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New species of the *Hydroporus longulus*-group from Iran, Armenia and Turkey with a synopsis of the group (Coleoptera: Dytiscidae)

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Abstract. *Hydroporus jelineki* sp. nov. is described from Iran and Turkey, *H. hajeki* sp. nov. from Iran, *H. holzschuhi* sp. nov. from Turkey and *H. shaverdoae* sp. nov. from Armenia. The lectotypes of *H. jacobsoni* Zaitzev, 1927 and *H. kraatzii* Schaum, 1868 are designated. *Hydroporus libanus* Régimbart, 1901 and *H. kryshtali* Bilyashiwski, 1993 are also included in the study, since they are similar to some of the new species and almost unknown in the literature; their original descriptions are translated from Latin and Ukrainian, respectively. Except *H. kraatzii*, the above-mentioned species are externally rather similar, and only the males can be distinguished with certainty by the shape of their aedeagi, which are figured along with the female genitalia of five species. All these species belong to the *longulus*-group of *Hydroporus* Clairville, 1806, the members of which were treated as belonging to the subgenus *Sternoporus* Falkenström, 1930 until not long ago. Some historical notes on the classification of the *longulus*-group members and, additionally, on that of the *H. memnonius*- and the *H. neglectus*-group members are provided. A synopsis of the *H. longulus*-group is also given, the total number of its members now increasing from 23 to 27. Finally, some general notes on the habitats of the *H. longulus*-group members are provided.

Key words. Coleoptera, Dytiscidae, *Hydroporus*, *longulus*-group, new species, lectotype, Palaearctic Region, Armenia, Georgia, Iran, Lebanon, Russia, Turkey

Introduction

Shortly after the description of five new species of the *H. longulus*-group of the genus *Hydroporus* Clairville, 1806 from Turkey (Fery & Erman 2009), further four new species of that group can be communicated. This is possible not only because more material became available in the meantime, but in particular because the identity of *Hydroporus jacobsoni*

Zaitzev, 1927 – for which the male genitalia were unknown until now – could be clarified. Thus, material which was waiting for its determination can now be classified with greater certainty.

The number of members of the *H. longulus*-group therefore increases from 23 in Fery & Erman (2009) to 27. It is remarkable that the area of the known distribution of this species group expands more and more from the western Mediterranean and central Europe to Asia Minor and the Near East. The knowledge about these species and also about those of the related *Hydroporus memnonius*- and *neglectus*-groups is far from complete, but we now have sufficient information to warrant taking stock. This is why there are provided 1) a historical review in part about the different classifications of the members of the three species groups, 2) a synopsis of the *H. longulus*-group members, and 3) notes on their habitats and collecting techniques.

Material and methods

The collections where specimens are located are coded as follows:

CAS	Coll. A. Skale, Hof/Saale, Germany;
CGW	Coll. G. Wewalka, Vienna, Austria;
CHF	Coll. H. Fery, Berlin, Germany, property of NMW;
CHS	Coll. H. V. Shaverdo, Vienna, Austria;
CLH	Coll. L. Hendrich, Berlin, Germany, property of NMW;
CMS	Coll. M. I. Shapovalov, Maykop, Republic of Adygeya, Russia;
NMPC	Národní Muzeum, Prague, Czech Republic (J. Hájek);
NMW	Naturhistorisches Museum Wien, Vienna, Austria (M. A. Jäch);
ZISP	Zoological Institute, Russian Academy of Science, St. Petersburg, Russia (A. Kirejtshuk);
ZMUK	Zoological Museum, University Kiev, Ukraine (A. V. Putchkov);
ZSM	Zoologische Staatssammlung München, Munich, Germany (M. Balke).

The male and female genitalia have been studied and figured in wet condition. In the text the following abbreviations are used: **hw** (handwriting), **TL** (total length), **MW** (maximum width), **IO/MP** (ratio of interocular distance and pronotal width at posterior angles). Co-ordinates are given in decimal notation unless cited verbatim from labels. My personal comments are given in square brackets. Numbers in braces mark localities and refer to the map in Fig. 26, which was made by using 'Microsoft Encarta World Atlas 2000'. The designation of two lectotypes is made to support the stability of the nomenclature. The terminology to denote the orientation of the genitalia follows Miller & Nilsson (2003).

Historical and general notes on the taxon *Sternoporus*

The species of the *H. longulus*-group have been treated as 'something special' within *Hydroporus* since Seidlitz (1887). He included in his '2. Gruppe [= group], 5. Abtheilung [= division]' of subgenus '*Hydroporus* i. sp.' ['i. sp.' = 'in specie' = 'in particular'; same meaning as 's. str.'] also members of the *H. memnonius*-group and the Holarctic *Hydroporus picicornis* J. Sahlberg, 1874, which was later included in the genus *Hydrocolus* Roughley

& Larson, 2000 and recently replaced by the name *Hydrocolus sahlbergi* Nilsson, 2001. Seidlitz (1887) also included *H. celatus* Clark, 1862 (now treated as a synonym of *H. longulus* Mulsant & Rey, 1861) in that group, but placed *H. neglectus* Schaum, 1845 in his '2. Gruppe, 2. Abtheilung' (Table 1).

Thirty-two years later, Zimmermann (1919) discussed intensively the value of several characters, in particular the shape of the posterior margin of the metacoxal processes, and created a new subgenus *Heterosternus* Zimmermann, 1919: 161, 178. In *Heterosternus* he included, beside the Holarctic *Hydrocolus sahlbergi* (see above), several Nearctic species which stand today in *Heterosternuta* Strand, 1935, *Hydrocolus* Roughley & Larson, 2000, *Neoporus* Guignot, 1931, and *Sanfilippodytes* Franciscolo, 1979. He also raised *Graptodytes* Seidlitz, 1887 and *Deronectes* Sharp, 1882 to generic rank, but he defined them in a much wider sense than today. Moreover, he divided '*Hydroporus* i. sp.' into several complexes, one of them called 'II.C' (Zimmermann 1919: 167). Herein he included species with relatively thick lateral rim of the pronotum and a more or less parallel body. *Hydroporus neglectus* was treated in his complex 'I.B.2' (Table 1).

The next step was done by Falkenström (1930: 24), who created the new subgenus *Sternoporus* Falkenström, 1930 of *Hydroporus* and placed three species in it (Table 1). Today one of them stands in the *H. longulus*-group and the other two are treated as *H. memnonius*-group members.

I refrain from presenting more details about the following historical development and refer to Wolfe & Matta (1981), Nilsson (1989: 113), and also Fery (1999: 223) who gave reviews about the grouping inside *Hydroporus* s. l., each until the respective year of publication. Nevertheless, it might be interesting for the reader to have an overview about Seidlitz', Zimmermann's and Falkenström's grouping and the development in the last four decades in tabulated form (Table 1). Here are also included the members of the *Hydroporus memnonius*- and *neglectus*-groups, as well as *Hydrocolus sahlbergi*, however, the species described as new in Fery & Erman (2009) and in the present work are not considered.

Although Nilsson (1989) synonymised *Sternoporus* with *Hydroporus*, the former name was still used by Pederzani (1995), Pederzani et al. (2004) and Pederzani & Rocchi (2005). Pederzani (1995: 66; note 37) wrote: 'Nilsson (1989) synonymized the subgenera of *Hydroporus*, I keep them distinct, as usual. *Hydroporidius* [Guignot, 1949] is poorly characterized indeed, but *Sternoporus* is a very distinct taxon, both in the metacoxal and the genital structure, as well as in the ecological behaviour.' This opinion is not too surprising; Wolfe & Matta (1981: 150) already pointed out that '... many subgenera are still readily recognized in the field (even by non-specialists).' *Sternoporus* is still in use among European colleagues, at least as a working title, e.g. when exchanging information about collected specimens. Everybody knows more or less what is meant by that name: mostly blackish, rather parallel-sided species with a microreticulate upper surface and sinuate, medially backwards protruding posterior margin of the metacoxal processes, which live in springs, bogs, and seepages at rather high altitude and can often be found in the muddy and vegetated areas beside flowing or stagnant water and not in the water body itself (see the section on typical '*Sternoporus*' habitats at the end of the present work). Thus, sometimes I wonder whether these '*Sternoporus*' are not yet something special.

Table 1. History of classification of *Hydroporus longulus*-, *memnonius*-, and *neglectus*-group members, plus *Hydrocolus sahlbergi*.

	Seidlitz (1887)	Zimmermann (1919)	Falkenström (1930)	Schaeflein (1971, 1979) [1]	Franciscolo (1979)	Wolfe & Matta (1981)	Foster & Angus (1985)	Foster (1987)
H. anatolicus								
H. apenninus								
H. bodemeyeri								
H. constantini								
H. cuprescens								
H. dobrogeanus								
H. erzurumensis								
H. gueorguievi								
H. jacobsoni								
H. jurjurensis		*Hydrop.* II.C.						
H. kraatzii	2. Gr., 5. Abt.	*Hydrop.* II.C.	*Sternoporus*	*Sternoporus*				
H. kryshtali								
H. libanus								
H. longulus	2. Gr., 5. Abt.	*Hydrop.* II.C.		*Sternoporus*	*Sternoporus*		*Hydroporus*	*Sternoporus*
H. nevadensis	2. Gr., 5. Abt.	*Hydrop.* II.C.						
H. pfefferi								
H. regularis	2. Gr., 5. Abt.							
H. sardomont.								
H. brancoi								
H. cantabricus		*Hydrop.* II.C.						
H. ferrugineus	2. Gr., 5. Abt.	*Hydrop.* II.C.		s. str.	*memnon.*-gr.		*Hydroporus*	*Sternoporus*
H. hebaueri								
H. lenkoranensis								
H. lluci								
H. longicornis	2. Gr., 5. Abt.	*Hydrop.* II.C.	*Sternoporus*	*Sternoporus*	*Sternoporus*	*Sternoporus*	*Hydroporus*	*Sternoporus*
H. melanarius	2. Gr., 5. Abt.	*Hydrop.* II.C.	*Sternoporus*	*Hydroporidius*	*Hydroporidius*	*Hydroporidius*	*Hydroporus*	*Sternoporus*
H. memnonius	2. Gr., 5. Abt.	*Hydrop.* II.C.		s. str.			*Hydroporus*	*Sternoporus*
H. neclae								
H. necopinatus		*Hydrop.* II.C. [4]			*memnon.*-gr. [4]		*Hydroporus* [4]	*Sternoporus* [4]
H. normandi		*Hydrop.* II.C.			*memnon.*-gr.			
H. obsoletus	2. Gr., 5. Abt.	*Hydrop.* II.C.		s. str.	*memnon.*-gr.		*Hydroporus*	*Sternoporus*
H. productus		*Hydrop.* II.C.						
H. sanfilippoi					*memnon.*-gr.			
H. angusi								
H. neglectus	2. Gr., 2. Abt.	*Hydrop.* I.B.2		Sternoporus		*Sternoporus*	*Hydroporus*	*Sternoporus*
Hydrocolus sahlbergi	2. Gr., 5. Abt. [6]	*Heterosternus* [6]	*Heterosternus* [6]					

[1] combining Schaeflein (1971, 1979);
[2] combining Nilsson (1989, 1990);
[3] combining Pederzani et al. (2004) and Pederzani & Rocchi (2005);
[4] under the name *cantabricus* Sharp, 1882, see Fery (1999).

