Koleopterologische Rundschau	87	51–84	Wien, September 2017

Hydraenidae of Djibouti, with description of two new species (Coleoptera: Hydraenidae)

M.A. JÄCH & J.A. DELGADO

Abstract

The family Hydraenidae (Coleoptera) is recorded from Djibouti (East Africa) for the first time. Two new species are described: *Limnebius* (*Bilimneus*) *josianae*, and *Ochthebius* (s.str.) *loulae* (*O. atriceps* group). Three species are recorded from the African Continent for the first time: *Hydraena* (*Hydraenopsis*) *arabica* BALFOUR-BROWNE, 1951, *Limnebius* (*Bilimneus*) *arabicus* BALFOUR-BROWNE, 1951, and *Ochthebius* (s.str.) *micans* BALFOUR-BROWNE, 1951 (*O. punctatus* group). One species, *Hydraena* (*Hydraenopsis*) *quadricollis* WOLLASTON, 1864, is recorded from Djibouti for the first time. One species of the *Ochthebius marinus* group, strongly resembling *O. chappuisi* ORCHYMONT, 1948, described after four females from southern Ethiopia (Omo River) and northern Kenya (Lake Turkana), could not be identified with certainty. Habitus photographs and line drawings of the genitalia of all seven species known from Djibouti (except *Limnebius arabicus*) are provided. In addition, the male genitalia of two other species of *Ochthebius* LEACH, 1815 are also illustrated. Keys to the species of the three genera of Hydraenidae from Djibouti are also provided.

Key words: Coleoptera, Hydraenidae, *Hydraena*, *Limnebius*, *Ochthebius*, taxonomy, new species, Djibouti, East Africa.

Introduction

So far, no Hydraenidae have ever been recorded from Djibouti. During an expedition to Djibouti, organized by the Association Djibouti Nature (www.djiboutinature.org), numerous water beetles were collected by the senior author and M. Madl in January/February 2016. During this expedition a total of seven species of Hydraenidae, including two new species, has been collected. All seven species are discussed and the two new species are described below. Keys are also provided.

Material and methods

Most of the specimens from Djibouti were collected by the senior author in 2016. A few additional specimens were collected by J. Lips (Lyon, France) in 2011 and 2014.

Line drawings were prepared with the aid of a camera lucida attached to a Nikon eclipse E600 microscope. Habitus photographs were taken with a Nikon DS-U2 unit Camera attached to a Leica MZ9S stereomicroscope. Images were stacked using CombineZP.

The material studied is deposited in the following collections:

BMNH	Natural History Museum, London, UK
CDM	Coll. Delgado, Murcia, Spain
CLL	Coll. Lips, Lyon, France [to be deposited in the Muséum d'histoire naturelle, Lyon, France]
IBE	Institute of Evolutionary Biology, Barcelona, Spain
ISNB	Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium
MNHN	Muséum national d'histoire naturelle, Paris, France
NMW	Naturhistorisches Museum Wien, Vienna, Austria

Label data of type specimens and of some historical specimens are cited between quotation marks; comments are given between square brackets.

Hydraena (*Hydraenopsis*) *arabica* BALFOUR-BROWNE, 1951

Hydraena arabica BALFOUR-BROWNE 1951: 201; JÄCH 1982: 60; FURTH 1983: 15; JÄCH & MARGALIT 1987: 332.
Hydraena (s.str.) *arabica* BALFOUR-BROWNE, 1951: HANSEN 1998: 35.
Hydraena (*Hydraenopsis*) *arabica* BALFOUR-BROWNE, 1951: JÄCH 1986: 20; JÄCH, BEUTEL, DÍAZ & KODADA 2000: 79; JÄCH 2004: 109; TRIZZINO, JÄCH, AUDISIO, ALONSO & RIBERA 2013: electronic appendices; JÄCH & SKALE 2015: 142.

MATERIAL EXAMINED (Djibouti, Tajourah Prov., Goda Mountains):

2 exs. (NMW, IBE): stream, ca. 0.2–1.0 m wide, slowly flowing through wide gravel bed in deep canyon, ca. 1.5 km SW Campement Touristique Ditillou, 11°46'25"N 42°40'48"E, ca. 760 m a.s.l., ca. 20 km WSW Tajourah, 28.I.2016, leg. M.A. Jäch (loc. "DJI 4").

1 ex. (NMW): residual pools and small stream, max. 1 m wide, slowly flowing through wide gravel bed, in canyon, ca. 0.5 km SW Campement Touristique Bankualé, 11°49'14.8"N 42°40'9.4"E, ca. 680 m a.s.l., ca. 25 km WNW Tajourah, 29.I.2016, leg. M.A. Jäch (loc. "DJI 6").

4 exs. (NMW): residual pools in small stream, max. 0.5 m wide, slowly flowing through narrow canyon, below Campement Touristique Goda, ca. 1.5 km E Randa, 11°51'3.2"N 42°40'9.8"E, ca. 700 m a.s.l., ca. 25 km NW Tajourah, 29.–30.I.2016, leg. M.A. Jäch (loc. "DJI 7"); 5 exs. (CLL): same locality, 3.XI.2011, leg. J. Lips (5929 - DJ219).

The DNA of one female paratype (voucher number IBE-AN515) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number: LT906394). The extracted specimen and DNA are deposited in the IBE.

DISTRIBUTION and HABITAT NOTES: This species was so far known only from Israel, Saudi Arabia, Oman, and Yemen.

First record for Djibouti and for the African Continent!

In Djibouti this species was collected only in the Goda Mountains (Tajourah Province) (Fig. 18), where it was found in the gravel of three different springs/streams near Randa, Bankualé and Ditillou (Fig. 21).

Hydraena (*Hydraenopsis*) *quadricollis* WOLLASTON, 1864

Hydraena quadricollis WOLLASTON 1864: 89; WOLLASTON 1865: 75; WOLLASTON 1867: 39; MARSEUL 1871: 118; PEYERIMHOFF 1946: 164; TONAPI & OZARKAR 1969: 1 [misidentification]; BERTHÉLEMY & WHYTTON DA TERRA 1977: 34; JÄCH 1982: 60; MALMQVIST, NILSSON & BÁEZ 1995: 8, 22; MACHADO & OROMÍ 2000: 119; OROMÍ, MARTÍN, ZURITA & CABRERA 2005: 83; SHARMA & BANO 2012: 500 ["*Hydraena quadricollis* Wallaston [sic]"; misidentification].
Hydraena (s.str.) *quadricollis* WOLLASTON, 1864: KNISCH 1924: 41; ORCHYMONT 1940: 18 ff.; BERTHÉLEMY, KADDOURI & RICHOUX 1992: 208; HANSEN 1998: 54.
Hydraena (*Hydraenopsis*) *quadricollis* WOLLASTON, 1864: JÄCH, BEUTEL, DÍAZ & KODADA 2000: 4, 32, 80; JÄCH 2004: 110; TRIZZINO, JÄCH, AUDISIO, ALONSO & RIBERA 2013: electronic appendices; JÄCH & SKALE 2015: 143.
[*Limnebius* [!] *quadricollis* (WOLLASTON): IENIŞTEA 1978: 313 – this record was listed under *Hydraena* (s.str.) *quadricollis* WOLLASTON, 1864 by HANSEN (1998: 54); however, the original record published by IENIŞTEA (1978) was most probably misplaced, it obviously refers to *Ochthebius quadricollis heeri* (WOLLASTON, 1854) from Madeira].
Hydraena nilotica REY 1886: 78; BERTHÉLEMY & WHYTTON DA TERRA 1977: 34.
Hydraena (s.str.) *nilotica* REY, 1886: KNISCH 1924: 40 [see also references therein]; ORCHYMONT 1940: 157 [synonymy]; BERTHÉLEMY, KADDOURI & RICHOUX 1992: 208; HANSEN 1998: 54.
Hydraena (*Hydraenopsis*) *nilotica* REY, 1886: JÄCH 2004: 110; JÄCH & SKALE 2015: 143.

MATERIAL EXAMINED (Djibouti, Dikhil Prov., Lac Abbé Basin):

3 exs. (NMW): small shallow pools and canals fed by thermal spring, 11°6'8.4"N 41°53'39.9"E, ca. 270 m a.s.l., ca. 7 km from lake shore, ca. 50 km W Dikhil, ca. 140 km SW Djibouti City, 1.II.2016, leg. M.A. Jäch (loc. "DJI 11").

1 ex. (NMW): small shallow pools and canals fed by thermal spring, 11°7'39.4"N 41°53'38.5"E, ca. 260 m a.s.l., ca. 5 km from lake shore, ca. 50 km W Dikhil, ca. 140 km SW Djibouti City, 2.II.2016, leg. M.A. Jäch (loc. "DJI 11a").

DISTRIBUTION and HABITAT NOTES: Distribution and taxonomy of this species are not yet clarified satisfactorily. It was described from the Canary Islands, where it seems to be extinct today. Apart from the Canary Islands it was recorded from Algeria, Tunisia, Egypt, Cape Verde, Sudan, Ethiopia, and Kenya. The record from Oman by TRIZZINO, JÄCH, AUDISIO, ALONSO & RIBERA (2013) probably refers to an undescribed species since the DNA of one specimen examined differs considerably from the DNA of a specimen from Tunisia. Further morphological studies as well as DNA sequencing will be necessary to clarify the taxonomy and distribution of *Hydraena quadricollis.*

Records from India by TONAPI & OZARKAR (1969) and SHARMA & BANO (2012) are definitely based on misidentifications. The latter authors listed *Hydraena quadricollis* under Hydrophilidae (subfamily Hydraeninae).

First record for Djibouti!

In Djibouti this species was collected in shallow pools and canals (Fig. 22) fed by thermal springs in the south-eastern Lac Abbé Basin (Dikhil Province) (Fig. 18).

Key to species of *Hydraena* KUGELANN, 1794 from Djibouti

1 Habitus as in Fig. 1; pronotal and elytral punctures less deeply impressed, elytral intervals less convex; tibiae slightly longer and thinner; male metatibia hardly noticeably emarginate mesally at basal third (see arrows in Fig. 1). Aedeagus (Fig. 7): main piece in lateral view more evenly curved, in ventral view more abruptly widened subapically; distal lobe distinctly smaller; both parameres very small; male sternite X (Fig. 8a) more distinctly asymmetrical; inner plate of gonocoxite (Fig. 8b) hardly projecting sublaterally; female tergite X (Fig. 8c) slightly more transverse; spermatheca as in Fig. 8d–e. In Djibouti known only from the northern part of the country (Goda Mountains in Tajourah Province) (Fig. 18) ..... ***arabica***

– Habitus as in Fig. 2; pronotal and elytral punctures more deeply impressed, elytral intervals more convex; tibiae slightly shorter and thicker; male metatibia completely straight. Aedeagus (Fig. 9): main piece in lateral view more straight, in ventral view gradually widened toward apex; distal lobe distinctly larger; parameres larger; male sternite X (Fig. 10a) less distinctly asymmetrical; inner plate of gonocoxite (Fig. 10b) distinctly projecting medially; female tergite X (Fig. 10c) slightly less transverse; spermatheca as in Fig. 10d–e. In Djibouti known only from the south-western part of the country (Lac Abbé Basin in Dikhil Province) (Fig. 18)… ..... ***quadricollis***

Limnebius (*Bilimneus*) *arabicus* BALFOUR-BROWNE, 1951

Limnebius (*Bilimneus*) *arabicus* BALFOUR-BROWNE 1951: 202; RUDOY, BEUTEL & RIBERA 2016: 21 ff.
Limnebius arabicus BALFOUR-BROWNE, 1951: JÄCH 1993: 108; HANSEN 1998: 64; JÄCH 2004: 111; JÄCH & DELGADO 2010: 177 ff.; JÄCH & DELGADO 2012: 132 ff.; JÄCH & SKALE 2015: 144.

