creek, 290 m, 18.VI.1999, Hendrich leg., WA 13/113 (CHB); 7 exs.: Shire of Derby, West Kimberley, Gibb River Road, Saddler Spring near Iminji Aboriginal Community, 350 m, 22.VI.1999, Hendrich leg., WA 20/120 (CHB, MTP); 2 exs.: E Kimberley, Mt. Barnett, Manning River, S 016°39'22 E 125°55'43.5, 18.VII.1998, Dr. W.G. Ullrich leg. (NHMB).

Diagnosis: Oblong-oval, poorly convex, more gently tapering toward the elytral apex. Coloration uniformly blackish-brown. Dorsal surface glossy, weakly iridescent. Median lobe of aedeagus distinctive (Fig. 3).

Description: total length: 5.7-6.6 mm (lectotype: 6.6 mm); total length without head: 5.0-5.9 mm (lectotype: 5.9 mm); maximum width: 2.75-3.1 mm (lectotype: 3.1 mm).

Head: brownish-black, dorsal reticulation quite fine, arranged in irregular wrinkles, together with very scarce, scattered, small dots. Underside and labrum dark brown, antennae and mouthparts reddish.

Pronotum: pitch-black, reddish-brown in some specimens; poorly iridescent. Dorsal surface with a fine microreticulation of wrinkles composed by hardly discernible meshes.

Elytra: pitch-black or dark brown; poorly iridescent, more shining than the two preceding species. Maximum width just close to the base; microreticulation as on pronotum; two regular series of longitudinal dots run on basal half of the elytra, more irregular on the distal half.

Underside: brown or reddish-brown; surface covered by a sculpture of strong polygonal meshes. Prosternum and prosternal with hair dots more scattered than in *H. balkei* and *H. pederzani*; hair punctures less dense on metasternum and metacoxal process. Legs: reddish-brown.

♂: Median lobe of aedeagus (Fig. 9) blunt, rounded apically; transverse ridge on left side very pronounced and deep. Left paramere as in Fig. 14.

♀: Similar to ♂, not differing from male externally.

Habitat: According to LARSON (1997) a more lentic species occurring in billabongs, reservoirs and rest pools of intermittent streams. In Western Australia collected at the edge of large, slow flowing and deep (up to 2 m depth) permanent rivers, shaded by old riverine *Pandanus aquaticus* and *Melaleuca* trees. The beetles are often found in shallow (15 cm), isolated and half-shaded riverine puddles or embayments among roots and organic debris like rotten leaves twigs and grasses (Fig. 20). At Galvan's Gorge (Fig. 18) in a rocky, shallow (25 cm) and very slow flowing stream, partly shaded by mixed *Pandanus* and *Melaleuca* forest and overgrown with grass tussocks and *Nymphaea violacea* (Fig. 19). At this side syntopic with *H. waterhousei* and *Canythrus ephemeralis* WATTS 2001. Also attracted to light.

Distribution (Fig. 17): Tropical north of Australia. From the Kimberley Plateau in Western Australia, Kakadu National Park in the Northern Territory to the Atherton Tableland and White Mountains National Park in north-eastern Queensland (LAWRENCE et al. 1987, LARSON 1993, 1997; WATTS 2001, WEIR 1998). South to northern New South Wales (WATTS 2002).

***Hydrocanthus (Sternocanthus) micans* group (GUIGNOT 1959)**

***Hydrocanthus (Sternocanthus) waterhousei* BLACKBURN 1888 (Figs 4, 10, 15, 17, 19)**

Hydrocanthus waterhousei BLACKBURN 1888: 65 (orig. descr.).

Hydrocanthus (Sternocanthus) waterhousei BLACKBURN - WATTS 1985: 27; LAWRENCE et al. 1987: 327; LARSON 1993: 60; 1997: 273; WATTS 2001: 61; 2002: 51-55.

Hydrocanthus (Sternocanthus) waterhousei BLACKBURN 1888 (misspell.): BAMEUL 1994: 362; NILSSON & VONDEL 2005: 120.

Type material: Not studied.

Material examined: AUSTRALIA: Western Australia: 1 ex.: Gibb River Road/Silent Grove, Bell George, 017°00'36,3"125°13'25,3"E, 19.VII.1998, Dr. W. Ullrich leg. (NMW); 4 exs.: E Kimberley, Mt. Barnett, Manning River, S 016°39'22 E 125°55'43.5, 18.VII.1998, Dr. W.G. Ullrich leg. (NHMB); 7 exs.: Shire of Derby, West Kimberley, Gibb River Road, Galvans Gorge, 420 m, 21.VI.1999, Hendrich leg., WA 19/119 (CHB); Queensland: 5 exs.: N Queensland, 20 km E of Normanton, II.1996, at light, S. Lamond leg. (CHB); 10 exs.: N Queensland, 20 km E of Normanton, I.1996, at light, riverside (CHB).

Diagnosis: Unmistakable species, oblong, weakly convex, coloration uniformly reddish or reddish-brown. Dorsal surface glossy, not iridescent. Right side of aedeagus without transverse ridge (Fig. 4).

Description: total length: 5.9-6.35 mm; total length without head: 5.3-5.65 mm; maximum width: 2.7-2.9 mm.

