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The genus *Neptosternus* SHARP 1882 in the Philippines: Taxonomy and Biogeography (Coleoptera: Dytiscidae)

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Abstract: Two new species of rheobiont diving beetle are here described from the Philippines: *Neptosternus cebuensis* sp.n. [Cebu] and *N. montalbanensis* sp.n. [Luzon]. Together with *N. hydaticoides* (RÉGIMBART 1877), a total of three *Neptosternus* species are now known from the Philippines. *Neptosternus cebuensis* sp.n. is a rather distinct species, while *N. montalbanensis* sp.n. appears close to *N. chumphon* BALKE & HENDRICH 1998 [Thailand]. The distribution of *Neptosternus* species in the Philippines is illustrated here, and we briefly outline biogeographical patterns in southeast Asian *Neptosternus*.

Key words: Coleoptera, Dytiscidae, *Neptosternus*, new species, Philippines, Biogeography.

Introduction

Species of the laccophiline genus *Neptosternus* SHARP 1882 are confined to the Afrotropical and Oriental regions. The genus currently comprises 84 species. Southeast Asian representatives were most recently revised by HENDRICH & BALKE (1997). The fauna of that region had to be updated soon afterwards, again indicating the remarkable species diversity of *Neptosternus* (BALKE et al. 1997; BALKE & HENDRICH 1998; this paper). 56 species in total are now known from SE Asia.

The present paper is in part based on historical material which was collected in the Philippines at the beginning of the last century and sold by the insect traders Bang Haas & Staudinger (Dresden, Germany) to the French coleopterist Raymond Peschet [1880-1940]. Recently, several specimens were collected on various islands of the Philippines by Dr Herbert Zettel (NMW, Austria) and Dr. Jan Kodada (Bratislava, Slovak Republic). The beetles collected by H. Zettel are the result of fieldwork conducted in the course of the Philippine water bug project (see: Annalen des Naturhistorischen Museum Wien 101B: 33-161 [several authors]).

Besides *Neptosternus hydaticoides* (RÉGIMBART 1877), we recognized two undescribed species among the material studied. Here, we describe these new species, rising the number of known Philippine *Neptosternus* species to three.

Material and Methods

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

CBH..... Collection Michael Balke and Lars Hendrich, Berlin, Germany

CHZ.....Collection Herbert Zettel, Vienna, Austria

LBMH.....Museum of Natural History, University of the Philippines, Los Banos, Philippines

MNHN..... Muséum National d'Histoire Naturelle, Paris, France

NMW..... Naturhistorisches Museum Wien, Austria

ZSM..... Zoologische Staatssammlung München, Germany

Habitus drawings were made with a drawing tube attached to a Leitz MZ12, the median lobes were traced from SEMs. The style of the descriptive notes follows HENDRICH & BALKE (1995), BALKE et al. (1997), BALKE & HENDRICH (1998), and HENDRICH & BALKE (1999).

Taxonomy

The genus *Neptosternus* SHARP is characterized by two apomorphies: Prosternal process trifid (plesiomorphic character state: simple, with only one tip); and posterior angle of pronotum greatly produced backwards, needle-shaped and acute (plesiomorphic character state: not produced backwards, rounded).

The following three species are now known from the Philippines (Fig. 9):

<i>N. cebuensis</i> sp.n.	Philippines: Cebu
<i>N. hydaticides</i> (RÉGIMBART 1877)	South East Asia, Philippines
<i>N. montalbanensis</i> sp.n.	Philippines: Luzon

Neptosternus cebuensis sp. n.

Holotype: ♂: "Philippinen: Cebu, S Badian / Matutinao, Kawasan Falls / 250m, 23.-24.2.1997 / leg. H. Zettel (116)" (LBMH). 1 ♀ Paratype with same locality data (CHZ).

Etymology: Named after the type locality.

Description: Measurements (N = 2). Total length of holotype 3,20 mm; length without head 2,85 mm; greatest width of beetle 1,75 mm. Total length of paratype 3,20 mm; length without head 2,80 mm; greatest width of beetle 1,70 mm.

Diagnosis: Small, somewhat broadly-elongate species with broad yellow subbasal band on elytron and an anteriorly and posteriorly darkened pronotum; body slightly arched in lateral view. Elytron with fine punctation only, lacking large discal punctures.

