

## The Hydrophiloid beetles of Socotra Island (Coleoptera: Georissidae, Hydrophilidae)

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**Abstract.** The hydrophiloid beetles (Georissidae, Hydrophilidae) of Socotra Island (Yemen) are reviewed based mainly on the material collected during the Czech expeditions undertaken between 2000 and 2012. A total of 16 species are recorded, three of which are newly described herein: *Georissus (Neogeorissus) maritimus* sp. nov., *G. (N.) nemo* sp. nov. (Georissidae) and *Hemisphaera socotrana* sp. nov. (Hydrophilidae). Seven species are recorded from Socotra Island for the first time: *Georissus (Neogeorissus)* sp., *Berosus corrugatus* Régimbart, 1906, *Laccobius eximius* Kuwert, 1890, *L. minor* (Wollaston, 1867), *L. praecipuus* Kuwert, 1890, *Enochrus nitidulus* (Kuwert, 1888), and *Sternolophus unicolor* Laporte de Castelnau, 1840. The previously published Socotran record of *Sternolophus decens* Zaitzev, 1909 is considered as misidentification. The Socotran hydrophiloid fauna is found to consist mostly of widely distributed African, Arabian/Near Eastern, Oriental and cosmopolitan species. The three newly described species may be considered as endemic to Socotra, but two of them seem to have close relatives in Africa and southern India. Notes on the remaining described species of the genus *Hemisphaera* Pandellé, 1876 are also included.

**Key words.** Hydrophiloidea, Hydrophilidae, Georissidae, *Georissus*, *Hemisphaera*, new species, new records, Socotra, Yemen

### Introduction

The fauna of hydrophiloid beetles of the Arabian Peninsula was studied in detail within the last two decades (e.g., HEBAUER 1994, 1997; GENTILI 1989; FIKÁČEK 2009a,b; FIKÁČEK & TRÁVNÍČEK 2009; FIKÁČEK et al. 2010). In spite of that, the fauna of the island of Socotra

(Yemen) remained virtually unknown until now, even though the island is known for its high proportion of endemic taxa of plants and animals (including insects), and its geological and climatic history makes it an interesting place for studies on biogeography and evolution (see BATELKA (2012) for a summary of the geological history, climate and biodiversity of Socotra archipelago). The only published records are those mentioned by GAHAN (1903) and WRANIK (2003), reporting in total eight species of the family Hydrophilidae (including a representative of *Laccobius* Erichson, 1837 not identified to species). Possibly, the absence of any other studies was caused by the scarcity of material available from the island or by the island's geographic position as it is in fact situated closer to Africa than to the Arabian Peninsula.

The recent series of expeditions of Czech entomologists to Socotra Island undertaken between 2000–2012 have yielded rather numerous material of hydrophiloid beetles, including three species of the family Georissidae not previously recorded from the island, and 13 species of Hydrophilidae including one endemic species new to science. Results of the study of this material are summarized in this contribution.

### Material and methods

The holotypes and a number of other specimens were dissected; male genitalia were mounted either in alcohol-soluble Euparal resin (on small pieces of glass attached below the specimen) or in water-soluble dimethyl hydantoin resin (on transparent plastic labels attached below the specimen). Genitalia were examined using an Olympus BX41 compound microscope which was also used for taking the photographs. SEM micrographs of the paratypes of all new species were taken using a Hitachi S-3700N environmental electron microscope at the Department of Paleontology, National Museum in Prague. Habitus photographs were taken using a Canon MP-E 65 mm macro lens attached to a Canon EOS 550D camera and stacked from multiple layers using Helicon Focus 5.1 Pro software. Drawings were traced from photographs or drawn using a drawing tube attached to the above compound microscope. Satellite views (Figs. 20, 22) were downloaded from GoogleEarth web application.

Morphological terminology follows KOMAREK (2004) and LAWRENCE et al. (2010), with an exception of using 'trichobothria' instead of 'systematic punctures' sensu HANSEN (1991) (see FIKÁČEK et al. (2012) for detailed discussion). Taxonomy and nomenclature follows HANSEN (1999) and SHORT & FIKÁČEK (2011). The specimens examined for this study are deposited in the following collections:

BMNH	Natural History Museum, London, UK (M. Barclay);
CDMS	University of Murcia, Murcia, Spain (J. Delgado);
CULS	Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague, Czech Republic (J. Farkač);
IRSNB	Institut Royal des Sciences Naturelles, Bruxelles, Belgium (P. Limbourg, A. Drumont);
JBCP	Jan Batelka private collection, Prague, Czech Republic;
KSEM	Natural History Museum, University of Kansas, Lawrence, Kansas, USA (A. Short);
MSNV	Museo Civico di Storia Naturale, Verona, Italy (L. Latella);
NHMW	Naturhistorisches Museum, Wien, Austria (A. Komarek, M. A. Jäch);
NMPC	National Museum, Prague, Czech Republic (M. Fikáček, J. Hájek);
PLCL	Pietro Lo Cascio private collection, Lipari (Messina), Italy.

## Taxonomy

### GEORISSIDAE

#### *Georissus* (*Neogeorissus*) *maritimus* sp. nov.

(Figs. 1–7, 15–16, 19–20)

**Type locality.** Yemen, Socotra Island, ca. 3 km NE of Shuab, 12°34.1'N 53°23.9'E, 3 m a.s.l.

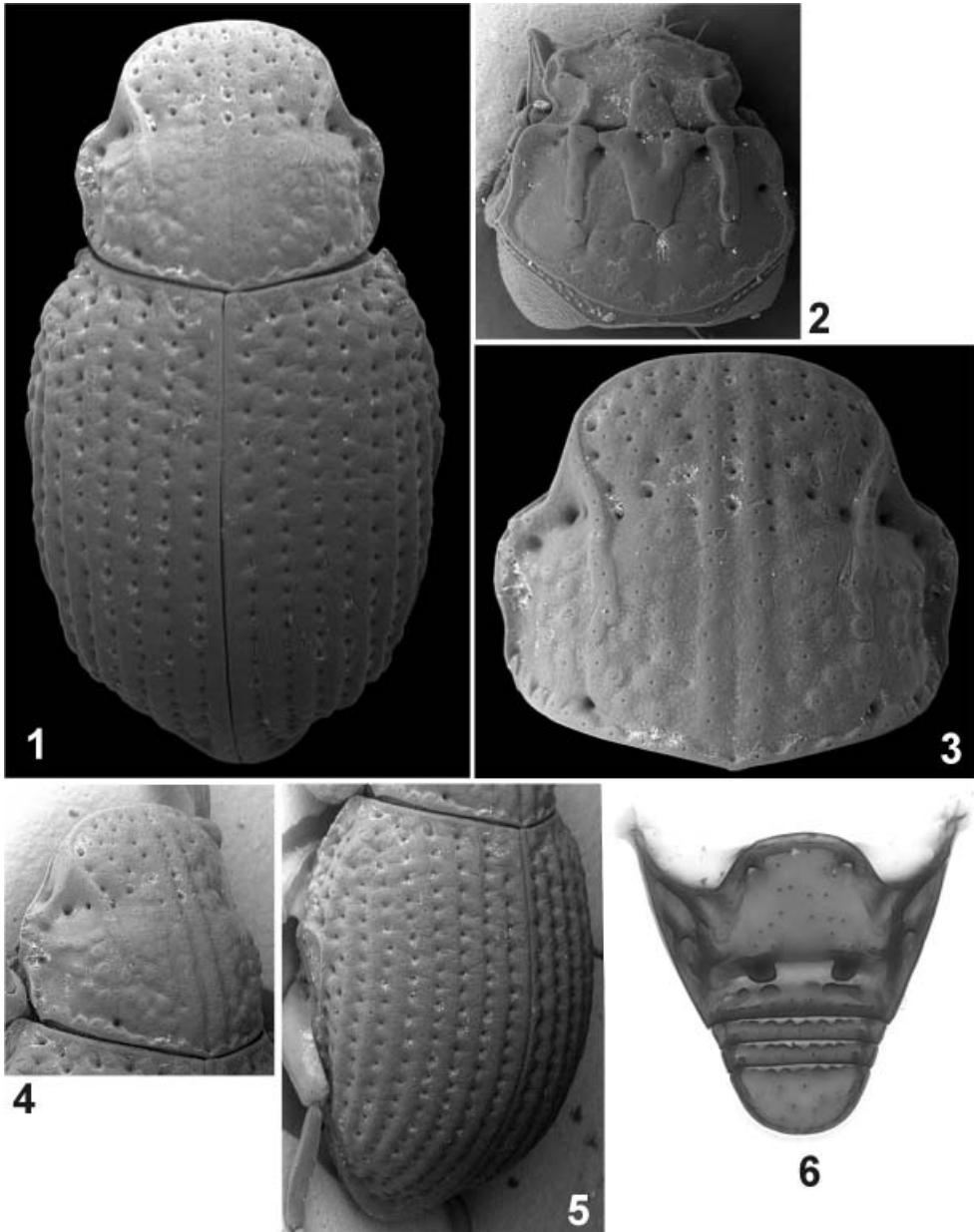
**Type material.** HOLOTYPE: ♂ (NMPC): 'YEMEN: Socotra island / ca. 3 km NE of Shuab / mangrove, *Avicennia marina* / 12°34.1'N 53°23.9'E; 3 m a.s.l. / saline, 20–21.vi.2012 // Socotra Expedition 2012 / J. Bezděk, J. Hájek, V. Hula, / P. Kment, I. Malenovský, / J. Niedobová & L. Purchart leg.'. PARATYPES: 4 ♂♂, 1 ♀, 41 spec. (BMNH, IRSNB, NHMW, NMPC, KSEM, 5 spec. in DNA grade kept in NMPC): same label data as the holotype.

**Description.** Body narrowly elongate, weakly convex in lateral view. Body length 1.20–1.60 mm (holotype 1.40 mm), width of head 0.30–0.40 mm (holotype 0.35 mm), maximum width of pronotum 0.45–0.60 mm (holotype 0.55 mm), maximum width of elytra 0.65–0.85 mm (holotype 0.75 mm). Coloration of elytra brown to piceous, pronotum dark brown with paler anterior portion, head piceous to black.