Head: slightly paler on clypeus; dorsal reticulation quite impressed, made by clearly distinguished circular cells; no dots are visible on the surface. Underside of the same colour as dorsum, labrum, antennae and mouthparts testaceous.

Pronotum: almost straight on fore half; beads of lateral sides and hind side more flat than in the preceding species. Dorsal surface with a reticulation finer than on head, arranged in shallow longitudinal wrinkles finely sculptured.

Elytra: elongate, with maximum width at the base; lateral sides, in dorsal view, poorly rounded and quite angulated just behind the half their length; seen in lateral view, straight at the shoulders. Surface shining; reticulation as on pronotum; two kind of dots are clearly visible: larger ones, arranged in two longitudinal series, somewhat regular in the basal half and more sparse in the apical half; smaller and finer dots arranged longitudinally along the suture and between the rows of larger dots.

Underside: reddish-yellow, slightly darker on prosternal process, metasternal and metacoxal plate and sternites; surface covered by a sculpture of quite impressed polygonal meshes, finer on sternites. Prosternum flat, slightly narrowed between the coxae and, therefore, prosternal process not so broadened as in other species of *Hydrocanthus*. Punctuation on prosternum and prosternal process close and uniform. Punctuation on metasternal and metacoxal plates visibly more scattered, and almost glabrous in the middle. Legs: yellow; metafemora with few dots along fore and hind side.

♂: Median lobe of aedeagus (Fig. 10) quite slender, broader in distal half. A trace of a transverse ridge on left side is very hardly visible. Left paramere (Fig. 15) similar to that of *H. australasiae* but more slender.

♀: Similar to ♂, not differing from male externally.

Habitat: See *H. australasiae* (Fig. 19). According to LARSON (1993, 1997) and WATTS (2002) a strictly lentic species. Also attracted to light.

Distribution: Tropical north of Australia (Fig. 17). From the Kimberley Plateau in Western Australia, Kakadu National Park in the Northern Territory to Lawn Hill National Park, Normanton, Atherton Tableland (LAWRENCE et al. 1987; LARSON 1993, 1997; WEIR 1998; WATTS 2001, 2002) and White Mountains National Park in north-eastern Queensland (WEIR in litt.). **First record for Western Australia.**

***Hydrocanthus (Sternocanthus) indicus* WEHNCKE 1876 (Figs 5, 6, 11, 16)**

Hydrocanthus indicus WEHNCKE 1876: 223 (orig. descr.).

Hydrocanthus indicus WEHNCKE 1876 - SHARP 1882: 279; BRANDEN 1885: 18; RÉGIMBART 1888: 609; 1889a: 150; 1889b: 51; 1891: 538; 1899: 252; 1900: 147; 1904: 81; ZIMMERMANN 1919: 118; 1920: 15; 1927: 10; SATŌ 1972: 143; VAZIRANI 1975: 41; VAZIRANI 1977: 4; ROCCHI 1976: 179; BALKE, HENDRICH & YANG 1999: 325; HENDRICH, BALKE & YANG 2004: 108.

Hydrocanthus (Sternocanthus) indicus WEHNCKE 1876 - GUIGNOT 1956: 60; BAMEUL 1994: 362; TOLEDO 2003: 76; NILSSON & VONDEL 2005: 117.

Type material: Lectotype: Male (MNHN), here designated: pinned, labelled "Schmidt [Small rectangular label as for *H. australasiae*] / Cochinchina [slightly larger, rectangular, yellow label, black bordered, handwritten]". Paralectotype: Female (MNHN): originally pinned, then glued on small, triangular card, unlabelled.

Material examined:

Brown specimens: CHINA: 2 exs.: Hong Kong, Luk keng marsh, 23.VI.1995, Dudgeon leg. (NMW). INDONESIA: 2 ex.: W Sumatra, Talu, VII.1992, Dr. W.G. Ullrich leg. (NHMB); 18 exs.: E Kalimantan, Pond of Mekhat Stream, nr. Eheng village, 13.VII.1995, P. Mazzoldi leg. (MTP, PMB). LAOS: 6 exs.: S Laos, Prov. Champasak, ca. 50 km S Pakse, nr. Ban Phautoumphone, 50-100 m (1a), 23-24.V.1996, H. Schillhammer leg. (NMW). MALAYSIA: 39 exs.: Pahang – Johor, Endau Rompin Nat. Park, 100 m, Salendang, 28.II-13.III.1995, Strba & Hergovits leg. (NMW); 8 exs.: Trengganu, Rantau Abang, coastal stream, 11.XI.1991, K. Lim & S. Lim leg. (ZRC). MYANMAR: 1 ex.: Rangoon, Taikkyi, Nyaunggon, 19-31.V.2001, M. Klichà leg. (MTP). THAILAND: 1 ex.: E Thailand, Ko Chang, Klong Prao, pond (13, 1), 11.XII.1990, M. Jäch leg. (NMW); 1 ex.: Narathiwat Prov., Sungai Padi, 23.X.1998, HK Lua leg., LHK0403 (ZRC). VIETNAM: 40 ex.: S Vietnam, Nam Cat Nat. Park, 1-5.V.1994, Pacholatko & Dembicky leg. (NHMB); 72 exs.: S Vietnam, Nam Cat Nat. Park, 1-5.V.1994, Pacholatko & Dembicky leg. (NMW); 1 ex.: N Vietnam, (Ben En) 180 km SSW Hanoi 40 km SW Than Hoa, Ben En National Park, 50 m, 29-30.VII.1997, A. Napolov leg. (NME); 2 exs.: N Vietnam, (Ben En) 180 km SSW Hanoi 40 km SW Than Hoa, Ben En National Park, 50 m, 27.VIII.1997, A. Napolov leg. (CHB).