MATERIAL EXAMINED (Djibouti, Tajourah Prov., Goda Mountains):

4 exs. (NMW: 2, IBE: 2): stream, ca. 0.2–1.0 m wide, slowly flowing through wide gravel bed in deep canyon, ca. 1.5 km SW Campement Touristique Ditillou, 11°46'25"N 42°40'48"E, ca. 760 m a.s.l., ca. 20 km WSW Tajourah, 28.I.2016, leg. M.A. Jäch (loc. "DJI 4").

29 exs. (NMW, CDM): residual pools and small stream, max. 1 m wide, slowly flowing through wide gravel bed, in canyon, ca. 0.5 km SW Campement Touristique Bankualé, 11°49'14.8"N 42°40'9.4"E, ca. 680 m a.s.l., ca. 25 km WNW Tajourah, 29.I.2016, leg. M.A. Jäch (loc. "DJI 6"). Seven additional specimens (NMW) stored in alcohol.

6 exs. (NMW): residual pools in small stream, max. 0.5 m wide, slowly flowing through narrow canyon, below Campement Touristique Goda, ca. 1.5 km E Randa, 11°51'3.2"N 42°40'9.8"E, ca. 700 m a.s.l., ca. 25 km NW Tajourah, 29.–30.I.2016, leg. M.A. Jäch (loc. "DJI 7").

The DNA of one paratype (voucher number IBE-AN516) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number LT906395). The extracted specimen and DNA are deposited in the IBE.

DISTRIBUTION and HABITAT NOTES: This species was so far known only from Israel and Yemen.

First record for Djibouti and for the African Continent!

In Djibouti it was collected only in the Goda Mountains (Tajourah Province) (Fig. 19), where it occurs, together with *Hydraena arabica*, in the gravel of three different springs/streams near Randa, Bankualé and Ditillou (Fig. 21). At some sites this species was found to be extremely abundant; hundreds of specimens were observed in some small residual pools (Figs. 24–25); however, due to their very small size (body length: usually less than 1 mm) they are easily overlooked.

Limnebius (*Bilimneus*) *josianae* sp.n.

TYPE LOCALITY (Fig. 23): Alloulli oasis in Wadi Kalou, ca. 75 m a.s.l., 11°33'28.5"N 42°20'26.4"E, ca. 90 km W Djibouti City, Arta Prov., central Djibouti.

TYPE MATERIAL: **Holotype** ♂ (NMW): "DJIBOUTI: Arta Prov. Alloulli, Oued Kalou ca. 90 km W Djibouti 30.-31.I.2016 leg. M.A. Jäch (DJI 8)", "75 m a.s.l. 11°33'28.5"N/42°20'26.4"E small springs, residual pools, rain water pools". **Paratypes**: 13 exs. (NMW: 11, IBE: 2), same locality data as holotype; 2 ♂♂, 1 ♀ (CLL): "DJIBOUTI Dikhil Prov., ca. 6 km E Gour'obbous, ca. 23 km NNW Dikhil, 270 m, 11°17'9.6"N 42°17'6.0"E, 25.III.2011, leg. J. Lips (5421-1 - DJ176)".

The DNA of one of the paratypes (voucher number IBE-AN414) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number LT837916). The extracted specimen and DNA are deposited in the IBE.

DESCRIPTION: Habitus as in Fig. 3. Length (from tip of labrum to elytral apex): 0.86–1.00 mm (holotype: 0.86 mm). Yellowish-brown to dark brown; head usually darker than remaining body parts, but lateral parts of clypeus usually paler; middle of pronotum sometimes darker than lateral parts of pronotum; elytral suture usually darkened; palpi and legs yellowish-brown, terminal palpomere usually darker. Body form subparallel to drop-shaped. Head and pronotum smooth and glabrous, very faintly punctate. Elytra microreticulate, meshes polygonal; sparsely setose; punctures hardly perceptible.

Aedeagus (Fig. 11): Main piece long and slender, slightly curved; widened subapically, apex acute; in lateral view, apex truncate and produced ventrad; with numerous short setae in apical third, especially along left margin.

Gonocoxite (Fig. 12a): Outer plate subquadrate, slightly asymmetrical, lateral margins slightly produced medially, basal apophyses distinct; basal margin with a conspicuous median apophysis-like projection; setae more or less confined to apical margin, posterior corners with some longer setae; inner plate strongly asymmetrical, strongly projecting basally on left side; cavea small.

Tergite X (Fig. 12b): Small, subtriangular, slightly asymmetrical; basal apophyses very large; apical part of disc and apical margin with several thick bristles and several trichoid setae; apical setae forming a pair of long tufts.

Spermatheca as in Fig. 12c–d.

SECONDARY SEXUAL DIMORPHISM: Tibiae (especially protibia) of male wider than in female. Elytral reticulation of female more distinctly impressed than in male; in male elytral reticulation often more or less effaced anteriorly. Basal pro- and mesotarsomeres of male enlarged.

DIFFERENTIAL DIAGNOSIS: The general shape of the aedeagus of *Limnebius josianae* vaguely resembles that of *L. evanescens* KIESENWETTER, 1865 (see JÄCH 1993: fig. 13), known

from Portugal, Spain, Morocco and Algeria. However, the apex of the aedeagus of the latter is totally different, especially in lateral view.

The aedeagus of *Limnebius conoideus* RÉGIMBART, 1905, described from Eritrea, is very different (see FERRO 1989: fig. 7; misspelled as "*conoides*"). It is extremely slender and more or less evenly curved in lateral view.

For differences between *Limnebius arabicus* and *L. josianae*, see the key below.

The remaining species of *Limnebius* LEACH, 1815 from the African continent south of the Sahara were described from the Democratic Republic of the Congo (*L. cupulifer* ORCHYMONT, 1941, *L. damasi* BALFOUR-BROWNE, 1950, *L. mutatus* ORCHYMONT, 1945, *L. wittei* BALFOUR-BROWNE, 1950), Uganda (*L. alluaudi* ORCHYMONT, 1948), Kenya (*L. jeanneli* ORCHYMONT, 1948), and southern Africa (11 species described by PERKINS 2015). None of these species seems closely related with *L. josianae*, their aedeagi are all quite different.

DISTRIBUTION and HABITAT NOTES: So far known only from the type locality (Arta Province), and from Gour'obbous (Dikhil Province) (Fig. 19), where it occurs in the gravel of small springs and residual pools (Fig. 23).

ETYMOLOGY: Named in honour of Josiane Lips (Lyon, France), expert of Djibouti beetles. She was the first person, who collected this new species.

Key to species of *Limnebius* LEACH, 1831 from Djibouti

1 Habitus as in *L. pararabicus* JÄCH & DELGADO, 2010 (see JÄCH & DELGADO 2010: fig. 3) and *L. dioscoridus* JÄCH & DELGADO, 2012 (see JÄCH & DELGADO 2012: fig. 1); elytra usually more strongly attenuate toward apex; elytral reticulation confined to posterior half. Aedeagus (see JÄCH 1993: fig. 10, JÄCH & DELGADO 2012: figs. 9–10): very small, with short acute apical appendage and with conspicuous, very small subapical excision on right side (ventral or dorsal view); outer plate of gonocoxite without median apophysis-like projection, inner plate not projecting, distinctly asymmetrical; female tergite X more or less as in *L. dioscoridus* (see JÄCH & DELGADO 2012: fig. 8), with moderately large apophyses. In Djibouti known only from the Goda Mountains (Tajourah Province) (Fig. 19) ..... ***arabicus***

– Habitus as in Fig. 3; elytra usually less strongly attenuate toward apex, almost subparallel-sided; elytra completely microreticulate (in male elytral reticulation often more or less effaced basally). Aedeagus (Fig. 11): longer, without apical appendage and without subapical excision; outer plate of gonocoxite (Fig. 12a) with a conspicuous median apophysis-like projection, inner plate strongly asymmetrical, strongly projecting basally on left side; female tergite X (Fig. 12b) with very large apophyses. Known only from Wadi Kalou (Arta Province, central Djibouti) and from Gour'obbous (Dikhil Province, southern Djibouti) (Fig. 19) ..... ***josianae***

Ochthebius (s.str.) cf. *chappuisi* ORCHYMONT, 1948

MATERIAL EXAMINED (Djibouti, Dikhil Prov.):

21 exs. (NMW: 19, IBE: 2): Lac Abbé Basin, small shallow pools and canals fed by thermal spring, 11°6'8.4"N 41°53'39.9"E, ca. 270 m a.s.l., ca. 7 km from lake shore, ca. 50 km W Dikhil, ca. 140 km SW Djibouti City, 1.II.2016, leg. M.A. Jäch (loc. "DJI 11").

9 exs. exs. (NMW: 8, CDM: 1): Lac Abbé Basin, small shallow pools and canals fed by thermal spring, 11°7'39.4"N 41°53'38.5"E, ca. 260 m a.s.l., ca. 5 km from lake shore, ca. 50 km W Dikhil, ca. 140 km SW Djibouti City, 2.II.2016, leg. M.A. Jäch (loc. "DJI 11a").

1 ♂ (NMW): Agna oasis, small irrigation canal (with grassy margins) fed by a thermal spring, 11°33'59.7"N 41°54'49.0"E, ca. 140 m a.s.l., ca. 20 km NW Yoboki, ca. 130 km W Djibouti, 31.I.2016, leg. M.A. Jäch (loc. "DJI 9").

The DNA of one male paratype (voucher number IBE-AN475) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number LT837918). The extracted specimen and DNA are deposited in the IBE.

DESCRIPTION: Habitus as in Fig. 4. Length (from tip of labrum to elytral apex): 1.55–1.75 mm. Head black, especially frons with purplish metallic lustre; pronotum brownish, with purplish and/or greenish metallic lustre; elytra yellowish, with longitudinal brownish stripes along suture and discal striae, median and lateral stripes usually reduced to series of brown punctures, first stria usually very short (reduced to short stria just anterior of elytral declivity); palpi yellowish-brown; legs yellowish.

Labrum sexually dimorphic; clypeus more or less comprehensively rugosely micropunctate.

Pronotum largely smooth and glabrous, with very small scattered punctures; impressions shallow or very shallow and more or less densely microreticulate, median furrow narrow, usually slightly enlarged subbasally and subapically, anterior admedian foveae round or slightly elongate, posterior admedian foveae elongate and oblique.

Elytra more or less broadly oval, with five distinct rows of punctures between suture and shoulder; punctures small and shallow, rather densely arranged; striae not impressed; intervals flat, faintly reticulate.

Middle of metaventrite comprehensively glabrous.

Aedeagus (Fig. 13): Main piece long and slender, more or less evenly curved in lateral view. Distal lobe short, recurved, ventral margin distinctly convex. Parameres long and slender, almost symmetrical, inserted near basal third, apically distinctly widened.

SECONDARY SEXUAL DIMORPHISM: Labrum of male anteriorly strongly upturned, emargination covered by semitransparent hyalinous cuticula; labrum of female not upturned, with small but distinct emargination. Mandibles of male with strong bristles along outer edge. Female clypeus usually slightly more convex in middle. Elytra usually more acuminate apically in female; elytral gutter medially distinctly widened in female. Terminal tergite of female with fringe of strong bristles. Basal protarsomeres of male slightly enlarged, with sucking setae.