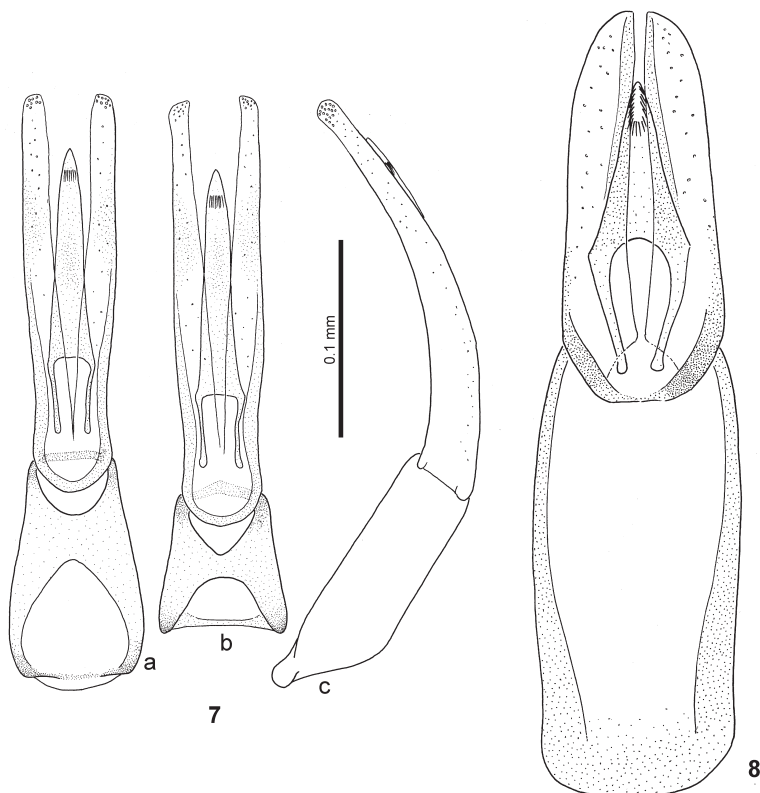
Head (Fig. 2). Clypeus weakly convex, with few weakly developed granules anteromedially, anterior margin with elevated bead without distinct granules; each side of clypeus with deep pit anterolaterally; lateral portion of clypeus posteriorly divided from mesal portion by high ridge without granules, ridges bent laterad and bearing more or less distinct granules more anteriorly. Frons elevated above clypeus, bearing large elongate rhomboid plate mesally reaching to posterior part of frons; laterally of mesal plate with high and wide ridge on each side; posterior part of median rhomboid and longitudinal ridges connected by group or large and low granules posteriorly; frons with two pairs of deep pits, one situated anteromesally, second laterally. Clypeus and median portion of frons with weak mesh-like microsculpture. Antennal club with three antennomeres.

Prothorax (Figs. 3–4). Pronotum 1.15× as wide as long, with maximum width at midlength; lateral portions rounded, without distinct projections. Median portion with two closely situated submedian ridges throughout, delimiting shallow median groove; each lateral lobe divided from mesal portion by longitudinal ridge falling into separate granules posteriorly. Anterior half of pronotum without granules, only bearing small pits intermixed with sparsely arranged punctures. Posterior half of pronotum without distinct bulges, with sparsely arranged large but low granules throughout the surface. Pronotum with two pairs of deep pits, one anteriorly and the other posteriorly of lateral lobe. Whole surface between granules with weak mesh-like microsculpture. Ventral portion of prothorax with extremely large antennal grooves, otherwise corresponding with *G. crenulatus* (Rossi, 1794).

Mesothorax. Elytra (Figs. 1, 5) combined 1.25× as long as wide, 1.75× as long as pronotum; base of elytra ca. as wide as maximum width of pronotum, maximum width of elytra in anterior third, then weakly narrowing posteriad to posterior fifth, apex strongly narrowed. Elytra completely devoid of granules, interstices without microsculpture. Elytral suture and intervals 1–7 evenly convex, interval 8 reduced, interval 9 slightly elevated; lateral portion with suboval depression at anterior third across intervals 8–9; all intervals more convex posteriorly than anteriorly. Elytral series 1–11 regular, serial punctures small but sharply impressed.



Figs. 1–6. *Georissus maritimus* sp. nov. (paratypes). 1 – pronotum and elytra in dorsal view; 2 – head, dorsal view; 3–4 – detail of pronotum (3 – dorsal view; 4 – dorsolateral view); 5 – elytron, dorsolateral view; 6 – abdomen.



Figs. 7–8. Genitalia of Socotran endemic *Georissus* species. 7 – *G. maritimus* sp. nov. (a, b: two different ventral views of the same aedeagus; c: lateral view); 8 – *G. nemo* sp. nov., ventral view.

Lateral-most portion of elytron declined, hence elytra laterally without clear projections. Median pentagonal protuberance of mesoventrite flat, with distinct pits.

Metathorax. Metaventricle ca.  $1.2\times$  as long as mesoventrite, flat, with few scattered indistinct granules along posterior margin and four deep pits along anterior margin; lateral portions divided from mesal part by longitudinal ridges. Metathoracic wings absent in specimens examined for this character ( $n=5$ ).

Abdomen (Fig. 6) gradually narrowing posteriad. Ventrite 1 flat mesally, with lateral portion declines and divided by ridge; median portion with sparsely arranged punctures, without granules; posterior margin of ventrite 1 with pair of large tubercles facing enlarged granules of ventrite 2. Ventrites 3–4 with weakly developed granules along anterior margin.

Male genitalia (Fig. 7). Aedeagus 0.35–0.45 mm long. Parameres  $1.6\times$  as long as phallobase, their combined width narrower than maximum width of phallobase; parameres nearly parallel-sided throughout except subbasally, subbasally slightly constricted; apex rounded at outer margin, bluntly pointed mesally; apex with numerous large pores, ventral portion

of paramere with numerous sparsely arranged micropores. Median lobe  $0.70\times$  length of parameres, narrowly triangular apically, apex sharp, gonopore situated subapically, struts ca.  $0.25\times$  as long as apical portion of median lobe. Phallobase widening posteriad, without large posterior opening.

**Differential diagnosis.** Based on the evenly convex elytral intervals, *Georissus maritimus* sp. nov. may be easily diagnosed from the species of the *G. costatus* and *G. caelatus* species groups sensu DELÈVE (1967a,b). It may be easily distinguished from the majority of the species with equally elevated elytral intervals by the absence of a median rhomboid impression on the pronotum, which it shares with the African species *G. sordidus* Grouvelle, 1915 and *G. bicolor* Grouvelle, 1909. The latter two species may be however immediately distinguished from *G. maritimus* sp. nov. by much larger and wider pale-coloured body, morphology of male genitalia and the sculpture of the abdomen (see DELÈVE 1967a), as well as by the sculpture of the pronotum which lacks any bulges in the posterior half in *G. maritimus* sp. nov. In fact, *Georissus maritimus* sp. nov. seems to be unique among all described species of the genus by its pronotal sculpture, i.e. the combination of the absence of a median rhomboid depression, absence of granules in anterior half of the pronotum and absence of elevated granulate bulges posteriorly. By the extremely long and narrow parameres and posteriorly widening phallobase, The new species resembles *G. alticosta* Grouvelle, 1909 (which has costate even elytral intervals), *G. alluaudi* Delève, 1967 (which has the pronotum with a rhomboid central depression), *G. acutecostatus* Fairmaire, 1898 and *G. biroi* Delève, 1969 (both with costate even elytral intervals).

**Etymology.** The species name refers to the type locality of this species, which is on the bank of a brackish lagoon situated at the estuary of a temporary stream to the Arabian Sea.

**Collection circumstances.** The type series was collected at night on a sandbar between the sea and a brackish lake in an estuary of a temporary stream (Figs. 19–20). The specimens were collected on places without vegetation which were wet due to the seepage of the subsurface water. The surrounding vegetation (which usually began within ca. 2 meters of the sites with *Georissus maritimus* sp. nov.) consisted of the low succulent shrubs of *Arthrocnemum macrostachyum* (Moris.) Moris (Amaranthaceae), *Limonium socotranum* (Vierh.) Radcl.-Sm. (Plumbaginaceae) and isolated groups of mangrove trees *Avicennia marina* (Forssk.) Vierh. (Avicenniaceae). No specimen of *Georissus maritimus* sp. nov. bore the substrate layer on the body dorsum.

**Distribution.** Known only from the type locality.

**Note.** The unique morphology of *G. maritimus* sp. nov. makes it impossible to assign this species to any of the species groups proposed by DELÈVE (1967a,b) and it seems to be rather isolated from the known species of the genus. Further studies are thus necessary to understand the geographic origin of the species.

### *Georissus (Neogeorissus) nemo* sp. nov.

(Figs. 8, 9–14, 17–18)

**Type locality.** Yemen, Socotra Island, Hallah Arhar,  $12^{\circ}33.0'N$   $54^{\circ}27.6'E$ , 15 m a.s.l.

**Type material.** HOLOTYPE: ♂ (NMPC): 'YEMEN: Socotra Isl. / Hallah Arhar (spring) /  $12^{\circ}33.0'N$   $54^{\circ}27.6'E$ , 15 m / 11.xi.2010, leg. J. Hájek'. PARATYPES: 1 ♀, 6 spec. (NMPC, KSEM, NHMW, IRSNB): same label data as the holotype; 62 spec. (BMNH; NMPC, KSEM, 10 spec. in DNA grade in coll. NMPC): 'YEMEN: Socotra island / Halla



area, Arher; freshwater / spring in sand dune / 9.-10.+15.vi.2012 / 12°33.0'N 54°27.6'E, 5 m // Socotra Expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský, / J. Niedobová & L. Purchart<sup>?</sup>; 1 spec. (NMPC): 'YEMEN: Socotra Island / ca. 3 km NE of Shuab / *Avicennia marina* mangrove; / sand dunes, 20.-21.vi.2012 / 12°34.1'N 53°23.9'E, 3 m // SOCOTRA expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský, / J. Niedobová & L. Purchart leg.?