	Nilsson (1987)	Nilsson (1989, 1990) [2]	Nilsson & Holmen (1995)	Pederzani (1995)	Nilsson (2001)	Pederzani et al. [3] (2004, 2005)	current classification (2009)
H. anatolicus					*longulus*-gr.		*longulus*-gr.
H. apenninus						*Sternoporus*	*longulus*-gr.
H. bodemeyeri					*longulus*-gr.		*longulus*-gr.
H. constantini					*longulus*-gr.		*longulus*-gr.
H. cuprescens					*longulus*-gr.		*longulus*-gr.
H. dobrogeanus					*longulus*-gr.	*Sternoporus*	*longulus*-gr.
H. erzurumensis					*longulus*-gr.		*longulus*-gr.
H. gueorguievi					*longulus*-gr.		*longulus*-gr.
H. jacobsoni					*longulus*-gr.		*longulus*-gr.
H. jurjurensis					*longulus*-gr.	*Sternoporus*	*longulus*-gr.
H. kraatzii			*memnon*.-gr.		*longulus*-gr.		*longulus*-gr.
H. kryshtali					*longulus*-gr.		*longulus*-gr.
H. libanus					*longulus*-gr.		*longulus*-gr.
H. longulus				*Sternoporus* [5]	*longulus*-gr.	*Sternoporus*	*longulus*-gr.
H. nevadensis					*longulus*-gr.		*longulus*-gr.
H. pfefferi					*longulus*-gr.		*longulus*-gr.
H. regularis					*longulus*-gr.	*Sternoporus*	*longulus*-gr.
H. sardomont.						*Sternoporus*	*longulus*-gr.
H. brancoi					*memnon*.-gr.		*memnon*.-gr.
H. cantabricus					*memnon*.-gr.		*memnon*.-gr.
H. ferrugineus					*memnon*.-gr.	*Hydroporus*	*memnon*.-gr.
H. hebaueri					*memnon*.-gr.		*memnon*.-gr.
H. lenkoranensis					*memnon*.-gr.		*memnon*.-gr.
H. lluci					*memnon*.-gr.		*memnon*.-gr.
H. longicornis	*Sternoporus*	*Hydroporus*	*memnon*.-gr.	*Sternoporus* [5]	*memnon*.-gr.		*memnon*.-gr.
H. melanarius	*Sternoporus*	*Hydroporus*	*memnon*.-gr.	*Hydroporidius* [5]	*memnon*.-gr.		*memnon*.-gr.
H. memnonius	*Sternoporus*	*Hydroporus*	*memnon*.-gr.		*memnon*.-gr.		*memnon*.-gr.
H. neclae							*memnon*.-gr.
H. necopinatus					*memnon*.-gr.		*memnon*.-gr.
H. normandi					*memnon*.-gr.		*memnon*.-gr.
H. obsoletus	*Sternoporus*		*memnon*.-gr.		*memnon*.-gr.		*memnon*.-gr.
H. productus					*memnon*.-gr.		*memnon*.-gr.
H. sanfilippoi					*memnon*.-gr.	*Hydroporus*	*memnon*.-gr.
H. angusi		*Hydroporus*			*neglectus*-gr.		*neglectus*-gr.
H. neglectus	*Sternoporus*	*Hydroporus*	*neglectus*-gr.		*neglectus*-gr.		*neglectus*-gr.
Hydrocolus sahlbergi	*Sternoporus* [6] with '?'	*Hydroporus* [6]	*Hydroporus oblitus*-gr. [5]		*Hydrocolus*		*Hydrocolus*

[5] without explicitly mentioning the species names, but indicating that Franciscolo's (1979) classification is adopted

[6] under the name *picicornis* J. Sahlberg, 1875; in genus *Hydroporus* before Roughley & Larson (2000); specific name replaced by *sahlbergi* Nilsson, 2001

On the other hand, the synonymy is supported not only by NILSSON's (1989) results on larvae, but also by additional facts:

1. Species of the *H. memnonius*-group (and even species of totally different groups, such as *H. discretus* Fairmaire & Brisout, 1859 of the *H. planus*-group) often have the posterior margin of the metacoxal processes protruded backwards medially and slightly sinuate nearby. This character maybe not as strongly expressed as in species like e.g. *H. longulus*, but it is often difficult to make a clear decision.
2. Some species of the *H. memnonius*-group (e.g., *H. brancoi* Rocchi, 1981 and *H. normandi* Régimbart, 1903) and also of other groups (e.g., *H. brancuccii* Fery, 1987 of the *H. planus*-group) can be found in typical '*Sternoporus*' habitats.
3. *Hydroporus longicornis*, the type species of *Sternoporus*, has the posterior margins of the metacoxal processes protruded backwards medially but only indistinctly sinuate nearby and it is a *H. memnonius*-group member. In addition, *H. longicornis* has a symmetrical median lobe in ventral view, whereas members of the *H. longulus*-group have an asymmetrical one, although in a few cases the asymmetry is only weak.

All these observations show that *Sternoporus* Falkenström cannot be clearly delimited and, instead, less strict entities such as 'group' should be used. This is why I do not hesitate to adopt the classification used by NILSSON (2001) in his World Catalogue of Dytiscidae.

Taxonomy

The external morphology of the species treated in the present work is very similar. A correct determination of single females is impossible and the identification of males requires studying their aedeagi. *Hydroporus jelineki* sp. nov. is described in detail below, the descriptions of the other species are kept shorter and sometimes only differential diagnoses are given to avoid repeating the many common features. Descriptions chiefly relate to the respective holotypes or lectotypes, which in all cases are mature males; female characters and the general variability are given separately. These descriptions and diagnoses shall be started with a general characterisation of the *H. longulus*-group members from FERY & ERMAN (2009: 2), which is always omitted in the rest of the paper: 'habitus elongate oval; upper side dark brownish to black, immaculate; pronotum and elytra on disc with distinct reticulate sculpture; lateral pronotal beading distinct; margin of elytra in lateral view ascending only slightly towards humeral angle; epipleura in lateral view visible to humeral angle; genae not distinctly darker than gula; metacoxal lines diverging anteriorly; posterior margin of metacoxal processes strongly sinuate and medially protruded backwards; median lobe of aedeagus in most species asymmetrical, in frontal view with apex slightly twisted to left, most easily observed in species with tip of median lobe more or less truncate.'

I first deal with species that have the tip of the median lobe in ventral view not pointed, but more or less truncate and broadly rounded. They are followed by species with the median lobe more or less evenly tapering to the tip in ventral view, at least in apical third; some of them have the tip rather pointed and others distinctly rounded.

Hydroporus jelineki sp. nov.

Type locality. Iran, Mazandaran province, 1 km N of Kandovan tunnel, Chalus river valley, ca. 36.165N 51.317E, 2620 m a.s.l. {2}.

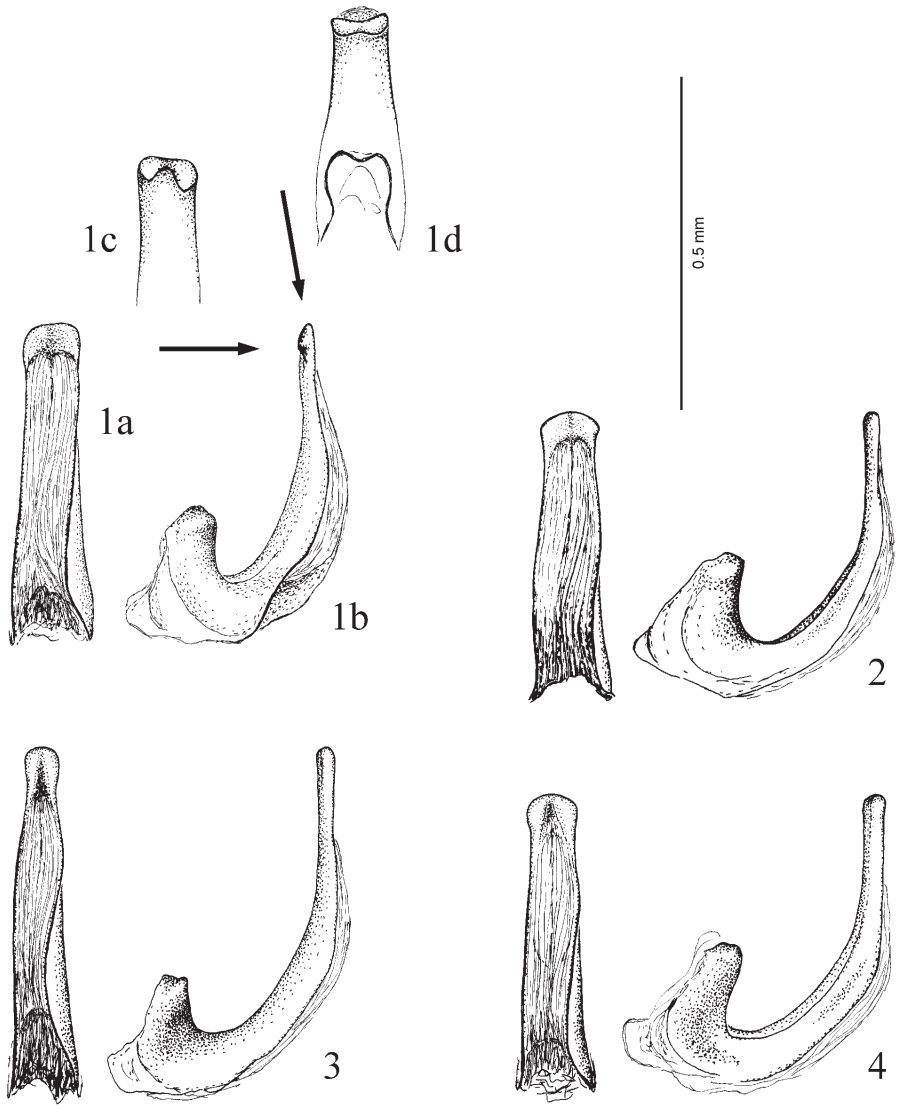
Type material. Holotype: ♂, 'Iran, 1.VI.2006, 'Alborz' Mts., 1 km N Tunel-e-Kandovan, 'Chalus Rud' river valley, 36°09,9'N 51°19,0'E; 2620 m, Jiří Hájek & Pavel Chvojka leg.' [printed] {2}, 'Holotype, Hydroporus jelineki sp. n., H. Fery det. 2009' [red, printed] (NMPC). Paratypes: **IRAN:** 2 ♂♂ 1 ♀, same collecting data as the holotype (NMPC, CHF). 1 ♀, '1.5.1970 Iran, Paß zw. Karadj u. Chalus [= pass between Karadj and Chalus], (2500 m), leg. Ressl', 'Hydroporus jacobsoni Zaitz.?, det. G. Wewalka [19]72' (CGW). Karaj is situated ca. 50 km NWW Tehran, and Chalus is situated N of Tehran at the border of the Caspian Sea. This collecting site is most probably close to the Kandovan tunnel {2}. 2 ♂♂ 4 ♀♀, 'Iran, 31.V.–1.VI.2006, Mazandaran prov., ‚Alborz' Mts., 2 km E Ilka, (alpine meadow, stream, lake), 36°14,0'N 51°26,0'E; 2900 m, Jiří Hájek & Pavel Chvojka leg.' [printed] {1} (NMPC, CHF). Most specimens, especially females, are infested by Laboulbeniales (J. Hájek, personal communication). 1 ♂, 'N. Iran, 2400 m, 8 km NE Ziaran, 10.–16.7.1977' [printed] {3}, 'Loc. no. 400, Exped. Nat. Mus. Praha' [printed] (NMPC). Ziaran is a mountain village near Abyek, ca. 52 km NW of Karaj, in the Zanjan province. According to Hoberlandt (1983: 23) the collecting site 'no. 400' is situated already in the Tehran province and its co-ordinates are 36.17N 50.58E. 1 ♂, 'Iran, Zanjan [province], Kuh-e Sendan Dag, 2000 m, 10 km N of Abhar [ca. 36.21N 49.21E], 9.6.2005, V. Major leg.' [printed] {5} (CAS). 1 ♂, 'Iran / Ostan-e Markazi [province], 10 km SE Tafresh [ca. 36.65N 50.07E] 2600 m, 16.7.2004 leg. Mühle' {4} (ZSM). Each paratype is provided with the respective red printed label.
Additional specimens examined (not treated as paratypes). **TURKEY:** 1 ♂ 2 ♀♀, 'SO-Türkei [= SE Turkey] 31.5., 5 km w. Şirnak [ca. 37.51N 42.39E] (44), leg. Jäch 1987' {6}, 'Hydroporus jelineki Fery (?), H. Fery det. 2009' [white label, printed] (NMW). These specimens are not treated as paratypes, because they are immature and thus the body shape and the shape of the genitalia decidedly changed. Certainly, the shape of the apex of the single male's median lobe is recognisable even though the rest of the structure is strongly deformed. Nevertheless, I have some doubt whether the Turkish population belongs to *H. jelineki* sp. nov., given also the large distance between the Turkish and the Iranian localities (ca. 700 km). Other species have much closer areas of distribution.