Colour: Upper side dark with large yellow patches. Head ferruginous; anteriorly ferruginous or darker, castaneous. Pronotum medially yellowish; anteriorly and posteriorly dark, blackish. Elytron blackish with two major yellow areas: a broad subbasal band; and a median-submarginal patch that is marginally fused with the apical patch (Fig. 1). Subbasal band and median-submarginal patch both reaching the margin of the elytron. On the holotype, a small, indistinct reddish patch is visible medio-discally but only on the

left elytron (Fig. 1). Median-submarginal patch small in the paratype. Venter yellowish to castaneous brown, epipleuron yellowish anteriorly; appendages yellowish to ferruginous.

Sculpture: Head covered with polygonal meshes, medially with dense but fine punctation. Pronotum with dense but fine punctation, some larger punctures visible basomedially; along anterior margin and laterally with microreticulation of polygonal meshes. Elytron with microreticulation consisting of slightly transversely orientated polygonal meshes; fine and densely punctate; the discal row of serial punctures comparably dense and well defined, 1st and 2nd lateral rows less distinct, sutural row not present.

Male: Median lobe of aedeagus as in Fig. 5.

Affinities: *Neptosternus cebuensis* sp.n. resembles *N. biltoni* HENDRICH & BALKE 1997 [Indonesia: C. Sulawesi, Togian Islands]; the pronotum is brighter medially however in *N. cebuensis*, and the shape of the median lobe of the aedeagus is differently shaped (see HENDRICH & BALKE 1997).

Distribution: Philippines: Cebu. Only known from the type locality (Fig. 9).

Habitat: Collected from the edge of a small stream which usually has a strong current. The beetles were collected during a drought when the stream was wadeable.

Neptosternus hydaticoides (RÉGIMBART 1877)

Laccophilus hydaticoides RÉGIMBART 1877: 359.

Neptosternus hydaticoides (RÉGIMBART): RÉGIMBART 1899: 270; HENDRICH & BALKE 1997: 57-58, and references therein.

Holotype: ♂: "[Philippinen] Manille, Baer" (MNHN) (studied by HENDRICH & BALKE 1997).

Additional material examined: 1 ex.: Philippines: Negros, Lousiana, Banks leg. [probably mislabeled, the only locality in the Philippines named "Luisiana" is situated on Luzon] (ZSM); 1 ex.: Mindanao, Surigao, Baker leg. (ZSM); 3 ex.: Mindanao, Misambis occ., W Ozamiz, Tanguib, Lumban, 6.iii.1997, H. Zettel leg. (124); 2 ex.: Mindanao, Zamboanga d.S., 14 km N Pagadian, Datagan, Kendis cave, 10.iii.1997, H. Zettel leg. (127); 7 ex.: Luzon, Montalba, Coll. Peschet (MNHN); 4 ex.: Mindoro, 28 km S Calapan, Balete (18), 100-700m, 27.-29.11.1992, H. Zettel leg. (CBH, NMW); 4 ex.: Ticao Island, Monreal, real, Matang Tubig spring, 28.2.1998, H. Zettel leg. (151) (NMW); 1 ex.: Palawan, 9 km W P. Princess Iwahig, 7.-8.4.1994, Zettel leg. (CBH, NMW); 4 ex.: C-Palawan, Umg. Cabanyugan, 100 m 2.12.1995, J. Kodada leg. (CBH, NMW); 2 ex.: Zambales, Olongapo, Subic Base, JEST (Jungle Surv.), 4.xii.1993, H. Zettel leg. (37h).

Description: Measurements (N = 5). Total length of beetle 3,25-3,30 mm; length without head 3,00-3,10 mm; greatest width of beetle 1,75-1,85 mm.

Diagnosis: Medium-sized, elongate species, usually with five yellow patches on elytron and an anteriorly and posteriorly darkened pronotum; body slightly arched in lateral view. Elytron with fine punctation only, lacking large discal punctures.

Colour: Upper side comparably dark; head yellowish or red, blackish or only slightly darkened anteriorly. Pronotum anteriorly and posteriorly dark, ferruginous medially; elytron black with five yellow patches: two subbasal, two median, one apical (Fig. 2). The subbasal ones sometimes fuse and produce a subbasal band; the subbasal-submarginal patch reaches the margin of the elytron; the median-submarginal one is not in touch with lateral margin of elytron. Venter yellowish-ferruginous, epipleuron yellowish anteriorly and ferruginous medially; appendages yellowish to ferruginous.