Black specimens: INDIA: 9 exs.: Assam, Kaziranga Nat. Pres., V.1991, S. Ja'ki leg. (MTP, JSL). SRI LANKA: 3 exs.: Surroundings of Colombo, 12.XI.1980, M. Jäch leg. (NMW).

Intermediate specimens: INDONESIA: 18 exs.: Eastern Sumatra, Riau Prov., Bukit Tigapuluh Nat. Park, 0°50'102°26', 18-25.I.2000, J. Bezděk leg. (MTP); 4 exs.: Siberut, Saliguma, 30.VIII.1992, Barries & Cate leg. (NMW); 2 exs.: Siberut, Bakeuluk – Madobak, 18.II.1992, (23) M. Jäch leg. (NMW). LAOS: 3 exs.: N Laos, Prov. Luang Nam Tha, Luang Nam Tha, 550 m, at light, 15.VI.1996, leg. H. Schillhammer leg. (NMW).

Diagnosis: Small *Hydrocanthus*, broadly oval, weakly convex; dorsal surface strongly iridescent; coloration uniformly dark brown or deep black. Left side of aedeagus without transverse ridge.

Description: total length: 5.3-5.8 mm (lectotype: 5.7 mm); total length without head: 4.65-5.3 mm (lectotype: 5.1 mm); maximum width: 2.6-2.9 mm (lectotype: 2.9 mm).

Head: dark, dorsal surface with a very fine reticulation of small meshes arranged in short, longitudinal wrinkles, together with very few sparse and fine dots. Underside and labrum reddish-brown, antennae and mouthparts testaceous (Figs 5-6).

Pronotum: dark reddish or black, iridescent; lateral sides deeply rounded, with bead strong and in relief, gradually narrowed to the base; anterior bead quite strong. Dorsal surface very finely sculptured with longitudinal meshes as on head, but quite longer and slightly more impressed.

Elytra: dark brown (in this case a little darker than pronotum) or deep black, maximum width behind the base, at about the first sixth of their length; lateral side, seen in lateral view, weakly concave at the shoulders. Surface strongly iridescent, more than on pronotum; sculpture very fine, as on pronotum; two longitudinal series of dots are visible: the

dots are small, quite regular on the basal half being more irregular in the hind half.

Underside: uniformly reddish-brown, a little darker on abdominal sternites, covered by a sculpture of polygonal meshes, more strongly impressed on metacoxae and metasternal wings, smoother on sternites. Hairy dots on prosternum and prosternal process quite uniformly spaced; prosternal process wide, strongly narrowed between the coxae. Punctuation on metasternal and metacoxal plates as on prosternal process. Legs: reddish-brown; metafemora with a row of dots along fore and hind side, this latter being irregular close to the apex.

♂: Median lobe of aedeagus (Fig. 11) broad, sickle-shaped, without traces of transverse ridge on left side. Left paramere (Fig. 16) with a series of hairs along the whole anterior side and with apical tuft poorly distinguished from the other hairs.

♀. Similar to ♂, not differing from male externally.

Distribution: Widespread in the Oriental Region: formally known from Bangladesh, Cambodia, China (Hong Kong), India (at least Eastern India), Laos, Indonesia (Java, Kalimantan, Siberut, Sumatra), Malaysia, Myanmar, Singapore, Sri Lanka, Thailand, Vietnam. Collected also at light (VAZIRANI 1975).

Notes: This species is distinctive in having different colour forms. The most widespread one is dorsally dark-brown (typical form) and it is known for the whole distribution of *H. indicus*, except for Eastern India (Assam) and Sri Lanka, where deep-black specimens with a bluish sheen occur (see Figs 5-6); specimens seen from Laos (Luang Nam Tha), Sumatra and Siberut share an intermediate brown-black colouration. Perhaps these forms should be considered as geographical races?

Discussion

In the Oriental and Australian realms *Hydrocanthus* is at present represented by five species, all belonging to the subgenus *Sternocanthus*: one species widespread in the whole tropical Asia, one in New Guinea and three in northern Australia. This is a rather small number, compared with the 31 species known for tropical Africa and Madagascar, the centre of speciation of *Sternocanthus*. All Oriental and Australasian species are inhabitants of more or less lowland lentic waters but could be collected in protected embayments at the edges of slow flowing rivers and streams as well. All Australian species are capable of flight and are attracted to light. *Hydrocanthus australasiae*, *H. pederzanii* and *H. waterhousei* are sympatric in NE Queensland and in many areas of north-western and northern Australia *H. australasiae* and *H. waterhousei* are syntopic. Species identification of *Hydrocanthus* from tropical Africa and Madagascar is often problematic, owing to the large number of taxa and the extreme uniformity of most of them, often defined only by slight and poorly constant differences of male sexual characters and very few external features. On the contrary to this scenario, all the Australasian species are easy to distinguish, as the shape of aedeagus is distinctive in all of them and the habitus of two species (*H. waterhousei*, *H. pederzanii*) is very characteristic. Only *H. balkei* and *H. pederzanii* share quite similar median lobes of the aedeagus, indicating the closest affinity of these two species.