VARIABILITY: Posterior margin of pronotum sometimes yellowish; extension and intensity of colouration of elytral stripes somewhat variable, elytra sometimes with brown irrorations (rarely totally brown), sometimes with brown punctures between stripes. Width of labral excision of female slightly variable. Extension of micropunctation of clypeus very variable. Size of admedian pronotal foveae quite variable. Median pronotal furrow rarely effaced medially. The shape of the elytra varies from short oval to elongate oval. Size and curvature of aedeagal distal lobe somewhat variable.

DISCUSSION: This species is closely related or identical with *O. chappuisi* ORCHYMONT, 1948 (*O. marinus* group), described from southern Ethiopia (Omo River) [= type locality] and northern Kenya (Lake Turkana). Unfortunately, the holotype and all three paratypes of *O. chappuisi* are females. We have examined the holotype (MNHN) labelled: "♀", "ETHIOPIE MÉRID Bourié [spelled as "Bourillé" in the original description (ORCHYMONT 1948: 56)] BORD DE LA RIV. OMO [bank of River Omo] 600 m.", "MUSÉUM DE PARIS Mission de l'Omo C. ARAMBOURG P.-A. CHAPPUIS & R. JEANNEL 1932-33", "TYPE" [red], "A.d'Orchymont det. Ochthebius (s.str.) Chappuisi m." [partly handwritten], and all three paratypes (MNHN, ISNB). Two of the paratypes (MNHN: 1, ISNB: 1) have the same locality data as the holotype. The third paratype (MNHN) is labelled: "♀", "ETHIOPIE MÉRID Nanoropus BORDS DU RODOLPHE [shore of Lake Turkana] 585 m.", "MUSÉUM DE PARIS Mission de l'Omo C. ARAMBOURG P.-A. CHAPPUIS & R. JEANNEL 1932-33", "Para- type", "A.d'Orchymont det. Ochthebius (s.str.) Chappuisi m.". The locality "Nanoropus" might refer to Namuroputh (Loima Division, Turkana

Central District, northern Kenya). The elevation data provided on the locality labels (600 m and 565 m) are probably wrong. The surface elevation of Lake Turkana is about 360 m a.s.l.

Externally, the type specimens of *O. chappuisi* agree very well with the specimens of *O.* cf. *chappuisi* from Djibouti, e.g. in size (1.7 mm long), body form, colouration, elytral reticulation. Other characters, such as the convexity of the clypeus, the size of the interocular foveae, the punctation of the pronotal disc, and the depth of the sublateral pronotal furrow, are obviously variable and do not permit to draw taxonomic conclusions.

In addition we have examined a single male (ISNB) from Voi (Taita-Taveta County, south-eastern Kenya) labelled: "♂", "MUSEUM PARIS AFRIQUE ORIENT. ANGL. VOÏ CH. ALLUAUD 1909", "SEPTEMBRE", "A.d'Orchymont det. Ochthebius (s.str.) ?Chappuisi m. aff. ♀♀ mS [not clearly legible] région". According to its label data this male was identified as *O.* ? *chappuisi* by Orchymont. It is about 1.6 mm long and seems to agree quite well with the types of *O. chappuisi* and with *O.* cf. *chappuisi* from Djibouti. However, its aedeagus (Fig. 14) is very different from that of *O.* cf. *chappuisi*, in fact resembling that of *O. salinarius* BALFOUR-BROWNE, 1954, described from South Africa; the main piece is more straight than in *O.* cf. *chappuisi* and the distal lobe is not recurved.

Geographically, the type locality of *O. chappuisi* lies almost exactly in-between Djibouti and Voi. The true identity of *O.* cf. *chappuisi* therefore cannot be clarified decisively without the examination of males (or any fresh material suitable for DNA extraction) from the Omo-Turkana region.

Several undescribed, closely related species from Benin and Madagascar are deposited in the NMW.

DISTRIBUTION and HABITAT NOTES: So far known only from two locations in south-western Djibouti (Dikhil Province) (Fig. 20): 1) small canals and shallow pools in the south-eastern Lac Abbé Basin (Fig. 22); 2) small irrigation canal fed by a thermal spring in the oasis of Agna.

Ochthebius (s.str.) *micans* BALFOUR-BROWNE, 1951

Ochthebius (s.str.) *micans* BALFOUR-BROWNE, 1951: 198; JÄCH 1992: 181; HANSEN 1998: 107; JÄCH 2004: 119; JÄCH & SKALE 2015: 158.

Ochthebius (s.str.) *subdifficilis* JÄCH, 1984: 110; JÄCH & MARGALIT 1987: 332; JÄCH 1992: 181; HANSEN 1998: 107; JÄCH 2004: 119; JÄCH & SKALE 2015: 158.

MATERIAL EXAMINED (Djibouti, Arta Prov.):

8 exs. (NMW: 6, IBE: 2): small springs and shallow residual pools, Alloulli oasis in Wadi Kalou, 11°33'28.5"N 42°20'26.4"E, ca. 75 m a.s.l., ca. 90 km W Djibouti City, 31.I.2016, leg. M.A. Jäch (loc. "DJI 8").

The DNA of one female (voucher number IBE-AN474) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number LT837917). The extracted specimen and DNA are deposited in the IBE.

REDESCRIPTION: Habitus as in Fig. 5. Length (from tip of labrum to elytral apex): 1.50–1.78 mm. Dorsal surface moderately densely covered with adpressed whitish setae; black, in some of the specimens head and pronotum with very slight greenish coppery violaceous metallic lustre; palpi and legs yellowish brown.

Labrum slightly transverse, sparsely punctate, anterior margin slightly excised medially; clypeus sparsely to moderately densely punctate, glabrous. Frontoclypeal suture strongly arcuate, almost V-shaped, deeply impressed, except laterally. Frons glabrous and sparsely to moderately densely punctate; interocular foveae very deep; ocelli absent.

Pronotum subcordiform, largely glabrous, sparsely to moderately densely punctate, impressions densely micropunctate; anterior corners more or less rectangular; anterior margin straight; lateral margins more or less straight anteriorly; anterior admedian foveae small, subcircular, deeply impressed, posterior admedian foveae large, oblique, oval, deeply impressed, median furrow well impressed, sometimes widened at level of anterior admedian foveae, posterior sublateral foveae usually well developed, shallow.

Elytra oval, rather short, with five distinct rows of punctures between suture and shoulder; punctures comparatively small, densely or moderately densely arranged, more or less regular, with a few scattered punctures on intervals; striae usually not impressed (except first stria); intervals rather flat, smooth.

Metaventrite pubescent.

Aedeagus (Fig. 15): Main piece rather short and stout, more or less straight, slightly widened medially, apically distinctly curved ventrad (lateral view). Distal lobe with moderately long stem, head transversely subglobular. Parameres short and thick, almost symmetrical, inserted near phallobase, apically hardly widened.

DISTRIBUTION and HABITAT NOTES: This species was so far known only from Israel, Jordan, Saudi Arabia, and Yemen.

First record for Djibouti and for the African Continent!

In Djibouti this species was collected only in the Alloulli oasis (Arta Province) (Figs. 20, 23), where it occurs together with *Limnebius josianae*.

Ochthebius (s.str.) *loulae* sp.n.

TYPE LOCALITY (Fig. 26): South-eastern Lac Abbé [or Abhé] Basin, ca. 2.3 km from lake shore, ca. 250 m a.s.l., 11°8'55.8"N 41°52'50.2"E, ca. 50 km W Dikhil, ca. 140 km SW Djibouti City, Dikhil Prov., south-western Djibouti.

TYPE MATERIAL: **Holotype** ♂ (NMW): "DJIBOUTI: Dikhil Prov. ca. 50 km W Dikhil ca. 140 km SW Djibouti eastern margin of Lac Abbé 1.-2.II.2016 leg. M.A. Jäch (DJI11)", "245–270 m a.s.l. 11°8'52.87"N/41°51'59.90"E- 11°6'8.41"N/41°53'39.92"E- 11°9'18.15"N/41°52'40.40"E thermal springs, small pools, canals". **Paratypes**: 2 ♂♂, 6 ♀♀ (NMW), 1 ♂, 1 ♀ (BMNH), 1 ♂, 1 ♀ (IBE), same locality data as holotype; 1 ♀ (CLL): "DJIBOUTI: Dikhil Prov. ca. 50 km W Dikhil eastern margin of Lac Abbé, 250 m, 6.III.2014, leg. J. Lips (8913)".

The DNA of one male paratype (voucher number IBE-AN476) was non-destructively extracted in the IBE and the barcode gene (5' end of the cytochrome oxidase I) sequenced (GenBank accession number LT837919). The extracted specimen and DNA are deposited in the IBE.

DESCRIPTION: Habitus as in Fig. 6. Length (from tip of labrum to elytral apex): 1.40–1.68 mm. Head black, especially clypeus and frons with slightly greenish metallic lustre; pronotum brownish, anterior corners and sometimes posterior margin yellowish, disc often with slightly greenish metallic lustre; elytra yellowish, often subtransparent, sometimes with poorly defined pale brownish spot in middle; palpi and legs yellowish.

Labrum transverse, anterior margin slightly emarginate medially, sexually dimorphic; clypeus partly or entirely rugosely micropunctate. Frontoclypeal suture distinctly arcuate, usually distinctly impressed, except laterally. Frons usually glabrous and sparsely micropunctate, sometimes more densely and rugosely micropunctate; interocular foveae and median fovea very deep; ocelli absent.

Pronotum subcordiform, largely smooth and glabrous, with very small scattered punctures; anterior corners strongly produced into curved projections; anterior margin sinuous, with a pair of distinct postocular teeth; anterior admedian foveae small, rounded or transverse, posterior

admedian foveae large, usually moderately deeply impressed and usually microreticulate, median furrow enlarged subbasally and subapically.

Elytra elongately oval, acuminate apically, with five distinct rows of punctures between suture and shoulder; punctures moderately large, more or less densely arranged; striae not impressed; intervals rather flat, smooth.

Middle of metaventrite comprehensively glabrous.

Aedeagus (Fig. 16): Main piece long and slender, more or less evenly curved in lateral view. Distal lobe elongate and sickle-shaped. Parameres long and slender, almost symmetrical, inserted near basal third, apically slightly widened.

SECONDARY SEXUAL DIMORPHISM: Females on average longer than males. Anterior margin of labrum of male slightly upturned. Elytra of female more elongate and more or less strongly acuminate apically, and elytral gutter often distinctly wider medially.

DIFFERENTIAL DIAGNOSIS: *Ochthebius loulae* (*O. atriceps* group (= "*O. atriceps* subgroup" sensu JÄCH 1991)) is very similar to *O. cameroni* BALFOUR-BROWNE, 1951, described from Kamaran Island (Red Sea, Yemen).

We have examined 14 paratypes (BMNH: 12, NMW: 2) of *O. cameroni*, labelled: "S. Arabia Kamaran I. 27–II[resp. ii]–1903 Dr.M.Cameron. B.M.1928-109.", "Quarry pools, strongly brackish.", "Co- type", "O. (Hymenodes) Cameroni Cotypes. J.Balfour-Browne det". They can be distinguished from *O. loulae* by the generally darker yellowish brown colouration, and by the aedeagus (Fig. 17). In dorsal or ventral view, the distal lobe of *O. cameroni* is more slender and more regularly curved, more distinctly sickle-shaped. The distal lobe of *O. loulae* is basally and medially wider and less regularly curved.