Sculpture: Head covered with polygonal meshes, medially densely punctate. Pronotum densely punctate, some larger punctures visible basomedially; along anterior margin and laterally with microreticulation of polygonal meshes. Elytron with microreticulation consisting of slightly transversely orientated polygonal meshes; fine and densely punctate; the discal row of serial punctures comparably dense and well defined, 1st and 2nd lateral rows less distinct, an obsolescent sutural row visible.

Male: Median lobe of aedeagus as in Fig. 6.

Affinities: In colour rather strongly resembling *N. moelleri* HENDRICH & BALKE 1997 and *N. pseudohydaticoides* HENDRICH & BALKE 1997 from Sulawesi. From both it can be distinguished by its size and median lobe.

Distribution: *Neptosternus hydaticoides*, as currently defined, is the most widespread species of the genus in SE Asia. It is distributed through the following countries: Indonesia [Lombok, Bali, Java, Sumatra], West Malaysia, Thailand, Vietnam, China [Hongkong, Guangxi], Taiwan and the Philippines, where the type material was also collected (Fig. 9).

Habitat: The specimens from Palawan collected by Jan Kodada were obtained from a primary rainforest stream. Herbert Zettel collected specimens from vegetation at the edge of streams. In other SE Asian countries [e.g. West Malaysia: Pahang Province; Indonesia: Bali] *N. hydaticoides* is a common species and inhabits different stream and river types, in open pasture land as well as in forested areas, even in slightly polluted situations (HENDRICH & BALKE 1995).

Neptosternus montalbanensis sp. n.

Holotype: ♂: "Montalba[sic!] Philippin.", "Staudinger Bang Haas", "Museum Paris 1945 Coll. R. Peschet" (MNHN).

Etymology: Named after the type locality Montalba [Montalba], situated a few kilometres northeast of Manila (Luzon, Philippines).

Description: Measurements (N = 1). Total length of holotype 3,00 mm; length without head 2,75 mm; greatest width of beetle 1,70 mm.

Diagnosis: Small, somewhat broadly-elongate species with narrow subbasal band on elytron; body arched in lateral view. Elytron with fine punctation only, lacking large discal punctures.

Colour: Upper side comparably dark; head ferruginous. Pronotum ferruginous anteriorly and medially; slightly darker posteriorly. Elytron blackish with two yellow areas: a subbasal band; and a median-submarginal patch that is marginally fused with the apical patch (Fig. 3). Subbasal band and median-submarginal patch both reaching the margin of the elytron. Venter yellowish to castaneous brown, epipleuron yellowish anteriorly; appendages yellowish to ferruginous.

Sculpture: Head covered with polygonal meshes, medially with dense but fine punctation. Pronotum with dense but fine punctation, some larger punctures visible basomedially; along anterior margin and laterally with microreticulation of polygonal meshes. Elytron with microreticulation consisting of slightly transversely orientated polygonal meshes; fine and densely punctate; the discal row of serial punctures comparably dense and well defined, 1st and 2nd lateral rows less distinct, sutural row not present.

Male: Median lobe of aedeagus as in Fig. 7.

Affinities: *Neptosternus montalbanensis* sp.n. resembles *N. chumphon* BALKE & HENDRICH 1998 from Thailand (Figs 3, 4). However the latter species is smaller, more elongate and the body is only slightly arched in lateral view. The yellow patches on the elytra are more expanded. Furthermore the median lobe (Fig. 7) shorter than in *N. chumphon* (Fig. 8).

Distribution: Philippines: Luzon. Only known from the type locality (Fig. 9).

Habitat: Unknown. Most probably rheobiont, like other known species of the genus (e.g. HENDRICH & BALKE 1995).

A note on Biogeography

We have here mapped the currently known distribution of (S)E Asian *Neptosternus* (Fig. 9). Only one species of the genus occurs in Taiwan, which is not surprising, as this island appears to be the northern range limit of the Afrotropical-Oriental genus. In the Wallacea, the genus reaches as far east as Flores (only *N. hydatioides*) and Sulawesi (10 species). The genus is not yet known to occur in the Moluccas.