Based on the punctuation of prosternum and prosternal plate, GUIGNOT (1959) divided *Sternocanthus* into three species-groups. Using Guignot's criteria, the five Australasian

species should be grouped as follow: *H. indicus* and *H. waterhousei* in the *H. micans*-group – having dots on prosternum as dense as on prosternal plate; *H. australasiae*, *H. balkei* sp.n. and *H. pederzani* sp.n. in the *H. grandis*-group – having dots on prosternum more or less visibly denser than on prosternal plate.

Nevertheless the three latter species plus *H. waterhousei* can be grouped together for a peculiar feature of the median lobe of aedeagus, a transverse ridge running on its left side, just before the lobe bents down, which generates a more or less visible, shallow or quite deep groove. In *H. indicus*, the left side of median lobe is smooth, without trace of such structure.

After a comparison with species of *Sternocanthus* from Africa and Madagascar, listed in the introduction, we have seen that all of them share the median lobe of aedeagus being smooth on the left side, as in *H. indicus*. On the basis of this character (unique within *Sternocanthus*), the known Australasian species of this genus can be seen to belong to two different species-groups, and most probably the group *H. australasiae-balkei-pederzani-waterhousei* is monophyletic; *H. indicus*, on the other hand can be inserted in Guignot's *H. micans* group, because of the punctuation of the prosternal plate. This could suggest an isolated offspring and differentiation of the group *H. balkei-pederzani-australasiae-waterhousei*, inside the Australasian region, perhaps older than the origin of *H. indicus* in Southern Asia.

Key to species of Australasian *Hydrocanthus*

- Dorsal coloration uniformly reddish-yellow; body shape very elongate; left side of median lobe of aedeagus with a hardly visible ridge as below. Northern Australia *H. waterhousei*
- Dorsal coloration dark, at most reddish-brown, but more frequently dark brown; body shape less elongate or, if elongate, large, almost black species from Australia; left side of median lobe of aedeagus with or without a transverse ridge, before the lobe bents apically 2
- Elytra and pronotum strongly iridescent; left side of median lobe of aedeagus without a transverse ridge before the lobe bents apically; hairs of left paramere almost uniformly arranged along the anterior side, with apical tuft poorly differentiated and slightly longer respect the other hairs. Southern Asia, from India to Borneo *H. indicus*
- Dorsal surface less iridescent; left side of median lobe of aedeagus with a transverse ridge before the lobe bents apically; hairs of left paramere clearly divided into two tufts along the anterior side: one medial and one apical, this latter very long ending in a curl. Species from Northern Australia and New Guinea 3
- Larger (6.30–7.80 mm); body outline quite oblong. NE Queensland *H. pederzani* sp.n.
- Smaller (5.70–6.50 mm); body outline more flattened and elongate 4
- Median lobe of aedeagus shorter, with rounded tip and with lateral ridge deeply incised, forming a groove; body outline more slender, with maximum width at base of elytra; coloration blackish. Northern Australia *H. australasiae*
- Median lobe of aedeagus slender, pointed at tip, with lateral ridge just slightly marked; body outline broader, tapering posteriorly, coloration pitch-black. North coast of Irian Jaya *H. balkei* sp.n.

Acknowledgements

We are indebted to the curators of the museums in Basel, Erfurt, Paris, Singapore and Vienna, to Jaroslav Štastný (Liberec, Czech Republic), Fernando Pederzani (Ravenna, Italy) and Prof. Dr.

Günther Wewalka (Vienna, Austria) for lending type material and specimens. Our thanks also go to Dr. Hans Fery (Berlin, Germany) and Prof. Garth Foster (Ayr, Scotland) for reading the manuscript, and to Dr. Alberto Ballerio (Brescia, Italy) for the excellent digital photos of the beetles.

Zusammenfassung

Die Arten der Gattung *Hydrocanthus* SAY 1833 (Coleoptera: Noteridae) aus dem australasischen Faunengebiet werden revidiert. Alle drei bisher aus der orientalischen und australischen Region bekannten Arten (*Hydrocanthus indicus* WEHNCKE 1876, *H. australasiae* WEHNCKE 1876 und *H. waterhousei* BLACKBURN 1888) werden wiederbeschrieben sowie zwei Arten (*H. balkei* sp.n. aus Irian Jaya, Indonesien und *H. pederzanii* sp.n. aus Nordost-Queensland) aus der *grandis* Artengruppe (GIGNOT 1959) als neu beschrieben. *Hydrocanthus australasiae* und *H. waterhousei* sind über den gesamten tropischen und subtropischen Norden Australiens verbreitet, letztere wird erstmalig für Westaustralien gemeldet. *Hydrocanthus pederzanii* besiedelt ein kleines Areal im Nordosten von Queensland und *H. balkei*, bisher nur von der Typenlokalität bei Nabire, Irian Jaya bekannt, stellt den Erstdnachweis der Gattung für Neuguinea dar. Wichtige artspezifische Unterscheidungsmerkmale (Medianlobi, Parameren und Färbungsmuster) werden illustriert. Ein Bestimmungsschlüssel für alle Arten ist beigefügt, Verbreitung und Habitatansprüche aller Arten werden diskutiert. Lectotypen für *H. indicus* und *H. australasiae* werden designiert. Insgesamt sind damit 53 Arten der Gattung *Hydrocanthus* weltweit beschrieben.

