

**Adephagous water beetles (Coleoptera: Gyrinidae, Haliplidae, Noteridae, Dytiscidae) of Yemen and Dhofar region (Oman) with description of a new *Hyphydrus* from Socotra Island**

Jiří HÁJEK<sup>1)</sup> & Antonín REITER<sup>2)</sup>

<sup>1)</sup>Department of Entomology, National Museum, Cirkusová 1740, CZ-193 00 Praha 9 - Horní Počernice, Czech Republic; e-mail: [jiri\\_hajek@nm.cz](mailto:jiri_hajek@nm.cz)

<sup>2)</sup>South Moravian Museum in Znojmo, Přemyslovců 8, CZ-669 45 Znojmo, Czech Republic; e-mail: [reiter@znojmu.cz](mailto:reiter@znojmu.cz)

**Abstract.** *Hyphydrus dioscoridis* sp. nov. from Socotra Island is described and illustrated. The new species belongs to the *H. signatus* species group, and is similar to *Hyphydrus pictus* Klug, 1834 from the Arabian Peninsula, from which it differs in the significantly coarser, deeper and denser punctation, broadly bordered clypeus, head between punctures microreticulated, tubercle on the apex of apical ventrite in male rounded, and microreticulate dorsal surface of the female. Adephagous water beetles of Yemen (including Socotra Island) and Dhofar region, southernmost Oman, are reviewed. Altogether eight species of Gyrinidae (of which one is not identified to species level), one species of Haliplidae, one species of Noteridae, and 52 species of Dytiscidae are documented. New records of 48 species are presented, while two previously described species, *Dineutus arabicus* Régimbart, 1907 and *Hydaticus arabicus* Guignot, 1951, are diagnosed and illustrated. Four species of Dytiscidae are recorded from Oman for the first time; twelve species (one Gyrinidae, 11 Dytiscidae) are recorded from Yemen for the first time – eight from continental Yemen and four from Socotra; in addition two other Dytiscidae species are recorded from Socotra for the first time, and the occurrence of another Gyrinidae species previously known from a doubtful record is confirmed. Habitat information is provided for recently collected species. The zoogeographical patterns of the region are briefly summarized.

**Key words.** Coleoptera, Gyrinidae, Haliplidae, Noteridae, Dytiscidae, *Hyphydrus*, new species, new records, Oman, Yemen, Socotra

## Introduction

Although a number of papers have already been published on the fauna of water beetles of the Arabian Peninsula, the area stays insufficiently known and represents a ‘white spot’ on the border of the Palaearctic, Afrotropical and Oriental zoogeographical regions. The only comprehensively treated countries of the Arabian Peninsula are Saudi Arabia (BRANCUCCI 1979, 1980, 1981, 1985) and the United Arab Emirates (HÁJEK & BRANCUCCI 2011). The information about the fauna of the territory of Yemen is scattered among several faunistic papers and/or descriptions of new species. As the southern part of Yemen (Aden) was under British rule (1839–1967), the first publications processed data from British expeditions (GAHAN 1895, RÉGIMBART 1907, BALFOUR-BROWNE 1951, GUIGNOT 1951). Subsequently, ROCCHI (1985) presented results of the Italian expeditions to North Yemen, WEWALKA (1992) described a new *Hydroporus* Clairville, 1806, a few faunistic data were included in the publication of AL-SAFADI & DUMONT (1996), and several new records were mentioned also in the paper of HÁJEK & WEWALKA (2009). The fauna of Dhofar region in southern Oman is even less known – the only contributions about that area were published by PEDERZANI (2003) and HÁJEK & WEWALKA (2009). On the other hand, the Dytiscidae fauna of Socotra is relatively well known, and was summarised by WEWALKA (2004) who also described two new species from the island.

This work was originally intended to be an update of the fauna of Socotra Island with several first records from mainland Yemen from the Czech biological expeditions held in 2000–2012. However, as the number of ‘interesting records’ increased, the paper changed to a review of the fauna of Yemen, and the fauna of Dhofar – the southernmost part of Oman – was included in the study for three reasons: 1) the predominantly mountainous Dhofar is spreading both in eastern Yemen and southern Oman without any distinct biogeographical border; 2) the fauna of Dhofar is more similar to that of Yemen than to that of rest of Oman, being separated from it by large lowland desert area; 3) Socotra is assumed to have separated from the Dhofar region (cf. FLEITMANN et al. 2004) and therefore recognition of Dhofar is important for understanding of the composition of present-day fauna of Socotra.

## List of localities

Below we present a list of localities of Czech expeditions to Yemen and Dhofar in 2000–2013, with detailed informations about habitat, wherever it was available. Geographical co-ordinates of all localities were verified and unified according to GoogleEarth software. Localities from Yemen and Dhofar are marked on schematic map (Fig. 1); for location of localities in Socotra Island, see BEZDĚK et al. (2012). The most important habitats are figured in Figs 2–14.

### YEMEN:

- 1) ABIJAN governorate: Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. River (ca. 1–10 m wide) meandering in a wide wadi with gravelly bottom, partly with muddy deposits and grazed littoral grasses (Fig. 2).
- 2) AL BAYDA governorate: NW Al Bayda by road, At Taghiq vill. env., 14°08'26"N, 45°25'53"E, 1968 m, 4.–5. xi.2007, A. Reiter leg. Small puddle with water drawn from an oasis, muddy bottom with low littoral vegetation.

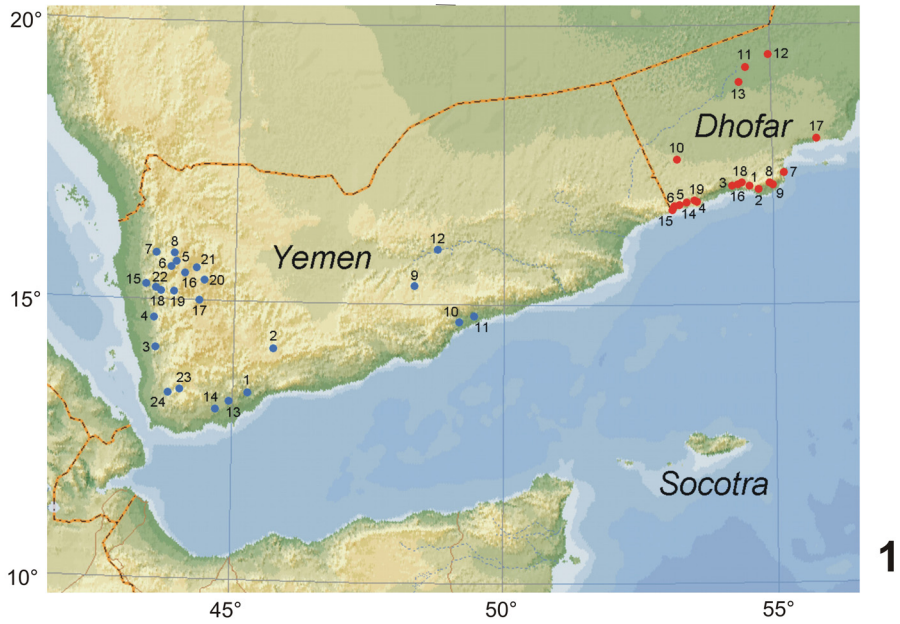
- 3) AL HUDAYDAH governorate: 12 km SE Al Mawkir vill., wadi Zabid, 14°09'35"N, 43°29'33"E, 264 m, 30.–31.x.2007, A. Reiter leg. Larger unshaded pool, ca. 15 × 7 m, in large gravelly watercourse; partly with flowing water, partly covered with filamentous algae.
- 4) AL HUDAYDAH governorate: Jabal Bura valley forest National Park, 14°52.4–5'N, 43°24.–25.2'E, 240–350 m, 30.x.–1.xi.2005, P. Kabátek leg.; 9.–11.iv.2007, S. Kadlec leg.; 4.xi.2010, J. Hájek leg. Drying up stream, ca. 1 m wide, gravelly bottom, partly covered with filamentous algae, partly shaded with vegetation; residual pools, ca. 0.5 m wide (Fig. 3).
- 5) AL MAHWIT governorate: 10 km S Shibam, Aruz, 15°27'43"N, 43°55'03"E, 2560 m, 1.–2.xi.2007, A. Reiter leg. Residual pool in periodic watercourse, ca. 15 × 5 m, muddy bottom with stones, grazed low littoral grasses.
- 6) AL MAHWIT governorate: Al Ahjur, Badia vill. env., Al Khaltabi waterfall, 15°28.4'N, 43°51.5'E, 2500 m, 2.xi.2010, J. Hájek leg. Stream above a waterfall, ca. 2 m wide, gravelly bottom, partly covered with filamentous algae; residual pool below the waterfall.
- 7) HAJJAH governorate: NE Hajjah by road, Halhal vill. env., 15°43'42"N, 43°37'25"E, 998 m, 2.–3.xi.2007, A. Reiter leg. Cascade of shallow pools with gravelly bottom, small waterfalls and hygropetric habitats; partly covered with filamentous algae.
- 8) HAJJAH governorate: Thula castle, 15°34'32"N, 43°53'54"E, 2967 m, 2.xi.2007, A. Reiter leg. Small reservoir (ca. 3 × 2 m) retaining precipitation; without littoral.
- 9) HADRAMAUT governorate: Al Khurabayah env., wadi Dawan, 15°08.8'N, 48°25.6'E, 1005 m, 19.–20.x.2005, D. Král leg. Collected at light trap in a wadi.
- 10) HADRAMAUT governorate: N of Al Mukalla, Nueima, 14°36.4'N, 49°05.7'E, 279 m, 20.–21.x.2005, D. Král leg. Collected at light trap in a wadi.
- 11) HADRAMAUT governorate: NE Ghayl Ba Wazir, 14°47'33"N, 49°22'46"E, 118 m, 6.–7.xi.2007, A. Reiter leg. Pool at the bottom of a karstic abyss.
- 12) HADRAMAUT governorate: W of Saywun, Shibam, 15°54'N, 48°39'E, 681 m, 4.iv.2007, S. Kadlec leg. Collected in a small stream.
- 13) LAHJ governorate: Kadamat Al Abdali vill. env., wadi Tuban, 13°07'49"N, 44°51'02"E, 200 m, 24.–25.x.2007, A. Reiter leg. Flowing residual pools in large gravelly watercourse, without vegetation.
- 14) LAHJ governorate: W Lahj Al Hutah by road, wadi Am Rija, 13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. Residual pool in periodic watercourse, diameter ca. 5 m, muddy bottom (Fig. 7).
- 15) SANA'A governorate: 5 km N of Beni Al Salal, 15°10.9'N, 43°23.4'E, 350 m, 4.–5.xi.2010, J. Hájek leg. Beetles were found in the morning under artificial lights in a petrol station.
- 16) SANA'A governorate: 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, 1.v.2004, A. Reiter leg.; 19.xi.2010, J. Hájek leg. Montane stream, ca. 3 m wide, gravelly bottom, heavily covered with filamentous algae (Fig. 4).
- 17) SANA'A governorate: 60 km SW Sana'a, wadi Anis, 15°00'N, 44°09'E, 1522 m, 7.x.2005, D. Král leg. Collected at light trap in a wadi with large residual pools.
- 18) SANA'A governorate: Bab Bahel, 15°07.0'N, 43°40.9'E, 1195 m, river valley and pool, 4.xi.2010, J. Hájek leg. Large and deep, exposed pool, probably fed from a nearby river.
- 19) SANA'A governorate: Beni Mansour vill. env., 15°06.1–4'N, 43°52.8–53.2'E, 1520–1550 m, 3.+5.+19.xi.2010, J. Hájek leg. Residual pools in drying up stream, ca. 1 m wide, clayey bottom, partly covered with filamentous algae.
- 20) SANA'A governorate: Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, 6.xi.2010, J. Hájek leg. Collected in a water tank, ca. 20 × 8 m, clayey bottom (Fig. 5).
- 21) SANA'A governorate: wadi Dahr, 2199 m, 15°26.5'N, 44°07.6'E, 5.x.2005, P. Kabátek leg. Collected at light trap in a wadi with residual pools.
- 22) SANA'A governorate: wadi Moor, 15°08.0'N, 43°36.4'E, 744 m, 5.xi.2010, J. Hájek leg. Fast running stream with small waterfalls, ca. 2 m wide, gravelly bottom.
- 23) TA'IZZ governorate: Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg. Large artificial pool, diameter ca. 12 m, used as a watering place, muddy bottom, without vegetation (Fig. 6).
- 24) TA'IZZ governorate: NNW Ash Shuqayrah by road, wadi Bani Khawlan, 13°19'57"N, 43°43'19"E, 460 m, 27.x.2007, A. Reiter leg. Wadi with a permanent river, ca. 2 m wide; shallow flowing pools, bottom with fine sediments as well as large stones, rich littoral vegetation (*Typha* L., *Juncus* L., *Cyperus* L., etc.).