Description. Habitus in dorsal view elongate oval; body outline with slight but perceptible discontinuity between pronotum and elytra; maximum width situated near middle of total length. Almost entire dorsal and ventral surface black and shiny. Upper side microreticulated, venter in part so.

Head rather broad, interocular distance equalling about half of pronotal width at posterior angles. Clypeus with two interocular grooves behind anterior margin. Punctures on head rather coarse, evenly distributed, distance between punctures about two times that of their diameter; punctures near anterior margin, near eyes and on vertex smaller, in grooves denser. Vertex with broad transverse brown marking; narrow and short, oblique stripe on clypeus above insertion of each antennae shining through brownish.

Pronotum with maximum width between posterior angles; sides in posterior two thirds weakly curved or almost straight, not parallel but slightly converging anteriad, in anterior third more strongly curved. Rim distinct, somewhat broader in anterior third or more or less of same width over entire length. Centre of disc with one very coarse puncture or short scratch; nearby punctation much finer and sparser than on clypeus of head; on each side of centre an area with punctation still finer and sparser; punctation near sides more or less as coarse as on clypeus; along anterior margin with a puncture line, punctures finer and dispersed in middle, to sides coarser and denser; without coarse punctures before posterior margin except near sides. Postero-laterally with a depressed area on each side, here punctures rarely deformed longitudinally. Lateral parts of pronotum with indistinct setae. Lateral beading brownish translucent, in particular posteriorly.

Elytra with punctation on disc more or less uniformly distributed; punctures coarser than those on head and on pronotum, somewhat smaller behind anterior margin, on sides and apex and next to suture. Distance between punctures on disc roughly that of their diameter; near sides and in particular on apex less dense. Puncture lines not very distinct but perceptible,



Figs. 1–4. Median lobe of aedeagus of: 1 – *Hydroporus jelineki* sp. nov. (a – ventral view, b – lateral view, c – apex in dorsal view, d – frontal view; arrows indicating direction of dorsal and frontal views); 2 – *H. erzurumensis* Erman & Fery, 2000 (redrawn from Erman & Fery (2000)); 3 – *H. libanus* Régimbart, 1901; 4 – *H. holzschuhi* sp. nov.

marked by somewhat denser normal punctures and a few interspersed coarser punctures. Setae on disc very short and indistinct, laterally and posteriorly longer and more distinct. In lateral view margin of elytra ascending slightly towards humeral angle. Lateral elytral beading distinct, narrower than pronotal beading. Epipleuron in lateral view visible to humeral angle. Elytra to a large extent black or very dark blackish brown, near sides and apex somewhat more brownish, along suture only very indistinctly more brownish.

Venter with most parts weakly microreticulated; gula, metacoxal processes, centres of metaventrite and second abdominal ventrite smooth. Genae smooth close to gula, elsewhere reticulated. Punctation on metacoxal plates, sides of metaventrite and on first two abdominal ventrites very coarse; on epipleura, centre of metaventrite, metacoxal processes and rest of abdominal ventrites less coarse and rather sparse; last abdominal ventrite with punctures somewhat coarser and sparser, reticulation more impressed. Punctures on gula very sparse centrally and much denser laterally. Anterior angles of prosternum with a small and flat, rather densely and roughly punctate, posteriorly sharply delimited, more or less triangular area. Most punctures on venter with fine indistinct seta.

Prosternal process posteriorly lanceolate, more or less tectiform in cross-section, sides beaded and provided with long setae. Process between procoxae with a distinct transverse ridge, sub-basally before this ridge with some transverse grooves; process not prolonged anteriorly as narrow convexity onto prosternum; middle of prosternum flattened and rugosely sculptured. Posterior margins of metacoxal processes medially protruded backwards, laterally sinuate; lines of metacoxal processes diverging anteriorly, not reaching posterior margin of metaventrite. Antennae with fourth segment shorter than third and fifth, latter two more or less of equal length; antennomeres five to ten more than 1.5 times as long as wide, slightly flattened, in cross section more or less elliptical.

Ventral surface predominantly black; posterior part of metacoxal processes brownish translucent, also posterior margins of last abdominal sterna very narrowly brownish translucent; each side of third, fourth and fifth abdominal ventrites indistinctly dark brownish. Gula of same colour as black genae. Mouthparts, prosternal process and legs including trochanters brownish; pro- and mesocoxae brownish only near socket of legs; middle of femora darkened. Antennae and palpi brownish, segments not darkened apically. Contrast between black surface and brownish appendages not very conspicuous.

♂♂. First three pro- and mesotarsomeres slightly dilated, provided with sucker setae, first ones of each additionally with sucker cups (compare Figs. 10–12 in Fery & Erman 2009); protarsal claws short, of same length, in particular anterior one thickened, curved near base and almost straight in distal two thirds, at tip slightly bent; mesotarsal claws evenly curved, longer than protarsal claws. Median lobe of aedeagus asymmetric (Fig. 1a–d), with a unique shape among all *Hydroporus*: in ventral view (Fig. 1a) almost parallel over entire length, but slightly widening before tip, broadly rounded on each side; dorsal side with two hook-like extensions on each side shortly before tip (Fig. 1c), well visible in lateral view (Fig. 1b), but also in ventral view (Fig. 1a) if median lobe slightly inclined. Frontal view in Fig. 1d being a good example for an apex of median lobe twisted to left, this character being present in all *H. longulus*-group members, but more difficult to observe in species with more or less pointed median lobe in ventral view. Paramere as in Fig. 9.

♀♀. Females without conspicuous external differences to males except slightly narrower pro- and especially mesotarsomeres, lack of sucker cups, and evenly curved protarsal claws; like in males latter shorter than mesotarsal claws. Gonocoxosternum and gonocoxae as in Figs. 16 and 21.

Measurements. Specimens from Iran: males: TL: 3.4–3.8 mm, MW: 1.65–1.95 mm, TL/MW: 1.92–2.06, IO/MP: 0.44–0.51; females: TL: 3.6–3.8 mm, MW: 1.8–1.95 mm, TL/MW: 1.94–2.05, IO/MP: 0.41–0.48. Specimens from Turkey: male: TL: 3.6 mm, MW: 1.85 mm, TL/MW: 1.95, IO/MP: 0.45; females: TL: 3.7–3.8 mm, MW: 1.85–1.95 mm, TL/MW: 1.95–2.05, IO/MP: 0.44–0.48.

Variability. Head in some specimens not black, but dark brownish; one specimen also with brownish spot on clypeus. Strength and density of punctation on head and on pronotum and lines of punctures on elytra somewhat variable. Brownish part of pronotal rim in some specimens extended anteriorly; brownish parts of elytra sometimes lighter, in some specimens more extended, e.g. on large parts of elytral sides. Specimens with more brownish upper surface also with less prominent or indistinguishable darkening of femora. Specimens from Şırnak, Turkey, with sides of pronotum distinctly less parallel in posterior half and more evenly and less curved over entire length.

Distribution. This species has a rather large area of distribution (Fig. 26): central northern Iran, Mazandaran, Ostan-e Markazi, Zanjan and border area of Zanjan/Tehran provinces. Immature specimens have been found in south-eastern Turkey, Şırnak province; however, a confirmation of their identity by reference to mature specimens is needed.

Biology. The specimens from the locality near the Kandovan tunnel were collected in a small ingress to the Chalus river (J. Hájek, personal communication). The Ilka specimens were collected in a small spring in an alpine meadow at a mountain pass (Figs. 27–28); the fact that they were collected at night [sic!] does not necessarily mean that they are noctambulists and cannot be found during the day. Hoberlandt (1983: 23) gave as habitat for the Ziaran locality: 'Mountain steppe. Collected from the vegetation and by light trap.' However, this mountain steppe includes some headsprings and the specimen was collected in one of them (I. Kovář and J. Hájek, personal communication).

Etymology. The species is named after Josef Jelínek (noun in apposition in the genitive case), former head of the Department of Entomology, National Museum in Prague, leading person in Czech entomology and specialist on the superfamily Cucujoidea, predominantly the family Nitidulidae. He kindly allowed me to study large parts of the Iranian water beetle material collected on three expeditions of the National Museum of Prague in 1970, 1973 and 1977.

Hydroporus libanus Régimbart, 1901

Hydroporus libanus Régimbart, 1901: 101 (original description). – Zimmermann (1931: 155) (misidentification). – Zaitzev (1953b: 172; 1972: 182) (misidentification). – Wewalka (1989: 149) (redescription).

Type locality. Lebanon, Brummānā (= Broumana), ca. 10 km E Beyrouth, ca. 33.88N 35.62E {25}.

Type material (not studied). Lectotype: ♂, 'Mt. Liban', 'Broumana' {25}, an illegible small label, probably a male sex symbol, 'Type' [red, printed], 'Hydroporus libanicus [sic!] Rég. n. sp., (Régim - vid.)' [probably hw Régim-

bart], 'Museum Paris, Coll. M. Pic' [printed], 'Hydroporus libanus det. Jäch [19]90' [added by M. A. Jäch in 1990] (MNHN). Notes: I have not been able to locate the lectotype nor other syntypes when visiting MNHN several times during the last years.

Notes on the type specimens: Régimbart (1901: 102) stated that he studied 'un très petit nombre d'exemplaires' [= a very small number of specimens]. These (former) syntypes have not been found and, thus, not studied by Wewalka (1989). Nevertheless, they must be regarded as paralectotypes. Wewalka (1989: 149) did not explicitly designate a lectotype, but instead wrote 'Type ♂: [...]'. According to Article 74.5 of the ICZN (1999), this proceeding has to be treated as a valid designation of the lectotype.

I am not absolutely sure about the type locality because another village with the name Brummānā is located ca. 20 km due NE of the first one (ca. 34.00N 35.80E). This locality also fits Régimbart's (1901: 102) description: 'sur le versant Ouest de ce massif montagneux [= on the western slope of this mountain range]'. It seems impossible to find out which of these two villages is meant by Régimbart, however, the first one was certainly easier to access in 1900, and is therefore assumed to be the type locality.

Régimbart (1901: 101) compared *H. libanus* with *H. obsoletus*. Zimmermann (1931: 155), after having studied specimens from Lebanon, stated that *H. libanus* is extremely similar to *H. obsoletus* and suspected that the former might be a subspecies of the latter. However, already Wewalka (1989: 149) stated that the similarity of both species 'is only superficial'. In addition, I have found one specimen of *H. obsoletus* standing under *H. libanus* in the collection of the ZSM with the following labels: 'Samml. A. Zimmermann' [printed], 'Hydroporus libanus?' [hw ?], '*Hydroporus obsoletus* Aubé, det. G. Wewalka [19]89' [hw Wewalka in part]. This is most probably the specimen that Zimmermann studied before 1931, causing his misidentification of *H. libanus*.