References

- BALKE M., HENDRICH L. & C.M. YANG (1999): Water beetles (Insecta: Coleoptera) in the Nature Reserves of Singapore. — Proceedings of the Nature Reserves Survey Seminar. Garden s' Bulletin Singapore **49** (2) (1997): 321-331.
- BAMEUL F. (1994): A new *Hydrocanthus* SAY from Madagascar (Coleoptera: Noteridae). — Bulletin Mensuel de la Société Linnéenne de Lyon **63** (10): 356-365.
- BLACKBURN T. (1888): Further notes on Australian Coleoptera, with description of new species. — Transactions and Proceedings of the Royal Society of South Australia **10** (1886-1887): 52-71.
- BRANDEN C. VAN DEN (1885): Catalogue des coléoptères carnassiers aquatiques (Halipidae, Amphizoidae, Pelobiidae et Dytiscidae). — Annales de la Société Entomologique de Belgique **29** (1): 5-116.
- GIGNOT F. (1959): Révision des hydrocanthares d'Afrique (Coleoptera Dytiscoidea). Deuxieme partie. — Annales du Musée Royal du Congo-Belge, Tervuren, Ser. 8 [Sci.Zool] **78**: 323-648.
- HENDRICH L., BALKE M. & C.M. YANG (2004): Aquatic Coleoptera of Singapore - Species Richness, Ecology and Conservation. — The Raffles Bulletin of Zoology **52** (1): 97-141.
- LARSON D.J. (1993): Ecology of tropical Australian Hydradephaga (Insecta: Coleoptera). Part 1. Natural history and distribution of northern Queensland species. — Proceedings of the Royal Society of Queensland **103**: 47-63.
- LARSON D.J. (1997): Habitat and community patterns of tropical Australian hydradephagan water beetles (Coleoptera: Dytiscidae, Gyrinidae, Noteridae). — Australian Journal of Entomology **36**: 269-285.
- LAWRENCE J.F., WEIR T.A. & J.E. PYKE (1987): Halipidae, Hygrobiidae, Noteridae, Dytiscidae and Gyrinidae. — In: Zoological Catalogue of Australia, Volume 4, Coleoptera: Archostemata, Myxophaga and Adephaga ed by Bureau of Flora and Fauna, Canberra. Canberra: Australian Government Publishing Service: 1-444.