Neptosternus is rather speciose in SE Asia. There are 20 known species in mainland SE Asia, with a good part of these occurring in Vietnam (HENDRICH & BALKE 1997; BALKE et al. 1997). Nineteen species are known from Borneo, ten from Sulawesi and seven from the Sunda Arc islands. No or only one species are shared by two or more of these areas of endemism (Fig. 9, lines and "0" or "1" between the areas).

This highlights the paucity of *Neptosternus* species on the Philippines, from where only three species are known. However, we suggest that it is still too early to speculate on the reasons for this enigmatic "lack" of species diversity. Rather, the Southern parts of the Philippines especially should be intensively searched for additional species, before the forests of even vaster areas are destroyed – taking their peculiar water beetle species with them.

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Zusammenfassung

In der vorliegenden Arbeit werden zwei rheophile Schwimmkäferarten der Gattung *Neptosternus* von den Philippinen beschrieben: *N. cebuensis* von der Insel Cebu und *N. montalbanensis* aus der Umgebung von Manila [Luzon]. Zusammen mit *N. hydatioides* sind damit drei Arten aus der Gattung von den Philippinen gemeldet. *Neptosternus cebuensis* ist dem *N. biltoni* aus Sulawesi sehr ähnlich, *N. montalbanensis* steht dem *N.*

chumphon aus Thailand sehr nahe. Die Diversität und die Verbreitung der Gattung auf den Philippinen werden dokumentiert und diskutiert, und anderen Regionen Südasiens vergleichend gegenübergestellt.

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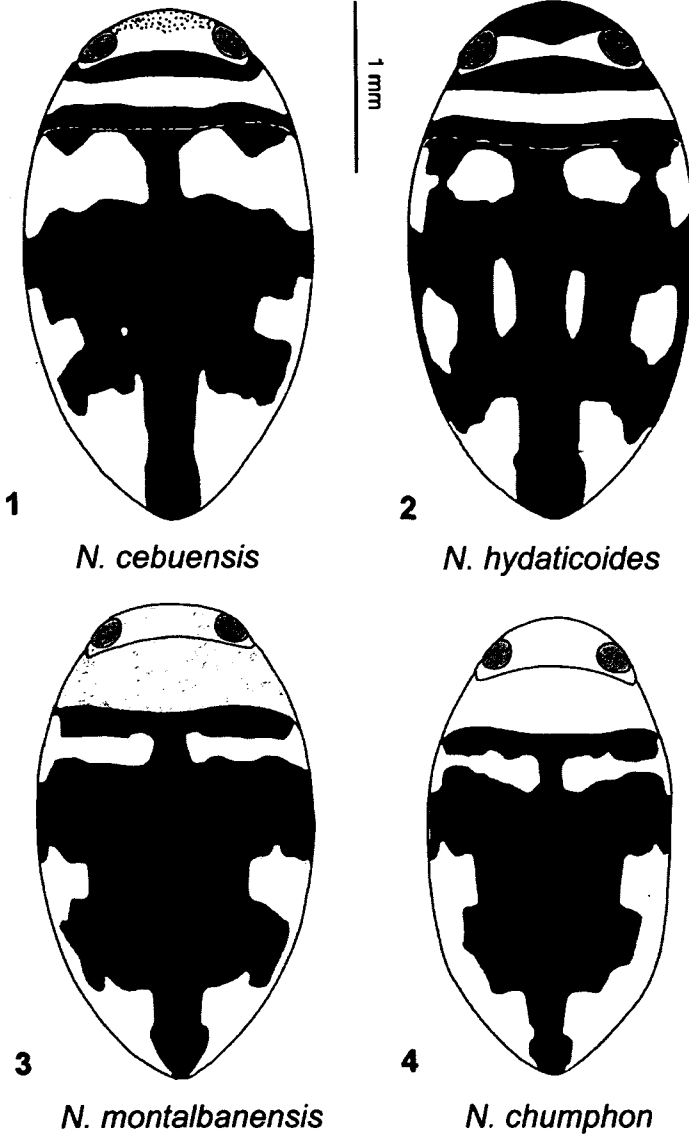
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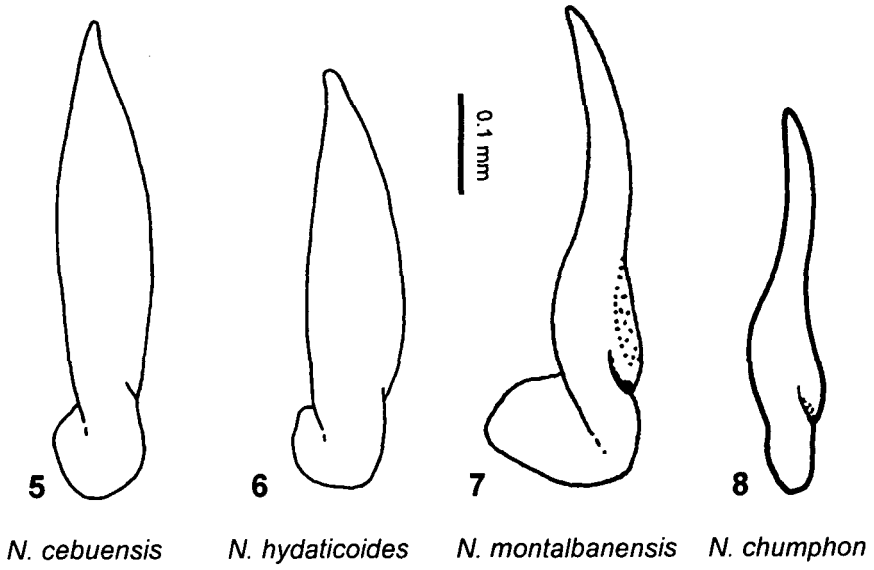
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Figs. 1-4 - Habitus and coloration of *Neptosternus* spp.