**DHOFAR:**

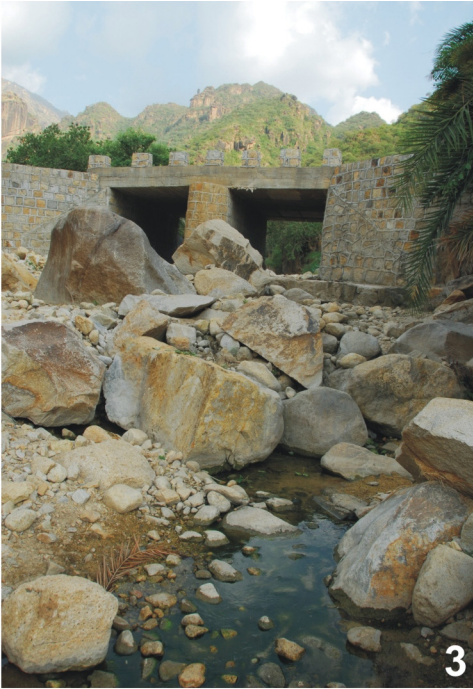
- 1) 12 km NW Mirbat, wadi Hannah [= wadi Heisher], 17°03'N, 54°37'E, 310 m, 1.x.2002, L. Kolářová leg.; 30.iii.2012, A. Reiter leg. Small stream at the forested valley floor. Stony streambed with flowing water, dammed with a concrete reservoir (Fig. 8).
- 2) 13 km E Mirbat, wadi Ain, 17°01'N, 54°47'E, 59 m, 29.iii.2012, A. Reiter leg. Slowly flowing stream in a shallow valley, sandy and muddy bottom, rich grazed littoral vegetation.
- 3) Ain Tabruq, 17°06'02"N, 54°19'36"E, 115 m, 28.x.2009, A. Reiter leg. Abundant spring flowing first in concrete bed and then in muddy bed with low littoral vegetation.
- 4) Al Mughsayl, 16°53'46"N, 53°46'24"E, 45 m, wadi 2 km from seashore, 26.x.2009, A. Reiter leg. Larger, more or less permanent pools in a wadi; gravelly bottom, partly with muddy sediments, littoral and submerged vegetation.
- 5) Difa, wadi, 16°45'N, 53°14'E, 435 m, 23.iii.2012, A. Reiter leg. Residual, partly flowing pools in a wadi; stony and gravelly bottom, partly covered with filamentous algae (Fig. 9).
- 6) Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg. Concrete watering place (Fig. 10).
- 7) Hasik, wadi 4 km to S, 17°25'N, 55°17'E, 46 m, 1.iv.2012, A. Reiter leg. Periodic river, ca. 1–5 m wide; gravelly bottom, partly with muddy sediments, littoral vegetation.
- 8) Jufa, 15 km W (Laga Shalia), 17°11'05"N, 54°56'38"E, 13.iv.2013, R. Fouqué leg. Collected in a stream and pools in a wadi.
- 9) Jufa, haunt, 17°08'15"N, 55°01'41"E, 175 m, 29.x.2009, A. Reiter leg. Concrete watering place fed from a well, and shallow inundated area (ca. 10 × 5 m) below the watering place; inundated area with muddy bottom and grazed littoral vegetation.
- 10) Mudhai oasis, spring, 17°28'38"N, 53°21'09"E, 548 m, 24.x.2009, A. Reiter leg. Artificial reservoir (ca. 15 × 10 m) fed from a spring in oasis; concrete bottom, partly with muddy sediments, littoral vegetation (*Typha*, *Juncus*).
- 11) Muntasar, spring, 19°27'14"N, 54°37'14"E, 135 m, 23.x.2009, A. Reiter leg. Large shallow pools in desert, caused by inundations from an artesian well; muddy bottom, littoral vegetation, efflorescence.
- 12) Muqshin, oasis, 19°35'N, 54°53'E, 155 m, 29.iii.2011, A. Reiter leg. Salty pools in a depression fed from an artesian well, muddy bottom, efflorescence; part of material was collected also under street lights (Fig. 11).
- 13) Qitbit, 19°09'20"N, 54°30'31"E, 164 m, 23.x.2009, A. Reiter leg. Artificial reservoir, ca. 8 × 5 m, with sandy-muddy bottom; fed from an artesian well in desert.
- 14) Rakhuyt, 16°46.3'N, 53°29.2'E, 0–50 m, 13.–14.i.2007, S. Jákl leg. Collected at light trap.
- 15) Sarfayt env., 16°41'23"N, 53°08'02"E, 580 m, 4.x.2013, P. Kučera leg.
- 16) Taqah env., 17°06'N, 54°26'E, 270–350 m, 18.–21.ix.2003, R. Červenka leg. Collected at light trap.
- 17) Wadi Ash Shuwaymiyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. Deep pool (depth more than 3 m) under a rocky terrace, ca. 20 × 10 m, surrounded with reeds (*Phragmites* Adans.).
- 18) Wadi Darbat, N part near Shihayt, 17°09'N, 54°28'E, 325 m, 28.iii.2012, A. Reiter leg. Large, partly flowing residual pools, gravelly bottom usually with muddy sediments and rich littoral vegetation.
- 19) Wadi Ra's Sajir, 16°50'42"N, 53°41'10"E, 30–400 m, 20.–31.viii.2012, P. Kučera leg. Wadi with dense vegetation.

**SOCOTRA:**

- Aloove area, near Hassan village, [inaccurately mentioned as Zemhon area], 12°30'58"–31°12"N, 54°06'39"–07°24"E, 220–350 m, 3.–4.ii.2010, L. Purchart & J. Vybíral leg.; 9.–10.xi.2010, J. Bezděk leg. Collected at light trap in shrubland with dominant *Croton* L. and *Jatropha* L.
- Dixam lake, Dixam plateau, 12°31'23"N, 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg. Small lake in a karstic plain, diameter ca. 30 m; stony bottom covered with muddy sediments, without vegetation. Used as a watering place.
- Dresmoinen village, wadi Darho, 12°30'18"N, 54°02'08"E, 365 m, 13.v.2004, A. Reiter leg. Stream and pools in a wide valley, gravelly-muddy bottom.
- Firmihin, Dixam plateau, 12°28.6'N, 54°01.1'E, 490 m, J. Bezděk leg. Collected at light trap in *Dracaena cinnabari* forest.
- Hadibo env., 12°36'02"N, 54°02'04"E, 10–100 m, 21.xi.–12.xii.2003, J. Farkač leg.
- Homhil protected area, 12°34'27"N, 54°18'32"E, 364 m, 28.–29.xi.2003, P. Kabátek & D. Král leg.



Figs 1–2. 1 – Map of studied area with marked localities in Yemen and Dhofar region. 2 – Aquatic habitat in Yemen: meandering river in wadi Bana.



Figs 3–5. Aquatic habitats in Yemen. 3 – temporary stream in Jabal Bura valley Forest National Park; 4 – pool in mountain stream densely covered with filamentous algae, 5 km SW Matnah; 5 – artificial water reservoir with muddy bottom at Bait Baws, Sana'a.



Figs 6–7. Aquatic habitats in Yemen. 6 – artificial water reservoir between garden plantations at Mashgab; 7 – residual pool with muddy bottom in lower part of wadi Am Rija.



Figs 8–9. Aquatic habitats in Dhofar, Oman. 8 – stream in forested wadi Hannah dammed with a small concrete dam; 9 – residual pool in wadi with gravel bottom at Difa, partially with running water.





Figs 10–11. Aquatic habitats in Dhofar, Oman. 10 – concrete tank at the livestock watering place near Hagarir, on the slope of Jabal Al Qamar mts.; 11 – salty pools in the desert at northeastern corner of Dhofar province, near Muqshin.



Figs 12–14. Aquatic habitats in Socotra. 12 – temporary stream in wadi Ayhaft; 13 – spring pool with filamentous algae in wadi Madar; 14 – pools surrounded with *Juncus* sp. marsh in wadi Zerig.

- Kam village, 10 km E of Hadibo, 12°33'42"N, 54°07'05"E, 60 m, 5.v.2004, A. Reiter leg. Partly shaded pool surrounded by an oasis in lower part of a wadi, close to the seashore; muddy bottom, partly with littoral vegetation.
- Qadub, coastal salt marsh, 12°38.3'N, 53°57.3'E, 8 m, 14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. Shallow pools, partly overgrown with *Chara* algae.
- Qalansiyah env., N slopes of Khayrha Mts., 12°38'50"N, 53°27'45"E, 85–592 m, 9.–10.xii.2003, J. Farkač leg.
- Sharet Halma village env., Noked plain, 12°21.9'N, 54°05.3'E, 20 m, 10.–11.xi.2010, J. Hájek leg. Collected at light trap at sandy dunes.
- Sirhin area, Dixam plateau, 12°31'08"N, 53°59'09"E, 812 m, 1.–2.xii.2003 J. Farkač leg.
- Wadi Ayhaft, 12°36'26–38"N, 53°58'49"–59'22"E, 190–220 m, 15.iii.2000, V. Bejček & K. Šťastný leg.; 24.–26.xi.2003, P. Kabátek leg.; 16.v.2004, A. Reiter leg.; 7.–8.xi.2010, J. Hájek leg. Large shallow residual pools in a wadi; in flowing part of a stream (Fig. 12).
- Wadi Denegen, 12°36'42"–37'01"N, 54°03'41–50"E, 10–140 m, 19.–20.ii.2000, V. Bejček & K. Šťastný leg.; 27.xi.2003, J. Farkač leg.; 4.v.2004, A. Reiter leg. Wadi with several aquatic habitats: periodic stream in gravelly watercourse; pools on alluvial terraces, with muddy bottom and littoral and submerged vegetation; shallow springs with *Juncus* marsh.
- Wadi Esgego, Dixam plateau, 12°28'09"N, 54°00'36"E, 300 m, 2.–3.xii.2003, P. Kabátek & D. Král leg.; 13.v.2004, A. Reiter leg. Stream in a deep valley, ca. 2 m wide; pools with sandy or muddy substrate partly shaded with coastal vegetation.
- Wadi Faar, 12°25'59"N, 54°11'42"E, 45–69 m, 1.iv.2001, V. Bejček & K. Šťastný leg.; 14.v.2004 A. Reiter leg. Residual pools in lower part of a wadi; larger pools with gravelly bottom, smaller pools with muddy substrate and partly covered with littoral vegetation.
- Wadi Ireh, 12°23.4'N, 53°59.8'E, 65 m, 13.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. Residual pools in lower part of a wadi, ca. 2 m in diameter, gravel bottom.
- Wadi Madar, Al Haghier Mts., 12°33.2'N, 54°00.4'E, 1180–1230 m, 12.–14.xi.2010, J. Hájek leg. Small montane stream, ca. 1 m wide, with stony or gravelly bottom; spring pools with muddy bottom, partly covered with *Chara* algae (Fig. 13).
- Wadi Zeriq, Dixam plateau, 12°29.6'N, 53°59.5'E, 655 m, 3.xii.2003, P. Kabátek leg.; 16.vi.2009, V. Hula leg.; 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. Large shallow pools on a submontane stream, muddy bottom; surrounded with *Juncus* marsh (Fig. 14).

## Material and methods

Habitus photographs were taken with a Canon EOS 550D digital camera and Canon MP-E 65 mm objective lens. Images of the same specimen at different focal planes were combined using Helicon Focus 5.1.19 software.

The terminology used to denote the orientation of the genitalia follows MILLER & NILSSON (2003). The following abbreviations are used in descriptions: TL – total length, length from front of head to apex of elytra; TL-h – total length minus head length, length of body from anterior margin of pronotum to apex of elytra; TW – maximum width of body measured at right angles to TL.

Exact label data are cited for the type material. A slash (/) separates different lines and a double slash (//) different labels of data. Additional remarks are found in square brackets. For explanations and alternative transcriptions of Socotran localities see BEZDĚK et al. (2012).

The specimens included in this study are deposited in the following institutional and private collections:

- BMNH The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom (Christine E. Taylor, Maxwell V. L. Barclay);
- CULS Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague (Jan Farkač);

GWCW	Günther Wewalka collection, Wien, Austria;
HFCB	Hans Fery collection, Berlin, Germany (property of NHMW);
IBEB	Institut de Biologia Evolutiva, Barcelona, Spain (Ignacio Ribera);
JSCL	Jaroslav Štátný collection, Liberec, Czech Republic;
MNHN	Muséum national d'Histoire naturelle, Paris, France (Thierry Deuve, Antoine Mantilleri);
NHMW	Naturhistorisches Museum, Wien, Austria (Manfred A. Jäch);
NMPC	Národní muzeum, Praha, Czech Republic (Jiří Hájek);
ONMM	Oman Natural History Museum, Muscat, Oman;
PKCL	Pavel Kučera collection, Liberec, Czech Republic.

Two specimens of *Hyphydrus dioscoridis* sp. nov. and one of *H. pictus* Klug, 1834 were used for DNA extraction using a commercial column kit in the laboratory of I. Ribera (IBEB), and the barcode fragment (5' end of the mitochondrial gene cytochrome oxidase 1) was sequenced with the primers LCO1490-HCO2198 (FOLMER et al. 1994). DNA extractions and specimen vouchers are kept in the IBEB; sequences have been deposited in the EMBL database under the accession numbers LM655065–LM655067.

## Taxonomy

### *Hyphydrus dioscoridis* sp. nov.

(Figs 15–26)

*Hyphydrus* sp. ♀: WEWALKA (2004: 470).