Additional material studied. TURKEY: 1 ♂, 'TR 24.5.1987, Amanos Geb. [= Amanus mountains], leg. Jäch (21)' [printed] {26}, 'Hydroporus libanus Reg, det. G. Wewalka [19]87' (NMW). Wewalka (1989: 149) provided the following additional data for this specimen: 'Soğukoluk, 15 km S Iskenderun' (ca. 36.49N 36.17E, ca. 300 km due N of the type locality). The Amanus mountains are also known as Nur Dağları or Gavur Dağları and are situated north of Hatay (= Antakya).

Original description. After the original description, only a few authors dealt with *H. libanus*: Zimmermann (1931: 155) misidentified the species; Zaitzev (1953b: 172; 1972: 182) repeated Zimmermann's words, certainly without having studied any specimen. A few other authors listed the species in catalogues or cited it in distributional lists. Only Wewalka (1989: 149) treated this species in more detail, being seemingly the first author after Régimbart who saw one of the syntypes from Lebanon and another specimen from southern Turkey (Amanus mountains). However, even Wewalka (1989) gave only a few descriptive notes and compared the species shortly with *H. obsoletus* and *H. dobrogeanus* Ieniştea, 1962. This is why I present here a translation of the first part of Régimbart's Latin description and add some further remarks:

'Length 3⅔ mm. Oblong-oval, elongate, parallel, depressed, with very fine and obsolete reticulation, entire surface reddish brown, legs and antennae of same colour; head large, rather densely but little strongly punctate, both sides with large and deep grooves anteriorly; pronotum transverse, short, rather strongly and little densely punctate, disc smooth, sides curved and strongly but rather narrowly beaded, posterior angles slightly obtuse, not absent [in the meaning of 'angles perceptible, not totally rounded']. Elytra oblong, parallel, posteriorly not narrowed but obtusely rounded, strongly and little densely and almost regularly punctate, punctures with very short hairs [setae]. Ventrally punctation little dense, but larger on coxae [metacoxal plates] and metasternum [metaventrite], more weak on epipleura; legs robust, anterior tibiae large and triangular, tarsi broad, widened, particularly at base.' (Régimbart 1901).

Differential diagnosis. The following differential diagnosis is based only on the specimen

from the Amanus mountains, because material from Lebanon could not be studied. I give chiefly the differences from *H. jelineki* sp. nov.: Habitus distinctly more elongate, sides less parallel, more evenly rounded over large parts of length. Maximum width of body near middle of total length, between first and second third of elytral length. Discontinuity of body outline in dorsal view between pronotum and elytra weak, because pronotum with sides already converging from posterior angles, maximum width at posterior angles. Punctation on disc of elytra coarser, distance between punctures sometimes less than their diameter, puncture lines rather indistinct. Entire upper surface brownish, clypeus and disc of pronotum slightly darker; head with vertex lighter brownish and parts behind each eye blackish. Venter with meso- and metaepisterna, metaventrite and metacoxal plates blackish brown; genae and gula dark brownish, of same colour; prosternum, epipleura and abdomen brownish, latter with some diffuse weakly darkened areas; appendages brownish; contrast between their colour and that of rest of surface not prominent.

♂♂. Median lobe of aedeagus (Fig. 3; see also Wewalka 1989: 152) in ventral view tapering to apex, far before apex widened and tip very broadly rounded. Paramere as in Fig. 10. Anterior protarsal claws less straight than in *H. jelineki* sp. nov. Sucker cups on first tarsomere of pro- and mesotarsomeres present.

♀♀. Possibly studied by Régimbart (1901), but not described in the literature. I have not seen any female specimens that could be associated with *H. libanus.*

Measurements. TL: 3.85 mm, MW: 1.80 mm, TL/MW: 2.23, IO/MP: 0.5.

Distribution. Endemic for Lebanon and southern Turkey, Hatay province (Fig. 26).

Biology. No details are known about the preferred habitats of *H. libanus*. It seems to occur like other members of the *H. longulus*-group in mountainous regions.

Hydroporus holzschuhi sp. nov.

Type locality. Turkey, Muş province, near Buğlan geçidi [= Buğlan pass], ca. 13 km due WNW Yaygin and ca. 10 km due ESE Solhan (in Bingöl province), ca. 38.93N 41.16E, ca. 1600–1900 m a.s.l {9}. The collecting site is in the Muş province, but close to the border with the Bingöl province; the approximate specification on the holotype label '50 km W Muş' means 'on road' (C. Holzschuh, personal communication).

Type material. Holotype: ♂, 'Asia minor 21.6.[19]72, 50 km W Muş, leg Holzschuh' [hw Wewalka] {9}, 'Hydroporus jacobsoni Zaitz. ?, det. G. Wewalka [19]72' [hw Wewalka in part], 'Hydroporus n. sp. ?' [hw Wewalka], 'Holotype, Hydroporus holzschuhi sp. n., H. Fery det. 2009' [red, printed] (NMW). Paratypes: **TURKEY:** 1 ♂ 1 ♀, 'Turkey, SE. Anat., N of Baskale [ca. 38.2N 44.0E], 2600 m, 21 8.[19]70' [printed] {8}, 'Loc. no. 104, Exp. Nat. Mus., Praha' [printed]. Each paratype is provided with the respective red printed label (NMPC). In Hoberlandt (1974: 20) is given '30 km N of Baskale'. The village of Başkale is situated in the SE of the Van province, ca. 75 km due SE the province capital Van. It is not clear whether '30 km due N of Baskale' is meant or '30 km on the road'. Most probably, the specimens were collected not far from the road from Başkale to Gürpinar and Tatvan.

Differential diagnosis (including chiefly differences from *H. libanus* but also those from *H. jelineki* sp. nov.). Habitus similar to that of *H. libanus*; maximum width of body near middle of total length, between first and second third of elytral length. Body outline and shape of pronotum in dorsal view as in *H. libanus*. Punctation on disc of elytra similar to that of *H. jelineki* sp. nov., less coarse than in *H. libanus*; distance between punctures about same as their diameter, puncture lines rather indistinct. Upper surface darker than that of *H. libanus*,

blackish in large parts, but not as dark as in *H. jelineki* sp. nov.; head dark brownish, with vertex lighter, but blackish behind each eye. Pronotum almost black, rim at sides brownish, somewhat darker anteriad. Elytra on disc of same colour as pronotum, brownish stripe along suture distinct, dark colour of disc gradually becoming lighter to sides and lateral third of each elytron thus brownish except near shoulders; these brownish parts in posterior two thirds intersected by a darker narrow longitudinal stripe. Ventral surface predominantly black, colouration similar to that of *H. jelineki* sp. nov.; femora somewhat darkened in middle. Antennae and palpi brownish, segments not darkened apically. Contrast between black surface and brownish appendages stronger than in *H. jelineki* sp. nov.

♂♂. Shape of median lobe as in Fig. 4, intermediate between that of *H. libanus* (Fig. 3) and *H. erzurumensis* Erman & Fery, 2000 (Fig. 2; drawing taken from Erman & Fery 2000); in ventral view broader than in former, but narrower than in latter; tip broadly rounded, almost as in *H. libanus*. Parameres as in Fig. 11. Sucker cups on first tarsomere of pro- and mesotarsomeres present.

♀♀. The single female studied without conspicuous external differences to males. Gonocoxosternum and gonocoxae as in Figs. 17 and 22.

Measurements. TL: (holotype / male paratype / female paratype): 3.9 / 3.2 / 3.7 mm; MW: 1.9 / 1.6 / 1.9 mm; TL/MW: 1.95–2.05; IO/MP: 0.45–0.50.

Variability. The two paratypes from Başkale, in particular the male, are somewhat smaller than the holotype from Muş. The female is darker all in all, and the male paratype has the appendages and the prosternal process lighter than the holotype.

Distribution. Endemic in the Muş and Van provinces in eastern Turkey (Fig. 26).

Biology: Hoberlandt (1974: 20) stated that the type locality was a 'green grassy valley of a brook, partly swampy, with *Juncus*; the bank of the brook narrow with stones.' Nothing more is known about the biology of this new species.

Etymology. I name this species after the collector of the holotype, Carolus Holzschuh, well-known specialist in Cerambycidae (Villach, Austria) (noun in apposition in the genitive case).

Hydroporus jacobsoni Zaitzev, 1927

Hydroporus jacobsoni Zaitzev, 1927: 17 (original description). – Zaitzev (1933: 335; 1946: 88; 1953a: 93; 1953b: 174; 1972: 184). – Gschwendtner (1939: 34). – Ieniştea (1978: 297, partim). – Schaeflein (1983: 16).
Hydroporus longicornis Sharp, 1871: Fichtner (1974: 189) (misidentification).

Type locality (by present designation of lectotype): Georgia, Gvileti, ca. 110 km N Tbilisi, altitude ca. 1500 m (Zaitzev 1927: 17); according to the label data of the lectotype SW Gvileti, on the way to the Devdorak glacier, NE peak of Mount Kazbek, ca. 42.70N 44.58E {19}.

Type material studied. Lectotype (by present designation): ♂, 'oz. u Devdoraksk. budki [= lake (or pond) near Devdorak hut (or 'booth' or 'refuge hut')], 16.VII.[19]26, Tarnogradsk.' [in Cyrillic, hw Zaitzev] {19}, 'Lectotype, Hydroporus jacobsoni Zaitzev, 1927, des. H. Fery 2009' [red, printed] (ZISP). The last four tarsomeres of the right fore leg and the last two of the left hind leg of the lectotype are disarticulated, but glued on the card. Paralectotypes: 2 ♀♀, 'Bakuriani, prov. Gori, 24.VI.[19]16' [Georgia, ca. 100 km W Tbilisi, ca. 2600 m a.s.l., ca. 41.74N 43.53E] {17}, one with additional 'Syntypus, Hydroporus jacobsoni Zaits. 1927' [red, hw R. E. Roughley? (Manitoba, Canada)] (ZISP). 5 exs., same first label, specimens strongly damaged by dermestids, sex not identifiable; each specimen glued onto its own card, these all mounted on the same pin (ZISP). Each pin is provided with a respective red printed paralectotype label.

Notes on the lectotype. The Devdorak glacier is situated near the peak of Mount Kazbek (northern Georgia, near the Russian border, ca. 42.69N 44.51E). The village of Gvileti (or Gveleti; ca. 42.71N 44.62E) is situated ca. 7 km NE of Mount Kazbek (a nearby village is Dar'yal'skoye). The hut mentioned on the label must be situated between Gvileti and Mount Kazbek. The following annotations can be found under the URL <http://prielbrusie.narod.ru/library/kazbek/index5.html> (access in January 2009; in Russian, translation by P. Petrov, Moscow, Russia): 'Climbing Mount Kazbek in 1903–1913. The popularity of the Devdorak way those years is also explained by the fact that at the foot of the glacier there was a hut, in which tourists stopped on their way up to the peak.' The collector cited on the label should be David Abramovich Tarnogradsky (1891–1974), director of the North-Caucasus Biological Station which published two of Zaitzev's works, one on Dytiscidae and one on Gyrinidae. Tarnogradsky was also given as the collector in the original description of *H. jacobsoni*, which also cited the collecting date as '16.VIII.[19]26' in contrast to the date on the lectotype label. However, I have no doubt that it was erroneously copied by Zaitzev from the label.