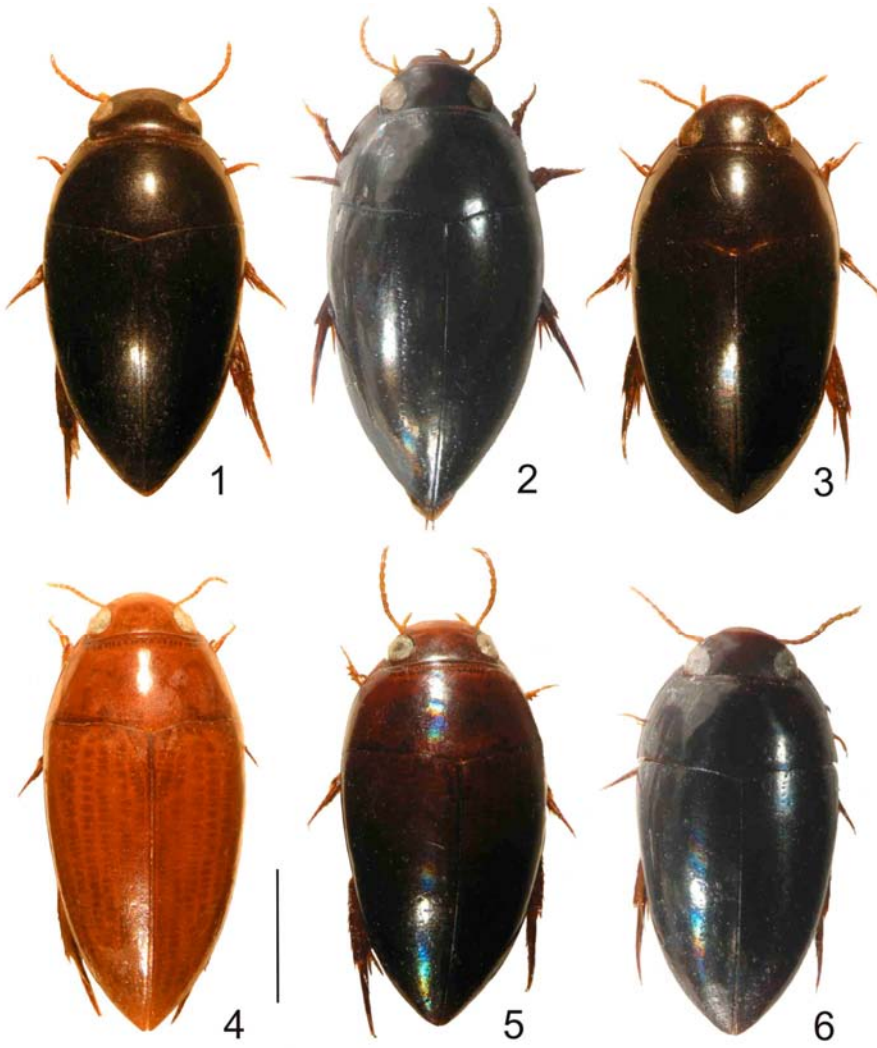
- MILLER K.B. (2001): *Hydrocanthus (Hydrocanthus) paludimonstrus*, a new species from Bolivia (Coleoptera: Noteridae: Hydrocanthini) and its implications for classification of the subgenera. — *The Coleopterist Bulletin* **55** (3): 363-368.
- MILLER K.B. & A.N. NILSSON (2003): Homology and terminology: communicating information about rotated structures in water beetles. — *Latissimus* **17**: 1-4.
- NILSSON A.N. & B.J. VAN VONDEL (2005): Amphizoidae, Aspidytidae, Haliplidae, Noteridae and Paelobiidae (Coleoptera, Adephaga). — In: *World Catalogue of Insects* **7**: 1-171.
- ROCCHI S. (1976): Dytiscidi del Bengla-Desh con descrizione di *Copelatus brivioi* n.sp. (Coleoptera Dytiscidae). — *Bollettino della Società Entomologica Italiana* **108** (8-10): 177-180.
- RÉGIMBART M. (1888): Viaggio di Leonardo Fea in Birmania e regioni vicine. X. Dytiscidae et Gyrinidae. — *Annali del Museo Civico di Storia Naturale di Genova* (2) **6**: 609-623.
- RÉGIMBART M. (1889a): Contribution à la faune Indo-Chinoise. Hydrocanthares. — *Annales de la Société Entomologique de France*: 147-156.
- RÉGIMBART M. (1889b): Dytiscidae et Gyrinidae nouveaux ou rares de la collection du Musée Royal de Leyde. — *Notes from the Leyden Museum* **11**: 51-63.
- RÉGIMBART M. (1891): Viaggio di Leonardo Fea in Birmania e regioni vicine. XXXIII. Énumération des Dytiscidae et Gyrinidae recueillis par M. Leonardo Fea, dans ses voyages en Birmanie et régions voisines. — *Annali del Museo Civico di Storia Naturale Giacomo Doria Genova* (2) **10**: 537-554.
- RÉGIMBART M. (1899): Révision des Dytiscidae de la région Indo-Sino-Malaise. — *Annales de la Société Entomologique de France* **68**: 186-367.
- RÉGIMBART M. (1900): Contribution à l'étude de la faune entomologique de Sumatra (Côte ouest - Vice-résidence de Païnan) (Chasses de M.J.-L. Weyers). — *Annales de la Société Entomologique de Belgique* **44**: 147-148.
- RÉGIMBART M. (1904): Familles des dytiscides, des gyrinides et des hydrophilides. Mission Pavie, Indo-chine. — *Études Diverses* **3**: 81-82.
- SATÔ M. (1972): Some notes on dytiscoid-beetles from Vietnam (Coleoptera). — *Annales Historico-Naturales Musei Nationalis Hungarici* **64**: 143-153.
- SHARP D. (1882): On aquatic carnivorous Coleoptera or Dytiscidae. — *Scientific Transactions of the Royal Dublin Society* (2) **2**: 179-1003 + pls. 7-18.
- TOLEDO M. (2003): Synopsis of the Noteridae of China, based mainly on material collected during the China Water Beetle Survey (1993-2001), pp. 67-88. In: Jäch M.A. & Ji L. (Eds.). — *Water beetles of China*, Vol. 3. Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, VI + 1-572.
- VAZIRANI T.G. (1975): Dytiscidae collected at light in the Oriental region. — *Indian Museum Bulletin* **9** (1) 1974: 41-44.
- VAZIRANI T.G. (1977): Catalogue of Oriental Dytiscidae. — *Records of the Zoological Survey of India Miscellaneous Publication Occasional Paper* **6** (1976): 1-111.
- WATTS C.H.S. (1985): A faunal assessment of Australian Hydradephaga. — *Proceedings of the Academy of Natural Sciences Philadelphia* **137**: 22-28.
- WATTS C.H.S. (2001): A new species of Australian *Canthydrus* SHARP with a key to the Australian species of Noteridae (Coleoptera). — *Records of the South Australian Museum* **34** (2): 61-64.
- WATTS C.H.S. (2002): Checklist and guides to the identification, to genus, of adults and larval Australian water beetles of the families Dytiscidae, Noteridae, Hygrobiidae, Haliplidae, Gyrinidae, Hydraenidae and the superfamily Hydrophiloidea (Insecta – Coleoptera). — *Cooperative Research Centre for Freshwater Ecology (Australia). Identification and Ecology Guide* **43**: 1-110.
- WEHNCKE E. (1876): Zehn neue *Hydrocanthus*-Arten. — *Deutsche Entomologische Zeitschrift* **20** (2): 221-223.