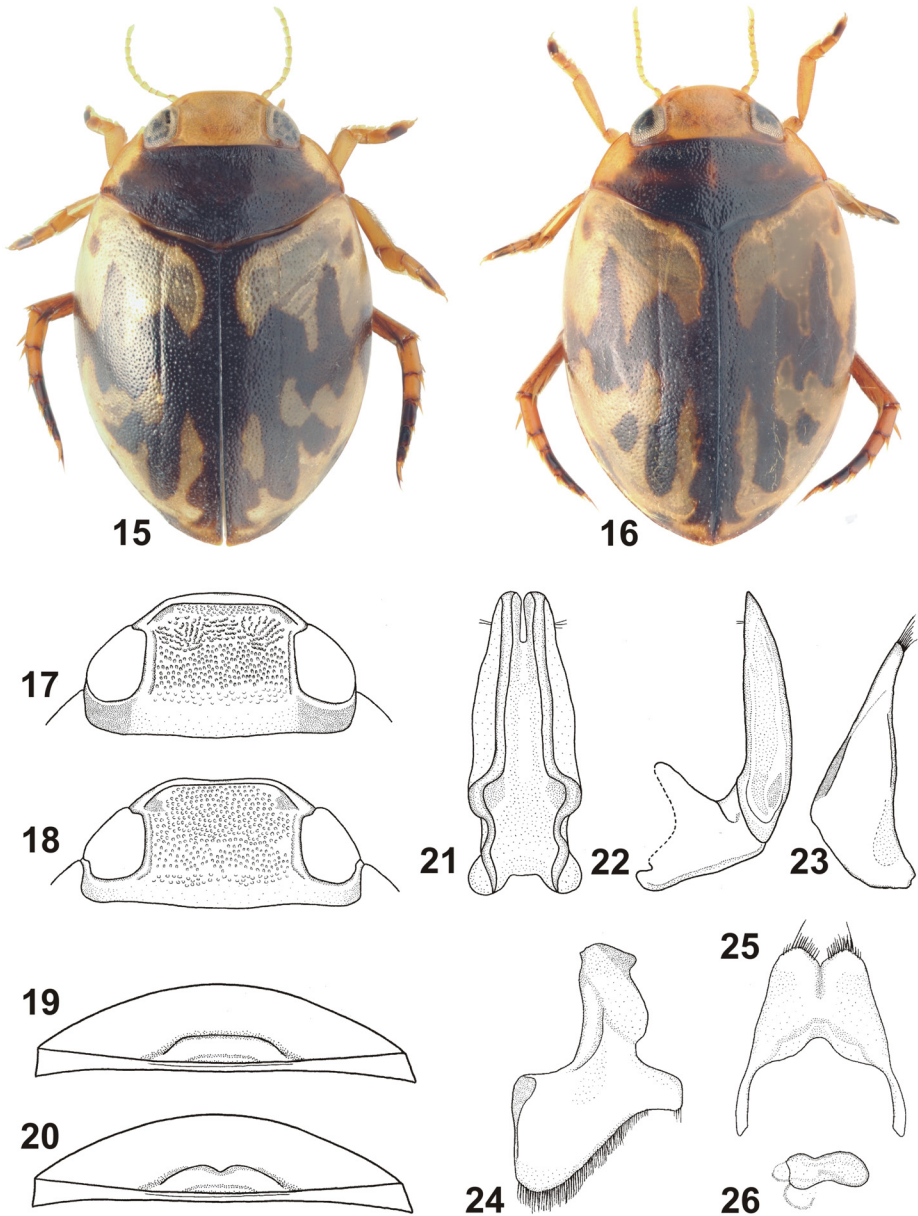
**Type locality.** Yemen, Socotra Island, wadi Dineghen, 12°36'42"N, 54°03'41"E, 140 m a.s.l.

**Type material.** HOLOTYPE: ♂ (NMPC), 'YEMEN, SOCOTRA island / wadi DENEKEN, 6 km SE / Hadibo; 140 m a.s.l. / 12°36'42"N; 54°03'41"E / 4. V. 2004 lgt. A.REITER [printed]'. PARATYPES: 1 ♂ 5 ♀♀, same label data as holotype (NMPC); 3 ♀♀, 'Yemen, Soqatra Is., 1.-2.xii.2003 / Dixam plateau, SIRHIN area / N 12°31'08" E 53°59'09" [GPS] / Jan Farkač lgt., 812 m // YEMEN – SOCOTRA 2003 / Expedition; Jan Farkač / Petr Kabátek & David Král [printed]' (NMPC); 1 ♀, 'YEMEN, SOCOTRA island / wadi FAR / 45 m a.s.l. / 12°25'59"N; 54°11'42"E / 14. V. 2004 lgt. A.REITER [printed]' (NMPC); 1 ♀, 'YEMEN, Socotra Island / wadi Ayhaft, 200 m / 12°36.5'N, 53°58.9'E / Jiří Hájek leg. 7-8.xi.2010 // used for DNA extraction / voucher number IBE-RA625 [printed]' (IBEB); 3 ♂♂ 2 ♀♀, 'YEMEN, Socotra Island / wadi Madar, 1180–1230 m / 12°33.2'N, 54°00.4'E, / Jiří Hájek leg. 12–14.xi.2010' (IBEB, NMPC) [one male with additional label: 'used for DNA extraction / voucher number IBE-RA612 [printed]' (IBEB)].

**Description of male holotype. *Habitus.*** Body shape globose, rounded. Pronotum trapezoidal, broadest basally; sides of pronotum regularly rounded. Maximum width of pronotum distinctly smaller than maximum width of body, angle between pronotum and elytra fairly distinct. Body surface shiny (Fig. 15).

***Colouration.*** Body colouring testaceous to ochraceous with dark (brownish-black) colour pattern. Head somewhat darkened posterior to eyes; pronotum largely darkened with broad longitudinal testaceous band along sides except posterior angles; elytra with separate rounded dark lateral subhumeral spot, and irregular longitudinal markings on disc (cf. Figs 15–16); legs testaceous with pro- and mesotarsomeres III, and metatarsomeres III–V darkened; ventral surface darkened except head and prosternum.

***Surface structure and sculpture.*** Head with indistinct microreticulation, chiefly anterior to eyes. Punctuation fine, rather sparse, smaller on vertex, lacking posteriorly to eyes; punctures irregularly distributed, distance between punctures usually bigger than their diameter; punctures in frontolateral depressions somewhat coarser, and sometimes confluent. Clypeus



Figs 15–26. 15–17, 19, 21–26 – *Hyphydrus dioscoridis* sp. nov. 15 – male habitus; 16 – female habitus; 17 – head in dorsal view; 19 – apical abdominal ventrite of male; 21 – median lobe in ventral view; 22 – median lobe in lateral view; 23 – paramere; 24 – gonocoxosternum; 25 – gonocoxae; 26 – spermatheca. 18, 20 – *H. pictus* Klug, 1834.

broadly bordered, its anterior margin rounded (Fig. 17); frontolateral depressions shallow.

Pronotum smooth, with shallow medial longitudinal scratch, and fine punctation; punctures sparser on disc and denser along lateral margins, punctation double, but differences in size of punctures rather small. Distance between punctures on disc much larger than their diameter; along margins distance between punctures approximately equal to diameter of coarse punctures. Sides of pronotum rounded, bordered except for anterior angles.

Elytra smooth, without reticulation; punctation double: size differences small, coarser punctures much sparser than finer punctures, distance between punctures larger than their diameter. Discal puncture line well marked in basal half, other puncture lines almost imperceptible. Epipleura finely punctate.

Ventral surface with reticulation only present laterally on head posterior to eyes; pro- and mesocoxae with areolate reticulation. Prosternal apophysis lanceolate, with longitudinal line of long golden setae medially. Metanepisternum (= metasternal wing) narrow, lacinate. Punctuation of metaventrite consisting of fine punctures; punctuation of metacoxal plates coarser and denser. Abdominal ventrites uniformly finely punctate; medially and along posterior margins with long golden setae. Apical ventrite with subapical carina raised medially to form distinct transverse swelling (Fig. 19); posterior margin with line of setigerous punctures, each with golden seta.

Pro- and mesotarsi slightly broadened, with adhesive setae. Protrochanters incised.

Median lobe of aedeagus in ventral view subparallel, only slightly narrowing to apex; apex deeply incised, with several short setae (Figs 21–22). Parameres (lateral lobes) triangularly shaped with apical tuft of setae (Fig. 23).

**Female.** Similar to males (Fig. 16); pro- and mesotarsi not broadened; protrochanters not incised. Microreticulation of head more distinct and punctation of elytra finer than in male; disc of elytra very finely microreticulate, thus surface rather matt. Tubercle on apical ventrite absent. Female genitalia as in Figs 24–26.

**Variability.** The specimens of the type series vary in the shape and extent of dark body colouration.

Measurements: TL 3.9–4.6 mm (holotype 4.3 mm), TL-h 3.4–4.1 mm (holotype 3.7 mm); TW 2.5–3.0 mm (holotype 2.7 mm).

**Differential diagnosis.** Based on the combination of the following characters, *Hyphydrus dioscoridis* sp. nov. belongs undoubtedly to the *Hyphydrus signatus* species group sensu BISTRÖM (1982): 1) longer spine of metatibia not serrate; 2) border of head foremargin without a furrow; 3) elytral punctation double; 4) metatibia externally with a distinct row of punctures; 5) median lobe symmetric in ventral view. The new species is similar to *Hyphydrus pictus* Klug, 1834 from the Arabian Peninsula and north-eastern Africa, but differs from this species in the significantly coarser, deeper and denser body punctation (distance between punctures equal to diameter of punctures or even less); clypeus more broadly bordered (cf. Figs 17–18); head between punctures microreticulated; tubercle on apex of apical ventrite without notch (with shallow notch in *H. pictus* (Fig. 20)), and elytral disc of female microreticulate.

**Molecular data.** The two barcode sequences of the specimens from wadi Madar and wadi Ayhaft were identical, but with a 5% difference from the specimen from continental Yemen (33 out of 568 positions). This genetic difference is larger than that of many closely related

species pairs of Dytiscidae (e.g. RIBERA & VOGLER 2004), and at a standard evolutionary rate of Adephegan Coleoptera would correspond to a separation of more than 1 million years (e.g. ANDÚJAR et al. 2012).

**Etymology.** The new species is named after ‘Dioscoridus’, an ancient Latin name of Socotra Island. The specific epithet is a noun in the genitive case, standing in apposition.

**Collection circumstances.** The new species was collected in residual pools of drying-up streams and springs in wadis (e.g. Fig. 13).

**Distribution.** So far known only from several localities in Socotra Island, Yemen.

## List of recorded species

### GYRINIDAE

#### *Aulonogyrus (Afrogyrus) ater* Brinck, 1955

**Published records.** BALFOUR-BROWNE (1951: 196): Yemen (as *Aulonogyrus caffer* (Aubé, 1838)).

**Distribution.** An eastern African species, spreading from Zambezi river in the south to Eritrea and mountains of south-west Arabia in the north (cf. BRINCK 1955).

#### *Aulonogyrus (Afrogyrus) flavipes* (Boheman, 1848)

**Published records.** TASCHENBERG (1883: 177): Socotra (as *Gyrinus* sp.); GAHAN (1903: 266): Socotra (as *Aulonogyrus virescens* Régimbart, 1883).

**Material examined.** YEMEN: SOCOTRA ISLAND: 2 ♂♂, wadi Ayhaft, 12°36.5'N, 53°58.9'E, 200 m, 7.–8.xi.2010, J. Hájek leg.; 1 ♂, Al Haghier Mts., wadi Madar, 12°33.2'N, 54°00.4'E, 1180–1230 m, 12.–14.xi.2010, J. Hájek leg. (all NMPC).

**Notes.** TASCHENBERG (1883) recorded a *Gyrinus* sp. from Socotra, while GAHAN (1903) presented a doubtful record of *Aulonogyrus virescens* Régimbart, 1883 (= *A. flavipes*), and considered it conspecific with Taschenberg's *Gyrinus*. The latter record was repeated also by BRINCK (1955).

**Habitat.** Collected in small pools in running parts of streams in wadis (e.g. Fig. 12).

**Distribution.** Widely distributed Afrotropical species; **occurrence confirmed in Yemen (Socotra Island).**

#### *Dineutus (Protodineutus) aereus* (Klug, 1834)

**Published records.** TASCHENBERG (1883: 177): Socotra; WATERHOUSE (1881: 470): Socotra; GAHAN (1903: 266): Socotra; BALFOUR-BROWNE (1951: 196): Yemen; PEDERZANI (2003: 24): Dhofar.

**Material examined.** OMAN: DHOFAR: 2 ♀♀, wadi Heisher, 1.x.2002, L. Kolářová leg. (JSCL, NMPC); 1 ♂, Taqah env., 270–350 m, 18.–21.ix.2003, R. Červenka leg. (JSCL). YEMEN: SOCOTRA ISLAND: Yemen, Socotra Island: 2 ♂♂ 1 ♀, 6 km NE Hadibo, wadi Denegen, 12°37'01"N, 54°03'50"E, 10–100 m, 19.–20.ii.2000, V. Bejček & K. Šťastný leg. (CULS, NMPC); 1 ♂, same data, but 12°36'55"N, 54°03'49"E, 85 m, 27.xi.2003, J. Farkač; 1 ♂ 1 ♀, same data, but 12°36'42"N, 54°03'41"E, 140 m, 4.v.2004, A. Reiter leg.; 1 ♂, wadi Ayhaft, 15.iii.2000, V. Bejček & K. Šťastný leg.; 2 ♂♂ 5 ♀♀, same data, but 12°36'38"N, 53°58'49"E, 190 m, 24.–26.xi.2003, P. Kabátek leg.; 2 ♂♂, same data, but 12°36.5'N, 53°58.9'E, pool, 200 m, 8.xi.2010, J. Hájek leg.; 1 ♂, wadi Faar, 12°25'59"N, 54°11'42"E, 69 m, 1.iv.2001, V. Bejček & K. Šťastný leg.; 1 ♂, Hadibo env., 12°36'02"N, 54°02'04"E, 10–100 m, 21.xi.–12.xii.2003,

J. Farkač leg.; 5 ♂♂ 2 ♀♀, Homhil protected area, 12°34'27"N, 54°18'32"E, 364 m, 28.–29.xi.2003, D. Král leg.; 1 ♀, Qalansiyah env., N slopes of Khayrha Mts., 12°38'50"N, 53°27'45"E, 85–592 m, 9.–10.xii. 2003, J. Farkač leg.; 1 ♂, Dixam plateau, wadi Esgego, 12°28'09"N, 54°00'36"E, 300 m, 2.–3.xii.2003, P. Kabátek leg.; 2 ♂♂, same data, but 13.v.2004, A. Reiter leg.; 1 ♂ 1 ♀, Dixam plateau, wadi Zeriq, 16.vi.2009, V. Hula leg.; 2 ♀♀, Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Collected in pools of drying up streams in wadis.

**Distribution.** Widespread species, occurring almost in entire Africa south of Sahara, southern Algeria and Libya, and Egyptian oases; widely distributed also in Arabia (BRINCK 1955).