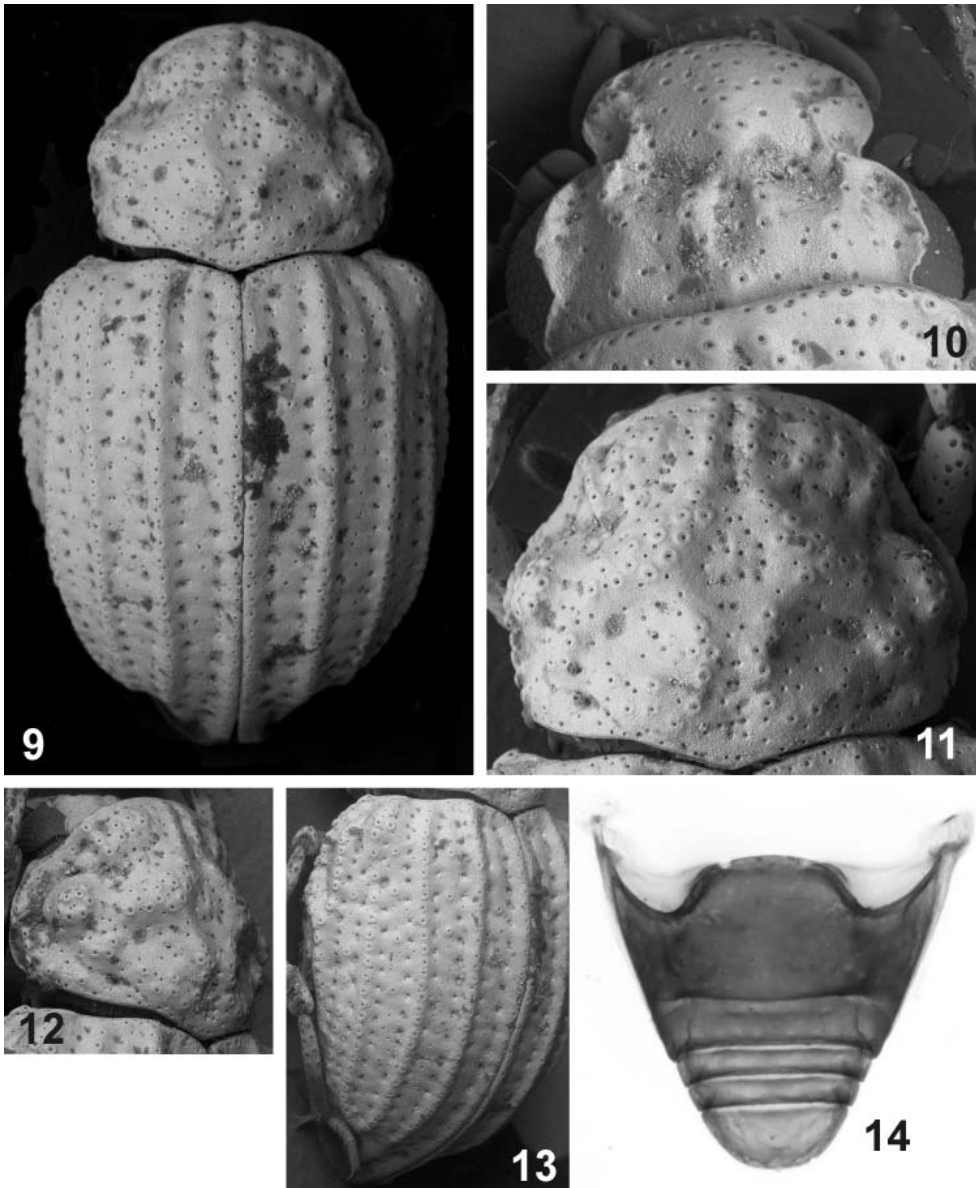
**Description.** Body weakly elongate, lowly convex in lateral view. Body length 1.3–1.5 mm (holotype 1.4 mm), width of head 0.35–0.45 mm (holotype 0.37 mm), maximum width of pronotum 0.5–0.6 mm (holotype 0.5 mm), maximum width of elytra 0.75–0.95 mm (holotype 0.80 mm). Coloration elytra and pronotum reddish brown to brown with olive reflections, head dark brown.

Head (Fig. 10). Clypeus weakly convex, with scattered sparsely arranged granules, anterior margin with marginal row of densely arranged granules; each posterolateral portion of clypeus anteriorly to eye declined, divided from mesal portion by ridge arising from frons, ridge high and sharp posteriorly, but more weakly defined anteriorly before joining with marginal clypeal row of granules. Frons with central elongate depression surrounded by elevated ridges each bearing several weakly pronounced granules; anterior portion of frons with sharp sublateral ridge without granules at midlength between central depression and inner margin of each eye (this ridges continues to clypeus more anteriorly); submesal portion with transverse blunt ridge connecting midlength of central ridge with posterior portion of sublateral ridge. Eyes large, oval in lateral view.

Prothorax (Figs. 11–12). Pronotum 1.1× as wide as long, with maximum width at posterior 0.4; lateral portions very small, slightly projecting laterad as blunt elongate lobes only. Anterior portion with two closely situated submedian ridges delimiting shallow median groove, each side laterally of ridges weakly convex, with scattered granules. Central portion of pronotum with large but rather shallow rhomboid depression delimited by wide granuliferous ridges anteriorly and narrow ones posteriorly, posterior ridges not joining but converging to posterior margin; posterolaterally of central depression with pair of large but shallow impressions delimited laterally by small granuliferous bulge; posterolateral portion of pronotum each with high granuliferous protuberance. Posterolateral pits absent. Ventral morphology of prothorax corresponding with *G. crenulatus*.

Mesothorax. Elytra (Figs. 9, 13) combined 1.2× as long as wide, 2.2× as long as pronotum; base of elytra ca. as wide as maximum width of pronotum, maximum width of elytra between anterior 0.1–0.5, elytra gradually narrowing in posterior 0.5–0.2, apex strongly narrowed. Elytral suture and intervals 2, 4 and 6 elevated into high narrow ridges, ridge on interval 6 arising from large humeral protuberance; lateral portion with Y-shaped structure formed by highly elevate interval 8 and anterior portion of interval 9; odd intervals (1, 3, 5) flat, not elevate, interval 7 flat anteriorly and becoming slightly elevate posteriorly. All ridges and humeral protuberance with very weak and low granules only, hence the elytral ridges nearly smooth; odd elytral intervals only with scattered and extremely low granules, hence appearing nearly totally flat. Elytral series regular, serial punctures small but sharply impressed. Lateral-most portion of elytron declined, hence elytral laterally without clear projections. Median pentagonal protuberance of mesoventrite flat, without distinct pits.

Metathorax. Metaventricle ca. 2× as long as mesoventrite, flat, only with few scattered



Figs. 9–14. *Georissus nemo* sp. nov. (9–13 – paratype; 14 – holotype). 9 – pronotum and elytra in dorsal view; 10 – head, dorsal view; 11–12 – detail of pronotum (11 – dorsal view; 12 – dorsolateral view); 13 – elytron, dorsolateral view; 14 – abdomen.



indistinct granules, without distinct median discrimen. Metathoracic wings present in specimens examined for this character ( $n=2$ ).

Abdomen (Fig. 14) gradually narrowing posteriad. Ventrites 1 flat, only with sparsely arranged indistinct granules especially in posterior third (anterior portion of some specimens totally bare), ventrites 2–4 without granules, ventrite 5 flat with few indistinct granules along posterior margin.

Male genitalia (Fig. 8). Aedeagus 0.4 mm long (measured in holotype only). Parameres  $0.85\times$  as long as phallobase, their combined width slightly narrower than maximum width of phallobase; lateral margins of parameres very slightly convergent in basal 0.6, arcuately bent inward apically; apex widely obtusely pointed; inner margins straight, well sclerotized. Median lobe  $0.75\times$  length of parameres, narrowly triangular apically, apex sharp, gonopore situated subapical, struts ca.  $0.4\times$  as long as apical portion of median lobe. Phallobase slightly widening posteriad, with wide but indistinct latero-posterior band along margins, without posterior opening.

**Differential diagnosis.** Based on the general sculpture of the pronotum (i.e., rhomboid central depression and low submedian and higher lateral tubercles, Fig. 11, 17) and elytra (i.e., odd intervals more elevated than even ones), *Georissus nemo* sp. nov. belongs to the *G. costatus* species group sensu DELÈVE (1967a,b). It may be distinguished from other species of the group by the combination of the following characters: elytral ridges highly elevated, very weakly denticulate in lateral view; intervals 2, 4 and 6 nearly completely flat with very few indistinct granules; lateral portions of pronotum not projecting into acute lobes; abdomen with very indistinct granules on ventrites 1 and 5 only; phallobase slightly longer than parameres, only indistinctly widened posteriad; parameres widely arcuate apically. By elytral morphology, *G. nemo* sp. nov. especially resembles the African species *G. alticosta* Grouvelle, 1909 and *G. decorsei* Paulian & Legros, 1943, and *G. decoratus* Delève, 1972 from Sri Lanka, all of which may be easily distinguished by the morphology of the aedeagus which is much narrower in both African species (DELÈVE 1967a, Fig. 8) and much wider in *G. decoratus* (DELÈVE 1972, Fig. 16). *Georissus nemo* sp. nov. also differs from both African species by the indistinctly denticulate elytral costae (costae are totally smooth in *G. alticosta* and *G. decorsei*) and from *G. decoratus* by flat elytral intervals 2 and 4 (slightly convex in the latter species).

*Georissus nemo* sp. nov. may be easily distinguished from the following unidentified species from Socotra Island by its smaller body size (the other species is 1.8–2.0 mm long), elytral costae with very indistinct denticulation (strongly denticulate in the other species), elytral intervals 2 and 4 flat (convex and bearing many distinct granules in the other species), abdominal ventrites with extremely indistinct granulation (with very distinct granulation on whole ventrites 1 and 5 in the other species), and by the weakly metallic coloration (head and pronotum strongly and elytra moderately metallic in the other species). From the third Socotran species of *Georissus*, *G. maritimus* sp. nov., it differs by its costate odd elytral intervals.