DISTRIBUTION and HABITAT NOTES: So far known only from the type locality (Figs. 20, 26), where it was found in small shallow unshaded pools with strongly saline water.

ETYMOLOGY: Named for Mrs. Loula A. Dabar (Gatineau, Quebec, Canada), wife of Mr. Houssain A. Rayaleh (Technical Advisor, Association Djibouti Nature, Djibouti).

Key to species of *Ochthebius* LEACH, 1815 from Djibouti

1 Member of the *O. punctatus* group. Habitus and colouration as in Fig. 5; dorsal surface of pronotum and elytra black. Aedeagus as in Fig. 15. In Djibouti known only from Alloulli oasis in Wadi Kalou (Arta Province, central Djibouti) (Fig. 20)..... ***micans***

– Not member of the *O. punctatus* group. Habitus and colouration as in Figs. 4, 6; dorsal surface of pronotum and elytra predominantly yellowish or yellowish brown, never entirely black. Aedeagi as in Figs. 13, 16..... 2

2 Member of the *O. atriceps* group. Habitus as in Fig. 6; anterior corners of pronotum produced to form acute curved teeth; postocular pronotal teeth present; anterior margin of pronotum slightly emarginate medially. Aedeagus as in Fig. 16. Known only from Lac Abbé Basin (Dikhil Province, south-western Djibouti) (Fig. 20)..... ***loulae***

– Member of the *O. marinus* group. Habitus as in Fig. 4; anterior corners of pronotum not produced into acute teeth; postocular pronotal teeth absent; anterior margin of pronotum not emarginate. Aedeagus as in Fig. 13. Known only from Lac Abbé Basin and Agna oasis (Dikhil Province, south-western Djibouti) (Fig. 20)..... **cf. *chappuisi***

Fig. 1: *Hydraena arabica*, male, arrows show inconspicuous emarginations in metatibiae.

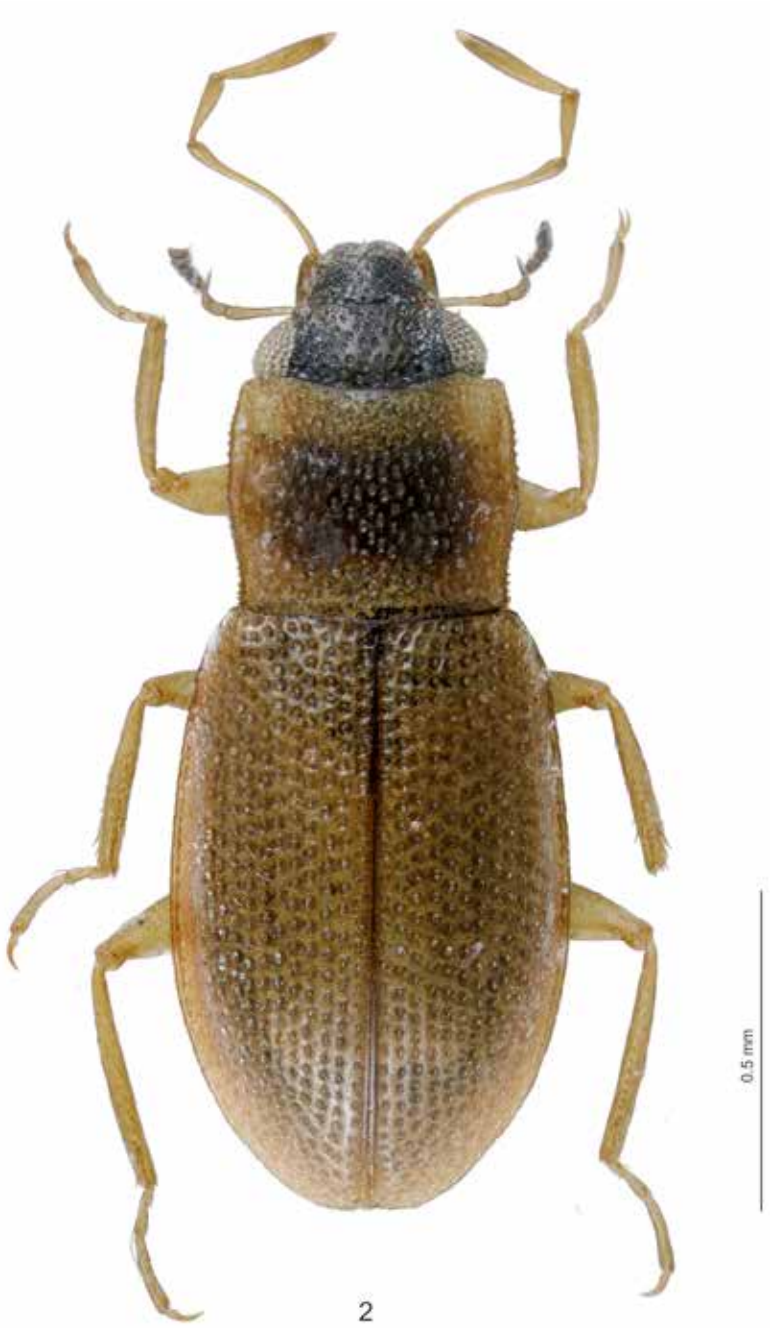


Fig. 2: *Hydraena quadricollis*, male.

Fig. 3: *Limnebius josianae*, holotype.

Fig. 4: *Ochthebius* cf. *chappuisi*, male.

Fig. 5: *Ochthebius micans*, male.

Fig. 6: *Ochthebius loulae*, holotype.

Fig. 7: *Hydraena arabica*, aedeagus in a) ventral and b) lateral view.

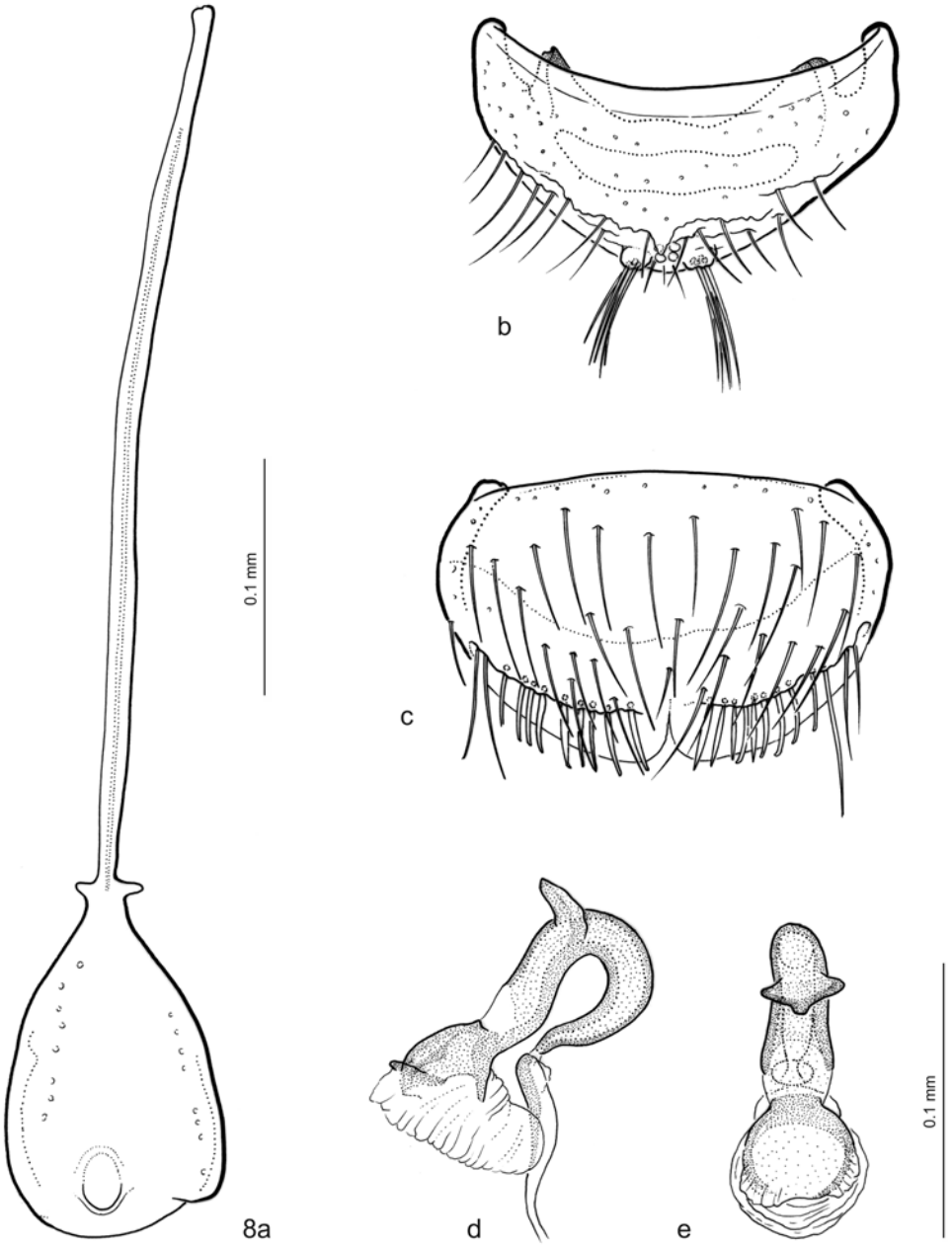


Fig. 8: *Hydraena arabica*, a) male sternite X and spiculum, b) gonocoxite, c) female tergite X, d–e) spermatheca.

Fig. 9: *Hydraena quadricollis*, aedeagus in a) lateral and b) ventral view, c) apex of aedeagus in dorsal view.

