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Three new species of the genus *Agnoshydrus* BISTRÖM, NILSSON & WEWALKA from Taiwan and Borneo (Coleoptera: Dytiscidae)

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Abstract

Two new species of the genus *Agnoshydrus* from Borneo and one from Taiwan are described. They are related to *A. barong* HENDRICH, BALKE & WEWALKA having in common coarse punctures on the medial part of metasternum. A key to all known species of *Agnoshydrus* is given.

Zusammenfassung

Zwei neue Arten der Gattung *Agnoshydrus* von Borneo und eine von Taiwan werden beschrieben. Diese haben mit *A. barong* HENDRICH, BALKE & WEWALKA die grobe Punktierung auf dem mittleren Teil des Metasternums gemeinsam. Ein Bestimmungsschlüssel für die bekannten Arten der Gattung *Agnoshydrus* wird angeführt.

Key words: Coleoptera, Dytiscidae, Hyphydrini, *Agnoshydrus*, new species.

Introduction

The genus *Agnoshydrus* has been described (BISTRÖM, NILSSON & WEWALKA, 1997) as member of the tribe Hyphydrini. Up to now the genus comprises five species: *A. laccophiloides* (REGIMBART 1888), *A. densus* BISTRÖM, NILSSON & WEWALKA 1997, *A. confusus* WEWALKA & BISTRÖM 1997, *A. schillhammeri* WEWALKA 1999 and *A. barong* (HENDRICH, BALKE & WEWALKA) in HENDRICH & BALKE 1995. The junior author provided a new species of the genus *Agnoshydrus* from Taiwan and among undetermined material of the collection of the Natural History Museum, Vienna and material collected by Paolo Mazzoldi, Brescia, a second new species from Borneo has been discovered. Also from Borneo a third new species of this genus has been contributed by David Bilton, Plymouth. The new species are described below.

Material

The study material which consists of nine specimens is deposited in the following institutions and private collections:

CMB	Coll. Mazzoldi, Brescia, Italy
CWT	Coll. Wang, Taipei, Taiwan
NMW	Naturhistorisches Museum, Vienna, Austria

***Agnoshydrus paulbrowni* sp.n.**

Type locality: Malaysia, Sabah, Danum valley

Holotype ♂ (NMW): "Aug. 1998 BORNEO Sabah \ Danum valley – streams in forest \ P. Brown leg.".

Description

Habitus: body regularly oblong-oval, globular (fig. 1).

Size: total length of body: 2.70 mm, length of body without head: 2.35 mm, width: 1.70 mm.

Head: testaceous; clypeus unbeaded; densely, superficially and regularly punctured; with superficial transverse microreticulation. Antennae testaceous, slender.

Pronotum: testaceous, ferrugineous along the posterior margin; slightly but regularly rounded laterally, lateral margins finely bordered; punctures regular, very dense and moderately coarse; without microreticulation; submat.

Elytra: ferrugineous, indistinctly paler near the apex; punctures regular, very dense and moderately coarse; longitudinal rows of punctures rudimentary; without microreticulation; submat. Epipleura ferrugineous, very densely and finely punctured.

Ventral side: head and pronotum testaceous, metasternum and central part of metacoxae ferrugineous, lareral part of metacoxae and abdomen rufo-testaceous; punctures on head and pronotum superficial, punctures on metasternum, metacoxae and abdomen very dense and moderately fine, few coarse punctures arranged like two V on medial part of metasternum (fig. 9); without microreticulation; prosternal process in lateral view smooth, in ventral view moderately broad, broadly rounded at apex, apex reaching metasternum, lateral beads of process moderately broad; distance between mesocoxal cavities broad; metasternal wings medially narrow; metacoxae with furrows; lateral lobe of metacoxal process reduced, not covering base of trochanter.

Legs: rufo-testaceous; metatibial spurs not modified, almost straight and slender.

Male: penis (fig. 4a, b); parameres (fig.4c); first segments of pro- and mesotarsi moderately enlarged; antennal segments 5 – 7 elongated and slightly enlarged (fig. 8b); five distinct furrows on each metacoxa; long hair-tufts on lateral sides of prosternal process; mesotrochanter and mesofemur with short hair-tufts at posterior edge; metatarsi with extreme long hair-tufts (fig. 8a).