**Etymology.** The species name refers to Captain Nemo, a fictional character of two novels by Jules Verne, who lived underseas (in a submarine Nautilus), hence in an environment unusual for a human. This resembles specimens of *Georissus nemo* sp. nov. collected in 2010 which were found underwater, in an environment unusual for this genus.

**Collection circumstances.** The vast majority of specimens in the type series were collected in Arhar along the permanent stream rising below the sand dunes on the base of rock cliffs of the Socotra Plateau falling to the sea coast. The specimens inhabited the sandy waterlogged surroundings of the stream partly overgrown by short-grazed lawn of few undetermined Poaceae and Cyperaceae and surrounded by shrubs of *Tamarix nilotica* (Ehrens.) Bunge (Tamaricaceae). The majority of the specimens were collected at night, creeping on the bare wet sand, while a portion of the specimens were attracted at light trap installed close to the stream. In 2010, when the locality was only shortly visited in the daytime, few specimens were found on the submerged underside of the stones directly in the stream. One specimen was also found among a large number of *G. maritimus* sp. nov. from the type locality of the latter species (see above).

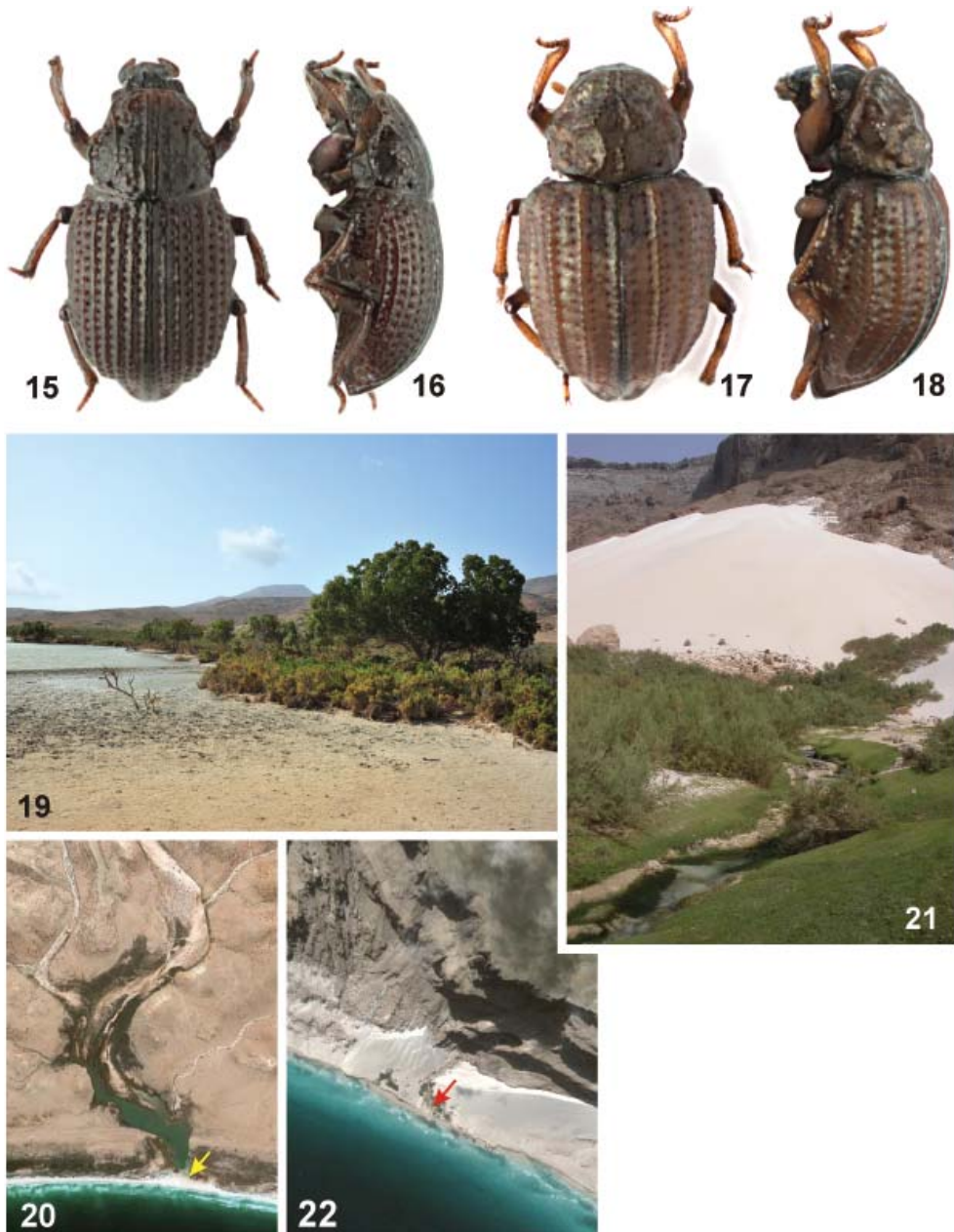
**Distribution.** Known from two distant localities on Socotra Island, indicating that the species may be widely distributed on suitable habitats of the island.

**Notes.** Although the relationships between the species of *Georissus* Latreille, 1809 are poorly known and the species groups defined by the pronotal and elytral sculpture may be easily polyphyletic, the strong resemblance of *G. nemo* sp. nov. to some African and Sri Lankan species (see Differential diagnosis) is rather striking. Moreover, there is a long series of an undescribed *Georissus* species in NMPC which was collected in southern India (Tamil Nadu state, S of Tuticorin) in salt marshes at the Támbra pathi river estuary, hence in a habitat somewhat resembling that of *G. nemo* sp. nov. The Indian species is very similar to *G. nemo* sp. nov. by dorsal sculpture, male genitalia and highly reduced abdominal granulation, although it shows some weak differences from *G. nemo* sp. nov. (elytral intervals 2 and 4 slightly convex, body coloration strongly metallic) and therefore seems to represent a separate species. Even though further studies of the Indian specimens are needed to completely understand their identity, the strong resemblance between both taxa suggests that *G. nemo* may possibly represent a South Indian element of Socotran fauna.

### *Georissus* (*Neogeorissus*) sp.

**Material examined.** SOCOTRA: 1 ♀ (NMPC): Dixiam plateau, wadi Esgego, 12°28'09"N 54°00'36"E, 300 m a.s.l., 2.–3.xii.2003, lgt. P. Kabátek; 1 ♀ (CULS): same locality and date, lgt. J. Farkač; 1 ♀ (NMPC): Zemhon area, 12°30'58"N 54°06'39"E, 270–350 m a.s.l., at light, 3.–4.ii.2010, lgt. J. Purchart & J. Vybiral. MAINLAND YEMEN: 1 ♂ (NMPC): Lahj gov., vadi Am Rijja, W of Lahj Al Hutah by road, 13°01'57"N 44°33'30"E, 297 m a.s.l., 25.–26.x.2007, lgt. A. Reiter; 1 spec. (NMPC): wadi Anis 60 km SW of Sana'a, 15°00'N 44°09'E, 1522 m a.s.l., 7.x.2005, lgt. S. Kadlec.

**Comments.** The species belongs to the *G. costatus* species group sensu DELÈVE (1967a,b) based on the pronotal sculpture, even elytral intervals higher than odd ones, and the coloration at least partly metallic (strongly so on the head and pronotum, weaker metallic tint is present on elytra which are otherwise paler than rest of the body, reddish to dark reddish brown with dark base and darker spots at midlength of intervals 1–2 and in basal third of intervals 5–6). Three females from Socotra Island agree in external morphology and coloration to the specimens from southern mainland Yemen with which they may be conspecific. All six examined specimens belong to the African complex of rather large species with very distinctly elevated even elytral intervals, represented in Africa by five species: *G. intermedius* Paulian & Legros, 1943 (Chad), *G. fairmairei* Alluaud, 1902 (Democratic Republic of the Congo), *G.*



Figs. 15–22. Socotran endemic *Georissus* species and their habitats. 15–16 – *G. maritimus* sp. nov. (15 – dorsal view; 16 – lateral view). 17–18 – *G. nemo* sp. nov. (17 – dorsal view; 18 – lateral view). 19–20 – the sand tongue 3 km NE of Shuab, type locality of *G. maritimus* sp. nov. (19 – general view of the habitat; 20 – satellite view showing the position of the locality); 21–22 – the stream at Arhar, type locality of *G. nemo* sp. nov. (21 – general view of the habitat; 22 – satellite view showing the position of the locality).



Figs. 23–25. *Hemisphaera socotrana* sp. nov. 23–24 – general habitus (23 – dorsal view, 24 – lateral view); 25 – type locality (stream in wadi Ayhaft).



*marlieri* Delève, 1967 (Namibia, Zaire), *G. renaudi* Delève, 1967 (Chad) and *G. metallicus* Paulian & Legros, 1943 (Chad, Guinea) (see DELÈVE 1967b). The aedeagus of the male from mainland Yemen differs from all these species except *G. marlieri* by narrow and elongate phallobase, but is slightly smaller (0.41 mm versus 0.46 mm in the types of *G. marlieri*), and the Yemeni specimens also slightly differ from *G. marlieri* in the basally narrower elytra. Without the comparison of longer series from Socotra and mainland Yemen (not currently available) with those from Africa, we are not able to assign the male from continental Yemen to *G. marlieri* reliably, and the identity of the Socotran specimens remains unclear as well, pending the collecting of males. However, the Yemeni and Socotran specimens clearly differ from *G. chameleo* Fikáček & Trávníček, 2009 from the United Arab Emirates (which also belongs to *G. costatus* species group, see FIKÁČEK & TRÁVNÍČEK (2009)) by the morphology of male genitalia as well as the body size and form, and the above specimens therefore represent the second species of the genus *Georissus* from the Arabian Peninsula.