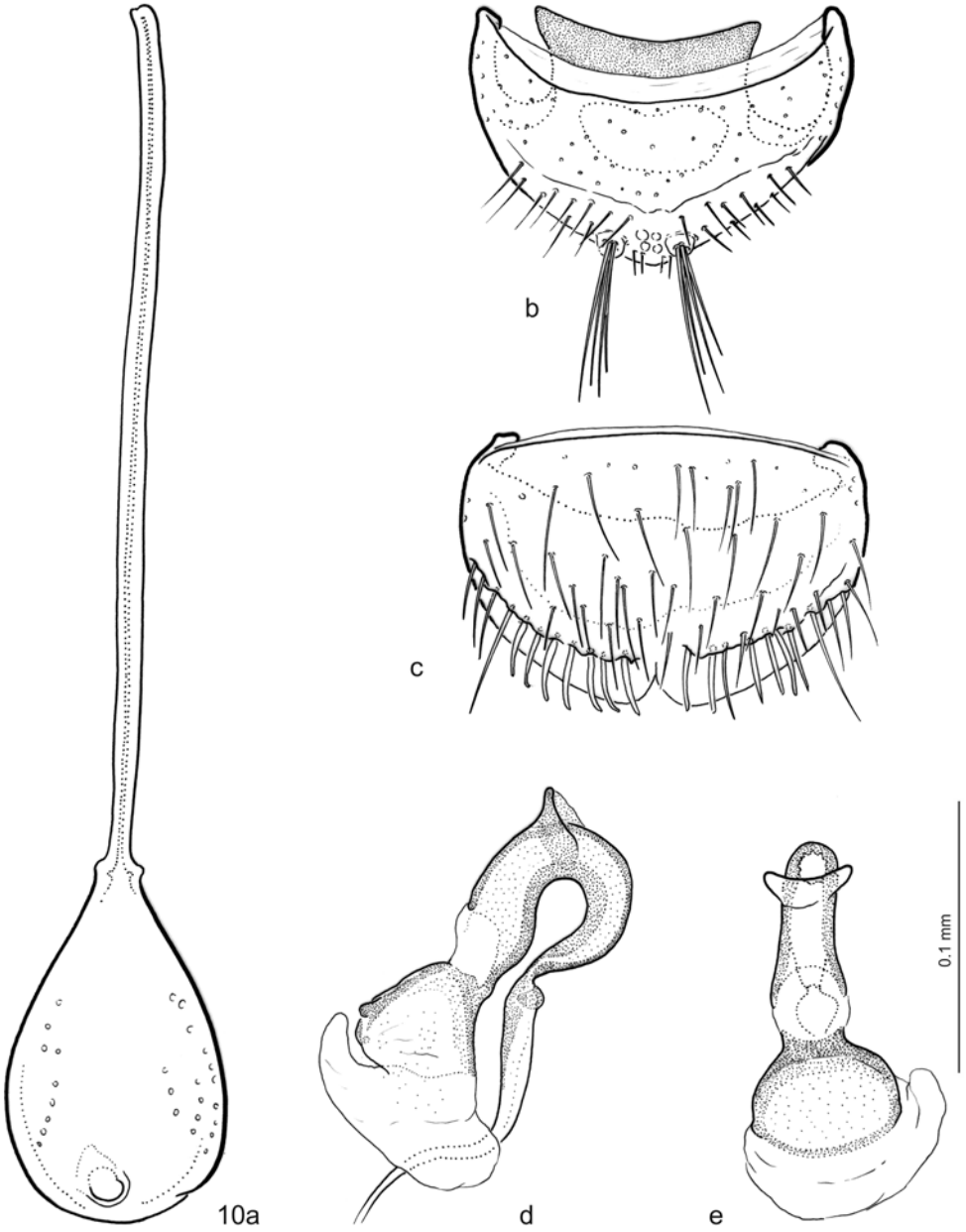


Fig. 10: *Hydraena quadricollis*, a) male sternite X and spiculum, b) gonocoxite, c) female tergite X, d–e) spermatheca.

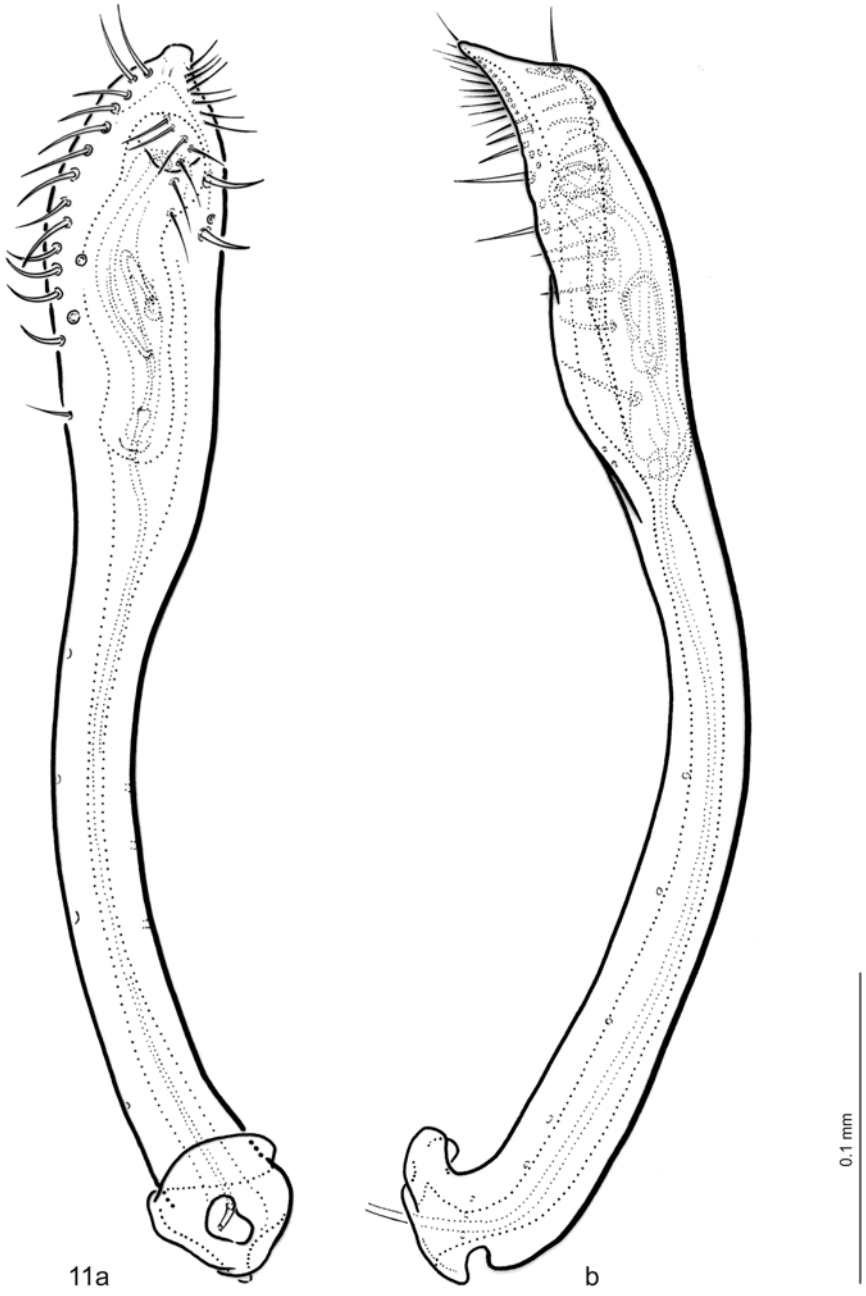


Fig. 11: *Limnebius josianae*, aedeagus in a) ventral and b) lateral view.

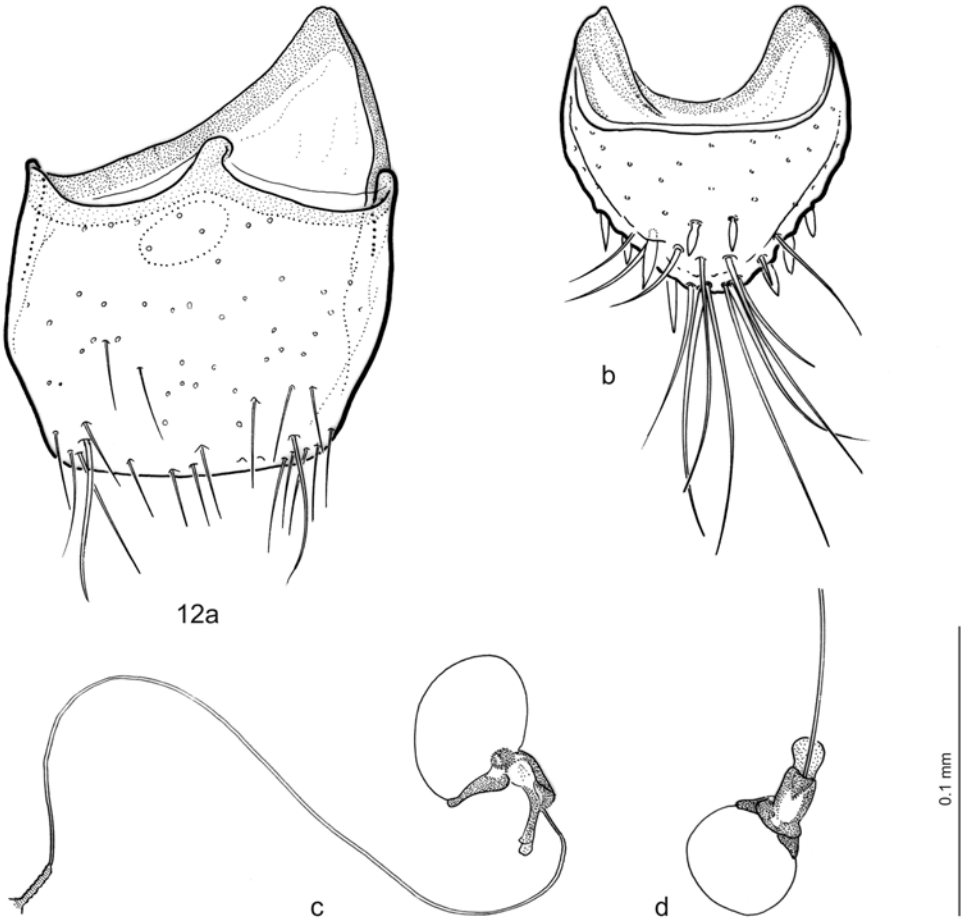


Fig. 12: *Limnebius josianae*, female, a) gonocoxite, b) tergite X, c–d) spermatheca.

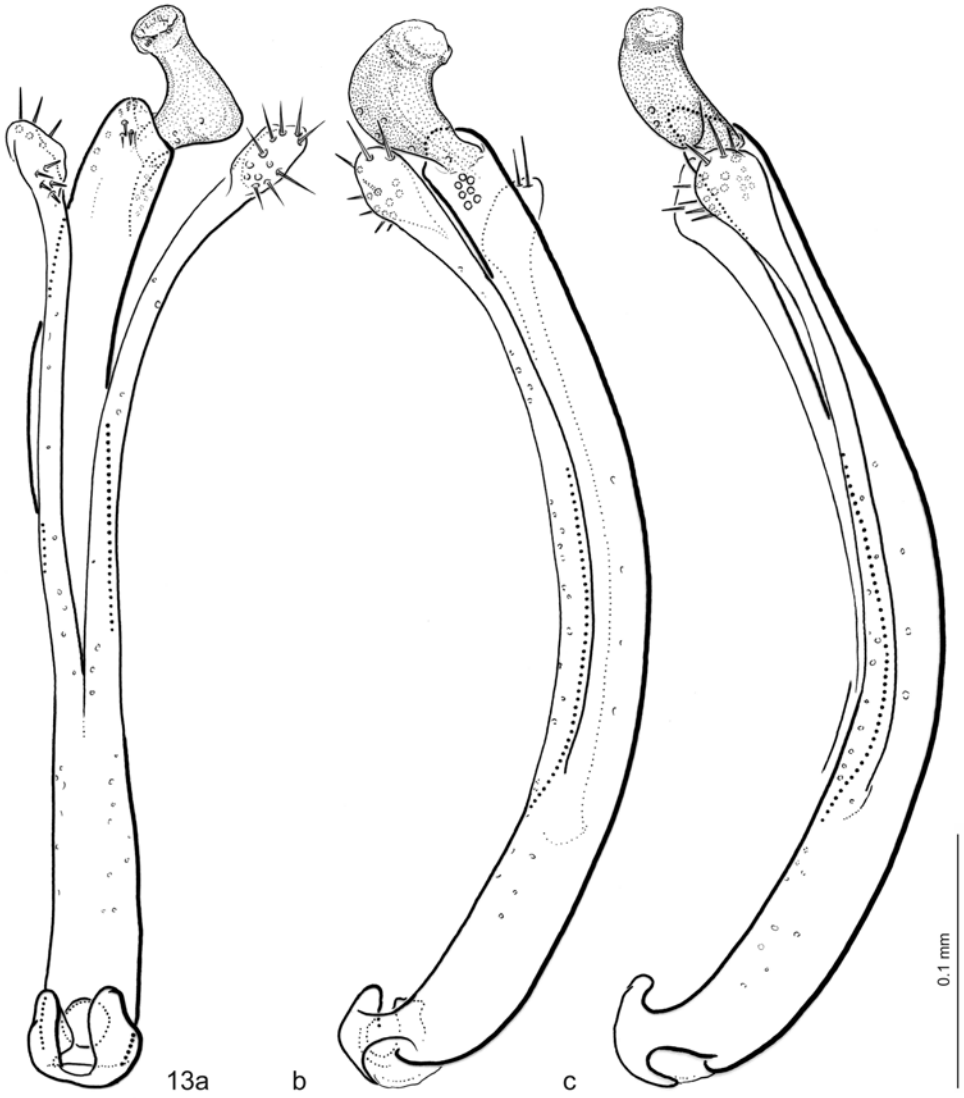


Fig. 13: *Ochthebius* cf. *chappuisi*, aedeagus of a specimen from Djibouti in a) ventral, b) dorsolateral, and c) lateral view.