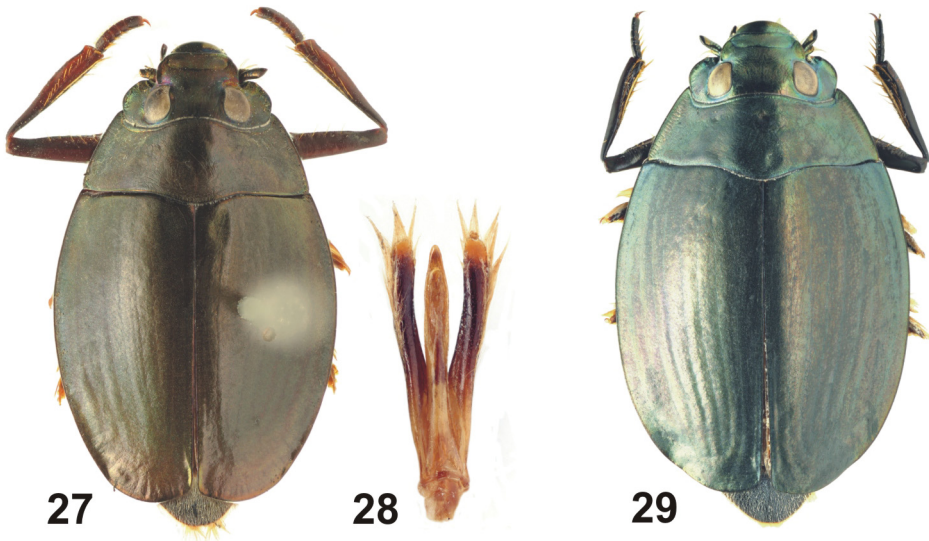
***Dineutus (Protodineutus) arabicus* Régimbart, 1907**

(Figs 27–28)

**Published records.** GAHAN (1985: 286): Yemen (as ?*Dineutus aereus*); RÉGIMBART (1907: 142): Yemen (original description); data repeated by BALFOUR-BROWNE (1951: 195).

**Type material.** SYNTYPES: 1 ♂, 'Type [round label with red margin, printed] // Hadramaut. [yellow underlined] / Arabia. / 94-235 [printed] // *Dineutus / arabicus* Rég. / n.sp. [Régimbart's handwriting]' (BMNH); 1 ♀, ♀ [printed] // Hadramaut. [yellow underlined] / Arabia. / 94-235 [printed] // No [printed] 461 [handwritten] / examined by / Prof. Thaxter for / Laboulbeniaceae. [printed] // *Dineutus / arabicus / co-type* Rég. [handwritten]' (BMNH).

**Notes.** A species known only from the type series from Hadramaut. With apical margin of elytra not serrate, it is more similar to Oriental *D. indicus* Aubé, 1838 rather than *D. aereus*. However *D. arabicus* differs from both mentioned species in absence of postero-lateral elytral situation (Fig. 27), deeply impressed elytral reticulation and different shape of male aedeagus (Fig. 28).



Figs 27–29. 27–28 – *Dineutus arabicus* Régimbart, 1907: 27 – habitus of male syntype (12.5 mm); 28 – median lobe in ventral view. 29 – *Dineutus* sp. ♀ (Yemen, Jabal Bura) (15.0 mm). Not in scale.



***Dineutus (Protodineutus) grandis* (Klug, 1834)**

**Published records.** BALFOUR-BROWNE (1951: 195): Yemen; ROCCHI (1985: 449): Yemen.

**Distribution.** A species distributed in north-east Africa and the Arabian Peninsula (cf. BRINCK 1955).

***Dineutus (Protodineutus) sp.***

(Fig. 29)

**Material examined. YEMEN: AL HUDAYDAH GOV.:** 1 ♀, Jabal Bura valley forest NP, 14°52'N, 43°24'E, 261–600 m, 9.–11.iv.2007, S. Kadlec leg. (NMPC).

**Notes.** A single female (body length 15 mm) cannot be identified within any of the known *Dineutus* species from the region. It is characterised with relatively elongate habitus with sides of elytra only weakly rounded and feeble subapical elytral sinuation; greenish lustre of dorsal surface and well visible elytral striae. Finding more specimens, especially males, is necessary for solving its classification.

***Dineutus (Spinodineutes) subspinosus* (Klug, 1834)**

**Material examined. OMAN: DHOFAR:** 1 ♂ 1 ♀, Hasik, wadi 4 km to S, 17°25'N, 55°17'E, 46 m, 1.iv.2012, A. Reiter leg. **YEMEN: SOCOTRA ISLAND:** 1 ♀, Dixam plateau, Dixam lake, 12°31'23"N 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg.; 1 ♂ 1 ♀, wadi Ireh, pool, 12°23.4'N, 53°59.8'E, 65 m, 13.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; 3 ♀♀, Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Similarly to *D. aereus*, collected in pools of drying up streams in wadis.

**Distribution.** Widespread African species, occurring through the continent except in the extreme south and north; abundant in Madagascar (BRINCK 1955). It is recorded also from Oman (BRANCUCCI 1985). Other records from the Arabian Peninsula and the Near East need to be verified. **First record from Yemen (Socotra Island).**

***Gyrinus (Gyrinus) luctuosus* Régimbart, 1883**

**Published records.** ROCCHI (1985: 449): Yemen.

**Distribution.** A species endemic to the Arabian Peninsula, so far recorded only from Iraq, Saudi Arabia and Yemen (cf. ROCCHI 1985).

## HALIPLIDAE

***Haliplus (Neohaliplus) lineatocollis* (Marsham, 1802)**

**Published records.** BALFOUR-BROWNE (1951: 182): Yemen; ROCCHI (1985: 445): Yemen.

**Material examined. YEMEN: AL MAHWIT GOV.:** 1 spec., Al Ahjur, Badia vill. env., Al Khaltabi waterfall, 15°28.4'N, 43°51.5'E, 2500 m, 2.xi.2010, J. Hájek leg. **SANA'A GOV.:** 5 spec., 5 km SW Matnah vill., 15°13'41"N, 43°59'40"E, 2750 m, stream, 1.v.2004, A. Reiter leg. (all NMPC).

**Habitat.** Collected in high altitude streams (e.g. Fig. 4).

**Distribution.** Widely distributed West Palaearctic species, known from the Canary Islands, north Africa, most of Europe to the Near and Middle East (VONDEL 2005).

## NOTERIDAE

*Canthydrus notula* (Erichson, 1843)

**Published records.** BALFOUR-BROWNE (1951: 182): Yemen.

**Material examined. OMAN: DHOFAR:** 26 spec., 30 km E Salalah, 6 km E Taqah, wadi Darbat, pools near sea, 26.ii.+1.iii.1998, G. Wewalka leg. et det. (GWCW, NMPC, ONMM); 1 spec., 40 km E km Salalah, Wadi Darbat, upper valley, rivulet, 26.ii.1998, G. Wewalka leg. et det. (CWCW); 3 spec., Jufa, haunt, 17°08'15"N, 55°01'41"E, 175 m, 29.x.2009, A. Reiter leg.; 2 spec., wadi Darbat, N part near Shihayt, 17°09'N, 54°28'E, 325 m, 28.iii.2012, A. Reiter leg.; 7 spec., 13 km E Mirbat, wadi Ain, 17°01'N, 54°47'E, 59 m, 29.iii.2012, A. Reiter leg. **YEMEN: ABLJAN gov.:** 7 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. (all NMPC).

**Habitat.** Collected in relatively large and permanent pools on the wadi bottom with dense littoral vegetation and partially running water (e.g. Fig. 2), or in a shallow vegetated puddle under a livestock watering place.

**Distribution.** Afrotropical species occurring in whole Sub-Saharan Africa, north-easterly reaching Yemen and southern Oman in the Arabian Peninsula (cf. NILSSON 2005).

## DYTISCIDAE

## Agabinae

*Agabus (Gaurodytes) biguttatus* (Olivier, 1795)

**Material examined. YEMEN: SANA'A GOV.:** 1 ♂ 2 ♀♀, 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, stream, 19.xi.2010, J. Hájek leg. (IBEB, NMPC).

**Habitat.** Collected under stones in a mountainous stream densely covered with filamentous algae (Fig. 4).

**Distribution.** Widely distributed and common species in the whole Western Palaearctic, from the Canary Islands to north-west China (cf. NILSSON & HÁJEK 2013). **First record from Yemen.**

## Colymbetinae

*Colymbetes piceus* Klug, 1834

**Published records.** BALFOUR-BROWNE (1951: 191): Yemen.

**Distribution.** A species occurring in Egypt, the Arabian Peninsula and Iran (NILSSON & HÁJEK 2013).

*Colymbetes substrigatus* Sharp, 1882

**Published records.** ROCCHI (1985: 447): Yemen.

**Distribution.** A species described from Saudi Arabia and subsequently recorded also from Yemen (ROCCHI 1985).

*Rhantus includens* (Walker, 1871)

**Published records.** BALFOUR-BROWNE (1951: 190): Yemen; ROCCHI (1985: 447): Yemen.

**Material examined. YEMEN: AL MAHWIT gov.:** 5 ♂♂ 15 ♀♀, 10 km S Shibam, Aruz, 15°27'43"N, 43°55'03"E, 2560 m, 1.–2.xi.2007, A. Reiter leg.; 1 ♂ 2 ♀♀, Al Ahjur, Badia vill. env., Al Khaltabi waterfall, 15°28.4'N, 43°51.5'E, 2500 m, 2.xi.2010, J. Hájek leg. **SANA'A GOV.:** 1 ♀, 5 km SW Matnah vill., 15°13'41"N, 43°59'40"E, 2750 m, stream,

1.v.2004, A. Reiter leg.; 1 ♀, Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Collected in various stagnant (pools, tank) and running (stream) water bodies, both natural and manmade, but always at high altitude (2400–2750 m a.s.l.) (e.g. Figs 4–5).

**Distribution.** A species occurring in north-east Africa and the Arabian Peninsula (BALKE 1992).

### Copelatinae

#### *Copelatus atrosulcatus* Régimbart, 1906

**Published records.** BALFOUR-BROWNE (1939: 83): Yemen.

**Distribution.** A species occurring in eastern Africa north to Ethiopia, and in south-west Arabia (GIGNOT 1961).

#### *Copelatus gestroi* (Sharp, 1882)

**Material examined. OMAN: DHOFAR:** 1 ♂, Mudhai oasis, spring, concrete pool, 17°28'38"N, 53°21'09"E, 548 m, 24.x.2009, A. Reiter leg.; 4 spec., Sarfayt env., 16°41'23"N, 53°08'02"E, 580 m, 4.x.2013, P. Kučera leg. (PKCL); 2 spec., 12 km NE of Sarfayt, 16°44'13"N, 53°13'30"E, 600 m, 4.x.2013, P. Kučera leg. (PKCL). **YEMEN: AL HUDAYDAH GOV.:** 1 ♂, Jabal Bura valley forest NP, 14°52'N, 43°24'E, 225–600 m, 30.x.–1.xi.2005, P. Kabátek leg. **HADRAMAUT GOV.:** 1 ♀, W of Saywun, Shibam, 15°54'N, 48°39'E, 681 m, 4.iv.2007, S. Kadlec leg.; 1 ♀, Al Khurabayah env., wadi Dawan, 15°08.8'N, 48°25.6'E, 1005 m, 19.–20.x.2005, D. Král leg. **SANA'A GOV.:** 2 ♀♀, wadi Moor, 15°08.0'N, 43°36.4'E, 744 m, stream, 5.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Always associated with running water, usually in side pools of springs and streams.

**Distribution.** A species described from Ethiopia and subsequently recorded from Egypt (including Sinai Peninsula), Israel, Saudi Arabia and southern Oman (WEWALKA 1974, NILSSON & HÁJEK 2013). **First record from Yemen.**

#### *Copelatus pulchellus* (Klug, 1834)

(Fig. 30)

**Material examined. YEMEN: SOCOTRA ISLAND:** 1 ♂ 2 ♀♀, Dixam plateau, Sinhin area, 12°31'08"N, 53°59'09"E, 812 m, 1.–2.xii.2003, J. Farkač leg.; 5 ♂♂ 5 ♀♀, Dixam plateau, Dixam lake, 12°31'23"N 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg.; 4 ♂♂ 6 ♀♀, Al Haghier Mts., wadi Madar, 12°33.2'N, 54°00.4'E, 1180–1230 m, springs, 12.–14.xi.2010, J. Hájek leg. (all NMPC).

**Notes.** Matt females with striolate whole surface of elytra prevail in Socotra (Fig. 30) – the form was described by SHARP (1882) from Mesopotamia as a separate species under the name *C. strigulosus*, but later synonymised with *C. pulchellus* by BALFOUR-BROWNE (1939).



Fig. 30. *Copelatus pulchellus* (Klug, 1834), female habitus.

**Habitat.** Collected in small pools of temporary stream, and in the littoral zone of larger permanent pool.

**Distribution.** A species occurring most probably in entire Sub-Saharan Africa, the Arabian Peninsula and Iraq (GUIGNOT 1961). **First record from Yemen (Socotra Island).**

### Dytiscinae

#### *Cybister (Cybister) cephalotes* Sharp, 1882

**Published records.** BALFOUR-BROWNE (1951: 194): Yemen.

**Material examined.** YEMEN: SANA'A GOV.: 1 ♀, 60 km SW Sana'a, wadi Anis, 15°00'N, 44°09'E, 1522 m, 7.x.2005, D. Král leg. (NMPC).

**Distribution.** A species known from Ethiopia and Sudan in eastern Africa, and Saudi Arabia and Yemen in the Arabian Peninsula (GUIGNOT 1961, NILSSON & HÁJEK 2013).

#### *Cybister (Cybister) tripunctatus africanus* Laporte de Castelnau, 1835

**Published records.** TASCHENBERG (1883: 176): Socotra (as *Trogus tripunctatus* (Olivier, 1795) and *T. punctipennis* Taschenberg, 1883); WATERHOUSE (1881: 470): Socotra (as *Cybister africanus*); GAHAN (1895: 286): Yemen (as *C. tripunctatus*); GAHAN (1903: 265): Socotra (as *C. tripunctatus*); BALFOUR-BROWNE (1951: 194): Yemen; ROCCHI (1985: 449): Yemen; PEDERZANI (2003: 24): Dhofar; WEWALKA (2004: 464): Socotra.