## HYDROPHILIDAE

### Berosini

#### *Berosus (Berosus) corrugatus* Régimbart, 1906

**Material examined.** 4 ♀♀ (CULS, NMPC): Dixiam plateau, Sirhin area, 12°31'08"N 53°59'09"E, 812 m a.s.l., J. Farkač lgt.; 1 ♂, 1 ♀ (CULS, NMPC): Noged plain, wadi Ireeh, 12°23'11"N 53°59'47"E, 95 m a.s.l., J. Farkač lgt.; 1 ♀ (NMPC): same data, but D. Král lgt.; 1 ♀ (CULS): Qalansiyah env., N slopes of Khayrha Mts., 12°38'50"N 53°27'45"E, 85–592 m a.s.l., J. Farkač lgt.

**Distribution.** African species widely distributed in sub-Saharan Africa (not in Madagascar) and reaching the southern Palaearctic along the Nile river (SCHÖDL 1995). It is the only member of the *B. rubiginosus* species group occurring in Socotra Island. It is absent from the Arabian Peninsula where it is replaced by *B. rubiginosus* Kuwert, 1890 (SCHÖDL 1995, HEBAUER 1997, FIKÁČEK et al. 2010). **First record from Socotra Island.**

#### *Berosus (Berosus) nigriceps* (Fabricius, 1801)

**Material examined.** 1 ♂, 3 spec. (NMPC): Noged plain, sand dunes, Sharet Halma env., 12°21.9'N 54°05.3'E, 20 m a.s.l., at light, 10.–11.xi.2010, J. Bezděk lgt.; 2 spec. (IRSNB): W Socotra, Shuab, mangroves, coast line, 23.xi.2010, M. Butkevičius lgt.; 1 spec. (NMPC): Qadub, 12°38.3'N 53°57.3'E, saline, 14.vi.2012, Socotra Expedition 2012 lgt.

**Distribution.** This is a common species widely distributed over the whole of Africa and reaching through the Near East and the Arabian Peninsula to southwest Asia and the Indian Peninsula (SCHÖDL 1994, HEBAUER 1997, HANSEN 1999). Previously recorded from Socotra Island by WRANK (2003).

### Chaetarthriini

#### *Hemisphaera socotrana* sp. nov.

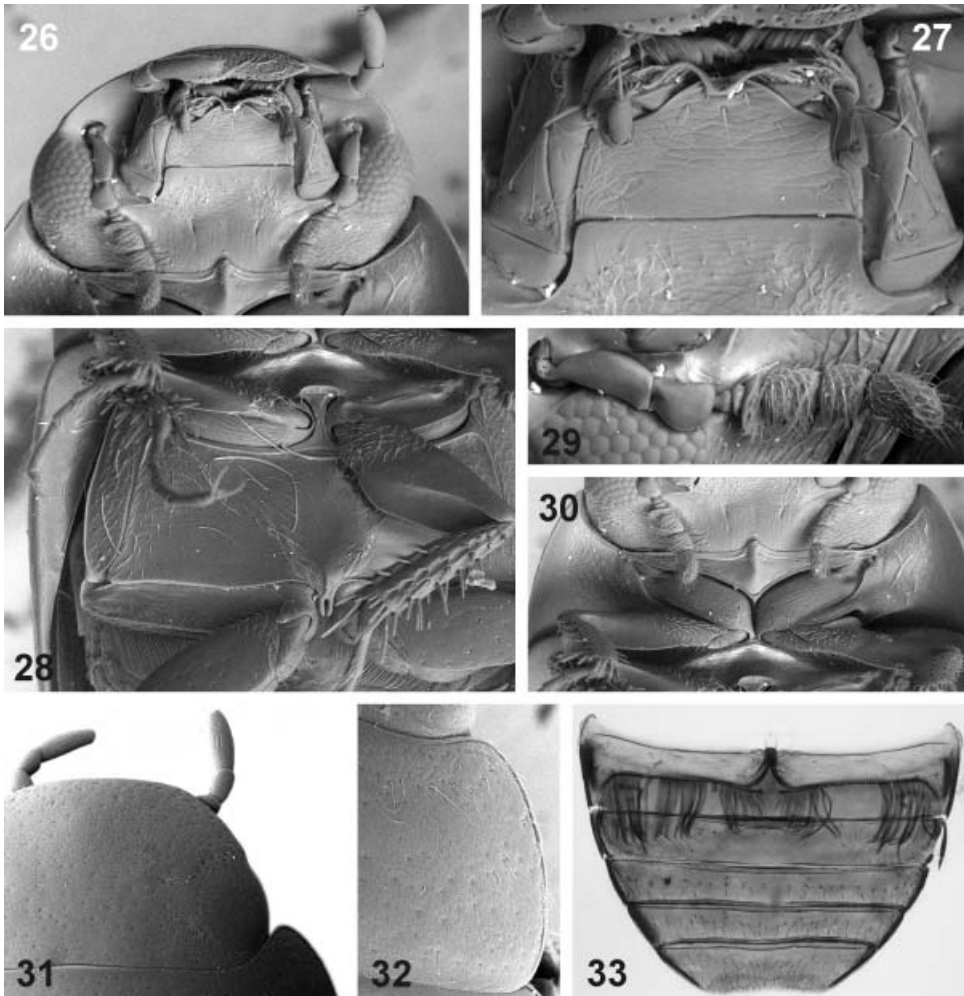
(Figs. 23–24, 26–36)

**Type locality.** Yemen, Socotra Island, wadi Ayhaft, 12°36.5'N 53°58.9'E, 200 m a.s.l.

**Type material.** HOLOTYPE: ♂ (NMPC): 'YEMEN: Socotra Isl. / wadi Ayhaft, 200m / 12°36.5'N 53°58.9'E / 7.–8.xi.2010 lgt. J. Hájek'. PARATYPES: 10 spec. (CDMS, IRSBN, KSEM, NHMW, NMPC): same label data as the holotype.

**Description.** Body widely elongate oval, moderately convex (male very slightly more convex than females), 1.2–1.5 mm long (holotype 1.3 mm), 0.6–0.8 mm wide (holotype 0.7 mm). Coloration piceous brown to black, lateral margins of pronotum and elytral apex narrowly reddish, border between reddish and dark parts vaguely defined; body venter dark brown; antenna yellowish, maxillary palpus reddish to dark reddish, with palpomere 4 darker, legs reddish.

Head transverse; clypeus slightly convex on anterior margin, bearing sparse and fine punctation, median portion with few trichobothria, interstices finely microsculptured; frons with fine and sparse punctation, bearing many trichobothria at inner margin of each eye; eyes rather



Figs. 26–33. *Hemisphaera socotrana* sp. nov. 26 – head, ventral view; 27 – detail of mentum; 28 – meso- and meta-ventrite; 29 – antenna; 30 – prosternum; 31 – head, dorsal view; 32 – lateral portion of pronotum; 33 – abdomen.



small, divided by  $3.8\times$  width of each eye. Labrum well sclerotized, but inclined to ventral part of head, bearing densely arranged long setae on its surface, anterior margin with few fine spines. Mentum transverse,  $2\times$  wider than long, bearing fine mesh-like microsculpture and few setae. Maxilla with trichobothria only on basistipes, maxillary palpus rather short and stout. Antenna with eight antennomeres, pedicel and cupula enlarged, antennal club loose. Gula wide, tentorial pits weakly developed and widely isolated.

**Prothorax.** Pronotum transverse, with rounded antero- and posterolateral corners, lateral margin weakly convex, finely rimmed; surface with fine and sparse punctation, punctures in shape of two extremely fine pits with very short seta inbetween; trichobothria distinct, large, forming rows in along anterior margin and at midlength. Hypomerone with wide bare portion, mesal sparsely pubescent portion not divided from lateral part by ridge; prosternum very short anterior to procoxae, slightly expanded at midwidth anteriorly and posteriorly, bearing blunt median longitudinal carina, prosternal process not developed. Procoxal cavities contiguous, procoxal fissure open, notopleural suture extremely short.

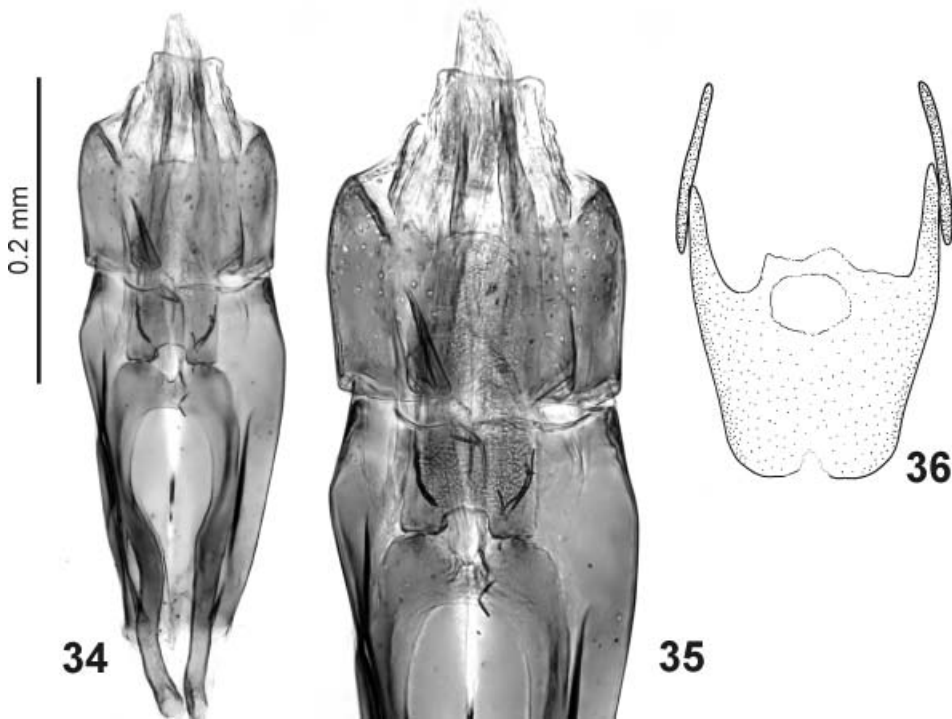
**Mesothorax.** Scutellar shield rather large, triangular. Elytra nearly parallel-sided at midlength, with deep sutural striae distinct in apical half; each elytron bearing 10 irregular series of fine punctures, scutellary stria present; each interval with few isolated punctures of size of serial punctation, alternate intervals with trichobothria; epipleuron narrow, reaching posterior margin of metaventrite only. Mesoventrite very short, bearing transverse elevation posteriorly. Mesocoxae transverse, very narrowly isolated by mesoventral and metaventral processes.