Female: At the type locality four female specimens with similar colouration and body-shape have been collected. Two are of similar size (total length of body: 2.57 - 2.70 mm, length of body without head: 2.37 – 2.40 mm, width: 1.70 mm) as the male holotype but have slightly navel-like punctures on elytra, additional coarse punctures on the medial part of metasternum and a short bead on the front margin of clypeus. The two other female specimens are a little smaller (total length of body: 2.28 - 2.30 mm, length of body without head: 2.00 – 2.07 mm, width: 1.47 – 1.50 mm) but have similar elytral punctures, similar shape of coarse punctures on the medial part of metasternum and unbeaded clypeus as the male holotype. In all female specimens no sclerotized spermatheca have been found. It is unclear if all female specimens or if one of the two forms belong to the same species as the holotype. Therefor the female specimens are not designated as paratypes. All specimens are deposited in the collection of NMW.

Diagnosis

A. paulbrowni is related to *A. barong* HENDRICH, BALKE & WEWALKA having in common coarse punctures on the medial part of metasternum (HENDRICH & BALKE 1995, p. 41, fig. 24) which are also present in *A. ciampori* and *A. taiwanus*. From *A. ciampori* *A. paulbrowni* can be distinguished in the male sex by the submat dorsal side, the missing distinct longitudinal notch along the lateral side of elytra, the extreme long hair-tufts on metatarsi, the modified antennae and the genitalia. From *A. taiwanus* *A. paulbrowni* can be distinguished by larger size, more globular form, the submat dorsal side and the male genitalia. *A. paulbrowni* very much resembles *A. densus* in habitus and dorsal punctuation but having coarse punctures on the medial part of metasternum.

Etymology: This species is dedicated to Paul Brown, Plymouth, who collected the type specimen of the new species.

Biology: The specimens have been collected in stream pools of a tributary of the Segama River in forest close to the Danum Valley Research Station.

Distribution: Borneo (Malaysia, Sabah).

Agnoshydrus ciampori sp.n.

Type locality: Malaysia, Sabah

Holotype ♂ (NMW): "Malaysia, Sabah, Sabalangan river, \ ca. 25 km SE Sapulut, 26. 06. 1998, \ J. Kodada & F. Ciampor Lgt.". Paratype: 1 ♀ Borneo, Kalimantan, Sungai Sabiha, left tributary of Sungai Ruei, left tributary of Katingan, ca. 130 km N Palangka Raya, 14. 7. 2005, leg. Mazzoldi (CMB).

Description

Habitus: body oblong-oval, attenuated on the apex, globular (fig. 2).

Size: total length of body: 2.40 mm, length of body without head: 2.20 mm, width: 1.50 mm.

Head: ferrugineous, paler on anterior part; clypeus distinctly bordered; finely and regularly punctured, some stronger punctures alongside the eyes; finely microreticulate, missing only posteriorly. Antennae testaceous, long and slender.

Pronotum: pale ferrugineous, indistinctly darker along the anterior and the posterior margin; lateral margins finely bordered, lateral sides almost straight; punctures moderately coarse and moderately dense, less dense on central part; microreticulation missing.

Elytra: ferrugineous, slightly paler at the apex; a distinct longitudinal notch along the lateral side; punctures regular, dense and moderately fine; longitudinal rows of punctures rudimentary; without microreticulation, shiny. Epipleura pale ferrugineous, very densely and finely punctured.

Ventral side: head and pronotum testaceous, metasternum and metacoxae ferrugineous, abdomen rufo-testaceous; punctures on head and pronotum superficial, punctures on metasternum and metacoxae moderately coarse and moderately dense, few very coarse punctures on the medial part of metasternum (fig. 10), punctures on abdomen very fine and dense; without microreticulation; prosternal process in lateral view smooth, in ventral view moderately broad, rounded at apex, apex reaching metasternum, lateral beads of process fine; distance between mesocoxal cavities broad; metasternal wings

medially narrow; metacoxae with deep wrinkles; lateral lobe of metacoxal process reduced, not covering base of trochanter.

Legs: rufo-testaceous; metatibial spurs not modified, almost straight and slender.

Male: penis (fig. 5a, b); parameres (fig. 5c); first segments of pro- and mesotarsi moderately enlarged; antennae not modified; long hair-tufts on all sides of prosternal process; mesotrochanter with long hair-tufts and mesofemur with short hair-tufts at posterior edge; metatarsi not modified.

Female: dorsal side as in male, sclerotized spermatheca not found.