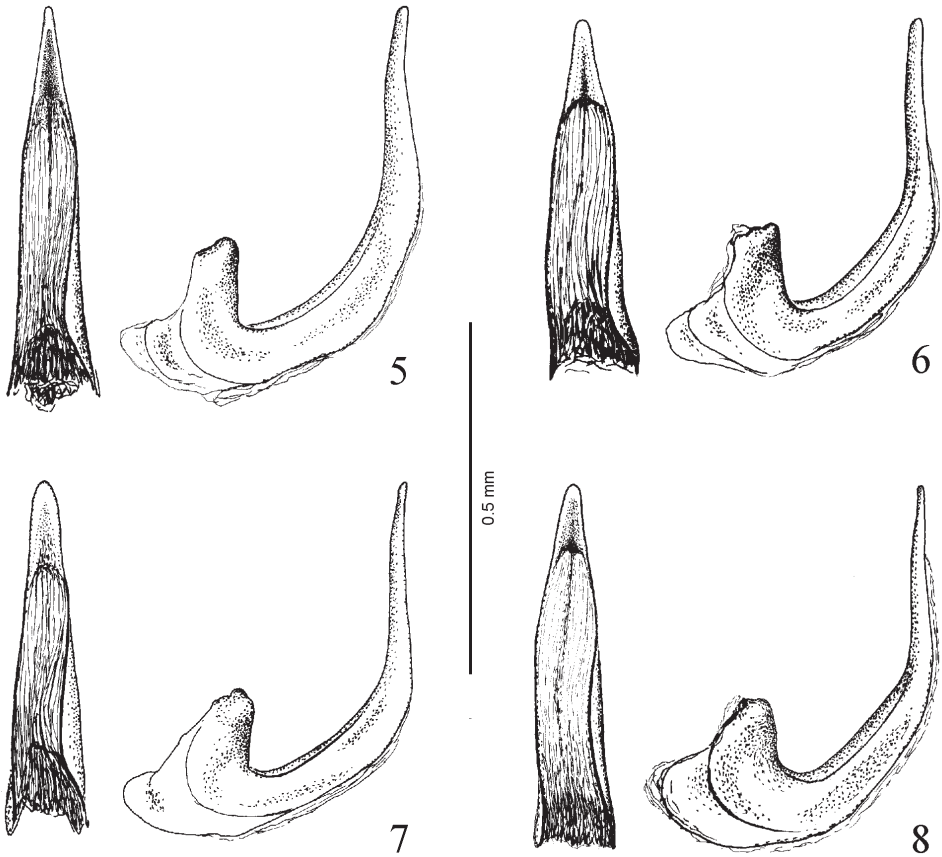
Notes on further paralectotypes (not examined): Besides Gvileti and Bakuriani in Georgia, the following further localities in Caucasus were provided in the original description by Zaitzev (1927: 17):

- 'near Adaj-choch (1070 m)': Adaj-choch [= Adaykhokh or Adaikhokh, {20}] mountains in southern Russia, Northern Ossetia; here is situated the well-known Mamison Pass (= Mamisonskiy Preval, ca. 42.70N 47.63E), ca. 75 km WSW Vladikavkaz.
- 'near Mount Bambak (ca. 2500 m), district Majkop': Majkop [= Maykop, {23}], situated in the Adygeya Republic in southern Russia, NW of north-western Georgia; Mount Bambak [= gora Bambak] is situated in the Krasnodar Kray near the border to the Adygeya Republic, ca. 43.91N 40.43E, NNE of the city of Krasnaya Polyana.

Except the paralectotypes from Bakuriani (see above), I have not been able to locate those from the other two localities. They are not deposited in the ZISP and previous inquiries at the Dzhanashia State Museum of Georgia, Tbilisi, where parts of the Zaitzev collection are stored, have not been successful. Should any former syntypes from these localities be found, they will have to be treated as paralectotypes (see Article 74.1.3 of the ICZN 1999).

Additional material studied. GEORGIA: 1 ♂, 'Grusia [= Georgia], 1871' [hw?], 'Geor[g]ien' [hw Wewalka] (ZISP). **RUSSIA:** 1 ♀, 'Lager [or Camp] Bombang, Kubansk oblast, Go?rulya, 10.VIII.[1]910'; last word meaning most probably the collector, at least one letter illegible; text in Cyrillic; translation by P. Petrov). I have not been able to find 'Camp Bombang' on any map; the Kubansk district is situated in north-western Caucasus, Krasnodarskiy Kray. 1 ♂, 'Kabardino-Balkaria, s. [= selo = village] Verkhniye Balkary, 7.VIII.2006, leg. Nabozhenko, Terskov' [Cyrillic; translation by P. Petrov]; [ca. 43.13N 43.45E; ca. 1100 m a.s.l.] {21} (CMS). 1 ♂ 1 ♀, 'Zentr. Kaukasus [= Central Caucasus], 25.6.[19]74, Joost' [blue ink, hw Joost?] (CLH, ZSM); the female with additional labels 'Zentral-Kaukasus, Joost leg., 25.6.1974 USSR' [hw Fichtner (?)], 'jacobsoni Zaitz., Fichtner det. [19]78' [hw Fichtner in part]. Both latter specimens belong to a series recorded under the name *H. longicornis* by Fichtner (1974: 189), who specified the collecting locality as 'near Itkol'. Schaeflein (1983: 16) studied a specimen from the same series and corrected the determination to *H. jacobsoni*. The name 'Itkol' denotes a village (chiefly a complex of tourist hotels) and a left tributary of the Baksan river on the south-eastern slopes of Mount Elbrus (north-western Caucasus, Kabardino-Balkar Republic, ca. 43.25N 42.57E, SE of the two peaks of Mount Elbrus; altitude approximately 2000 m a.s.l.) {22}.

Differential diagnosis (based only on the lectotype, paralectotypes not considered; chiefly differences from *H. jelineki* sp. nov. given): Maximum width of body distinctly behind middle of total length, more or less in middle of elytral length. Discontinuity of body outline in dorsal view between pronotum and elytra more distinct, because pronotum with sides in posterior two thirds almost parallel, maximum width near posterior angles. Punctation on disc of elytra slightly less coarse and a little denser than in *H. jelineki* sp. nov., but puncture lines more distinct. Head brownish, on vertex lighter brownish, between insertion of antennae and eyes and behind eyes blackish. Pronotum near anterior angles diffusely brownish, rim dark brownish, at posterior angles a little lighter. Elytra very dark brownish, almost black; each elytron in anterior two thirds with brownish stripe parallel to suture. Venter with contrast



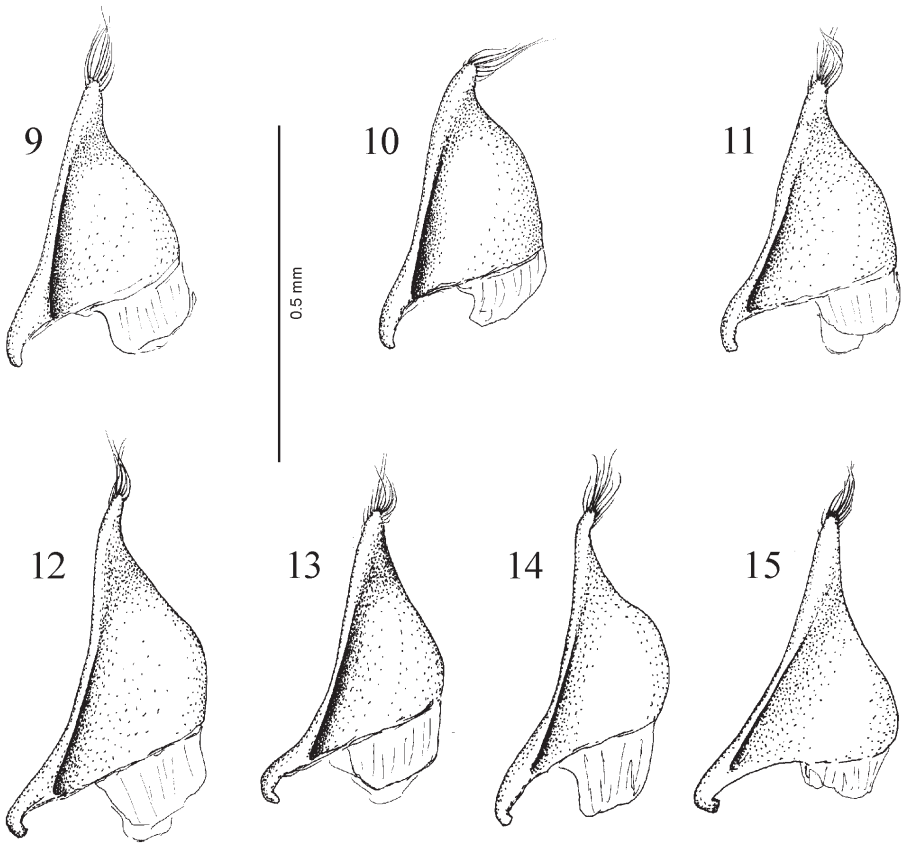
Figs. 5–8. Median lobe of aedeagus in ventral and lateral view. 5 – *Hydroporus jacobsoni* Zaitzev, 1927; 6 – *H. hajeki* sp. nov.; 7 – *H. shaverdoae* sp. nov.; 8 – *H. kryshtali* Bilyashiwski, 1993.

between brownish appendages and blackish surface more distinct than in *H. jelineki* sp. nov.; darkening of middle of femora almost absent.

♂♂. Median lobe of aedeagus (Fig. 5) with shape in ventral view as described by Zaitzev (1927: 17; see below), almost parallel in basal two thirds, more or less evenly tapering to tip in apical third; tip very shortly rounded; in lateral view apical third distinctly curved, tip rather broad. Paramere as in Fig. 12. Sucker cups on first tarsomere of pro- and mesotarsomeres present.

♀♀. Not known from the type locality. Gonocoxosternum and gonocoxae of the female from Itkol as in Figs. 18 and 23.

Measurements. Lectotype: TL: 3.75 mm, MW: 1.85 mm, TL/MW: 2.03, IO/MP: 0.50. Other specimens: TL: 3.6–3.7 mm, MW: 1.7–1.85 mm, TL/MW: 1.95–2.06, IO/MP: 0.46–0.49.



Figs. 9–15. Left paramere. 9 – *Hydroporus jelineki* sp. nov. 10 – *H. libanus* Régimbart, 1901; 11 – *H. holzschuhi* sp. nov.; 12 – *H. jacobsoni* Zaitzev, 1927; 13 – *H. hajeki* sp. nov.; 14 – *H. shaverdoae* sp. nov.; 15 – *H. kryshtali* Bilyashiwski, 1993.

Variability. The specimens studied vary to a certain extent in colouration of the dorsal and ventral surface, in punctation and body outline (degree of pronoto-elytral discontinuity, position of maximum width of the body). The shape of the median lobe varies also a little in the four males studied, but at present I cannot separate them as distinct populations that could be clearly characterised and possibly described as new taxa (see also the remarks below).

Distribution. *Hydroporus jacobsoni* is distributed in the Georgian and Russian Caucasus (Fig. 26; for several localities see the next section). However, the true distribution of the species is by far not clear, because only females, which cannot be assigned to *H. jacobsoni* with certainty, are known from most localities; such localities are provided with a question mark in Fig. 26. Any future males from other Russian or Georgian localities should be studied to verify whether they belong to *H. jacobsoni* or to another, possibly still undescribed species. Guéorguiev (1981: 407) recorded *H. jacobsoni* from several localities in Turkey.

According to my studies these data are most probably incorrect and must be attributed either to *H. dobrogeanus* or to other species, e.g. those described in Fery & Erman (2009).