**Metathorax.** Metaventrite ca. twice as long as mesoventrite, sparsely pubescent laterally, bare mesally; postcoxal ridge bent posteriad sublaterally; posterior metaventral process deeply bifid. Posterior wings present, well developed.

Abdomen with five sparsely pubescent ventrites, ventrite 1 ecarinate, bearing dense row of long setae on each side; ventrite 5 weakly concave at posterior margin.

**Male genitalia.** Phallobase of aedeagus long, ca.  $2\times$  longer than parameres, widest subanteriorly, slightly narrowing basad. Parameres widely subtriangular, apically membranous. Median lobe with apical portion ca. as long as basal struts, apicomedian sclerite slightly narrowing from base to narrowly rounded apex, median lobe surrounded by membranous structure subapically. Sternite 9 wide, with moderately long lateral projections, very shallow emargination on posterior margin and wide and very low median process.

**Differential diagnosis.** The new species may be easily distinguished from all other west Palaearctic species as well as from the African *H. lima* Orchymont, 1941 by the morphology of its aedeagus and the shape of sternite 9 (compare Figs. 34–36 with Figs. 37–43). When compared to the Mediterranean species, *H. socotrana* sp. nov. resembles *H. guignoti* Schaefer, 1975 and *H. miltiadis* Sahlberg, 1908 by moderately convex body and narrow, vaguely defined pale coloration of sides of the pronotum and at elytral apex; its sutural stria reaches ca. midlength of elytra as in *H. seriatopunctata* (Perris, 1874) and *H. miltiadis*, and its maxillary palpus is pale with darkened palpomere 4 as in *H. miltiadis*. In contrast to *H. socotrana* sp. nov., *Hemisphaera lima* is much more convex in lateral view, its coloration is completely black without paler areas on sides of pronotum and at elytral apices, and it bears dark brown maxillary palpi. We were not able to compare the Socotran species with the types of *H. liliputana* (Régimbart, 1903), but the single female from Madagascar present in NMPC largely differs



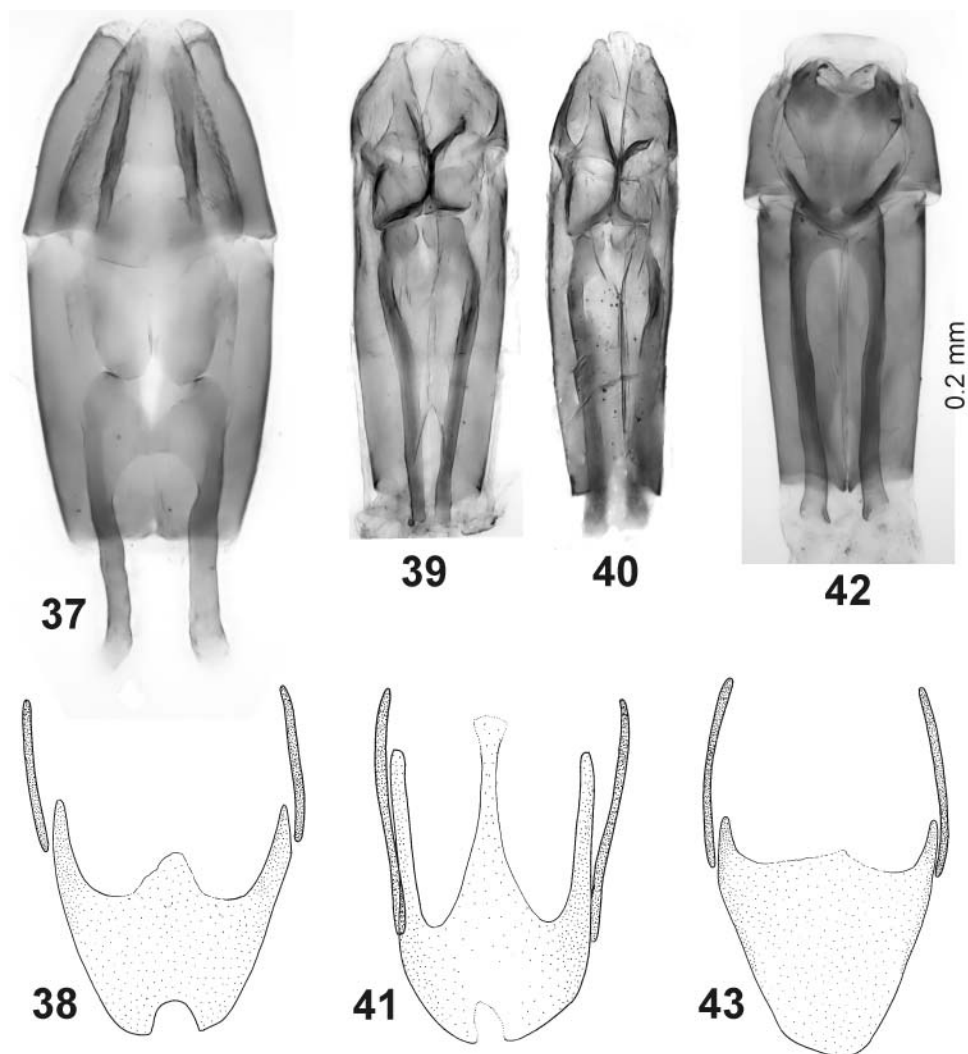
Figs. 34–36. Male genitalia of the holotype of *Hemisphaera socotrana* sp. nov. 34–35 – aedeagus (34 – general view; 35 – detail of parameres and median lobe); 36 – sternite 9.

from *H. socotrana* by much more depressed body, large and clearly defined yellow apical spot in apical fifth of elytra, and even elytral series consisting of much denser punctation than odd ones (in *H. socotrana* sp. nov., the density of punctures in all series is similar).

**Etymology.** The species name refers to the presence of the species in the island of Socotra.

**Collection circumstances.** The specimens were found in wet gravel on the side of a stony stream together with *Limnebius dioscoridus* Jäch & Delgado, 2012. The stones were submerged in water and overgrown by a thin layer of algae (J. Hájek, pers. comm.).

**Notes on the taxonomy of the genus *Hemisphaera*.** The genus *Hemisphaera* Pandellé, 1876 currently contains five species, of which three (*H. seriatopunctata*, *H. multiadis* and *H. guignoti*) occur in the Mediterranean and two are African (*H. lima* is known from Tanzania and *H. liliputana* from Madagascar). Additional potentially undescribed taxa are known from Africa, Europe and southern India (M. Fikáček & J. Delgado, unpubl. data). For this study we have examined the type and additional material of four described species, which were found to slightly differ in the convexity of elytra, extent of pale coloration of pronotum and elytral apices and the coloration of maxillary palpi and in the character of elytral series. They also exhibit large differences in the morphology of the aedeagus and the shape of sternite 9 (Figs. 36, 38, 41, 43). The genitalia and sternite 9 of *H. seriatopunctata* are not illustrated



Figs. 37–43. Male genitalia of the *Hemisphaera* species (37, 39–40, 42 – aedeagus; 38, 41, 43 – sternite 9). 37–38 – *H. guignoti* Schaefer, 1975 (Algeria, ‘Philippeville’ [= Skikda], coll. NMPC); 39–41 – *H. miltiadis* Sahlberg, 1908 (39 – paratype, Lesbos, coll. IRSNB; 40–41 – Turkey, Izmir, coll. IRSNB); 41–43 – *H. lima* Orchymont, 1941 (paratype, Tanzania, Ukerewe, Victoria Nyanza, coll. IRSNB).

here (see CASTRO & DELGADO (1997) for aedeagus illustration), but are extremely similar to those of *H. miltiadis* (including the presence of the X-shaped thickening on the median lobe and long median projection of sternite 9) and the status of both latter species hence requires revisional study.

## Laccobiini

*Laccobius (Microlaccobius) eximius* Kuwert, 1890

**Material examined.** 6 ♂♂, 8 ♀♀ (NMPC, MSNV): Haghier Mts., Wadi Madar, 12°33.2' N, 54°00.4'E, 1180–1230 m, 12–14.xi.2010, lgt. Jiří Hájek.

**Distribution.** The distribution of the species is unclear due to changes of its taxonomic position by various authors until it was confirmed as a separate species by FIKÁČEK et al. (2010) (see p. 147 in the latter paper for history of the taxonomic concepts of the species). The species was described from 'Hejaz' and since then recorded from various parts of the Arabian Peninsula (HEBAUER 1997, as *L. praecipuus*) and Egypt (KUWERT 1890), but most these records require confirmation as they may concern the widespread *L. praecipuus*. So far, the only specimens examined by us reliably belonging to *L. eximius* were all collected in western Saudi Arabia at high altitudes (ca. 2000 m a.s.l.) of the mountain range along the Red Sea. **First record from Socotra Island.**

**Note.** *Laccobius eximius* was found at a single locality at high altitude in Socotra Island. This corresponds to its distribution on the Arabian Peninsula, where the species inhabits the mountains in the western part of Saudi Arabia where it replaces the common lowland species *L. praecipuus*. The dorsal coloration of the Socotran specimens is paler than in the majority of the Saudi Arabian specimens which are nearly completely dark (see FIKÁČEK et al. 2010, Fig. 11). Pale specimens of *L. eximius* easily differ from *L. praecipuus* by darker pronotum (uniformly black on a larger surface) and elytral longitudinal puncture rows uniformly darkened (sometimes these rows join one another forming a nearly black elytral surface). The morphology of the aedeagus of the Socotran specimens agrees in all details with those from the Arabian Peninsula (see FIKÁČEK et al. 2010, Figs. 7–9) and *L. eximius* is therefore easily distinguished from *L. praecipuus* by genital morphology. Socotran specimens of *L. eximius* are generally smaller than those from the Arabian Peninsula.