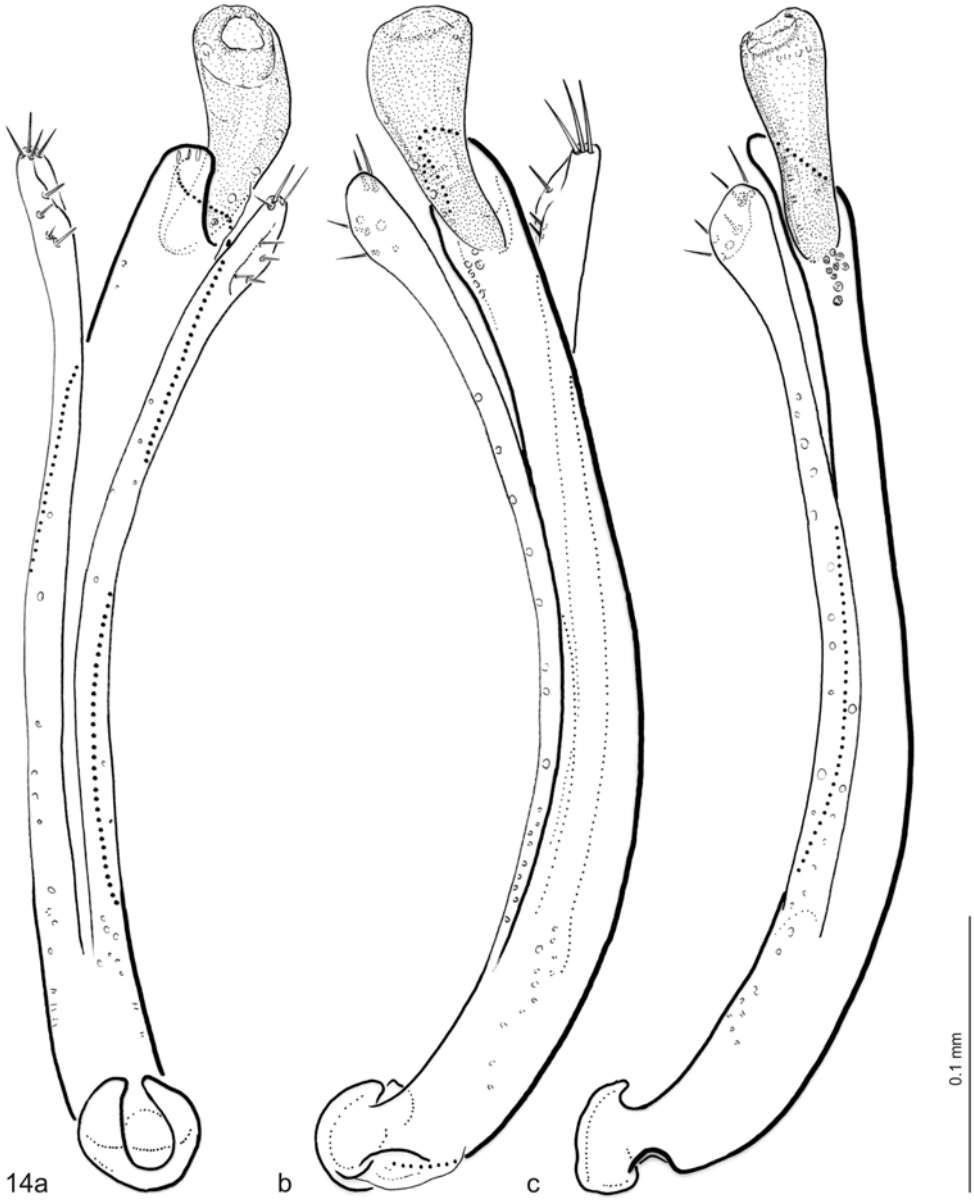


Fig. 14: *Ochthebius* ? *chappuisi* (det. Orchymont), aedeagus of a specimen from south-eastern Kenya in a) ventral, b) dorsolateral, and c) lateral view.

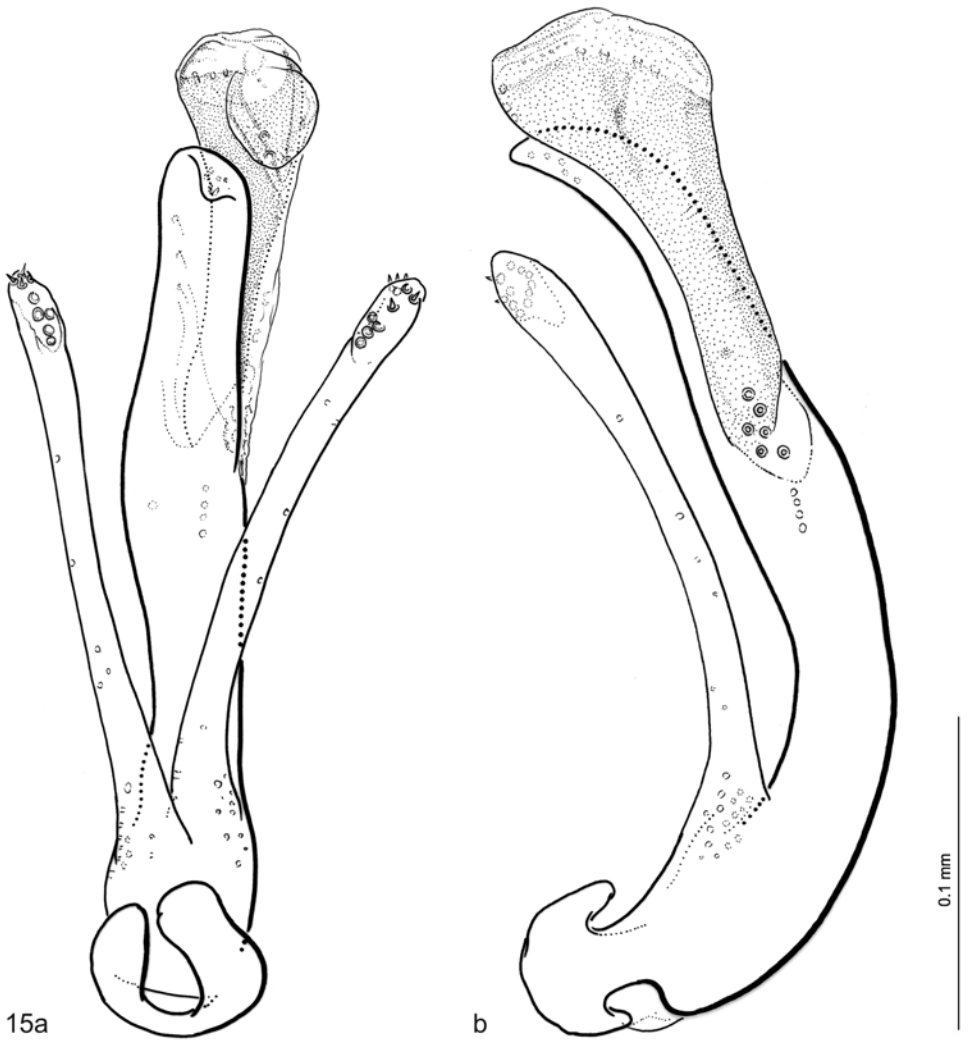


Fig. 15: *Ochthebius micans*, aedeagus in a) ventral and b) lateral view.

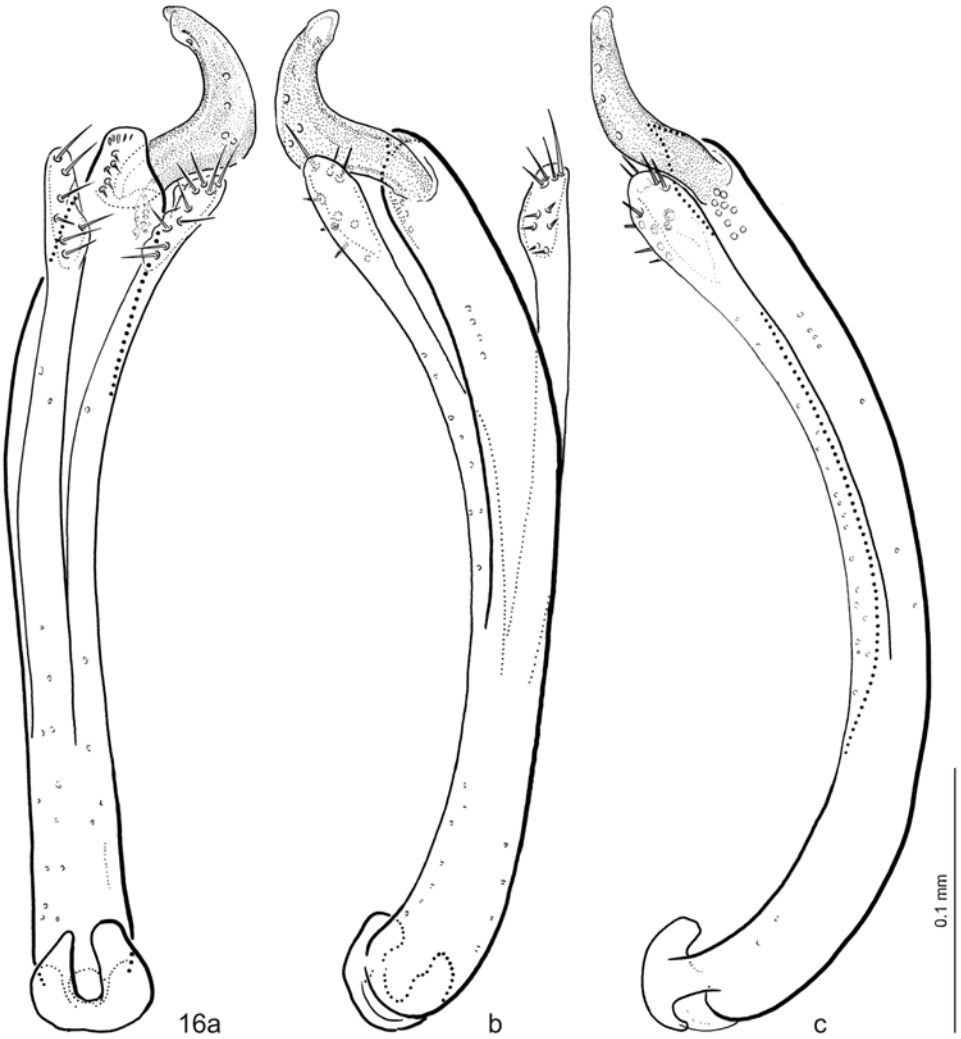


Fig. 16: *Ochthebius loulae*, aedeagus in a) ventral, b) dorsal, and c) lateral view.