**Material examined.** OMAN: DHOFAR: 2 ♂♂, Al Mughsayl, 16°53'46"N, 53°46'24"E, 45 m, wadi, pools 2 km from seashore, 26.x.2009, A. Reiter leg.; 1 ♂, Jufa, haunt, 17°08'15"N, 55°01'41"E, 175 m, 29.x.2009, A. Reiter leg. (all NMPC); 1 spec., 15 km W of Jufa (Laga Shalia), 17°11'05"N, 54°56'38"E, 380 m, 29.ix.2011, P. Kučera leg. (PKCL); 7 spec., same data, but 24.viii.2012 (PKCL); 1 spec., same data, but 13.iv.2013, R. Fouqué leg. (JSCL); 2 spec., same data, but 10.x.2013, P. Kučera leg. (PKCL); 2 ♂♂, 13 km E Mirbat, wadi Ain, 17°01'N, 54°47'E, 59 m, 29.iii.2012, A. Reiter leg. (NMPC); 1 ♂, wadi Ash Shuwaymyyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. (NMPC); 1 spec., Ajdarawt, wadi Ra's Sajir, 30 m, 22.viii.2012, P. Kučera leg. (PKCL); 3 spec., wadi Muqshin, 19°35'06"N, 54°53'04"E, 9.iv.2013, P. Kučera leg. (PKCL). YEMEN: ABIJAN GOV.: 1 ♀, Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. HADRAMAUT GOV.: 5 ♂♂ 1 ♀, N of Al Mukalla, Nueima, 14°36.4'N, 49°05.7'E, 279 m, 20.–21.x.2005, D. Král leg. SOCOTRA ISLAND: 1 ♀, wadi Ayhaft, 12°36'38"N, 53°58'49"E, 190 m, 24.–26.xi.2003, P. Kabátek leg.; 1 ♂, same data, but 12°36.5'N, 53°58.9'E, pool, 200 m, 7.–8.xi.2010, J. Hájek leg.; 1 ♀, Homhil protected area, 12°34'27"N, 54°18'32"E, 364 m, 28.–29.xi.2003, P. Kabátek leg.; 2 ♂♂, 10 km E of Hadibo, Kam vill., 12°33'42"N, 54°07'05"E, 60 m, 5.v.2004, A. Reiter leg.; 1 ♂, Dixam plateau, Dixam lake, 12°31'23"N 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg.; 1 ♂ 2♀♀, Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Collected in various aquatic habitats, mostly larger pools both natural and manmade (e.g. Figs 2, 14); frequently attracted also to light traps. In the Arabian Peninsula so far not documented from higher altitudes.

**Distribution.** *Cybister tripunctatus* occurs in subtropical and tropical areas of the whole Old World. The subspecies *C. t. africanus* occurs in entire continental Africa, reaching south Europe in the north and Arabian Peninsula in the east (GUIGNOT 1961).

#### *Cybister (Melanectes) vulneratus* Klug, 1834

**Published records.** GAHAN (1985: 286): Yemen; BALFOUR-BROWNE (1951: 195): Yemen; ROCCHI (1985: 449): Yemen.

**Material examined.** OMAN: DHOFAR: 1 ♂, Rakhyut, 0–50 m, 13.–14.i.2007, S. Jákl leg.; 1 ♂, Ain Tabruq, spring,

17°06'02"N, 54°19'36"E, 115 m, 28.x.2009, A. Reiter leg.; 2 ♂♂, Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg.; 2 ♂♂, 13 km E Mirbat, wadi Ain, 17°01'N, 54°47'E, 59 m, 29.iii.2012, A. Reiter leg.; 1 ♀, wadi Ash Shuwaymyyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. (all NMPC); 3 spec., 15 km W of Jufa (Laga Shalia), 17°11'05"N, 54°56'38"E, 380 m, 27.ix.2011, P. Kučera leg. (PKCL); 1 spec., same data, but 13.iv.2013, R. Fouqué leg. (JSCL). **YEMEN: HADRAMAUT GOV.:** 4 ♂♂ 3 ♀♀, N of Al Mukalla, Nueima, 14°36.4'N, 49°05.7'E, 279 m, 20.–21.x.2005, D. Král leg.; 1 ♀, NE Ghayl Ba Wazir, 14°47'33"N, 49°22'46"E, 118 m, bottom of karstic abyss, 6.–7.xi.2007, A. Reiter leg. (all NMPC).

**Habitat.** Collected in similar habitats as previous species with which it may occur syntopically.

**Distribution.** Widely distributed Afrotropical species. *Cybister vulneratus* is known from entire Africa with the exception of Cape provinces, southern Spain and Sicily (Italy) in southern Europe, the Arabian Peninsula and Iran (GUIGNOT 1961, NILSSON & HÁJEK 2013).

### *Eretes griseus* (Fabricius, 1781)

**Published records.** GAHAN (1985: 286): Yemen (as *Eretes succinctus* (Klug, 1834)).

**Material examined. YEMEN: SANA'A GOV.:** 1 ♀, 5 km N of Beni Al Salal, 15°10.9'N, 43°23.4'E, 350 m, artificial lights in petrol station, 4.–5.xi.2010, J. Hájek leg. (NMPC).

**Habitat.** A single Yemeni specimen was collected at light.

**Distribution.** A species recently revalidated and distinguished from *E. sticticus*. It occurs in most subtropical and tropical areas of the Old World, except Australia (cf. MILLER 2002).

### *Eretes sticticus* (Linnaeus, 1767)

**Published records.** GAHAN (1985: 286): Yemen (as *Eretes helvolus* (Klug, 1834)); ROCCHI (1985: 447): Yemen; PEDERZANI (2003: 24): Dhofar; WEWALKA (2004: 465): Socotra.

**Material examined. OMAN: DHOFAR:** 2 ♀♀, Qitbit, spring, 19°09'20"N, 54°30'31"E, 164 m, 23.x.2009, A. Reiter leg. (NMPC); 1 ♂ 1 ♀, Difa, wadi, 16°45'N, 53°14'E, 435 m, 23.iii.2012, A. Reiter leg. (NMPC); 1 ♀, Muqshin, oasis, at light, 19°35'N, 54°53'E, 155 m, 29.iii.2011, A. Reiter leg. (NMPC); 1 spec., same data, but 9.iv.2013, P. Kučera leg. (PKCL); 2 spec., 15 km W of Jufa (Laga Shalia), 17°11'05"N, 54°56'38"E, 380 m, 27.ix.2011, P. Kučera leg. (PKCL); 3 ♂♂, wadi Ash Shuwaymyyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. (NMPC); 1 ♂ 1 ♀, Hasik, wadi 4 km to S, 17°25'N, 55°17'E, 46 m, 1.iv.2012, A. Reiter leg. (NMPC); 1 spec., W of Al Mughsayl, wadi Ra's Sajir, 16.84497°N, 53.68615°E, 20.–31.viii.2013, P. Kučera leg. (PKCL). **YEMEN: AL MAHWIT GOV.:** 1 ♂, 10 km S Shibam, Aruz, 15°27'43"N, 43°55'03"E, 2560 m, 1.–2.xi.2007, A. Reiter leg. (NMPC). **SOCOTRA ISLAND:** 1 ♀, Dixam plateau, Dixam lake, 12°31'23"N 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg. (NMPC).

**Habitat.** Collected predominantly in deeper pools in wadis, mostly with muddy bottom, and without vegetation; frequently attracted also to light trap.

**Distribution.** A cosmopolitan species occurring in the Old World in Africa including the Cape Verde and Canary Islands, southern Europe, and the Near and Middle East in Asia (MILLER 2002).

### *Hydaticus (Prodaticus) africanus* (Rocchi, 1976)

**Published records.** GAHAN (1895: 286): Yemen (as *Prodaticus pictus* Sharp, 1882).

**Material examined. OMAN: DHOFAR:** 2 ♂♂, 12 km NW Mirbat, wadi Hannah, 17°03'N, 54°37'E, 310 m, 30.iii.2012, A. Reiter leg. (NMPC); 25 spec., 15 km W of Jufa (Laga Shalia), 17°11'05"N, 54°56'38"E, 24.viii.2012, P. Kučera leg. (JSCL, PKCL); 13 spec., same data, but 13.iv.2013, R. Fouqué leg. (JSCL); 5 spec., same data, but 10.x.2013, P. Kučera leg. (PKCL); 1 spec., wadi Al Mughsayl, 16°52'N, 53°43'E, 120 m, 10.iv.2013, P. Kučera leg. (PKCL); 3 spec., Sarfayt env., 16°41'23"N, 53°08'02"E, 580 m, 4.x.2013, P. Kučera leg. (PKCL). **YEMEN:** 1 ♂, Hadramaut (BMNH).

**Habitat.** Found in a small concrete dam on a stream on the bottom of a forested wadi (Fig. 8), and in larger pools in vegetated wadis.

**Distribution.** A species described from Somalia and subsequently recorded also from Saudi Arabia (BRANCUCCI 1985). The single record of similar species *H. pictus* from Yemen (GAHAN 1895) belongs in fact also to *H. africanus*. **First records from Oman.**

*Hydaticus (Prodaticus) arabicus* Guignot, 1951

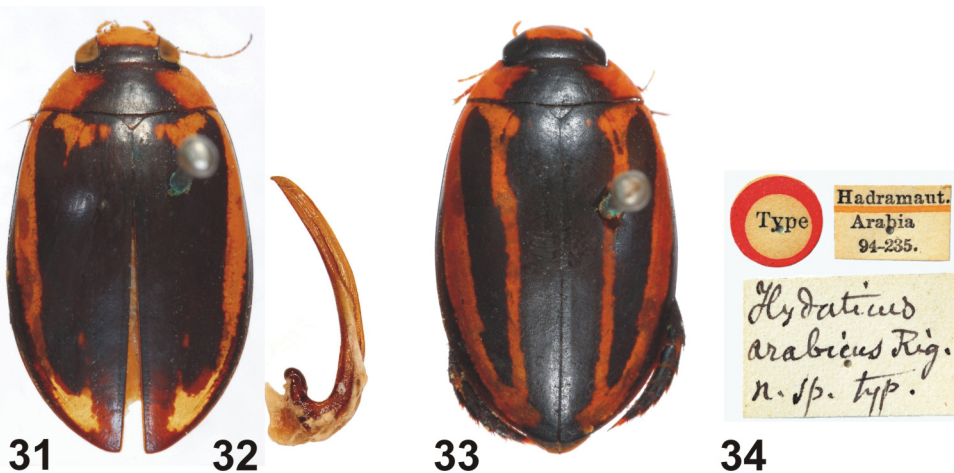
(Figs 31–34)

**Published records.** GAHAN (1895: 286): Yemen (as *Hydaticus histrio* Clark, 1864); data repeated by BALFOUR-BROWNE (1951: 192) (as *H. histrio*); GUIGNOT (1951: 21) (original description of *H. arabicus*); and BRANCUCCI (1981: 229).

**Type material.** HOLOTYPE: ♂, ‘Hadramaut / Arabia / 94-235. [printed] // arabicus Rég. / n. sp. (Brit. Mus.) [handwritten] // TYPE [printed, red label] // HOLOTYPE [printed, red label] // Hydaticus / arabicus / Guign. Type [handwritten]’ (MNHN). PARATYPE: ♂, ‘Hadramaut / Arabia / 94-235. [printed] // ♂ [printed] // Paratype [printed, red label with black frame]’ (MNHN).

**Additional material examined.** 1 ♂ 1 ♀, with the same locality data (BMNH).

**Notes.** A species known only from the type series from Hadramaut, Yemen, originally from BMNH. It was first studied by M. Régimbart, who kept two specimens for his collection, but did not manage to describe it. Later, F. Guignot discovered two males in Régimbart’s collection (MNHN) with manuscript name “*Hydaticus arabicus*” and described it (GUIGNOT 1951) without knowledge of two additional specimens still in BMNH. Here we present those additional specimens, one of which is the only known female. Whereas all males have reduced longitudinal yellow stripes on disc of elytra (Fig. 31), female has stripes complete (Fig. 33), much resembling the widely distributed Oriental *Hydaticus histrio*. However, both species differ in shape of median lobe of aedeagus, whose apex is distinctly curved in *H. arabicus* (Fig. 32; see also BRANCUCCI 1981: fig. 8).



Figs 31–34. *Hydaticus arabicus* Guignot, 1951. 31 – male habitus (14 mm); 32 – median lobe in lateral view; 33 – female habitus (16 mm); 34 – labels of specimens from BMNH. Not in scale.

**Distribution.** Hadramaut region, Yemen. The occurrence of the species in Oman (cf. NILSSON & HÁJEK 2013) was based on an unpublished record by G. Wewalka, which was however misidentified *H. satoi dhofarensis* Pederzani, 2003 (G. Wewalka, pers. comm.).

### *Hydaticus (Prodaticus) decorus* Klug, 1834

**Published records.** GAHAN (1985: 286): Yemen; ROCCHI (1985: 449): Yemen.

**Material examined. YEMEN: SANA'A GOV.:** 1 ♂, wadi Dahr, 2199 m, at light, 5.x.2005, P. Kabátek leg. (NMPC).

**Habitat.** A single recorded specimen was collected at light near a drying up stream in a wadi (P. Kabátek, pers. comm.).

**Distribution.** A species occurring in north-east Africa (Egypt, Sudan) and western Arabia (cf. ROCCHI 1985).

### *Hydaticus (Prodaticus) dorsiger* Aubé, 1838

**Material examined. YEMEN: AL MAHWIT GOV.:** 1 ♀, 10 km S Shibam, Aruz, 15°27'43"N, 43°55'03"E, 2560 m, 1.–2.xi.2007, A. Reiter leg. **SANA'A GOV.:** 2 ♂♂, Beni Mansour vill. env., 15°06.1–4'N, 43°52.8–53.2'E, 1520–1550 m, stream valley, 3.+5.+19.xi. 2010, J. Hájek leg.; 1 ♂, Bab Bahel, 15°07.0'N, 43°40.9'E, 1195 m, river valley and pool, 4.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** All recorded specimens were collected from pools at altitude higher than 1000 m a.s.l.

**Distribution.** Widely distributed species, occurring from Madagascar through whole tropical Africa to Arabia (GUIGNOT 1961). **First record from Yemen.**

### *Hydaticus (Prodaticus) dregei* Aubé, 1838

**Published records.** BALFOUR-BROWNE (1951: 192): Yemen (as *Hydaticus jucundus* Reiche, 1849); ROCCHI (1985: 448): Yemen (as *H. jucundus*).