*Laccobius (Microlaccobius) minor* (Wollaston, 1867)

**Material examined.** 1 ♂, 1 ♀ (NMPC): Qadub, 12°38.3'N 53°57.3'E, saline, 14.vi.2012, Socotra Expedition 2012 lgt.

**Distribution.** *Laccobius minor* is a species widespread in savannah and semidesert areas of Africa, reaching northwards to Yemen, southern Saudi Arabia, Israel and Lebanon (GENTILI 1981, 1988, 1989; HEBAUER 1994). **First record from Socotra Island.**

**Note.** The Socotran specimens were collected in shallow exposed pools in the salt marsh ca. 20 m of the seacoast.

*Laccobius (Microlaccobius) praecipuus* Kuwert, 1890

**Material examined.** 16 ♂♂, 10 ♀♀, 1 spec. (NMPC, MSNV): Hallah Arhar (spring), 12°33.0'N 54°27.6'E, 15 m, 11.xi.2010, lgt. J. Bezděk; 8 spec. (NMPC): Halla area, Arhar, freshwater spring in sand dune, 12°33.0'N 54°27.6'E, 15 m a.s.l., 9.–10.+15.vi.2012, Socotra Expedition 2012 lgt.; 5 ♂♂, 5 ♀♀ (NMPC): wadi Ayhaft, 12°36.5'N, 53°58.9'E, 200 m, 7–8.xi.2010, Jiří Hájek lgt.; 1 ♀ (NMPC): same label data, J. Bezděk lgt.; 3 ♂♂, 1 ♀ (CULS): Dixiam Plateau, Wadi Esgego, 12°28'09"N 54°00'36"E, 300 m, 2–3.xii.2003, Jan Farkač lgt.; 1 ♂, 2 ♀♀ (NMPC): same label data, David Král lgt.; 1 ♂, 1 ♀ (NMPC): same label data, Petr Kabátek lgt.; 2 ♀♀ (NMPC): Dixiam

plateau, Wadi Zeeriq, 12°31'08"N 53°50'09"E, 750 m, 3.xii.2003, lgt. David Král; 2 spec. (NMPC): Dixam plateau, Firmihin, *Dracaena* woodland, 12°28.6'N 54°01.1'E, 490 m a.s.l., 14.–15.vi.2012, Socotra Expedition 2012 lgt.; 1 ♂ (NMPC): Ba'a village env., 12°32'19"N 54°10'41"E, 234 m, 5.xii.2003, lgt. P. Kabátek; 2 ♀♀ (NMPC): Homhil protected area, 12°34'27"N 54°18'32"E, 364 m, 28.–29.xi.2003, lgt. P. Kabátek; 1 ♂ (NMPC): Aloove area, Hassan village env., 25°31.2'N 54°07.4'E, 221 m, 8.–10.xi.2010, lgt. J. Bezděk; 1 ♂, 1 ♀ (NMPC): Qualentiah env., slopes 5 km SE from Quaysoh, 12°39.69'N 53°26.658'E, 4–5.vi.2010, lgt. V. Hula & J. Niedobová; 1 ♀ (NMPC): Zemhon area, 12°20'58"N 54°06'30"E, 270–300 m, 16.–17.vi.2010, lgt. V. Hula.

**Distribution.** *Laccobius praecipuus* is a common species of the lowland regions of Socotra (ca. below 800 m a.s.l.). It is the commonest species of the genus in the Arabian Peninsula and is also widely distributed in the Afrotropical region as well as northern Africa (GENTILI 1981, 1988, 1989, 1991). **First record from Socotra Island.**

### Hydrophilini

#### *Sternolophus (Sternolophus) unicolor* Laporte de Castelnau, 1840

**Material examined.** 1 ♀ (CULS): wadi Far, 1.iv.2001, lgt. J. Farkač; 1 ♂ (NMPC): Firmin, x.2000, lgt. V. Bejček & K. Štátný; 2 spec. (CULS, NMPC): Calanthia, 29.–30.iii.2001, lgt. J. Farkač; 2 ♂♂, 1 spec. (CULS): Ayhaft, 15.iii.2000, lgt. J. Farkač; 1 spec. (NMPC): wadi Ayhaft, 12°36.5'N 53°58.9'E, 200 m a.s.l., 7.–8.xi.2010, lgt. J. Hájek; 1 spec. (NMPC): same locality and date, lgt. P. Hlaváč; 3 spec. (NMPC): Firmihin plateau, 12°28'46"N 54°01'E, 400–500 m a.s.l., 18.–19.vi.2010, lgt. V. Hula & J. Niedobová; 1 spec. (IRSNB): hills near Hadibu, 29.ii.2008, G. 31.496, lgt. A. Saldaitis; 8 spec. (CULS, NMPC): wadi Faar, 12.433°N 54.195°E, 69 m a.s.l., 3.xii.2000, lgt. V. Bejček & K. Štátný.

**Distribution.** African species widely distributed in Madagascar and east Africa. **First record from Socotra Island.**

**Note.** WRANIK (2003) lists the Near East/Arabian species *S. decens* Zaitzev, 1909 for the Socotran fauna, but this record seems to be based on the misidentification. The taxonomy of the genus *Sternolophus* Solier, 1834 is still not properly resolved and no modern revision exists for the Old World species of the genus. The Socotran specimens clearly differ from *S. decens* by the diagnostic characters given in the identification key by ZAITZEV (1909): they are generally wider than the Arabian specimens of *S. decens* and bear a longer and stouter metaventral spine. They agree well with the specimens of *S. unicolor* from Madagascar present in the collection of NMPC. Few *Sternolophus* specimens with a wider general body form from southern Yemen are present in the collection of NMPC, but they clearly differ from the Socotran specimens by a shortened and apically blunt metaventral spine and may be conspecific with the Yemeni specimens which BALFOUR-BROWNE (1951) identified as possibly belonging to *S. solieri* Laporte de Castelnau, 1840.

#### *Hydrophilus (Temnopterus) aculeatus* (Solier, 1834)

**Material examined.** 1 spec. (CULS): Hadibo, 6.–24.ix.1999, V. Bejček & K. Štátný lgt.; 3 spec. (IRSNB): Ayhaft valley, 22.xi.2008, A. A. Saldaitis lgt.; 1 spec. (IRSNB): Haghier Mt., Ayhaft valley, 20.iii.2009, A. A. Saldaitis lgt.

**Distribution.** Widely distributed African species reaching northwards to Egypt and the Near East (but absent from the Arabian Peninsula) (HANSEN 1999). Previously recorded from Socotra Island by GAHAN (1903) and WRANIK (2003).

## Acidocerini

*Enochrus (Methydrus) nitidulus* (Kuwert, 1888)

**Material examined.** 1 ♂, 1 ♀ (NMPC): Hamadero, 20.–21.xi.2000, V. Bejček & K. Šťastný lgt., det. S. Schödl 2002; 1 spec. (NMPC): Calanthia, 29.–30.iii.2001, lgt. J. Farkač, det. S. Schödl 2002; 1 spec. (NMPC): Dixam plateau, wadi Zeeriq, 12°31'08"N 53°59'09"E, 750 m a.s.l., 3.xii.2003, lgt. D. Král; 3 spec. (NMPC, CULS): Dixam plateau, wadi Esgego, 12°28'09"N 54°00'36"E, 300 m a.s.l., 2.–3.xii.2003, lgt. D. Král; 2 spec. (NMPC): same locality, lgt. P. Kabátek; 1 ♂, 3 spec. (NMPC): wadi Ayhaft, 12°36.5'N 53°58.9'E, 200 m a.s.l., 7.–8.xi.2010, lgt. J. Hájek; 1 ♂, 2 spec. (NMPC): Al Haghier Mts., wadi Madar, 12°33.2'N 54°00.4'E, 1180–1230 m a.s.l., 12.–14.xi.2010, lgt. J. Bezděk; 1 spec. (NMPC): Aloove area, Hassan env., 12°31.2'N 54°07.4'E, 221 m a.s.l., 9.–10.xi.2010, lgt. J. Hájek; 1 spec. (NMPC): Hallah Arhar (spring), 12°33.0'N 54°27.6'E, 15 m a.s.l., 11.xi.2010, lgt. J. Bezděk; 5 spec. (NMPC): Halla area, Arhar, freshwater spring in sand dune, 12°33.0'N 54°27.6'E, 15 m a.s.l., 9.–10.+15.vi.2012, Socotra Expedition 2012 lgt.; Firmihin plateau, 12°28'46"N 54°01'E, 400–500 m a.s.l., 18.–19.vi.2010, lgt. 18.–19.vi.2010, lgt. V. Hula & J. Niedobová lgt.; 4 spec. (IRSNB): top of Dixam valley, 22.ii.2009, lgt. A. A. Saldaitis; 1 spec. (NMPC): Homhil, 12.587'N 54.302'N, 330 m a.s.l., 20.–21.xi.2000, lgt. V. Bejček & K. Šťastný; 1 spec. (NMPC): Homhil protected area, 12°34'27"N 54°18'32"E, 364 m a.s.l., 28.–29.xi.2003, lgt. P. Kabátek; 1 spec. (NMPC): 12°30'58"N 54°06'39"E, 270–350 m a.s.l., 3.–4.ii.2010, lgt. Purchart & Vybiral; 1 spec. (NMPC): Hadiboh env., 12°65'02"N 54°02'04"E, 10–100 m a.s.l., 21.xi.–12.xii.2003, lgt. P. Kabátek; 1 spec. (CULS): wadi Faar, 12.433°N 54.195°E, 69 m a.s.l., 3.xii.2000, lgt. V. Bejček & K. Šťastný; 1 spec. (NMPC): Qadub, 12°38.3'N 53°57.3'E, saline, 14.vi.2012, Socotra Expedition 2012 lgt.