***Hydroporus jacobsoni* in the literature**. *Hydroporus jacobsoni* has been rarely treated in the literature and the only essential contributions have been given by Zaitzev. The first seven lines of the original description (Zaitzev 1927: 17) are in Latin (see below for the following part in Russian). A shortened translation into German is given by Gschwendtner (1939: 34–35) and a translation into English follows here:

'♂ ♀. Similar to *H. longulus* Muls. but certainly different: microsculpture of surface less regular, less even, elytra posteriorly more constricted, with punctures coarser and much more approximated, side margin (in lateral view) anteriorly less ascending (but more strongly than in *H. melanarius*); pronotum near sides more coarsely (sometimes subrugosely) punctate, sides little curved, lateral beading thicker. Penis until 2/3 of length of rather equal width, then tapering [to tip]. Length 3.4–3.8 mm.' Notes: In the English translation (Zaitzev 1972: 185) of Zaitzev (1953b: 174) the shape of the median lobe in ventral view is described as 'then abruptly tapering' behind the basal two thirds. The adverb 'abruptly' seems to be at least somewhat misleading and the phrase should be replaced by 'from here tapering [until tip]'.

All other contributions known to me are in Russian. I give here the translations by P. Petrov of the relevant parts of these works:

Zaitzev (1927: 17–18) (for the Latin part see above): 'The new species belongs to the cycle *longulus-nevadensis-cantabricus*, but since the latter two Pyrenean species are known to me only by description, so I am comparing our [= my] species only with the former [= *H. longulus*], two specimens of which I have before my eyes. It is impossible to consider it the same as *longulus* if it were only for the fact that the latter [= *H. longulus*] as well as the two others mentioned above are characteristic inhabitants of the western Mediterranean region, one with larger range of distribution, both the others with narrower. However, in Apfelbeck [1904: 377] we find a record of the species [= *H. longulus*] for Herzegovina and Attica, but we are still not completely convinced of the correctness of this record. Differences in the shape of the penis do not allow considering our species as a race of *longulus*. Judging by the localities where it was found, this species lives in our land only in water bodies of higher mountainous areas. Leder [= Schneider & Leder 1877: 86] reports *H. longulus* from Suram [locality {18}]. No doubt this record refers to our species, the more so because Suram is situated near Bakuriani [locality {17}], where specimens used for this description were taken. Jacobson (Beetles of Russia, p. 426) was absolutely right doubting Leder's data.'

Suram, better known under the name Surami, is a town in central Georgia (ca. 42.01N 43.25E) NW of the town of Khashuri. A mountain range in the west of Khashuri was formerly called Suramskiy Khrebet and today is named as the Likhskiy Khrebet (Schütze & Kleinfeld 2001: 131). In Leder (1880: 454) it is called 'Suram-Gebirge' or 'Meskisches Gebirge' [Gebirge = mountains]. This mountain range divides Georgia into the eastern and western part and connects the Greater Caucasus and the Lesser Caucasus ranges. The distance between Khashuri and Bakuriani is about 30 km.

Zaitzev (1933: 335): 'Lake Tabis-kuri, Bakuriani [locality {17}], Suram [locality {18}], then on the main Caucasus range (spring near Mount Adai-khokh [locality {20}], 1070 m, near

Vladikavkaz), Gvilety [locality {19}], ca. 1500 m, near Mount Bambak [locality {23}] in environs of Maikop, 2050 m. This species may be considered close to *longulus* Muls. and *cantabricus* Sharp, which both live in mountain water bodies of the Pyrenees, the Alps, and the Balkan Peninsula. There are no closer relatives either of these two species or of *jacobsoni* in the north, at present. Probably some species during the postglacial time, when rising higher into the mountains, produced all the three species mentioned above, and maybe also *astur* Sharp.' [*Hydroporus astur* Sharp, 1882 is a junior subjective synonym of *Hygrotus marklini* (Gyllenhal, 1813); see Balke & Fery 1993.]

Zaitzev (1946: 88): 'It was found also in the eastern part of the main range (Lagodekhsk nature reserve, river Antsal'-or [ca. 41.76N 46.22E, ca. 120 km due E Tbilisi, locality {16}], 7 VIII [19]37 Kakauridze!)' [the exclamation mark most probably means 'the collector'].

Zaitzev (1953a: 93): 'Considerable material is present from Bakuriani [locality {17}], Gvileti [locality {19}], Lagodekhi (river Antsal'-or) [locality {16}]. In mountain water bodies with flowing water.'

Hydroporus hajeki sp. nov.

Type locality. Iran, Ardabil province, Jebal-e Sabalan mountain [= Kühha-ye Sabalan], Qutur Su [= Guter-Su = Ghotur Suei], ca. 40 km due WNW Ardabil, ca. 38.325N 47.842E; ca. 2725 m a.s.l. {7}.

Type material. Holotype: ♂, 'Iran, Ardabil prov., 5.VI.2006, Qutur Su (sulphureous springs), ‚Jebal-e Sabalan' Mt., 38°19,6'N 57°50,5'E; 2725 m, Jiří Hájek & Pavel Chvojka leg.' [printed] {7}, 'Holotype, Hydroporus hajeki sp. n., H. Fery det. 2009' [red, printed] (NMPC). Paratypes: **IRAN:** 6 ♂♂, 4 ♀♀, same collecting data as the holotype; each paratype provided with a red printed paratype label (NMPC, CHF).

Differential diagnosis (given chiefly as differences from *H. jelineki* sp. nov.). Externally very similar to *H. jelineki* sp. nov. Punctation on elytra on average slightly coarser and less dense, puncture lines more distinct. Upper surface black except vertex of head and posterior part of pronotal rim. Darkening of middle of femora rather inconspicuous in most specimens.

♂♂. Median lobe (Fig. 6) in ventral view more or less evenly tapering to apex, tip rather broadly rounded. Paramere as in Fig. 13. Sucker cups on first tarsomere of pro- and mesotarsomeres present.

♀♀. See remarks under *H. jelineki* sp. nov. Gonocoxosternum and gonocoxae as in Figs. 19 and 24.

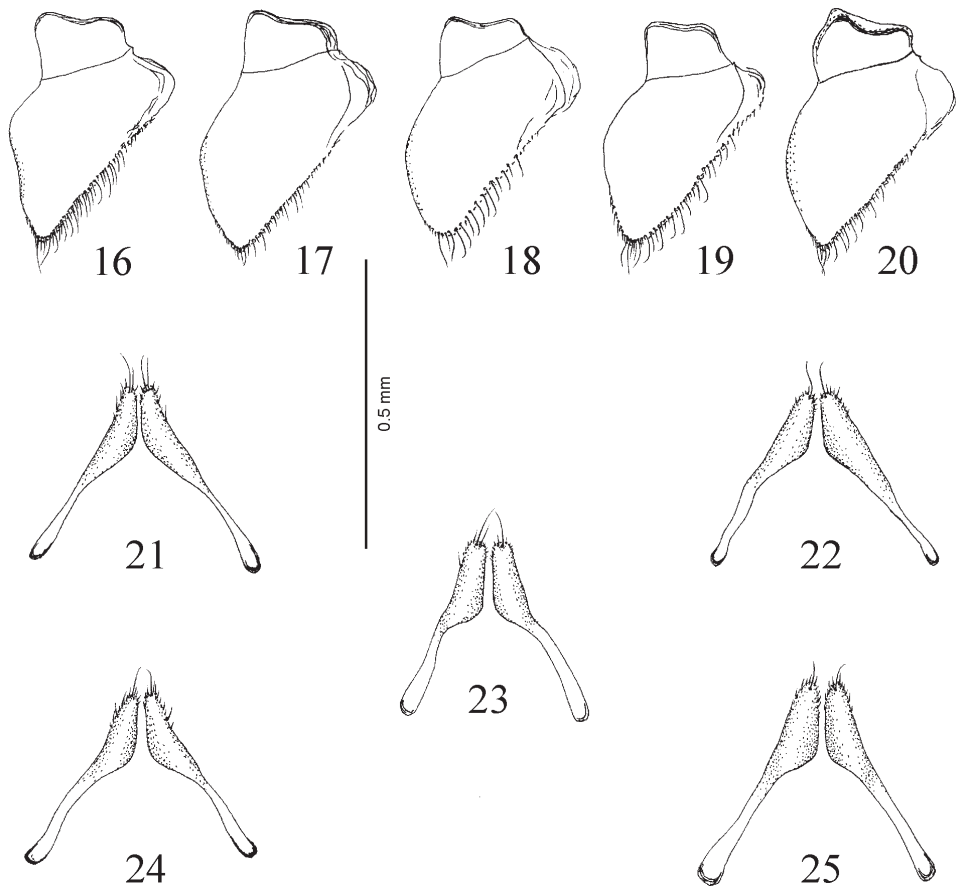
Measurements. TL: 3.3–3.7 mm, MW: 1.65–1.85 mm, TL/MW: 1.97–2.03, IO/MP: 0.46–0.50.

Variability. Only variability in size noticed in the type series.

Distribution. So far known only from the type locality in the Ardabil province, north-western Iran (Fig. 26).

Biology. Sabalan is 'an isolated volcano with lots of springs, some of them sulphurous'. The specimens were collected in a bog with small pools (5–20 cm in diameter) near a non-sulphurous spring on the slopes of the mountain (J. Hájek, personal communication; see Figs. 29–30).

Etymology. This species is named after my friend Jiří Hájek (Prague, Czech Republic) (noun in apposition in the genitive case).



Figs. 16–25. 16–20 – gonocoxosternum. 16 – *Hydroporus jelineki* sp. nov.; 17 – *H. holzschuhi* sp. nov.; 18 – *H. jacobsoni* Zaitzev, 1927 (specimen from Itkol); 19 – *H. hajeki* sp. nov.; 20 – *H. shaverdoae* sp. nov. 21–25 – gonocoxae. 21 – *H. jelineki* sp. nov.; 22 – *H. holzschuhi* sp. nov.; 23 – *H. jacobsoni* (specimen from Itkol); 24 – *H. hajeki* sp. nov.; 25 – *H. shaverdoae* sp. nov.

Hydroporus shaverdoae sp. nov.

Hydroporus sp. n.: Shaverdo (2003: 35, 36).

Type locality. Armenia, Mount Aragats, NW Byurakan, near Amberd, 40.406N 44.228E; ca. 2100 m a.s.l. {15}.

Type material. Holotype: 1 ♂, 'Armenia: Mt. Aragats (18), NW Byurakan, nr. Amberd, 40°24.34'N 44°13.65'E, ca. 2100 m, 6.5.2001, leg. Shaverdo & Schillhammer' [printed] {15}, 'Hydroporus jacobsoni Zaitz., Shaverdo H. det. 2001' [printed, hw Shaverdo in part], 'Holotype, Hydroporus shaverdoae sp. n., H. Fery det. 2009' [red, printed] (NMW). The numbers in brackets on the labels of the holotype and other specimens deposited in CHS refer to additional collecting data given in Shaverdo (2003). Paratypes: **ARMENIA:** 1 ♀, same collecting data as the holotype (CHS). 1 ♂ 5 ♀♀, 'S Armenia: 31.5.2001 (76), 3 km above Kadzharan [= Kajaran or Kadscharan, ca. 39.16N 46.16E], Kadzharan river, ca. 2000 m, leg. Shaverdo' [printed] {10}, 'Hydroporus jacobsoni Zaitz., Shaverdo H. det. 2001' [printed, hw Shaverdo in part] (CHS, CHF). Each paratype is provided with the respective red printed label.