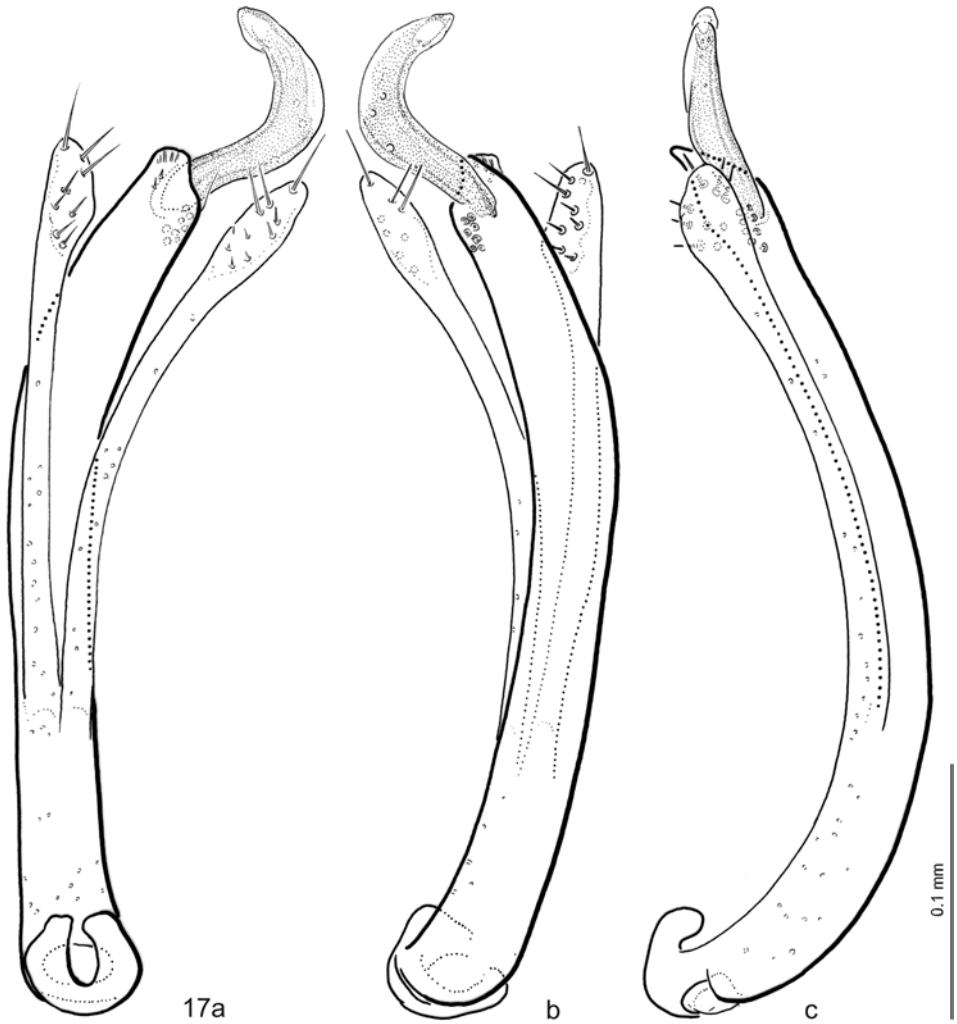
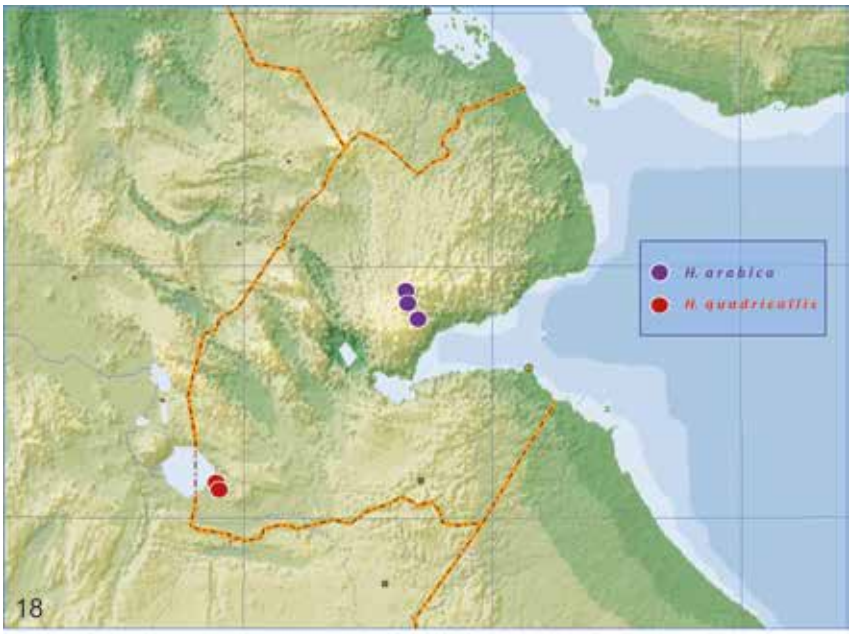
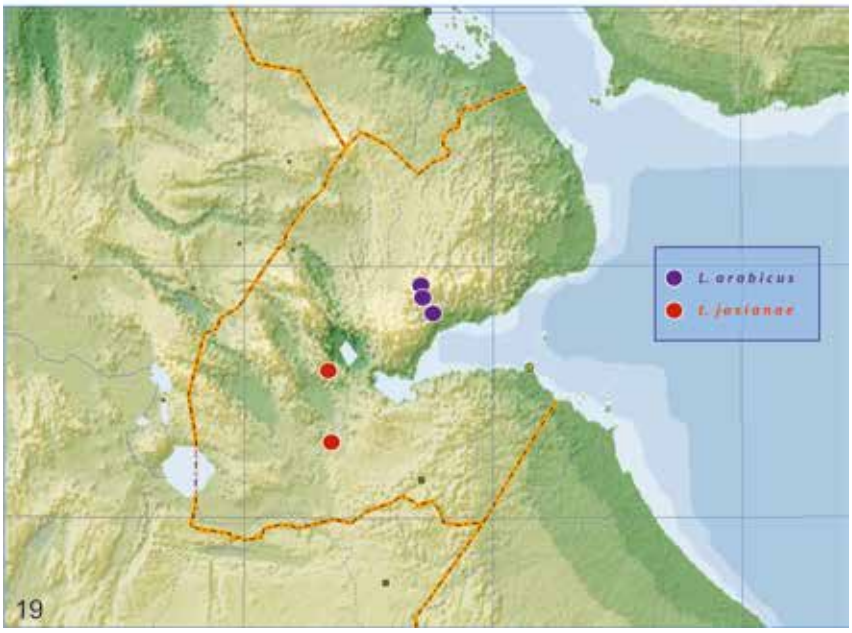


Fig. 17: *Ochthebius cameroni*, aedeagus in a) ventral, b) dorsal, and c) lateral view.





Figs. 18–19: Geographical distribution of 18) *Hydraena arabica* and *H. quadricollis*, and 19) *Limnebius arabicus* and *L. josianae* in Djibouti.

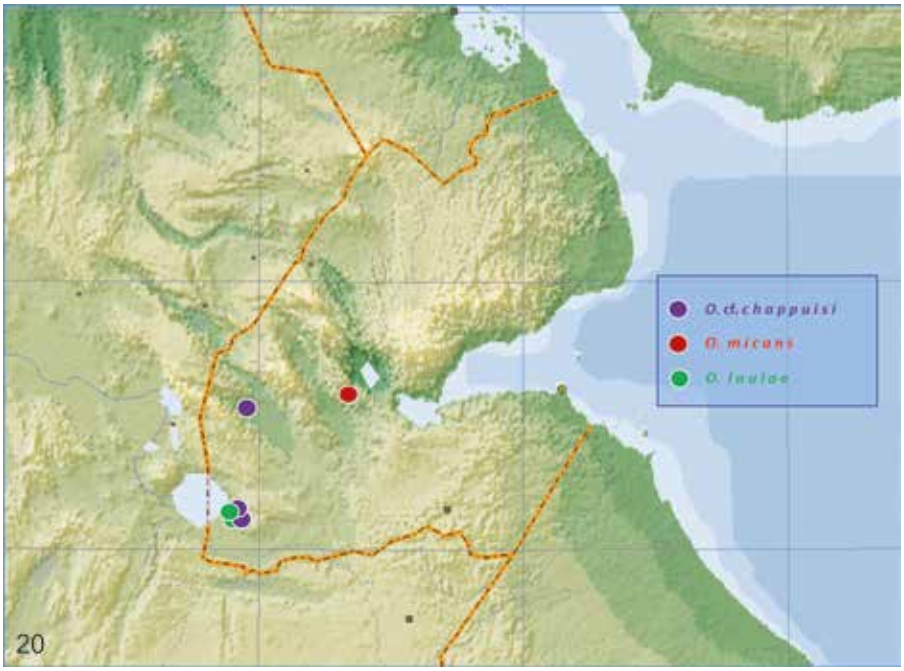


Fig. 20: Geographical distribution of *Ochthebius* cf. *chappuisi*, *O. micans* and *O. loulae* in Djibouti.

Fig. 21: Small stream, ca. 1.5 km SW Campement Touristique Ditillou, ca. 760 m a.s.l., Tajourah Prov., Goda Mountains, northern Djibouti (loc. "DJI 4"). Habitat of *Hydraena arabica* and *Limnebius arabicus*.

Fig. 22: Canal and shallow pools fed by thermal spring, south-eastern Lac Abbé Basin, ca. 5 km from lake shore, ca. 260 m a.s.l., Dikhil Prov., south-western Djibouti (loc. "DJI 11a"). Habitat of *Hydraena quadricollis* and *Ochthebius* cf. *chappuisi*.

Fig. 23: Alloulli oasis in Wadi Kalou, ca. 75 m a.s.l., Arta Prov., central Djibouti (loc. "DJI 8"). Type locality of *Limnebius josianae* and habitat of *Ochthebius micans*.

Fig. 24: Small residual pool in canyon, ca. 0.5 km SW Campement Touristique Bankualé, ca. 680 m a.s.l., Tajourah Prov., Goda Mountains, northern Djibouti (loc. "DJI 6"). Hundreds of specimens of *Limnebius arabicus* were found to dwell in this pool.

Fig. 25: Close-up of insect net showing at least 90 specimens of *Limnebius arabicus* from the small residual pool depicted in Fig. 24.

Fig. 26: Small saline ditch, south-eastern Lac Abbé Basin, ca. 2.3 km from lake shore, ca. 250 m a.s.l., Dikhil Prov., south-western Djibouti (loc. "DJI 11a"). Type locality of *Ochthebius loulae*.

Discussion

The two species of *Hydraena*, *H. arabica* and *H. quadricollis*, belong to the subgenus *Hydraenopsis* JANSSENS, 1972, and within this very speciose subgenus they are obviously members of the same group of species. This group is widely distributed from the Canary Islands, Cape Verde Islands, throughout continental Africa, to Israel, the Arabian Peninsula, and India.