Diagnosis

A. ciampori is related to *A. barong* having in common coarse punctures on the medial part of metasternum (HENDRICH & BALKE 1995, p. 41, fig. 24) which are also present in *A. paulbrowni* and *A. taiwanus*. From *A. paulbrowni* *A. ciampori* can be distinguished in the male sex by the shiny dorsal side, the distinct longitudinal notch along the lateral side of elytra, the missing extreme long hair-tufts on metatarsi, the antennae not modified and the genitalia. From *A. taiwanus* *A. ciampori* can be distinguished by larger size, more globular habitus, coarser punctures on elytra and the genitalia. *A. ciampori* resembles *A. densus* in habitus but can be distinguished by shiny dorsal side, coarser punctures on elytra and coarse punctures on medial part of metasternum.

Etymology: This species is dedicated to Dr. Fedor Ciampor, Bratislava, Slovakia, co-discoverer of this species and expert in water beetle systematics.

Biology: The type specimen has been collected in the Sabalangan river most probably within roots near the river banks. The river is about 7 m wide and in average 0.5 m deep, partly shaded, flowing through primary forest.

Distribution: Borneo (Malaysia, Sabah and Indonesia, Kalimantan).

Agnoshydrus taiwanus sp.n.

Type locality: Taiwan, Gauyaur

Holotype ♂ (NMW): "Gauyaur, Fuhsing, Taoyuan Hsien \ TAIWAN, E121°16'15", N24°47'45", 400m \ 1993-09-09 (A), S. C. Kang". Paratype: 1 ♀ with same data as the holotype (CWT).

Description

Habitus: body regularly oblong-oval, moderately globular (fig. 3).

Size: total length of body: 2.10 mm, length of body without head: 1.93 mm, width: 1.33 mm.

Head: testaceous; clypeus not bordered; superficially and irregularly punctured, some stronger punctures alongside the eyes; completely but finely microreticulate. Antennae testaceous, long and slender.

Pronotum: testaceous, indistinctly darker along the anterior margin on central part and along posterior margin; lateral margins finely bordered, lateral sides slightly but regularly rounded; punctures regular, moderately dense and fine, some coarser punctures along the anterior margin; microreticulation limited to lateral parts.

Elytra: rufo-testaceous, paler at the posterior third; punctures regular, dense and very fine; longitudinal rows of punctures fine; without microreticulation, shiny. Epipleura ferrugineous, very densely and finely punctured.

Ventral side: head, pronotum and abdomen testaceous, metasternum and metacoxae rufo-testaceous; punctures on head and pronotum superficial, punctures on metasternum and metacoxae moderately coarse and moderately dense, few coarse punctures on medial part of metasternum (fig. 11), punctures on abdomen very fine and dense; without microreticulation; prosternal process in lateral view smooth, in ventral view moderately broad, rounded at apex, apex reaching metasternum, lateral beads of process moderately broad; distance between mesocoxal cavities broad; metasternal wings medially moderately broad; metacoxae smooth without wrinkles; lateral lobe of metacoxal process reduced, not covering base of trochanter.

Legs: rufo-testaceous; metatibial spurs not modified, almost straight and slender.

Male: penis (fig. 6a, b); parameres (fig. 6c); first segments of pro- and mesotarsi minimally enlarged; metatrochanter and metafemur without hair-tufts along the posterior edge.

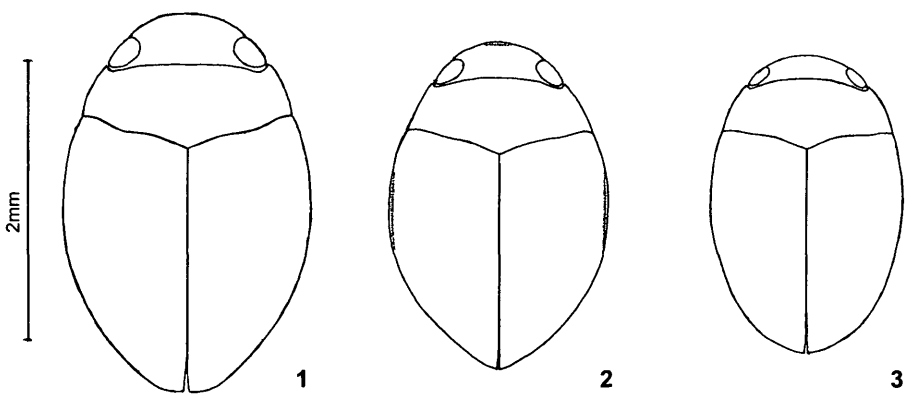
Female: dorsal and ventral side as in male, sclerotized spermatheca not found.