Additional material studied. The following six specimens probably belong to the new species, but are not treated as paratypes since they are females and I am not sure about their identity: 1 ♀, 'Armenia: N Yerevan (65), 24 km NW Hrazdan, bel. [= below] Ankavan, 40°38.22'N 44°32.34'E, ca. 1970 m, 27.5.2001, leg. Shaverdo' [printed] {14}, 'Hydroporus jacobsoni Zaitz., Shaverdo H. det. 2001' [printed, hw Shaverdo in part] (CHS). 3 ♀♀, 'Armenia: N Yerevan (55), 30 km NW Hrazdan, above Ankavan, 40°37.35'N 44°28.02'E, ca. 2050 m, 19.5.2001, leg. Shaverdo & Schillhammer' [printed] {13}, 'Hydroporus jacobsoni Zaitz., Shaverdo H. det. 2001' [printed, hw Shaverdo in part] (CHS, CHF). 1 ♀, 'Armenia: E Dilizhan [= Dilijan] (61), Parzlich Lake, 22.5.2001, ca. 1330 m, 40°45.19'N 44°57.72'E, leg. Shaverdo & Schillhammer' [printed] {12}, 'Hydroporus jacobsoni Zaitz., Shaverdo H. det. 2001' [printed, hw Shaverdo in part] (CHS). 1 ♀, 'Arm. Sevan Lake, Tsovagynch [= Tsovagyugh, ca. 40.63N 44.95E], 17.–20.6.1981, Josef Král lgt.' [printed] {11}, 'Hydroporus (Sternoporus) ♀ ?, jakobsoni [sic!] Zaitz, Wewalka 1983' [hw Wewalka] (CGW).

Differential diagnosis (given chiefly as differences from *H. jelineki* sp. nov.). More similar to *H. jelineki* sp. nov. and especially to *H. hajeki* sp. nov. than to *H. jacobsoni*. Maximum width of body more or less in middle of total length, distinctly before middle of elytral length. Discontinuity of body outline in dorsal view between pronotum and elytra weak, maximum width of pronotum at posterior angles. Punctation on disc of elytra more or less as in *H. jelineki* sp. nov., puncture lines distinct. Upper surface mostly black; only vertex of head, short stripe above insertion of each antennae and pronotal rim at posterior angles dark brownish. Venter with contrast between brownish appendages and body surface not prominent, more or less as in *H. jelineki* sp. nov. Darkening of middle of femora indistinct.

♂♂. Median lobe (Fig. 7) in ventral view with tip broader rounded than in *H. hajeki* sp. nov. (Fig. 6) and *H. kryshtali* (Fig. 8), and clearly much broader than in *H. jacobsoni* (Figs. 5–7). Paramere as in Fig. 14. Sucker cups on first tarsomere of pro- and mesotarsomeres present.

♀♀. Without conspicuous external differences to males. Gonocoxosternum and gonocoxae as in Figs. 20 and 25.

Measurements. TL: 3.45–3.9 mm, MW: 1.65–1.85 mm, TL/MW: 1.97–2.14, IO/MP: 0.47–0.50.

Variability. Some specimens also dark brownish next to suture of elytra and/or on entire pronotal rim; in a few specimens elytra in larger extent dark brownish. Punctation slightly varying in coarseness and density; sides of pronotum in a few specimens slightly more curved posteriorly.

Distribution. So far known as endemic for Armenia, collected in the northern as well as in the southern part (Fig. 26).

Biology. The following additional collecting data have been communicated by H. V. Shaverdo (see also Shaverdo 2003): locality {10}: puddles on the banks of Kadzharan river, between large granite rocks (diameter ca. 3 m), plenty of *Heracleum*, bottom of puddles covered by decaying plant material. Locality {12}: puddle, caused by deep car tracks, probably long-lasting, shaded, with much flooded vegetation (*Ranunculus*), in surrounding forest. Locality {13}: small spring fed puddles, bottom sandy-stony, thick layer of decaying leaves, grass, twigs and branches, banks with *Caltha*. Locality {14}: shallow stagnant area and flooded grassland, ca. 10 cm deep, near Marmaryk river; geology: granite with volcanic and crystalline components. Locality {15}: small river, fast flowing, ca. 2–5 m wide, exceedingly cold (ca. 5°C), most aquatic beetles from small accompanying rivulets with dense aquatic vegetation (incl. moss); geology: volcanic (basalt, tuff).

Etymology. The species is named after my colleague and friend Helena V. Shaverdo (Vienna, Austria), who kindly submitted her material for study (noun in apposition in the genitive case).

Hydroporus kryshtali Bilyashiwski, 1993

Hydroporus kryshtali Bilyashiwski, 1993: 15 (original description).

Type locality. Ukraine, Crimea, Kara-Dagh massif, ca. 44.9N 34.7E {24}.

Type material. Holotype: ♂, 'Ukrainian SSR, Crimean oblast, mountain district Kara-Dagh, 8.VII 1997, leg. A.A. Petrenko' {24}, 'derelict well, in humid silty soil' [both label texts in Cyrillic; translation by M. Bilyashiwski], 'Holotypus [printed], Hydroporus kryshtali ♂, det. Bilyashiwskiy [hw Bilyashiwski]' [red] (ZMUK). The holotype lacks the last seven segments of the right antenna and the last nine of the left one.

Diagnosis. Considering that the existence of this species or at least its description will be unknown to many colleagues, I provide here a translation of the original description (Bilyashiwski 1993: 15):

'Material: Holotype ♂, Crimea, Kara-Dagh massif, derelict well (in humid clayey silt/soil), stored in the Zoological Museum of the Kiev University, Petrenkow leg. Male: Body black, legs, antennae, and mouth parts yellowish red, total length 3.6–3.7 mm, maximum width of elytra 1.8 mm. The whole dorsal surface shagreened, microsculpture formed by small and evenly punctured isodiametrical cells of equal size (the punctation is more sparse on frons). Segments of antennae thickened, almost like a string of pearls [the antennae seem to have been damaged only after the description]. Pronotum with broad beading, in particular anteriorly; posterolaterally near the base with weak impressions. Elytra with three puncture lines which are more marked anteriorly. The punctures larger than those on head and pronotum. Prosternal process lanceolate, provided with a transversal tubercle between procoxae, which is formed by a sloping edge of the process anteriorly. The sloping part with transversal carinae. The process is compressed in the anterior third, and its posterior part obtuse. The suture of posterior episterna provided with coarse punctures. Sides of metasternum and metacoxae as well as the first three abdominal sternites coarsely punctured, the punctation almost absent in the middle of the sternites. Fourth and fifth sternite provided with weak punctures, particularly at the sides and near the sutures. The microreticulation consists of a net of small transversal cells. Last visible abdominal sternite shagreened, totally covered by small scattered punctures. Posterior margin of the metacoxal processes prolonged medially. Anterior claws of same length, sickle-shaped; inner claw much broader than the external one, inner side sloping. Shape of the aedeagus closely related to that of *Hydroporus gueorguievi* Wewalka, nevertheless, in apical third and tip much narrower. Females unknown. Except the male genitalia, this species can be distinguished from related species by the strongly thickened segments of the antennae, the shape of the prosternal process and some less important details of the external morphology.'

Thanks to A. V. Putchkov (Kiev, Ukraine), I had the opportunity to study the holotype in 1996. The original description is quite appropriate, but the following remarks shall be added: The body shape is more parallel and elongate than that of *H. jacobsoni* and *H. shaverdoae* sp. nov. The sides of the pronotum have a dark brownish rim, the anterior and posterior

margins are brownish translucent; the elytra are only indistinctly lighter next to the suture than elsewhere. The protarsal claws are very short, of equal length, strongly curved at base and otherwise straight.

♂♂. Median lobe (Fig. 8) in ventral view more tapering to tip and more shortly rounded than in *H. shaverdoae* sp. nov. (Fig. 7). Paramere as in Fig. 15. Pro- and mesotarsi not studied for sucker cups.

♀♀. So far unknown.

Measurements. TL: 3.6 mm, MW: 1.7 mm (not 1.8 mm as given in the original description), TL/MW: 2.12.

Distribution. So far known only from the type locality in the Kara-Dagh massif in Crimea, Ukraine (Fig. 26). I have studied several *H. longulus*-group specimens from Crimea – all males proved to be *H. dobrogeanus*.

Etymology. Colleague Bilyashiwski kindly communicated that the species was named in honour of O.P. Kryshtal, a famous Ukrainian entomologist (noun in apposition in the genitive case).

Hydroporus kraatzii Schaum, 1868

Hydroporus kraatzii Schaum, 1868 in Kraatz (1868: 384) (original description).

Hydroporus kraatzii Schaum, 1868 in Schaum & Kiesenwetter (1868: 66), **syn. nov.** (objective junior synonym and primary homonym, preoccupied by *H. kraatzii* Schaum, 1868 in Kraatz (1868: 384); synonymy personally communicated by A. N. Nilsson, Umeå, Sweden).

Hydroporus kraatzii Schaum, 1868 in Schaum & Kiesenwetter (1868: 66): Sharp (1882: 481) – Nilsson & Holmen (1995: 67) – Nilsson (2009a: 146).

Hydroporus kraatzi Kiesenwetter, 1868: Gemminger & Harold (1868: 435) (incorrect authorship, referring to *H. kraatzii* Schaum, 1868 in Schaum & Kiesenwetter (1868)).

Hydroporus kraatzi Schaum, 1868: Zimmermann (1919: 169, 1920: 88, 1931: 153). – Schaeflein (1971: 38).

Hydroporus hedwigi Reitter, 1897: 45: Zimmermann (1919: 169) (synonymy with *H. kraatzii*). – Nilsson (2007: 51).

Hydroporus hedwigae Schenkling, 1917: 52 (unjustified emendation of *H. hedwigi* Reitter): Nilsson (2007: 51) (synonymy).

Type locality. Poland, 'Glatzer Schneeberg' ['Schneeberg' = 'snow mountain'; this mountain is called Králický Sněžník in Czech and Śnieżnik Kłodzki in Polish]. The border between the Czech Republic and Poland runs exactly across the peak of the mountain. The co-ordinates of the 'Glatzer Schneeberg' are given in Wikipedia (access January 2009) as 50.201N 16.849E. According to Kraatz (1968: 384), Kraatz himself collected at least some specimens on the northern slope of the 'Glatzer Schneeberg'. It is therefore more likely that the type locality is in Poland and not in the Czech Republic.

Type material. Lectotype (by present designation): ♂, a small rectangular dark blue label, 'Type' [hw Cl. Müller], 'Glatzer Schneebg' [hw Cl. Müller], 'Type von Hydr. Kraatzi Schaum' [red, hw?], 'Lectotype, Hydroporus kraatzii Schaum, 1868, des. H. Fery 2009' [red, printed] (ZSM).

Notes on the type material. According to Horn et al. (1990: 345) and Scherer (1982: 60), at least parts of Schaum's Hydroporinae came 'via E. A. H. v. Kiesenwetter, via Cl. Müller' to the ZSM in 1905. It is known from other Schaum's types that at least some of them were provided with a small rectangular dark blue label and/or that Clemens Müller, owing to his knowledge about the origin of the specimens, added labels in his own handwriting (see Fery 1992a: 67, 1992b: 119, 1992c: 343, 351; Fery et al. 1996: 315; Fery & Brancucci 1997: 247). Thus, I have no doubt that the designated lectotype is a (former) syntype of *H. kraatzii* Schaum, 1868.

Horion (1941: 393) reported that 'types' should be stored in the Deutsches Entomologisches Institut (DEI). However, Döbler (1976) did not list any types of *H. kraatzii* in the collections of the DEI and I have not been able to find such specimens during several visits at that institute.

The first publication of the name *Hydroporus kraatzii* (Kraatz 1868: 384) cites the species as '*Hydroporus Kraatzii* Schaum n. sp. in litt.' Although the author of that work is Kraatz, the authorship of the taxon must be assigned to Schaum because he is cited as the author. In addition, the taxon was described by Schaum a second time in Schaum & Kiesenwetter (1868: 66) (compare Article 50.1.1 including the Example in ICZN 1999).

Synopsis of the *Hydroporus longulus*-group

The following synopsis of the species of the *H. longulus*-group is chiefly based on the World Catalogue of Dytiscidae (Nilsson 2001, 2009a) and on the newest version of the Catalogue of Palaearctic Dytiscidae (Nilsson 2009b).