**Material examined. YEMEN: AL HUDAYDAH GOV.:** 4 ♂♂ 3 ♀♀, Jabal Bura valley forest NP, 14°53'N, 43°26'E, 557 m, 19.–21.iii.2007, P. Kabátek leg. (NMPC).

**Habitat.** The specimens were collected at light near a drying up stream in a wadi (P. Kabátek, pers. comm.).

**Distribution.** Widely distributed Afrotropical species. Recorded from Arabia under the name *H. jucundus* Reiche, 1849 (BRANCUCCI 1980, ROCCHI 1985).

### *Hydaticus (Prodaticus) flavolineatus* Boheman, 1848

**Material examined. YEMEN: AL HUDAYDAH GOV.:** 1 ♂, Jabal Bura valley forest NP, 14°53'N, 43°26'E, 557 m, 19.–21.iii.2007, P. Kabátek leg. (NMPC)

**Habitat.** A single recorded specimen was collected at light near a drying up stream in a wadi (P. Kabátek, pers. comm.).

**Distribution.** Widely distributed Afrotropical species, occurring in whole sub-Saharan Africa and reaching Arabia in Asia (GUIGNOT 1961). **First record from Yemen.**

### *Hydaticus (Prodaticus) satoi dhofarensis* Pederzani, 2003

**Published records.** BRANCUCCI (1980: 109): Dhofar (as *Hydaticus satoi* Wewalka, 1975); PEDERZANI (2003: 18): Dhofar (original description).

**Material examined. OMAN: DHOFAR:** 1 ♀, 30 km E Salalah, 6 km E Taqah, Wadi Darbat, pool near sea, 26.ii.1998, G. Wewalka leg. et det. (GWCW); 2 spec., wadi Darbat, 17°05'N, 54°26'E, 160 m, 9.x.2013, P. Kučera leg. (PKCL); 1 ♀, Rakhut, 0–50 m, 13.–14.i.2007, S. Jákl leg. (NMPC); 1 ♀, Difa, wadi, 16°45'N, 53°14'E, 435 m, 23.iii.2012, A. Reiter leg. (NMPC); 9 spec., Ajdarawt, wadi Ra's Sajir, 30 m, 22.viii.2012, P. Kučera leg. (JSCL, PKCL); 2 spec., 15 km W of Jufa (Laga Shalia), 17°11'05"N, 54°56'38"E, 380 m, 24.viii.2012, P. Kučera leg. (PKCL); 4 spec., Sarfayt env., 16°41'23"N, 53°08'02"E, 580 m, 4.x.2013, P. Kučera leg. (PKCL); 6 spec., 12 km NE of Sarfayt, 16°44'13"N, 53°13'30"E, 600 m, 4.x.2013, P. Kučera leg. (PKCL).

**Habitat.** Drying up pools in vegetated wadis on the SSE oriented slope of Jabal Al Qamar (Fig. 9).

**Distribution.** *Hydaticus satoi* Wewalka, 1975 is a widely distributed Oriental species. *Hydaticus s. dhofarensis* is a subspecies endemic to southern Oman (PEDERZANI 2003).

### *Hydaticus (Prodaticus) servillianus* Aubé, 1838

**Published records.** WEWALKA (2004: 465): Socotra.

**Material examined. OMAN: DHOFAR:** 21 spec., 30 km E Salalah, 6 km E Taqah, Wadi Darbat, pools near sea, 24.ii.+1.iii.1998, G. Wewalka leg. et det. (GWCW, ONMM). **YEMEN: SOCOTRA ISLAND:** 1 ♂, wadi Ayhaft, 12°36.5'N, 53°58.9'E, pool, 200 m, 7.–8.xi.2010, J. Hájek leg. (NMPC).

**Habitat.** Collected from larger residual pools of drying up streams in wadis.

**Distribution.** This species is widely distributed in the whole Afrotropical Region, mainly in central Africa and Madagascar (GUIGNOT 1961). In the Arabian Peninsula known from the United Arab Emirates, Oman and Yemen (NILSSON & HÁJEK 2013).

## Hydroporinae

### *Hydroglyphus angularis* (Klug, 1834)

**Published records.** BALFOUR-BROWNE (1951: 185): Yemen (as *Guignotus angularis*).

**Material examined. OMAN: DHOFAR:** 8 spec., 30 km W Salalah, Wadis near Al Mughsayl, pools and lagoons, 27.ii.1998, G. Wewalka leg. et det. (GWCW, ONMM); 2 spec., Qitbit, spring, 19°09'20"N, 54°30'31"E, 164 m, 23.x.2009, A. Reiter leg. (NMPC). **YEMEN: ABLJAN GOV.:** 2 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. **AL HUDAYDAH GOV.:** 2 spec., ca. 12 km SE Al Mawkir vill., wadi Zabid, 14°09'35"N, 43°29'33"E, 264 m, 30.–31.x.2007, A. Reiter leg. **LAHJ GOV.:** 13 spec., W Lahj Al Hutah by road, wadi Am Rija, 13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. **SANA'A GOV.:** 2 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. **TA'IZZ GOV.:** 2 spec., Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg. **SOCOTRA ISLAND:** 1 spec., Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Collected predominantly from muddy littoral of larger pools, both natural and manmade (e.g. Figs 2, 5–7, 14).

**Distribution.** This species is widely distributed in the entire northern half of Africa (BISTRÖM 1986). In Asia it is known from Turkey, Iraq, the Arabian Peninsula, Iran and Pakistan (NILSSON & HÁJEK 2013). First precise data from Oman – the occurrence of this species in Oman



in Palaearctic catalogue (NILSSON & HÁJEK 2013) was based on unpublished records by G. Wewalka mentioned above. **First record from Socotra Island.**

### *Hydroglyphus confusus* (Klug, 1834)

**Published records.** BALFOUR-BROWNE (1951: 184): Yemen (as *Guignotus confusus*).

**Material examined.** OMAN: DHOFAR: 7 spec., 30 km E Salalah, 6km E Taqah, Wadi Darbat, pools near sea, 26.ii.1998, G. Wewalka leg. et det. (GWCW, ONMM); 1spec., 30 km W Salalah, Wadis near Al Mughsayl, pools and lagoons, 27.ii.1998, G. Wewalka leg. et det. (GWCW). YEMEN: ABLIJAN GOV.: 2 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. HAJJAH GOV.: 1 spec., NE Hajjah by road, Halhal vill. env., 15°43'42"N, 43°37'25"E, 998 m, 2.–3.xi.2007, A. Reiter leg. LAHJ GOV.: 16 spec., W Lahj Al Hutah by road, wadi Am Rija, 13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. TA'IZZ GOV.: 6 spec., Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** Habitat requirements identical with those of *H. angularis*; both species were often collected together.

**Distribution.** North African species, occurring predominantly in areas surrounding Sahara desert (cf. BISTRÖM 1986); known also from the Near and Middle East (cf. NILSSON & HÁJEK 2013). First precise data from Oman – the occurrence of this species in Oman in Palaearctic catalogue (NILSSON & HÁJEK 2013) was based on unpublished records of G. Wewalka mentioned above.

### *Hydroglyphus infirmus* (Boheman, 1848)

**Published records.** ROCCHI (1985: 446): Yemen (as *Guignotus geminus* var. *capensis* Régimbart, 1895); HÁJEK & WEWALKA (2009: 99): Dhofar, Yemen.

**Material examined.** YEMEN: AL MAHWIT GOV.: 1 spec., Al Ahjur, Badia vill. env., Al Khaltabi waterfall, 15°28.4'N, 43°51.5'E, 2500 m, 2.xi.2010, J. Hájek leg. SANA'A GOV.: 12 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg.; 7 spec., 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, stream, 19.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Collected both in running (stream) and stagnant (tank) water bodies. All Yemeni records came from high altitude above 2400 m a.s.l. (Figs 4–5).

**Distribution.** Widely distributed African species occurring in most areas of southern and eastern Africa and reaching the Arabian Peninsula in the north (BISTRÖM 1986, HÁJEK & WEWALKA 2009).

### *Hydroglyphus major* (Sharp, 1882)

**Published records.** BALFOUR-BROWNE (1951: 185): Yemen (as *Guignotus major*); ROCCHI (1985: 446): Yemen (as *G. major*); PEDERZANI (2003: 24): Dhofar; WEWALKA (2004: 465): Socotra (Samha); HÁJEK & WEWALKA (2009: 99): Dhofar.

**Material examined.** OMAN: DHOFAR: 5 spec., Difa, wadi, 16°45'N, 53°14'E, 435 m, 23.iii.2012, A. Reiter leg.; 6 spec., Hasik, wadi 4 km to S, 17°25'N, 55°17'E, 46 m, 1.iv.2012, A. Reiter leg. YEMEN: SANA'A GOV.: 5 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Yemeni specimens were collected in muddy littoral of a tank (Fig. 5). Omani specimens came from residual pools on the bottom of wadis (Fig. 9).

**Distribution.** The species occurs in the Saharan Africa from Niger, Algeria and Chad to the countries along the Red Sea (Egypt, Sudan, Eritrea, Djibouti, Somalia, Saudi Arabia and Yemen), reaching Israel in the north and southern Oman in the east (HÁJEK & WEWALKA 2009).

### *Hydroglyphus signatellus* (Klug, 1834)

**Published records.** BALFOUR-BROWNE (1951: 185): Yemen (as *Guignotus signatellus*).

**Material examined.** OMAN: DHOFAR: 10 spec., Muntasar, spring, 19°27'14"N, 54°37'14"E, 135 m, 23.x.2009, A. Reiter leg.; 1 spec., Qitbit, spring, 19°09'20"N, 54°30'31"E, 164 m, 23.x.2009, A. Reiter leg.; 2 spec., Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg.; 10 spec., Muqshin, oasis, salty pools, 19°35'N, 54°53'E, 155 m, 29.iii.2011, A. Reiter leg.; 3 spec., wadi Ash Shuwaymiyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. YEMEN: ABLJAN GOV.: 6 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. SOCOTRA ISLAND: 2 spec., 6 km SE of Hadibo, wadi Denegen, 12°36'42"N, 54°03'41"E, 140 m, 4.v.2004, A. Reiter leg.; 12 spec., 10 km E of Hadibo, Kam vill., 12°33'42"N, 54°07'05"E, 60 m, 5.v.2004, A. Reiter leg.; 18 spec., Zemhon area, 12°30'58"N, 54°06'39"E, 270–350 m, at light, 3.–4.ii.2010, L. Purchart & J. Vybíral leg.; 3 spec., Noged plain (sand dunes), Sharet Halma vill. env., 12°21.9'N, 54°05.3'E, 20 m, at light, 10.–11.xi.2010, J. Hájek leg.; 3 spec., Qadub, coastal salt marsh, 12°38.3'N, 53°57.3'E, 8 m, 14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Collected predominantly from puddles and small pools, often salty – both in desert and close to the sea shore (e.g. Figs 10–11); frequently attracted also to light trap.

**Distribution.** Widely distributed African and Palaearctic species. In Sub-Saharan Africa, it is recorded from Senegal, Gambia, Mali, Sudan, Ethiopia, Djibouti, Somalia and Kenya (BISTRÖM 1986). In the Palaearctic Region, it occurs from North Africa and southern Europe throughout the Near East to Central Asia; in the east it reaches Tajikistan, Afghanistan and Pakistan (cf. NILSSON & HÁJEK 2013). **First record from Socotra Island.**

### *Hydroglyphus socotraensis* Wewalka, 2004

**Published records.** WEWALKA (2004: 466): Socotra.

**Material examined.** YEMEN: SOCOTRA ISLAND: 2 spec., Dixam plateau, Sinhin area, 12°31'08"N, 53°59'09"E, 812 m, 1.–2.xii.2003, J. Farkač leg.; 2 spec., Dixam plateau, wadi Esgego, 12°28'09"N, 54°00'36"E, 300 m, 2.–3.xii.2003, P. Kabátek leg.; 6 spec., same data, but 13.v.2004, A. Reiter leg.; 3 spec., Dixam plateau, wadi Zerriq, 12°31'08"N, 53°59'09"E, 750 m, 3.xii.2003, P. Kabátek leg.; 4 spec., 6 km SE of Hadibo, wadi Denegen, 12°36'42"N, 54°03'41"E, 140 m, 4.v.2004, A. Reiter leg.; 2 spec., Dixam plateau, Dixam lake, 12°31'23"N, 53°57'12"E, 1000 m, 12.v.2004, A. Reiter leg.; 5 spec., wadi Ayhaft, 12°36'26"N, 53°59'22"E, 220 m, 16.v.2004, A. Reiter leg.; 18 spec., same data, but pool, 7.–8.xi.2010, J. Hájek leg.; 3 spec., Aloove area, Hassan vill. env., 12°31.2'N, 54°07.4'E, 221 m, at light, 9.–10.xi.2010, J. Bezděk leg.; 2 spec., Dixam plateau, Firmihin (*Dracaena* forest), 12°28.6'N, 54°01.1'E, 490 m, at light, J. Bezděk leg.; 2 spec., Qadub, coastal salt marsh, 12°38.3'N, 53°57.3'E, 8 m, 14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (all NMPC).

**Habitat.** Collected frequently in puddles and both natural and manmade pools, from sea level to Dixam plateau (1000 m a.s.l.); found also in salty coastal marsh, and frequently attracted also to light trap.

**Distribution.** So far known only from the type series (WEWALKA 2004); a species endemic to Socotra Island.

### *Uvarus peringueyi* (Régimbart, 1895)

**Material examined.** YEMEN: SANA'A GOV.: 2 ♂♂, 1 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. (NMPC).

**Habitat.** It was collected in muddy littoral of a tank (Fig. 5).

**Distribution.** Species widely distributed in eastern and south-eastern Africa (cf. BISTRÖM 1988). Another species – *Uvarus occultus* (Sharp, 1882) – was described from Saudi Arabia, and may represent its junior synonym. However the single known specimen of *U. occultus* differs from *U. peringueyi* in slightly bigger and broader body and in almost uniformly ferruginous colouration of the dorsal surface (HÁJEK & BISTRÖM 2009). **First record from Yemen.**

### *Yola bicristata* (Sharp, 1882)

**Published records.** BALFOUR-BROWNE (1951: 186): Yemen; data repeated by BISTRÖM (1983: 28); ROCCHI (1985: 446): Yemen.