Diagnosis: *A. taiwanus* is similar to *A. barong* in size, coloration and punctuation including the coarse punctures on metasternum but habitus is broader and shape of aedeagus and parameres (penis and parameres of *A. barong*: fig. 7a, b, c) is different. *A. taiwanus* also resembles *A. paulbrowni* and *A. ciampori* by having coarse punctures on metasternum but is smaller and has finer punctures on elytra. From *A. densus*, *A. confusus* and *A. schillhammeri* *A. taiwanus* can be separated by the less globular habitus and the coarse punctures on metasternum.

Etymology: This species seems to be endemic to Taiwan.

Biology: unknown.

Distribution: Taiwan.



Figs. 1 - 3: body outlines of: 1) *A. paulbrowni*, 2) *A. ciampori* and 3) *A. taiwanus*.

Discussion

A. laccophiloides, *A. densus*, *A. confusus* and *A. schillhammeri* are forming a very homogenous group of species distributed in Southeast Asia having in common penis with apex dorsoventrally flattened and distinctly curved, quite broad characteristic parameres

and medial part of metasternum missing coarse punctures. The transfer of *Allopachria barong* having different form of penis and parameres (Fig. 7) and coarse punctures on medial part of metasternum to the genus *Agnoshydrus* (WEWALKA 2000) reduced the main common characters of this genus to (i) body shape globular, (ii) body dorsally covered with very fine, dense evenly distributed punctuation, (iii) prosternal process not dentate (iv) lateral lobe of metacoxal process reduced, not covering base of trochanter and (v) penis with apex not bifurcate. The three new species together with *Allopachria barong* are forming a less homogenous group so far distributed in Taiwan, Borneo and Bali having in common few coarse punctures on medial part of metasternum. In future DNA sequence analysis could help to understand the phylogeny of the genus *Agnoshydrus* and related genera.

Key to species of *Agnoshydrus*

1 Medial part of metasternum with coarse punctures and smooth areas in between (fig. 9, 10, 11 and HENDRICH & BALKE 1995, p. 41, fig. 24) 2
- Medial part of metasternum with dense and regular punctuation 5
2 Clypeus distinctly bordered; with a distinct longitudinal notch along the lateral side of elytra; size: 2.40 mm; species from Borneo ..... *A. ciampori*
- Clypeus not bordered; without a distinct longitudinal notch along the lateral side of elytra 3
3 Larger species; size: 2.30 - 2.70 mm; species from Borneo ..... *A. paulbrowni*
- Smaller species; size: 1.90 - 2.10 mm 4
4 Body regularly oblong-oval, size: 2.10 mm; species from Taiwan .... *A. taiwanus*
- Body oblong-oval, elytra distinctly attenuated apically; size: 1.90 - 2.00 mm; species from Bali ..... *A. barong*
5 Metatibial spurs modified, short and broad, size: 2.36 mm; species from Myanmar ..... *A. laccophiloides*
- Metatibial spurs not modified 6
6 Head and pronotum almost black, body form narrower; size: 2.20 – 2.30 mm; species from South Laos ..... *A. confusus*
- Head and pronotum pale ferrugineous, body form globular 7
7 penis in dorsal view regularly attenuated to apex; size: 2.25 – 2.30 mm; species from South Vietnam ..... *A. schillhammeri*
- Apex of penis in dorsal view shovel-like; size: 2.25 – 2.30 mm; species from Laos and Thailand ..... *A. densus*