- WEIR T.A. (1998): Some aquatic beetles (Insecta: Coleoptera: Hydradephaga) of the Musselbrook area. — In: The Royal Geographical Society of Queensland Inc.(Ed.): Musselbrook Reserve Scientific Study Report, Geography Monograph Series No. 4: 311-316.
- ZIMMERMANN A. (1919): Die Schwimmkäfer des Deutschen Entomologischen Museums in Berlin-Dahlem. — Archiv für Naturgeschichte **83** (1917) (A 12): 69-249.
- ZIMMERMANN A. (1920): Dytiscidae, Haliplidae, Hygrobiidae, Amphizoidae. — In: SCHENKLING S. (ed.), Coleopterorum Catalogus, Vol. 4, pars 71. — Berlin: W. Junk: 1-326.
- ZIMMERMANN A. (1927): Fauna sumatrensis. (Beitrag Nr. 45). Revision der Haliplidae et Dytiscidae von Sumatra. — Supplementa Entomologica, Berlin Dahlem **16**: 1-44.

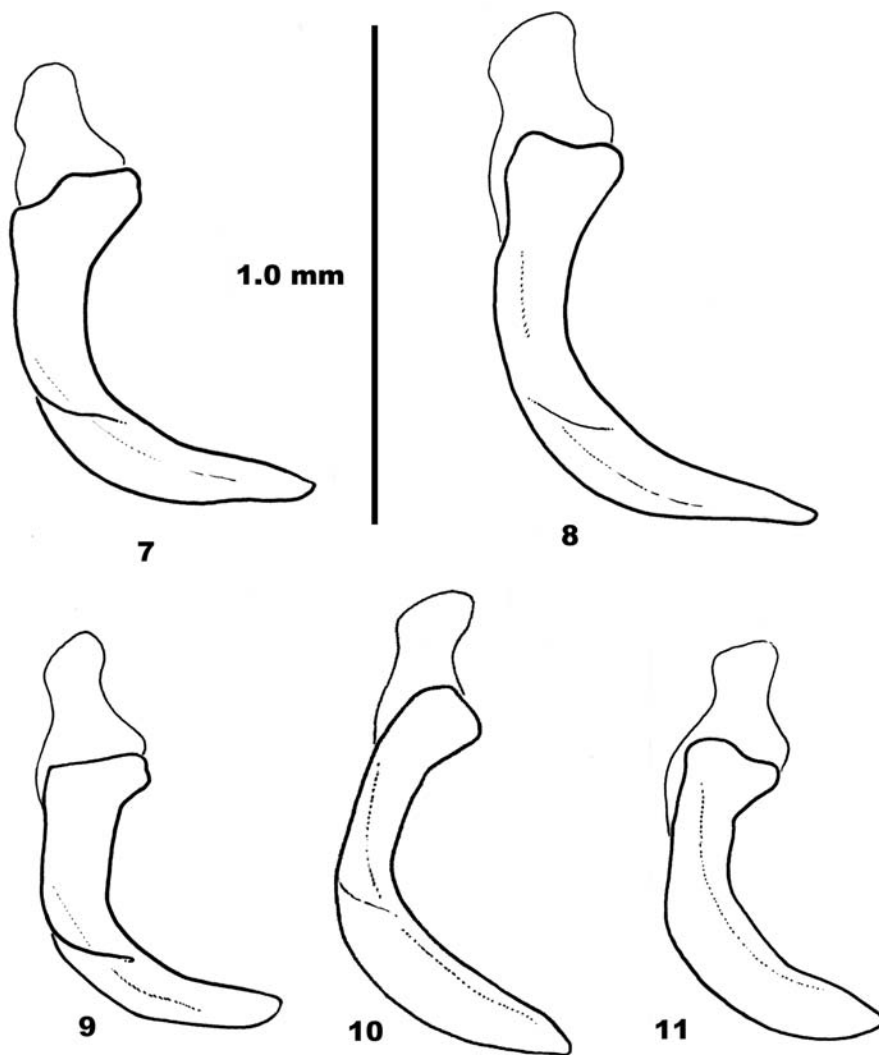
Author's addresses:

Mario TOLEDO
Università degli Studi di Parma
Dipartimento di Biologia Evolutiva e Funzionale
Museo di Storia Naturale
Via Farini 90, I-43100 Parma, Italy
E-mail: matoledo@libero.it