**Material examined.** YEMEN: ABLJAN GOV.: 8 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. LAHJ GOV.: 2 spec., Kadamat Al Abdali vill. env., wadi Tuban, 13°07'49"N, 44°51'02"E, 200 m, 24.–25.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** Collected at the edge of wadi pools with partially running water (e.g. Fig. 2).

**Distribution.** Arabian species known only from Saudi Arabia and Yemen (BISTRÖM 1983).

### *Yola buettikeri* Brancucci, 1985

(Fig. 35)

**Material examined.** YEMEN: AL HUDAYDAH GOV.: 6 spec., Jabal Bura valley forest NP, 14°52.4–5'N, 43°24.–25.2'E, 240–350 m, stream valley, 4.xi.2010, J. Hájek leg. (NMPC).

**Notes.** The specimens from Yemen have slightly more extensive yellow colour on pronotum: anterior half of pronotum yellow, except for thin blackish stripe along the anterior margin (Fig. 32); otherwise, they fit perfectly to the original description (BRANCUCCI 1985).

**Habitat.** Collected in small gravelly residual pools of a temporary stream in a wadi (Fig. 3).

**Distribution.** A species described and so far known only from Saudi Arabia. **First record from Yemen.**

### *Yola darfurensis* J. Balfour-Browne, 1947

**Published records.** BALFOUR-BROWNE (1951: 186): Yemen; data repeated by BISTRÖM (1983: 21).

**Distribution.** A species described from Sudan and subsequently recorded also from Yemen (BALFOUR-BROWNE 1951).



Fig. 35. *Yola buettikeri* Brancucci, 1985, habitus.

### *Yola enigmatica* Omer-Cooper, 1954

**Material examined.** YEMEN: AL HUDAYDAH GOV.: 4 spec., ca. 12 km SE Al Mawkir vill., wadi Zabid, 14°09'35"N, 43°29'33"E, 264 m, 30.–31.x.2007, A. Reiter leg. LAHJ GOV.: 13 spec., W Lahj Al Hutah by road, wadi Am Rija,

13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. TA'IZZ gov.: 8 spec., Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** Collected in residual pools in wadis (e.g. Fig. 7) as well as manmade reservoirs out of the valley (Fig. 6); it seems to prefer habitats with muddy substrate, and without vegetation.

**Distribution.** A species occurring in Africa in (semi)arid belt between Sahara desert and tropical rain forests, from Mauritania and Senegal to Sudan, Ethiopia and Djibouti (cf. BISTRÖM 1983); in the Arabian Peninsula recorded from Saudi Arabia (BRANCUCCI 1985). **First record from Yemen.**

### *Yola wraniki* Wewalka, 2004

**Published records.** WEWALKA (2004: 467): Socotra.

**Material examined. YEMEN: SOCOTRA ISLAND:** 1 spec., Dixam plateau, wadi Esgego, 12°28'09"N, 54°00'36"E, 300 m, 2.–3.xii.2003, P. Kabátek leg.; 2 spec., same data, but D. Král leg.; 7 spec., same data, but 13.v.2004, A. Reiter leg.; 4 spec., 6 km SE of Hadibo, wadi Denegen, 12°36'42"N, 54°03'41"E, 140 m, 4.v.2004, A. Reiter leg.; 10 spec., wadi Ayhaft, 12°36.5'N, 53°58.9'E, 200 m, pool, 7.–8.xi.2010, J. Hájek leg.; 4 spec., Al Haghier Mts., wadi Madar, 12°33.2'N, 54°00.4'E, 1180–1230 m, 12.–14.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Collected in spring and stream pools in wadis originating from the Hagher Mountains.

**Distribution.** A species endemic to Socotra Island, so far known only from the type series (WEWALKA 2004).

### *Yolina insignis* (Sharp, 1882)

**Published records.** BALFOUR-BROWNE (1951: 186): Yemen; ROCCHI (1985: 446): Yemen; BISTRÖM (1983: 60): Yemen.

**Material examined. OMAN: DHOFAR:** 5 spec., Difa, wadi, 16°45'N, 53°14'E, 435 m, 23.iii.2012, A. Reiter leg.; 1 spec., wadi Darbat, N part near Shihayt, 17°09'N, 54°28'E, 325 m, 28.iii.2012, A. Reiter leg.; 8 spec., 13 km E Mirbat, wadi Ain, 17°01'N, 54°47'E, 59 m, 29.iii.2012, A. Reiter leg.; 7 spec., wadi Ash Shuwaymiyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg.; 18 spec., Hasik, wadi 4 km to S, 17°25'N, 55°17'E, 46 m, 1.iv.2012, A. Reiter leg. **YEMEN: ABLIAN GOV.:** 1 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. **AL HUDAYDAH GOV.:** 3 spec., ca. 12 km SE Al Mawkir vill., wadi Zabid, 14°09'35"N, 43°29'33"E, 264 m, 30.–31.x.2007, A. Reiter leg.; 12 spec., Jabal Bura valley forest NP, 14°52.4–5'N, 43°24.–25.2'E, 240–350 m, stream valley, 4.xi.2010, J. Hájek leg. **HAAJAH GOV.:** 3 spec., NE Hajjah by road, Halhal vill. env., 15°43'42"N, 43°37'25"E, 998 m, 2.–3.xi.2007, A. Reiter leg. **LAHJ GOV.:** 10 spec., W Lahj Al Hutah by road, wadi Am Rija, 13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. **SANA'A GOV.:** 2 spec., Beni Mansour vill. env., 15°06.1–4'N, 43°52.8–53.2'E, 1520–1550 m, stream valley, 3.+5.+19.xi. 2010, J. Hájek leg.; 1 spec., wadi Moor, 15°08.0'N, 43°36.4'E, 744 m, stream, 5.xi.2010, J. Hájek leg.; 1 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. **TA'IZZ GOV.:** 2 spec., Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg.; NNW Ash Shuqayrah by road, wadi Bani Khawlan, 13°19'57"N, 43°43'19"E, 460 m, 27.–28.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** Associated mostly with running water, especially with side pools of streams and rivers in wadis (e.g. Figs 2–3, 7); rarely also in pools (tank), especially at higher altitude (Figs 5–6). Yemeni localities came from lower parts of wadis up to 2400 m a.s.l. in the mountains; in Oman, *Yolina insignis* was found in pools in middle and lower parts of wadis on slopes of Jabal Al Qamar in western part of Dhofar to Jabal Jinawt on eastern coast of the province (e.g. Fig. 9).

**Distribution.** A species occurring in eastern Africa and the Arabian Peninsula (Saudi Arabia, Yemen) (BISTRÖM 1983). **First record from Oman.**

### *Hydroporus carli* Wewalka, 1992

**Published records.** BALFOUR-BROWNE (1951: 187): Yemen (as *Hydroporus inscitus* Sharp, 1882); WEWALKA (1992: 52): Yemen (original description).

**Notes.** The species was first published by BALFOUR-BROWNE (1951) under the name *Hydroporus inscitus* Sharp, 1882; however, WEWALKA (1992) recognised the series from Yemen distinct from ‘true *inscitus*’ from Iraq and described it as a separate species.

**Distribution.** A species endemic to Yemen.

### *Nebrioporus insignis* (Klug, 1834)

**Published records.** BALFOUR-BROWNE (1951: 189): Yemen (as *Zimmermannius insignis*); ROCCHI (1985: 446): Yemen (as *Potamonectes (Zimmermannius) insignis*); TOLEDO (2009: 57): Yemen.

**Distribution.** A species with confirmed occurrence in the Arabian Peninsula and Egypt (TOLEDO 2009).

### *Nebrioporus mascatensis* (Régimbart, 1897)

**Material examined.** OMAN: DHOFAR: 1 spec., Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg. (NMPC).

**Habitat.** Collected in a concrete tank at a livestock watering place (Fig. 10).

**Distribution.** A species described from northern Oman and subsequently recorded also from the United Arab Emirates, Iran and Afghanistan (HÁJEK & BRANCUCCI 2011).

### *Nebrioporus millingeni* (J. Balfour-Browne, 1951)

**Published records.** BALFOUR-BROWNE (1951: 188): Yemen (as *Potamonectes millingeni*, original description); TOLEDO (2009: 38): Yemen.

**Material examined.** YEMEN: SANA'A GOV.: 4 ♂♂ 2 ♀♀, 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, stream, 1.v.2004, A. Reiter leg., H. Fery det. (HFCB, NMPC); 2 ♂♂ 2 ♀♀, same data, but 19.xi.2010, J. Hájek leg. (IBEB, NMPC).

**Habitat.** Collected in a mountainous stream with gravelly bottom, densely covered with filamentous algae (Fig. 4), together with the following species.

**Distribution.** A species known so far only from two localities in Yemen (TOLEDO 2009).

### *Nebrioporus seriatus* (Sharp, 1882)

**Published records.** BALFOUR-BROWNE (1951: 187): Yemen (as *Potamonectes seriatus*); ROCCHI (1985: 446): Yemen (as *Potamonectes seriatus*); TOLEDO (2009: 40): Yemen.

**Material examined.** YEMEN: SANA'A GOV.: 2 ♂♂ 3 ♀♀, 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, stream, 19.xi.2010, J. Hájek leg. (IBEB, NMPC).

**Habitat.** Collected in a mountainous stream with gravelly bottom, densely covered with filamentous algae (Fig. 4), together with the previous species.

**Distribution.** Arabian species recorded only from Saudi Arabia and Yemen (TOLEDO 2009).

### *Hydrovatus acuminatus* Motschulsky, 1859

**Material examined.** OMAN: DHOFAR: 32 spec., 30 km E Salalah, 6 km E Taqah, Wadi Darbat, pools near sea, 26.ii.1998, G. Wewalka leg. et det.; 8 spec., 40 km E Salalah, Wadi Darbat, upper valley, rivulet, 26.ii.1998, G. Wewalka leg. et det.; 8 spec., 30 km W Salalah, Wadis near Al Mughsayl, pools and lagoons, 27.ii.1998, G. Wewalka leg. et det. (all GWCW); 1 ♂, Ain Tabruq, spring, 17°06'02"N, 54°19'36"E, 115 m, 28.x.2009, A. Reiter leg.; 1 spec., Jufa, haunt, 17°08'15"N, 55°01'41"E, 175 m, 29.x.2009, A. Reiter leg.; 4 spec., wadi Darbat, N part near Shihayt, 17°09'N, 54°28'E, 325 m, 28.iii.2012, A. Reiter leg. (all NMPC). YEMEN: SOCOTRA ISLAND: 1 ♀, Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (NMPC).

**Habitat.** In Oman collected in shallow vegetated puddles on the wadi bottom, below a karstic spring or below a livestock watering place, with partially running water; a single specimen from Socotra was found in a large pool surrounded with *Juncus socotranus* (Buchenau) Snogerup marsh in a wadi (Fig. 14).

**Distribution.** Widely distributed species occurring in most areas of tropical Africa and Asia (cf. BISTRÖM 1997). **First record from Yemen (Socotra Island).**

### *Herophydrus guineensis* (Aubé, 1838)

**Published records.** WATERHOUSE (1881: 470): Socotra (as *Hyphidrus guineensis*); data repeated by TASCHENBERG (1883: 177) and GAHAN (1903: 265).

**Material examined.** YEMEN: SOCOTRA ISLAND: 1 spec., Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (NMPC).

**Habitat.** The single specimen recently collected in Socotra came from a large pool surrounded with *Juncus socotranus* marsh in a wadi (Fig. 14).

**Distribution.** Widely distributed species known from most of African territory except for Sahara, reaching also Mediterranean area and the Arabian Peninsula (cf. BISTRÖM & NILSSON 2002).

### *Herophydrus musicus* (Klug, 1834)

**Published records.** BALFOUR-BROWNE (1951: 184): Yemen; BISTRÖM & NILSSON (2002: 59): Yemen.

**Distribution.** Widely distributed Palaearctic species occurring in the whole Mediterranean area and subtropical parts of Asia eastward to western China and India (NILSSON & HÁJEK 2013).

### *Hygrotus (Coelambus) confluens* (Fabricius, 1787)

**Published records.** BALFOUR-BROWNE (1951: 183): Yemen.

**Material examined.** YEMEN: HAJJAH GOV.: 1 spec., Thula castle, 15°34'32"N, 43°53'54"E, 2967 m, 2.xi.2007, A. Reiter leg. SANA'A GOV.: 2 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg.; 1 spec., 5 km SW Matnah vill., 15°13.7'N, 43°59.7'E, 2750 m, stream, 19.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Collected both in a mountainous stream (Fig. 4) and a manmade tank (Fig. 5), but always at a very high altitude exceeding 2400 m a.s.l.

**Distribution.** A Palaearctic species distributed in the whole of Europe (except the most northern parts), northern Africa, and Asia eastward to Afghanistan and Kashmir (NILSSON & HÁJEK 2013).

*Hygrotus (Coelambus) inscriptus* Sharp, 1882

**Material examined. OMAN: DHOFAR:** 3 spec., Muqshin, oasis, salty pools, 19°35'N, 54°53'E, 155 m, 29.iii.2011, A. Reiter leg. (NMPC).

**Habitat.** Recorded from a very isolated oasis in the desert separating two fertile parts of Oman. Pools without vegetation were situated in a depression with artesian springs; high salinity of water is proven by efflorescence of salts on the banks (Fig. 11).