Figs. 5-8 - Median lobe of aedeagus (ventral view) of *Neptosternus* spp.

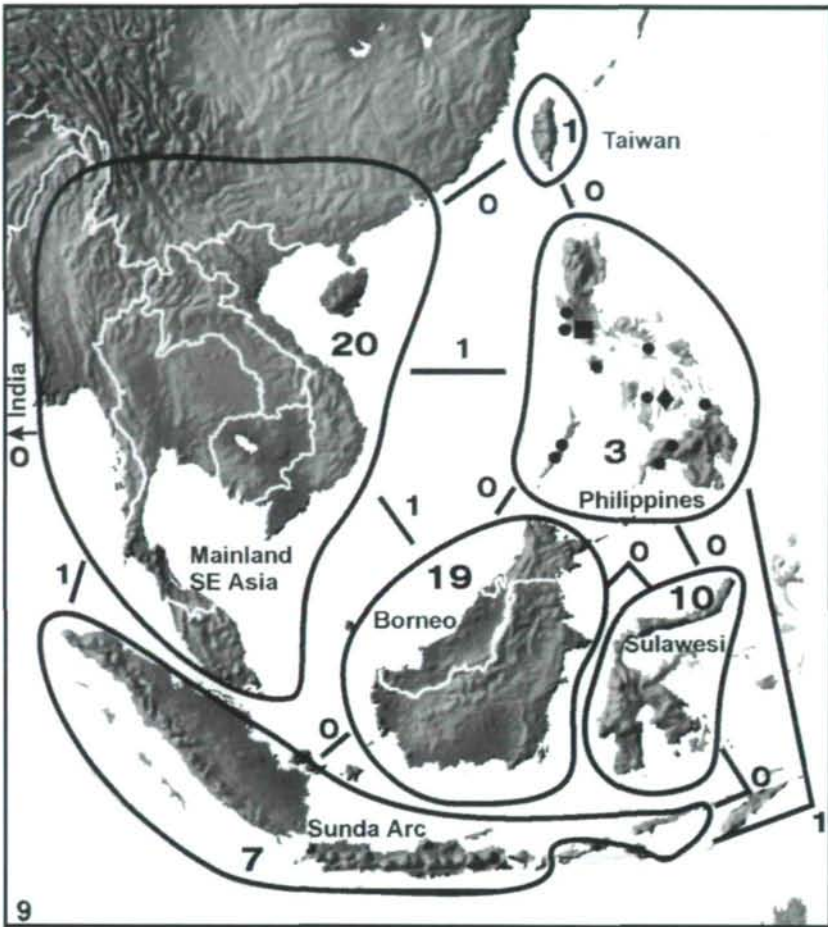


Fig. 9 – SE Asian *Neptosternus* spp., areas of endemism, species numbers, and faunal overlap between the areas (lines, "0", "1" = no or only one species shared); and distribution of *Neptosternus* in the Philippines: black dots = *N. hydatioides*; black square = *N. montalbanensis*; black diamond = *N. cebuensis*.