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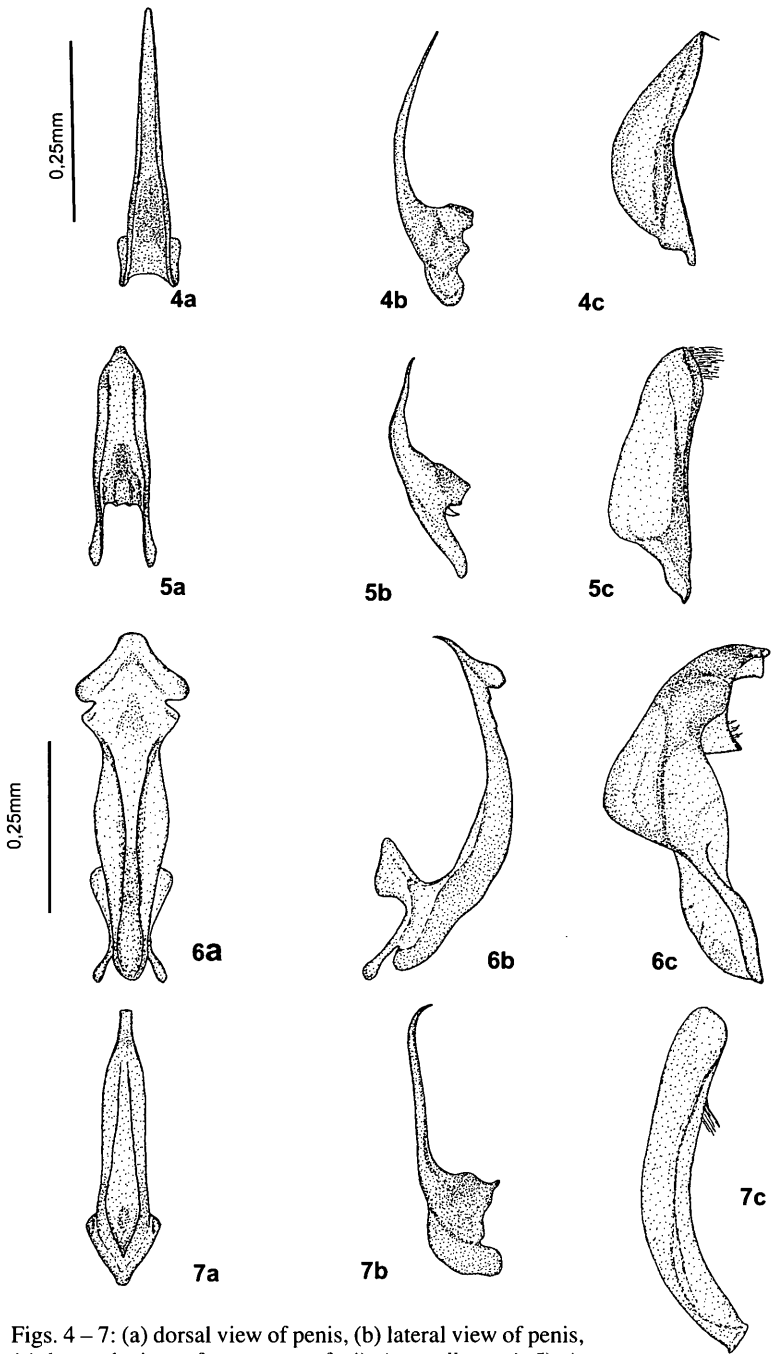


Figs. 4 – 7: (a) dorsal view of penis, (b) lateral view of penis, (c) latereal view of paramere of: 4) *A. paulbrowni*, 5) *A. ciampori* 6) *A. taiwanus* and 7) *A. barong*.

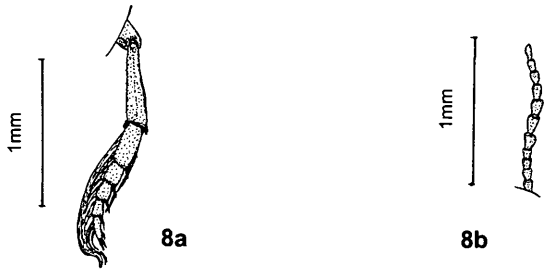
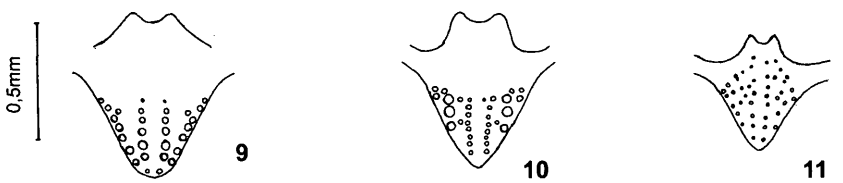


Fig. 8: (a) right hind leg, (b) left antenna of *A. paulbrowni*.



Figs. 9 - 11: medial part of metasternum: 9) *A. paulbrowni*, 10) *A. ciampori* and 11) *A. taiwanus*

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