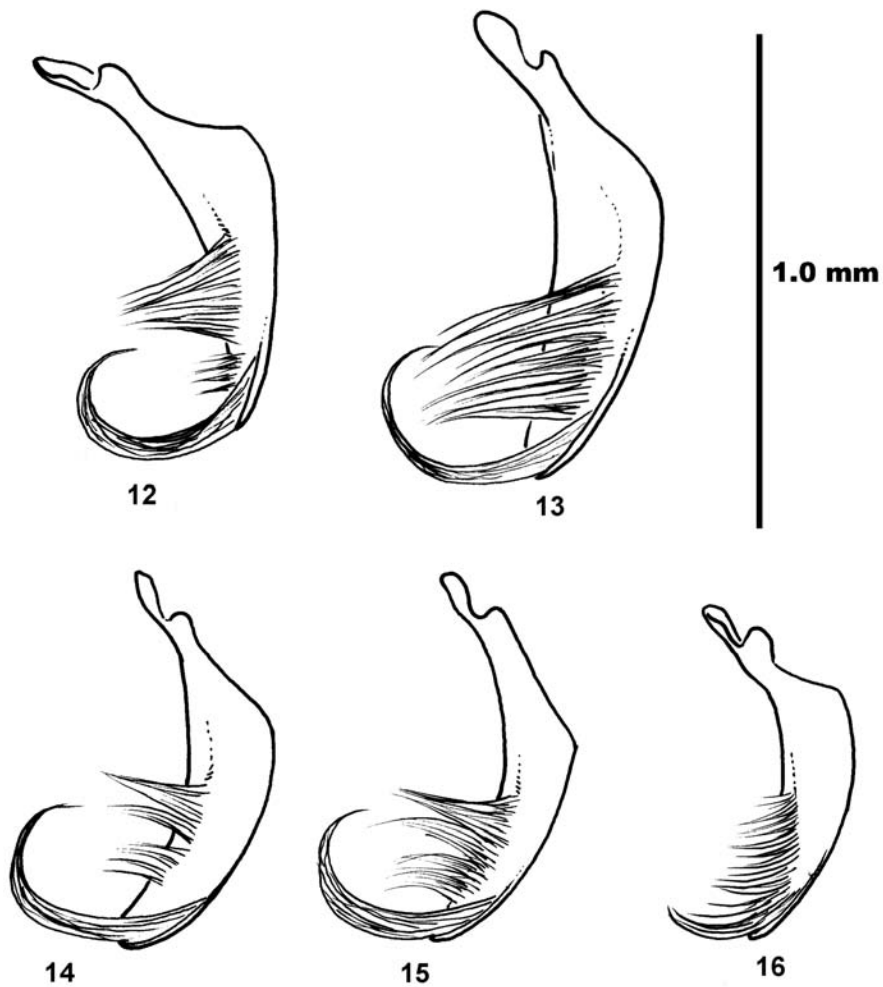
Dr. Lars HENDRICH
Mörchinger Strasse 115 A
D-14169 Berlin, Germany
E-mail: hendrich1@aol.com
www.wasserkaefer.de



Figs 1-6: Habitus of: (1) *Hydrocanthus balkei*; (2) *H. pederzani*; (3) *H. australasiae*; (4) *H. waterhousei*; (5) *indicus*, f. *typica*; (6) *indicus*, black form (scale: 2 mm).



Figs 7-11: Median lobes of aedeagus (left lateral view, rotated): (7) *Hydrocanthus balkei*; (8) *H. pederzani*; (9) *H. australasiae*; (10) *H. waterhousei*; (11) *H. indicus*.



Figs 12-16: Left paramere (inner face, rotated): (12) *Hydrocanthus balkei*; (13) *H. pederzani*; (14) *H. australasiae*; (15) *H. waterhousei*; (16) *H. indicus*.

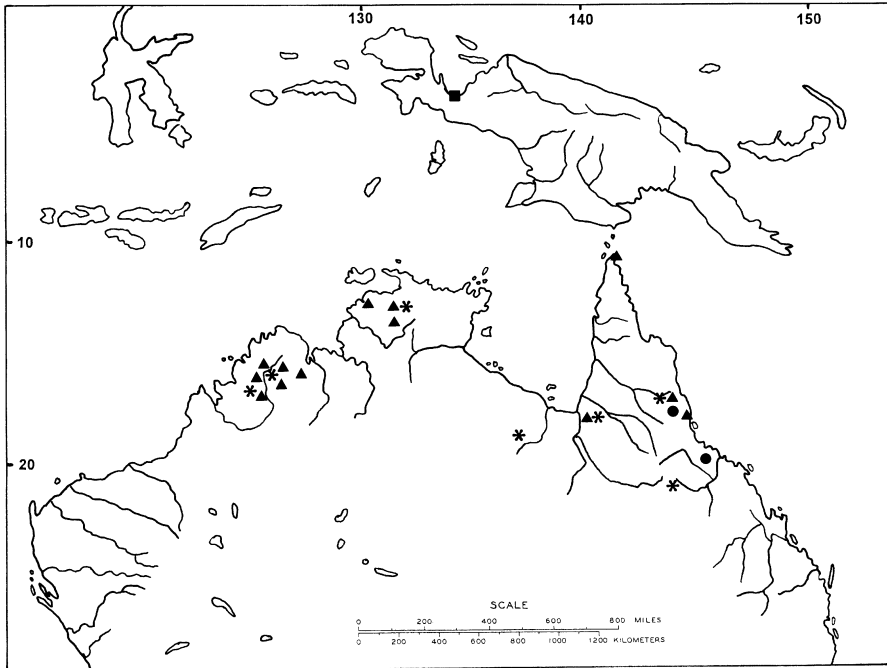


Fig. 17: Distribution of the Australasian species of the genus *Hydrocanthus* (*Sternocanthus*) after LARSON (1993, 1997), WEIR (1998) and specimens cited in this publication. *Hydrocanthus australasiae* (triangles), *H. waterhousei* (asteriks), *H. balkei* (square) and *H. pederzanii* (dots).



Figs 18-20: Habitats of *Hydrocanthus* in northern Australia: **(18, 19)** Galvan's Gorge, Western Australia, East Kimberley. Habitat of numerous Dytiscidae and the Noteridae *Hydrocanthus australasiae*, *H. waterhousei* and *Canthydrus ephemeralis* WATTS 2001; **(20)** King Edward River Crossing, Kimberley Plateau, Western Australia. Habitat of *H. australasiae*.