The two species of *Limnebius*, although belonging also to the same subgenus (*Bilimneus* REY, 1883), do not seem to be very closely related. *Limnebius arabicus* belongs to a complex of species known from Israel, the Arabian Peninsula and Socotra, while *Limnebius josianae* seems to be related with some species of Mediterranean origin. Unfortunately, very little is known about the species of *Limnebius* of Sub-Saharan Africa.

The three species of *Ochthebius* are not related to each other at all. They belong to three different species groups. *Ochthebius micans* (*O. punctatus* group) is clearly of Arabian origin. *Ochthebius* cf. *chappuisi* belongs to the wide-spread *O. marinus* group, which is found in all biogeographical regions. The relationships within the *O. marinus* group are not yet well understood. *Ochthebius loulae* belongs to the *O. atriceps* group, primarily found in the Mediterranean Region and western Asia (incl. the Arabian Peninsula). This group was not known from East Africa so far.

Conclusions: The majority, if not all hydraenid species of Djibouti are of northern (Palearctic) origin. Three of the species were known so far only from the Arabian Peninsula and Israel, and one species is most closely related with a species from Yemen.

Two species, *Hydraena arabica* and *Limnebius arabicus* occur in springs, small mountain streams and residual pools at higher elevations (680–760 m) in the so-called Danakil Block (Danakil Alps, or Danakil Horst), an isolated, partly forested mountain range between the Danakil (or Afar) Depression and the Red Sea. All other species were found in the Danakil

Depression at lower elevations (75–270 m). Two species, *Limnebius josianae* and *Ochthebius micans*, were found in fresh water desert springs in wadis, and three species, *Hydraena quadricollis*, *Ochthebius loulae*, and *O.* cf. *chappuisi* were collected in springs near an inland salt lake (Lac Abbé); the latter species was found also in a desert spring in an oasis. One of these species, *O. loulae*, can be regarded as halobiontic.

Acknowledgements

We thank P. Limbourg and Dr. W. de Koninck (both ISNB), J. Lips (Lyon, France), A. Mantilleri (MNHN), and C. Taylor (BMNH) for the loan of study material. The loan of the holotype and two paratypes of *Ochthebius chappuisi* was kindly arranged by A. Komarek (Mödling, Austria) during his visit to the MNHN.

DNA extraction and sequencing was funded by project CGL2013-48950-C2-1-P (AEI/FEDER, UE) to I. Ribera (IBE), which is gratefully acknowledged.

Last not least the senior author thanks Mr. Houssain A. Rayaleh, alias Houssain Assamo (Technical Advisor, Association Djibouti Nature, Djibouti) for organizing his expedition across Djibouti, as well as Mr. Ebou (driver) and Mr. Mohamed-Houssain (Bedouin guide) for their support and faithful guidance during this trip.

References

BALFOUR-BROWNE, J. 1951: 16. Coleoptera: Haliplidae, Dytiscidae, Gyrinidae, Hydraenidae, Hydrophilidae, pp. 179–220, pls. X–XI. – In: British Museum Expedition to South-west Arabia, 1937-38. – London, British Museum, xiv + 504 pp.

BERTHÉLEMY, C., KADDOURI, A. & RICHOUX, P. 1992: Revision of the genus *Hydraena* Kugelann, 1794 from North Africa (Coleoptera: Hydraenidae). – Elytron 5 [1991]: 181–213.

BERTHÉLEMY, C. & WHYTTON DA TERRA, L.S. 1977: Hydraenidae et Elmidae du Portugal (Coleoptera). – Annales de Limnologie 13 (1): 29–45.

FERRO, G. 1989: Note su qualche Limnebiinae (Coleoptera Hydraenidae) XXII: Contributo alla conoscenza degli Hydraenidae. – Bulletin et Annales de la Société royale belge de l'Entomologie 125: 277–281.

FURTH, D.G. 1983: Aquatic entomofauna of a Dead Sea oasis. – Hydrobiologia 102: 3–25.

HANSEN, M. 1998: Hydraenidae (Coleoptera). – In Hansen, M. (ed.): World Catalogue of Insects. Vol. 1. – Stenstrup: Apollo Books, 168 pp.

IENIŞTEA, M.-A. 1978: Hydradephaga und Palpicornia, pp. 291–314. – In Illies, J. (ed.): Limnofauna Europaea (2. ed.). – Stuttgart: Gustav Fischer Verlag, XVII + 532 pp.

JÄCH, M.[A.] 1982: Die Gattung *Hydraena* in Israel (Col. Hydraenidae). – Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 34: 59–60.

JÄCH, M.A. 1984: New and little known Palearctic species of the genus *Ochthebius* (Col. Hydraenidae). – Aquatic Insects 6 (2): 109–114.

JÄCH, M.A. 1986: A synopsis of the genus *Hydraena* (Coleoptera: Hydraenidae) of the Middle East. – Israel Journal of Entomology 20: 13–23.

JÄCH, M.A. 1991: Revision of the Palearctic species of the genus *Ochthebius* VII. The *foveolatus* group (Coleoptera: Hydraenidae). – Koleopterologische Rundschau 61: 61–94.

JÄCH, M.A. 1992: Revision of the Palearctic species of the genus *Ochthebius* Leach X. the *punctatus* species group (Hydraenidae: Coleoptera). – Bulletin et Annales de la Société royale belge de l'Entomologie 128: 167–195.

JÄCH, M.A. 1993: Taxonomic revision of the Palearctic species of the genus *Limnebius* Leach, 1815 (Coleoptera: Hydraenidae). – Koleopterologische Rundschau 63: 99–187.

JÄCH, M.A. 2004: Hydraenidae, pp. 102–122. – In Löbl, I. & Smetana, A. (eds.): Catalogue of Palaearctic Coleoptera. Vol. 2. – Stenstrup: Apollo Books, 942 pp.

JÄCH, M.A., BEUTEL, R.G., DÍAZ, J.A. & KODADA, J. 2000: Subgeneric classification, description of head structures, and world check list of *Hydraena* Kugelann (Insecta: Coleoptera: Hydraenidae). – Annalen des Naturhistorischen Museums in Wien (Ser. B) 102: 177–258.

JÄCH, M.A. & DELGADO, J.A. 2010: Order Coleoptera, family Hydraenidae, pp. 173–194. – In Harten, A. van (ed.): Arthropod fauna of the UAE. Vol. 3. – Abu Dhabi: Multiply Marketing Consultancy Services, 700 pp.

JÄCH, M.A. & DELGADO, J.A. 2012: *Limnebius dioscoridus* sp. nov. from Socotra Island (Coleoptera: Hydraenidae). – Acta Entomologica Musei Nationalis Pragae 52 (suppl. 2): 131–134.

JÄCH, M.A. & MARGALIT, J. 1987: Distribution of Dytiscids in springs of the Dead Sea Area (Coleoptera: Dytiscidae). – The Coleopterists Bulletin 41 (4): 327–334.

JÄCH, M.A. & SKALE, A. 2015: Hydraenidae, pp. 130–162. – In Löbl, I. & Löbl, D. (eds.): Catalogue of Palaearctic Coleoptera. Vol. 2. Hydrophiloidea – Staphylinoidea. Revised and updated edition. – Leiden: Brill, xxvi + 1702 pp. [printed in two parts: pp. i–xxvi + 1–900, pp. 901–1702]

KNISCH, A. 1924: Hydrophilidae. – In Schenkling, S. (ed.): Coleopterorum Catalogus. – Berlin: W. Junk, 306 pp.

MACHADO, A. & OROMÍ, P. 2000: Elenco de los Coleópteros de las Islas Canarias (Catalogue of the Coleoptera of the Canary Islands). – La Laguna: Instituto de Estudios Canarios, 308 pp.

MALMQVIST, B., NILSSON, A.N. & BÁEZ, M. 1995: Tenerife's freshwater macroinvertebrates: status and threats (Canary Islands, Spain). – Aquatic Conservation: Marine and freshwater ecosystems 5: 1–24.

MARSEUL, S.A. de 1871: Repertoire des coléoptères d'Europe décrits isolément depuis 1864. – L'Abeille, Mémoires d'Entomologie VIII: 1–420. [pp. 185–420 issued in 1872]

ORCHYMONT, A. d' 1940: Les Palpicornia des Îles Atlantiques. – Mémoires du Musée Royale d'Histoire Naturelle de Belgique, 2. ser. (20): 1–87.

ORCHYMONT, A. d' 1948: Mission scientifique de l'Omo, Tome VII. – Fascicule 62. Coleoptera XV. Hydraenidae. – Mémoires du Muséum nationale d'Histoire naturelle (Nouvelle série) XXVII (2): 29–62, pls. Ill–IV.

OROMÍ, P., MARTÍN, E., ZURITA, N. & CABRERA, A. 2005: Coleoptera, pp. 78–86. – In Arechavaleta, M., Zurita, N., Marrero, M.C. & Martín, J.L. (eds.): Lista preliminar de especies silvestres de Cabo Verde (hongos, plantas y animales terrestres). – Consejería de Medio Ambiente y Ordenación Territorial, Gobierno de Canarias, 155 pp.

PERKINS, P.D. 2015: Taxonomy of the water beetle genus *Limnebius* Leach in southern Africa (Coleoptera: Hydraenidae). – Zootaxa 3948 (1): 41–59.

PEYERIMHOFF, P. de 1946: Les Coléoptères des Atlantides et l'élement atlantique. – Mémoires de la Société de Biogéographie 8: 153–197.

REY, C. 1886: Histoire naturelle des Coléoptères de France (suite). – Annales de la Société linnéenne de Lyon 32 [1885]: 1–187, pls. 1–2.

RUDOY, A., BEUTEL, R.G. & RIBERA, I. 2016: Evolution of the male genitalia in the genus *Limnebius* Leach, 1815 (Coleoptera, Hydraenidae). – Zoological Journal of the Linnean Society 2016: 1–31, plus supporting information.

SHARMA, R.M. & BANO, R. 2012: Insecta : Coleoptera (aquatic). – Zoological Survey of India. Fauna of Maharashtra, State Fauna Series 20 (2): 499–501.

TONAPI, G.T. & OZARKAR, V.A. 1969: A new record of *Hydraena quadricollis* Wollaston (Coleoptera: Hydrophilidae) from India. – The Coleopterists' Bulletin 23: 1–4.

TRIZZINO, M., JÄCH, M.A., AUDISIO, P., ALONSO, R. & RIBERA, I. 2013: A molecular phylogeny of the cosmopolitan hyperdiverse genus *Hydraena* Kugelann (Coleoptera, Hydraenidae). – Systematic Entomology 38: 192–208, plus supporting information.

WOLLASTON, T.V. 1864: Catalogue of the coleopterous insects of the Canaries in the collection of the British Museum. – London: The Trustees of the British Museum, xiii + 648 pp.

WOLLASTON, T.V. 1865: Coleoptera Atlantidum, being an enumeration of the coleopterous insects of the Madeiras, Salvages, and Canaries. – London: John van Voorst, xlvii + 526 pp. + 140 pp. (Appendix, Indices).

WOLLASTON, T.V. 1867: Coleoptera Hesperidum, being an enumeration of the coleopterous insects of the Cape Verde Archipelago. – London: John van Voorst, xxxix + 285 pp. [possibly published in 1868]

Dr. Manfred A. JÄCH
Naturhistorisches Museum Wien, Burgring 7, A – 1010 Wien, Austria (manfred.jaech@nhm-wien.ac.at)

Dr. Juan A. DELGADO
Departamento de Zoología, Facultad de Biología, Universidad de Murcia, 30100 Murcia, Spain (jdelgado@um.es)