**Distribution.** Based on current knowledge, this species is distributed in the Near East and Arabian Peninsula, reaching northwards to Azerbaijan (HANSEN 1999). **First record from Socotra Island.**

**Note.** The identification of the above specimens is based on three specimens from Socotra Island identified as *E. nitidulus* in 2002 by the late colleague Stefan Schödl who was working on the revision of the subgenus *Methydrus* at the time (the revision was never finished and published due to his sudden death in 2005). All additional specimens available to us are conspecific and agree with those identified by S. Schödl in all aspects including the male genitalia.

*Helochares (Helochares) dilutus* (Erichson, 1843)

**Material examined.** 2 ♂♂, 1 ♀ (NMPC, CULS): Calanthia, 29.–30.iii.2001, J. Farkač lgt.; 1 ♂ (NMPC): wadi Ayhaft, 12°36.5'N 53°58.9'E, 200 m a.s.l., 7.–8.xi.2010, J. Bezděk lgt.; 3 spec. (NMPC): Qadub, 12°38.3'N 53°57.3'E, saline, 14.vi.2012, Socotra Expedition 2012 lgt.

**Distribution.** This species is widely distributed in sub-Saharan Africa (but not reaching northern Africa). Previously recorded from Socotra Island by WRANIK (2003).

## Coelostomatini

*Coelostoma (Holocoelostoma) stultum* (Walker, 1858)

**Material examined.** 1 ♂, 2 spec. (NMPC): Firmihin, 12°28'27"N 54°00'54"E, 400–500 m a.s.l., 6.–7.ii.2010, at light, L. Purchart & J. Vybiral lgt.; 1 ♂, 11 spec. (JBCP, NMPC): Dixam plateau, Firmihin (*Dracaena* forest), 12°28.6'N 54°01.1'E, 490 m a.s.l., 15.–16.xi.2010, J. Batelka lgt.; 1 ♂ (NMPC): wadi Ayhaft, 12°36.5'N 53°58.9'E, 200 m a.s.l., 7.–8.xi.2010, J. Hájek lgt.; 1 ♀ (NMPC): Dixam plateau, wadi Esgego, 12°28'09"N 54°00'36"E, 300 m a.s.l., D. Král lgt.; 1 ♂ (NMPC): Zemhon area, 12°30'58"N 54°06'39"E, 270–350 m a.s.l., 3.–4.ii.2010, at light, L. Purchart



& J. Vybíral lgt.; 4 ♀♀ (CULS, NMPC): wadi Faar, 12.433°N 54.195°E, 69 m a.s.l., 3.xii.2000, lgt. V. Bejček & K. Štástný; 1 spec. (NMPC): Qadub, 12°38.3'N 53°57.3'E, saline, 14.vi.2012, Socotra Expedition 2012 lgt.

**Distribution.** Widely distributed Oriental species reaching eastwards to the Arabian Peninsula. Previously recorded from Socotra Island by WRANIK (2003).

### *Dactylosternum abdominale* (Fabricius, 1792)

**Material examined.** 1 ♂, 3 spec. (NMPC): Dixiam plateau, Firmihin (*Dracaena* forest), 12°28.6'N 54°01.1'E, 490 m a.s.l., 15.–16.xi.2010, L. Purchart lgt.; 1 spec. (NMPC): Zemhon area, 12°30'58"N 54°06'39"E, 270–350 m a.s.l., at light, 3.–4.ii.2010, L. Purchart & J. Vybíral lgt.

**Distribution.** *Dactylosternum abdominale* is widely distributed throughout the tropics and subtropics all over the world and rarely also reaches the adjacent temperate areas (SMETANA 1978, HANSEN 1999). Previously recorded from Socotra Island by WRANIK (2003).

## Megasternini

### *Cercyon (Cercyon) nigriceps* (Marshall, 1802)

**Material examined.** 1 ♂, 1 ♀, 5 spec. (NMPC): Al Haghier Mts., wadi Madar, 12°33.2'N 54°00.4', 1180–1230 m a.s.l., 12.–14.xi.2010, J. Hájek lgt.; 2 spec. (NMPC): Al Hagier Mts., W slopes, Skant area, 12°35'52"N 54°00'01", 1240 m a.s.l., 2.xii.2003, D. Král lgt.; 1 spec. (NMPC): Hadiboh env., 12°65'02"N 54°02'04"E, ca. 10–100 m a.s.l., 21.xi.–12.xii.2003, D. Král lgt.; 1 spec. (NMPC): Zemhon area, 12°30'58"N 54°06'39"E, 270–350 m a.s.l., 3.–4.ii.2010, Purchart & Vybíral lgt.; 2 spec. (CULS): Dixiam plateau, Sirhin area, 12°31'08"N 53°59'09"E, 812 m a.s.l., 1.–2.xii.2003, J. Farkač lgt.; 1 spec. (NMPC): same label data, but P. Kabátek lgt.; 4 spec. (NMPC): Dixiam plateau, Firmihin (*Dracaena* forest), 12°28.6'N 54°01.1'E, 490 m a.s.l., 15.–16.xi.2010, J. Bezděk lgt.; 1 spec. (PLCL): wadi Ayhaft, 28.ii.–1.iii.2009, P. Lo Cascio & F. Grita lgt.; 6 spec. (NMPC): Dixiam plateau, wadi Esgego, 12°28'09"N 54°00'36"E, 300 m a.s.l., 2.–3.xii.2003, lgt. D. Král.

**Distribution.** Originally most probably Oriental (S. Ryndevich, pers. comm.), this species was introduced during or prior to the 19th century to tropical and subtropical areas all over the world, and occurs rarely in adjacent temperate regions. Previously recorded from Socotra Island by WRANIK (2003).

## Discussion

Based on our study, the hydrophiloid fauna of Socotra Island contains 16 species (three species of Georissidae, and 13 of Hydrophilidae), most of which are widely distributed aquatic species (ten species) or cosmopolitan terrestrial species introduced throughout the world (two species: *Dactylosternum abdominale* and *Cercyon nigriceps*). Of the ten widely distributed aquatic taxa, seven are widely distributed in sub-Saharan Africa (*Berosus corrugatus*, *B. nigriceps*, *Laccobius minor*, *L. praecipuus*, *Sternolophus unicolor*, *Hydrophilus aculeatus* and *Helochares dilutus*) even through some of them also reach the Arabian Peninsula and the Near East (*Berosus nigriceps*, *Laccobius minor*, *L. praecipuus*, *Hydrophilus aculeatus*). Only three of the widely distributed aquatic species do not occur in Africa: two are endemic to Arabian Peninsula and Near East (*Laccobius eximius* and *Enochrus nitidulus*), and

*Coelostoma stultum* is an Oriental species reaching and widespread in Arabian Peninsula. The unidentified species of *Georissus* (*Neogeorissus*) may represent either of these groups, as it belongs to the African species group but may possibly represent an undescribed species known also from southern Yemen.

Only three species, all newly described in this contribution, are supposedly endemic to Socotra Island. Two of them inhabit running waters (*Georissus nemo* sp. nov. and *Hemisphaera socotrana* sp. nov.), while one was collected on seepages of sea and brackish water in mangroves (*Georissus maritimus* sp. nov.). The genus *Hemisphaera* is known from Africa, the Mediterranean area and southern India; species similar to *Georissus nemo* sp. nov. are known from Africa and southern India, and the mangrove-inhabiting *Georissus maritimus* sp. nov. is morphologically and ecologically unique among known *Georissus* species and its position within the genus cannot be therefore estimated at present. Unfortunately, the taxonomy of both *Georissus* and *Hemisphaera* is only poorly known and further studies are therefore needed to understand the biogeographic relations of all three endemic Socotran species. However, the possible relationship of Socotran species to the south Indian fauna is rather surprising as a similar pattern is only known in two species of Socotran Heteroptera, *Onychotrechus rhexenor* Kirkaldy, 1903 (Gerridae) and *Leptocoris bahram* Kirkaldy, 1899 (Rhopalidae) (ANDERSEN 1980, GROSS 1960, GÖLLNER-SCHIEDING 1983). Of the non-endemic species, the occurrence of *Laccobius eximius* in Socotra may be of some biogeographic significance as the species seems to be otherwise restricted only to the mountains along the western coast of Arabian Peninsula.

The recent study of the fauna of New Caledonia recognized that the aquatic species are mostly represented by widely distributed species and the endemic taxa are those inhabiting margins of streams and rivers (GENTILI 2010; JÄCH 2010; KOMAREK 2010a,b; NASSERZADEH 2010, SHORT 2010a,b; FIKÁČEK 2010). Terrestrial taxa were represented by a number of endemic species plus *Dactylosternum abdominale* and *Cercyon nigriceps* (FIKÁČEK 2010). This general pattern corresponds well with the fauna of Socotra Island: two of three endemic Socotran species inhabit stream margins (but note that the non-endemic *Laccobius* species also inhabit this habitat) and terrestrial taxa are only represented by the same two introduced species as in New Caledonia. The arid character of Socotra Island clearly does not provide a suitable environment for leaf-litter inhabiting hydrophilid taxa (hence terrestrial endemic species are absent), and seems to be limiting also for the aquatic species, preventing any island radiation. This is well illustrated by the georissid fauna of Socotra which clearly originates from independent dispersals (three Socotran *Georissus* species are not related to each other, but each belongs to a different species group) rather than from an island radiation.

### Acknowledgements

We are indebted to Jan Batelka (Prague) and Jan Farkač (Prague) for allowing us to examine the specimens deposited in their collections, to Pol Limbourg (IRSNB) for the possibility to study the type specimens deposited in the Orchymont collection, to Kamil Zagoršek (Department of Paleontology, National Museum, Prague) for his help with taking the SEM micrographs, to Jiří Hájek and Petr Kment (both NMPC) for providing us with detailed collecting circumstances and locality photographs of both new species, to J. Batelka and J. Hájek for

general discussions concerning the Socotran fauna, and to M. Gimmel (KSEM) for proof-reading of the English text. The preparation of this contribution was partly supported by the grant of the Ministry of Culture of the Czech Republic no. DF12P01OVV021. Examination of the specimens using scanning electron microscope Hitachi S-3700N was possible due to the Barrande I project partially supported by the European Union.

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