**Distribution.** A species occurring in arid areas from Egypt and the Arabian Peninsula, through the Near and Middle East to Central Asia (cf. NILSSON & HÁJEK 2013). **First record from Oman.**

*Hyphydrus pictus* Klug, 1834

**Published records.** BALFOUR-BROWNE (1951: 183): Yemen; ROCCHI (1985: 445): Yemen; PEDERZANI (2003: 24): Dhofar. **Material examined. OMAN: DHOFAR:** 9 spec., 30 km E Salalah, 6 km E Taqah, Wadi Darbat, pools near sea, 26.ii.1998, G. Wewalka leg. et det. (GWCW, ONMM); 1 ♂, Taqah env., 270–350 m, 18.–21.ix.2003, R. Červenka leg.; 8 spec., Mudhai oasis, spring, concrete pool, 17°28'38"N, 53°21'09"E, 548 m, 24.x.2009, A. Reiter leg.; 1 ♀, Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg.; 1 ♂, wadi Ash Shuwaymiyah, 17°56'N, 55°32'E, 31 m, 1.iv.2012, A. Reiter leg. (all NMPC). **YEMEN: AL BAYDA GOV.:** 1 spec., NW Al Bayda by road, At Taghiq vill. env., 14°08'26"N, 45°25'53"E, 1968 m, 4.–5.xi.2007, A. Reiter leg. **AL MAHWIT GOV.:** 1 spec., 10 km S Shibam, Aruz, 15°27'43"N, 43°55'03"E, 2560 m, 1.–2.xi.2007, A. Reiter leg. **SANA'A GOV.:** 12 spec., Beni Mansour vill. env., 15°06.1–4'N, 43°52.8–53.2'E, 1520–1550 m, stream valley, 3.+5.+19.xi.2010, J. Hájek leg. (1 spec. used for DNA extraction, specimen voucher IBE-RA609). **TA'IZZ GOV.:** 10 spec., Najd an Nashamah env., Mashgab vill., 13°21'29"N, 43°57'26"E, 1182 m, 26.–27.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** A species most probably without special habitat requirements; found both in residual pools of drying up streams in wadis, and various natural and manmade stagnant water bodies (e.g. Figs 6, 10).

**Distribution.** A species occurring in north-eastern Africa, the Arabian Peninsula and Iran (BISTRÖM 1982).

## Laccophilinae

*Laccophilus continentalis* Gschwendtner, 1935

**Material examined. YEMEN: SOCOTRA ISLAND:** 1 ♂, Dixam plateau, wadi Zerig, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. (NMPC).

**Notes.** Identification of this species has been verified by Olof Biström (Helsinki, Finland). The single Socotran male slightly differs from the African specimens in shape of median lobe (O. Biström, pers. comm. 2014). However, as the variability in median lobe is known also in African population of the species (O. Biström, pers. comm. 2014), and only a single specimen is known from Socotra, we prefer to maintain the species as *L. continentalis*.

**Habitat.** The single specimen recently collected in Socotra came from a large pool surrounded with *Juncus* sp. marsh in a wadi (Fig. 14).

**Distribution.** A species known from southern Africa, and eastern Africa north to Somalia (GUIGNOT 1959, OMER-COOPER 1965). **First record from Yemen (Socotra Island).**

*Laccophilus maindroni maindroni* Régimbart, 1897

**Material examined.** OMAN: DHOFAR: 4 spec., Hagarir, pasture, haunt, 16°41'34"N, 53°09'21"E, 658 m, 25.x.2009, A. Reiter leg. (NMPC); 1 spec., 15 km W of Jufá (Laga Shalia), 17°11'05"N, 54°56'38"E, 380 m, 24.viii.2012, P. Kučera leg. (PKCL).

**Habitat.** Collected in a concrete tank at a livestock watering place (Fig. 10), and in small pools in a wadi.

**Distribution.** The nominotypical subspecies was described from northern Oman and subsequently recorded also from the United Arab Emirates (HÁJEK & BRANCUCCI 2011).

*Laccophilus pallescens* Régimbart, 1903

**Published records.** WEWALKA (2004: 471): Socotra.

**Material examined.** YEMEN: SOCOTRA ISLAND: 1 ♀, Dixam plateau, Sinhin area, 12°31'08"N, 53°59'09"E, 812 m, 1.–2.xii.2003, J. Farkač leg.; 1 ♂, Dixam plateau, wadi Zerriq, 12°31'08"N, 53°59'09"E, 750 m, 3.xii.2003, P. Kabátek leg.; 4 spec., same locality, pools, *Juncus* marsh, 12°29.6'N, 53°59.5'E, 655 m, 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; 8 spec., 6 km SE of Hadibo, wadi Denegen, 12°36'42"N, 54°03'41"E, 140 m, 4.v.2004, A. Reiter leg.; 3 spec., Dresmouiten vill., wadi Darho, 12°30'18"N, 54°02'08"E, 365 m, 13.v.2004, A. Reiter leg.; 5 spec., wadi Ayhaft, 12°36.5'N, 53°58.9'E, 200 m, pool, 7.–8.xi.2010, J. Hájek leg. (all NMPC).

**Habitat.** Collected mostly in larger pools of drying up streams in wadis (e.g. Figs 12, 14).

**Distribution.** Widely distributed Afrotropical species (cf. GUIGNOT 1959)

*Laccophilus pictipennis* Sharp, 1882

**Published records.** BALFOUR-BROWNE (1951: 193): Yemen; ROCCHI (1985: 447): Yemen.

**Material examined.** OMAN: DHOFAR: 4 spec., Difá, wadi, 16°45'N, 53°14'E, 435 m, 26.iii.2012, A. Reiter leg. YEMEN: ABIJAN GOV.: 16 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. AL BAYDA GOV.: 1 spec., NW Al Bayda by road, At Taghiq vill. env., 14°08'26"N, 45°25'53"E, 1968 m, 4.–5.xi.2007, A. Reiter leg. AL HUDAYDAH GOV.: 9 spec., Jabal Bura valley forest NP, 14°52.4–5'N, 43°24.–25.2'E, 240–350 m, stream valley, 4.xi.2010, J. Hájek leg. HAJJAH GOV.: 3 spec., NE Hajjah by road, Halhal vill. env., 15°43'42"N, 43°37'25"E, 998 m, 2.–3.xi.2007, A. Reiter leg. LAHJ GOV.: 6 spec., W Lahj Al Hutah by road, wadi Am Rija, 13°01'57"N, 44°33'30"E, 297 m, 25.–26.x.2007, A. Reiter leg. SANA'A GOV.: 6 spec., 60 km SW Sana'a, wadi Anis, 15°00'N, 44°09'E, 1522 m, 7.x.2005, D. Král leg.; 2 spec., Beni Mansour vill. env., 15°06.1–4'N, 43°52.8–53.2'E, 1520–1550 m, stream valley, 3.+5.+19.xi.2010, J. Hájek leg. TA'IZZ GOV.: 2 spec., NNW Ash Shuqayrah by road, wadi Bani Khawlan, 13°19'57"N, 43°43'19"E, 460 m, 27.–28.x.2007, A. Reiter leg. (all NMPC).

**Habitat.** Mostly associated with running water; especially in relatively permanent side pools of streams and river, mostly at lower and middle altitudes (ca. 150–1500 m) (e.g. Figs 2–3, 7, 9).

**Distribution.** A species known from Ethiopia and Egypt in Africa, and Saudi Arabia and Yemen in the Arabian Peninsula (BRANCUCCI 1983, NILSSON & HÁJEK 2013). **First record from Oman.**

*Laccophilus sharpi* Régimbart, 1889

**Material examined.** YEMEN: ABIJAN GOV.: 59 spec., Ba Tays vill. env., wadi Bana, 13°20'58"N, 45°17'48"E, 168 m, 8.xi.2007, A. Reiter leg. (NMPC).

**Habitat.** Collected in larger and relatively stable pools in a wadi, with partially running water and dense littoral vegetation (Fig. 2).



**Distribution.** Widely distributed species in tropical areas of Asia (from Saudi Arabia to Sulawesi in Indonesia) and Australia (BRANCUCCI 1983). **First record from Yemen.**

### *Laccophilus sordidus* Sharp, 1882

**Published records.** BALFOUR-BROWNE (1951: 193): Yemen; ROCCHI (1985: 447): Yemen.

**Material examined.** YEMEN: SANA'A GOV.: 3 spec., Sana'a city, Bait Baws, 15°16.3'N, 44°12.1'E, 2410 m, tank, 6.xi.2010, J. Hájek leg. (NMPC).

**Habitat.** The species was collected in muddy littoral of a tank (Fig. 5).

**Distribution.** Predominantly Arabian species described from Saudi Arabia and subsequently recorded from Egypt, Sinai Peninsula, Yemen and Iran (cf. SHAVERDO et al. 2013).

### *Laccophilus sublineatus* Sharp, 1882

**Published records.** BALFOUR-BROWNE (1951: 193): Yemen; BRANCUCCI (1983: 270): Yemen; ROCCHI (1985: 447): Yemen.

**Distribution.** A species described from Saudi Arabia (Hejaz) and 'Mesopotamia'. Subsequently its occurrence in Mesopotamia was doubted, and the species was recorded from Yemen (BRANCUCCI 1983).

## Discussion

The area of the Arabian Peninsula, including the Socotra Archipelago, is traditionally included in the Palaearctic zoogeographical realm (cf. LÖBL & SMETANA 2003). However, this is not very accurate, especially for the southern part of Arabia, which represents a typical transition zone between the Afrotropical and Palaearctic (and partly also Oriental) realms. The exceptionality of the Arabian Peninsula was recently confirmed by a comprehensive study of distributions and phylogenetic relationships of amphibians, birds and mammals, and the area was included in a newly proposed Saharo-Arabian zoogeographical realm (HOLT et al. 2013).

Our work revealed that Afrotropical taxa notably prevail in the studied area. That is most apparent in Socotra, where the recorded species are widespread also in Africa, and even the endemic species belong to genera which prevail in Africa (*Yola* Gozis, 1886) or at least occur there in a number of species (Old World genera *Hydroglyphus* Motschulsky, 1853 and *Hyphydrus* Illiger, 1852). The superiority of African taxa is well apparent also in southern Arabian Peninsula: 38 (70 %) of 54 recorded Hydradephaga species are known to occur also in the Afrotropical realm. Some of them represent widely distributed Afrotropical species (e.g. *Canthydrus notula*, *Hydaticus dregei*, *H. dorsiger*, *H. flavolineatus*, *Hydroglyphus infirmus*); others are species inhabiting the region along the Red Sea and the Gulf of Aden, i.e. distributed in Somalia, Ethiopia, Sudan, Egypt and the Arabian Peninsula (e.g. *Dineutus grandis*, *Copelatus gestroi*, *Cybister cephalotes*, *Hydaticus africanus*, *H. decorus*, *Laccophilus pictipennis*, *Rhantus includens*).

The affiliation of the fauna and flora of Dhofar region to Yemen is well documented. Dhofar region represents the easternmost place of distribution of many predominantly Afrotropical organism, e.g., baobab tree *Adansonia digitata* L. (Malvaceae), or desert rose *Adenium obesum* (Forssk.) Roem. & Schult. (Apocynaceae) (PICKERING & PATZELT 2008); viper *Bitis*

*arietans* (Merrem, 1820) (EGAN 2007); passeriform birds *Tchagra senegala* (Linnaeus, 1766) and *Tersiphone viridis* (Müller, 1776) (DEL HOYO & ELLIOT 2006, 2009; PORTER & ASPINALL 2010); or rock hyrax *Procavia capensis* (Pallas, 1776) and several other mammal species (cf. HARRISON & BATES 1991). In water beetles, the same distributional pattern shows, e.g. *Canthydrus notula*, *Copelatus gestroi*, *Hydaticus africanus*, *Hydroglyphus infirmus*, *Laccophilus pictipennis*, *Yolina insignis*. On the other hand, two dytiscid species, *Laccophilus maindroni* and *Nebrioporus mascatensis*, distributed predominantly in Persian Gulf area, were found in Dhofar as well; as the locality (Hagarir, see Fig. 10) lies almost at the Yemeni border, we expect occurrence of both species also in Yemen.

The Palaearctic fauna is represented in the studied area by several species (*Haliphys lineatocollis*, *Agabus biguttatus*, *Hygrotus confluens*). All of them are confined only to the high altitude areas around 2500 m a.s.l. The high mountains thus represent isolated islands of Palaearctic fauna in the region. The only Oriental element found in southern Arabian Peninsula is the widely distributed *Laccophilus sharpi*.

Taxa endemic to the Arabian Peninsula (altogether 10 species and two subspecies found in the studied area) have a special position. Among them, one species (*Gyrinus luctuosus*) is widely distributed in the Arabian Peninsula; the highest number of endemic species (seven) is confined to the mountains of south-western Saudi Arabia and western Yemen (*Colymbetes substrigatus*, *Hydroporus carli*, *Laccophilus sublineatus*, *Nebrioporus millingenii*, *N. seriatus*, *Yola bicristata*, *Y. buettikeri*); two species are known only from a single, hundred-year-old finding in Hadramaut region (*Dineutus arabicus*, *Hydaticus arabicus*); one (sub)species occurs along eastern coast of the Arabian Peninsula (*Laccophilus maindroni maindroni*); and one (sub)species is endemic to Dhofar (*Hydaticus satoi dhofarensis*).

The relationships of those endemic species are generally poorly understood; however, at least the substantial morphological similarity of the two taxa from Hadramaut with widely distributed Oriental species, i.e. *Dineutus arabicus* with *D. indicus*, and *Hydaticus arabicus* with *H. histrio*, allows us the assumption of their vicariant speciation and isolation from a common Oriental ancestor, caused by the formation of deserts in the Arabian Peninsula. This statement is moreover supported by existence of endemic species on 'the other side' of the desert – in the Persian Gulf area, which seem to be vicariant with the African–south Arabian species, i.e. *Copelatus antoniorum* Hájek & Brancucci, 2011 with *C. gestroi*, and *Hydroglyphus sinuspersicus* Hájek & Wewalka, 2009 with *H. major* (see HÁJEK & BRANCUCCI 2011 and HÁJEK & WEWALKA 2009, respectively). The endemic Yemeni species *Hydroporus carli* is probably closely related to *H. inscitus* from northern Middle East (cf. WEWALKA 1992). Finally, Arabian species of *Colymbetes* Clairville, 1806 and *Nebrioporus* Régimbart, 1906 seem to have general affinity to Palaearctic fauna (see TOLEDO 2009 for *Nebrioporus*), while e.g. those of *Yola* Gozis, 1886 seem to be closely related to Afrotropical taxa (cf. BISTRÖM 1983).

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