Hydroporus anatolicus J. Balfour-Browne, 1963
Hydroporus apenninus Pederzani & Rocchi, 2005
Hydroporus artvinensis Fery & Erman, 2009
Hydroporus bodemeyeri Ganglbauer, 1900
= *Hydroporus bulgaricus* Hlisnikovský, 1955
= *Hydroporus collarti* Guignot, 1949
= *Hydroporus guignoti* Gschwendtner, 1935
Hydroporus cagrankaya Fery & Erman, 2009
Hydroporus constantini Hernando & Fresneda, 1996
Hydroporus cuprescens K. W. Miller & Fery, 1995
Hydroporus dobrogeanus Ieniştea, 1962
Hydroporus erzurumensis Erman & Fery, 2000
Hydroporus gueorguievi Wewalka, 1975
Hydroporus hajeki sp. nov.
Hydroporus holzschuhi sp. nov.
Hydroporus jacobsoni Zaitzev, 1927
Hydroporus jelineki sp. nov.
Hydroporus jurjurensis Régimbart, 1895
= *Hydroporus djurdjurensis* Bedel, 1925 (unjustified emendation)
Hydroporus kraatzii Schaum, 1868 in Kraatz (1868)
= *Hydroporus kraatzii* Schaum, 1868 in Schaum & Kiesenwetter (1868) (second description)
= *Hydroporus hedwigi* Reitter, 1897
= *Hydroporus hedwigae* Schenkling, 1917 (unjustified emendation)
Hydroporus kryshtali Bilyashiwski, 1993
Hydroporus libanus Régimbart, 1901
Hydroporus longulus Mulsant & Rey, 1861
= *Hydroporus celatus* Clark, 1862
Hydroporus lundbergi Fery & Erman, 2009

Hydroporus nevadensis Sharp, 1882
Hydroporus pfefferi Wewalka, 1974 (replacement name)
= *Hydroporus orientalis* Hlisnikovský, 1955 (preoccupied by *Hydroporus orientalis* Clark 1863, standing today in genus *Hydroglyphus* Motschulsky, 1853)
Hydroporus regularis Sharp, 1882
Hydroporus sardomontanus Pederzani, Rocchi & Schizzerotto, 2004
Hydroporus shaverdoae sp. nov.
Hydroporus sivrikaya Fery & Erman, 2009
Hydroporus toledoi Fery & Erman, 2009

Notes on typical habitats of *H. longulus*-group members and collecting techniques

Members of the *H. longulus*-group attract the attention of water beetle collectors not only because of their elegant habitus, but also because they are usually assumed rare and apparently difficult to collect. Most collections have only a small number of them if any. The problem is that these species do not live where water beetlers usually collect – they are only accidentally found in ponds and streams!

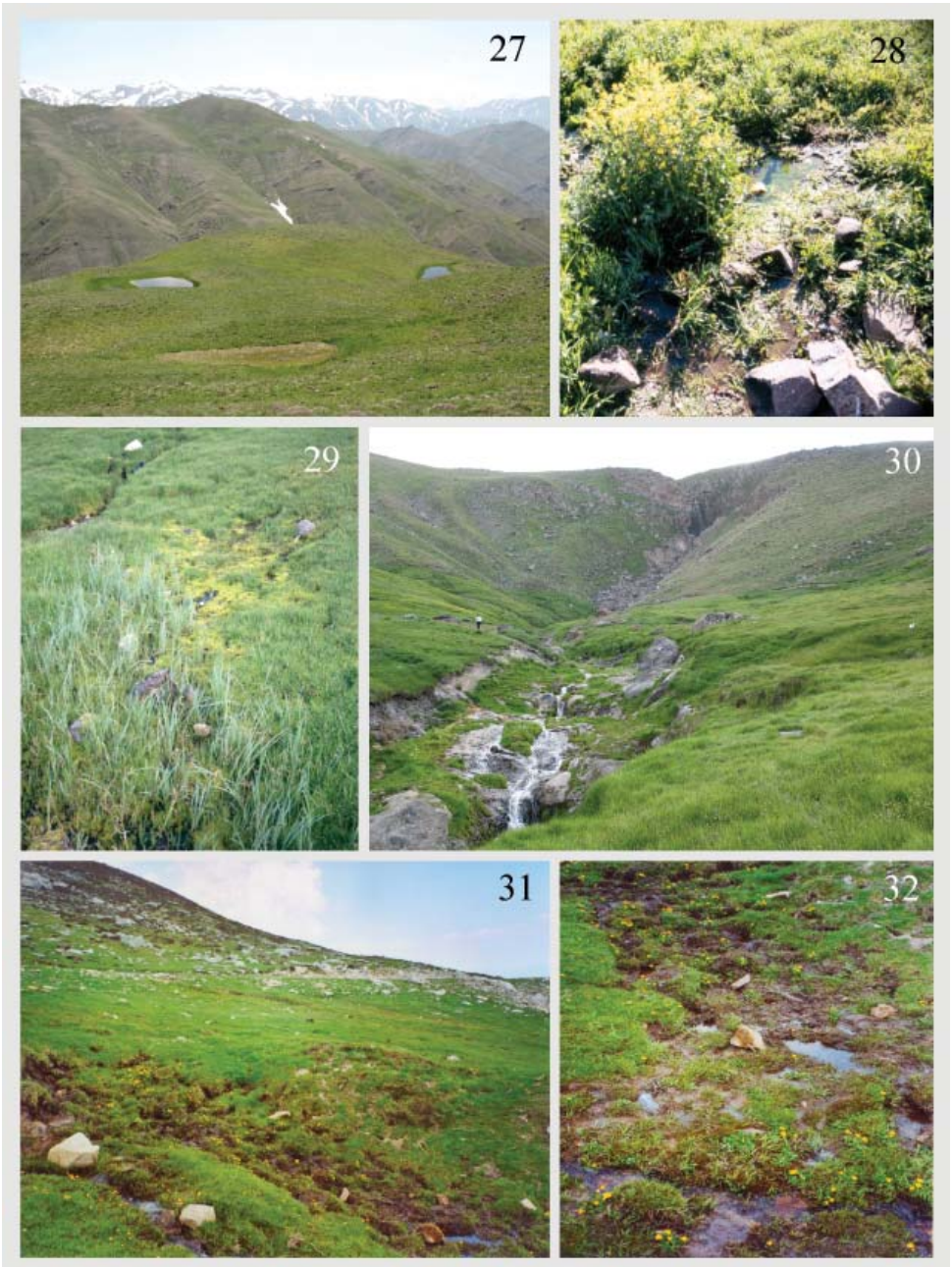
The literature contains hints such as 'in mountains, [...] in *Sphagnum*' (Schaeflein 1971: 39) or 'from hills until sub-alpine or even alpine level, in little streams' (Guignot 1947: 111). Little more information is given in Burmeister (1939: 224): 'mountainous [...] in small stream-pools, ponds and springs, often under stones at the border of streams' and similar statements are found in Horion (1941: 392). Kofler (1963: 25) collected it 'by squeezing the water out of fully wet spring-moss followed by sieving'. Carron (2005: 101) calls *H. kraatzii* 'a difficult to collect and semi-subterranean species' and interestingly reports about *H. longicornis* (a *H. memnonius*-group member with similar biology): 'The species lives semi-subterranean, near springs and trickling and even on wet meadows without visible water'. F. Balfour-Browne (1940: 322) states that for *H. longulus* 'the usual habitat is springs, wells and trickling, mossy or peaty streams [...] I used to find it regularly at one spot [...] where a small trickle of water ran down a mossy slope. When found it is usually not uncommon, but it seems definitely restricted as to habitat.' Schaeflein (1979: 7) gives even more details about *H. kraatzii* and *H. longicornis* that were found together with *H. gyllenhalii* Schiödte, 1841: 'the collecting site is not a water in the usual sense, but a small flat puddle [...] fed by a small spring [...] in summer one must stamp depressions with the boots into the mud. When water is re-filling these depressions, the species can be caught by means of a small tea strainer.' Relatively detailed habitat descriptions are also given under the section 'Biology' of *H. shaverdoae* sp. nov.

Hernando & Fresneda (1996: 160) give an exhaustive description of the habitat of *H. constantini* (translation not verbatim): 'All habitats were very small springs on a sloping ground, once forming small streams, but then already seeping into the wet ground, and this all repeatedly over short distances. Most specimens were found by stamping the wet meadow next to the springs, also at places where no water is seen on the surface; the specimens came out of the ground and crawled between the vegetation. At other places the specimens were

Fig. 26. Distribution of *Hydroporus jelineki* sp. nov. (1–6), *H. hajeki* sp. nov. (7), *H. holzschuhi* sp. nov. (8–9), *H. shaverdoae* sp. nov. (10–15), *H. jacobsoni* Zaitzev, 1927 (16–23), *H. kryshtali* Bilyashiwski, 1993 (24), *H. libanus* Régimbart, 1901 (25–26).

found crawling on the underside of small stones, placed in water only a few millimetres deep; sometimes they were apparently simply hidden in the mud. Even if single puddles were slightly polluted by cowpats, some specimens could still be collected. It is possible that the specimens came here only accidentally, but anyway it seems clear that this species and others of the same group are not inhabitants of common waters. Their habits might be called hygropetric or rhithrobiontic or both.' Gerecke (1996: 474) described and figured a similar habitat as a 'rheohelocrene' spring.

I can confirm the last observations and want to add some of my own experiences: The main habitat of *H. longulus*-group members is not the water body itself, but the areas next to it, where water is seeping through the mud, through *Sphagnum* and other vegetation or decaying leaves, sometimes flowing in a thin film over the sloping ground, then again trickling out of the mud at a more steeping spot, forming small puddles of only a few centimetres diameter and then seeping again into the muddy ground. Definitely, at least a very slow flow of water seems necessary for these species. Figures 27–32 show such typical habitats. The first four photos are from two Iranian localities and the last two from a Spanish locality, given as a European locality for comparison. I had the best results when I filled the net by hand with mud from



Figs. 27–32. Habitats. 27–28 – *Hydroporus jelineki* sp. nov. (Ilka, locality {1}, photos by J. Hájek); 29–30 – *H. hajeki* sp. nov. (Qutur, locality {7}, photos by J. Hájek); 31–32 – *H. constantini* Hernando & Fresneda, 1996 (Spain, province Santander, Pico Tres Mares, photos by H. Fery).

seepages beside small streams and springs and afterwards washed the mud out and removed the vegetation. Rarely did I find the beetles in high number in one filling of the net; it took some time to get a dozen or two – if at all – however, these beetles are worth the effort. On the other hand, the beetles can also be found at the borders of streams where the flow of the water is very slow and similar habitats are formed by *Sphagnum*, decaying leaves and other detritus (e.g., *Hydroporus cuprescens* K. W. Miller & Fery, 1995 in Cyprus). Very special bionomics ('hygropetric behaviour') is reported for *H. sardomontanus* from Sardinia (Italy). It was found in large numbers 'walking or hiding on the wet surface of a vertical rock wall' (Pederzani et al. 2004: 127). The related *H. regularis* from Corsica prefers similar habitats and is classified as belonging to the phanerofluicolous fauna by Balke et al. (1997: 84).

Finally, I would like to emphasise the limited knowledge about the swimming and flying capabilities of the *H. longulus*-group members. Fery & Erman (2009: 2) suspect that limited swimming and flying capabilities can be linked to the high degree of endemism of many of these species. To test the swimming capability I propose to perform a simple field experiment: put the beetles into a receptacle filled with water and a few plants and observe what they do! A compilation of the flying capability of British Hydradephaga is given in Foster (1979) and that of German species in Kehl & Dettner (2007). Concerning the members of the *H. longulus*-group, it is only known that *H. kraatzii* and *H. longulus* have never been observed in flight and flight tests have been negative. Unfortunately, it is much more difficult to investigate the flight capability and a simple test for it is not available (compare, e.g., Foster 1979).

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