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Hydroporus macedonicus nov. spec., a new member of the *Hydroporus planus*-group (Coleoptera, Dytiscidae)

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A b s t r a c t: *Hydroporus macedonicus* nov. spec. is described from the Kožuf mountains in the southern part of the Republic of Macedonia. The species belongs to the *Hydroporus planus*-group, but its broad and stout habitus resembles at first glance that of members of other groups, e. g. such as *Hydroporus kraatzii* SCHAUM 1867. Further external characters as well as molecular data show, however, that the new species is related to south-eastern European populations of *Hydroporus discretus* FAIRMAIRE & BRISOUT 1859. One of its characteristic features are the brownish latero-basal areas on the black elytra, a pattern which occurs also in other populations of *H. discretus* of which two have already been described: *Hydroporus discretus* ab. *woerndlei* ZIMMERMANN 1919 and *Hydroporus discretus tatricus* KINEL 1949. Typical material of both was studied and the lectotype of the latter designated.

K e y w o r d s: Coleoptera, Dytiscidae, *Hydroporus planus*-group, new species, lectotype, Macedonia.

Introduction

During a collecting trip through the southern part of the Republic of Macedonia in July 2004 the junior author found two males of *Hydroporus* CLAIRVILLE 1806, which could not be attributed to any known species. On the other hand the species can easily be identified as belonging to the *Hydroporus planus*-[or *fuscipennis*-]group, although - due to the broad and stout habitus - it resembles at first glance *Hydroporus kraatzii* SCHAUM 1867 or even *Hydroporus lundbladi* (FALKENSTRÖM 1938). The former is a member of the *Hydroporus longulus*-group, the latter ranking with the *planus*-group members since the genus *Hydrotarsus* FALKENSTRÖM 1938 has been synonymised with *Hydroporus* CLAIRVILLE 1806 (RIBERA et al. 2003).

NILSSON (2001) listed 29 species in the *planus*-group. The inclusion of the three former *Hydrotarsus* spp., the recently described *Hydroporus tuvaensis* PEDERZANI 2001, the transfer of *Hydroporus tibetanus* Zaitzev, 1953 from the *nigrita*- to the *planus*-group (SHAVERDO 2004: 260), and *Hydroporus macedonicus* nov. spec. now raise this number to 35.

Acronyms, material and acknowledgements

The following abbreviations are used for the collections where material is located:

CHF..... coll. H. Fery, Berlin, Germany, property of the NMW
NMW ..... Naturhistorisches Museum Wien, Austria (M.A. Jäch, H.V. Shaverdo)
ZSM ..... Zoologische Staatssammlung, München, Germany (M. Baehr, M. Balke)

We are indebted to all colleagues mentioned above for making material available for our studies. L. Hendrich (Berlin, Germany) examined the new species and we thank him for his comments. We also thank M. Kahlen (Innsbruck, Austria) who kindly helped with deciphering of some label texts. R. A. Baker (Leeds, UK) is thanked for the linguistic revision of a draft of the manuscript. J. Hájek (Praha, Czech Republic) and J. Šťastný (Liberec, Czech Republic) kindly let us study their material from Bulgaria, Montenegro, Italy, Slovakia, and Czech Republic – thanks for their co-operation! Special thanks are due to A. Izquierdo and I. Ribera (Madrid, Spain) for the molecular data and analyses of the sequences of *H. macedonicus* and *H. discretus* FAIRMAIRE & BRISOUT 1859, which were obtained with funds from the project CGL2004-00028/BOS to I. Ribera. Both colleagues generously placed their results at our disposal.

The following abbreviations are used in the text: hw (handwriting), TL (total length), MW (maximum width). Comments in square brackets are those of the present authors.

Hydroporus macedonicus nov. spec.

T y p e l o c a l i t y: Republic of Macedonia, Kožuf mountains, Dve Uši, near the village of Konopište.

H o l o t y p e: ♂, "20.7.2004 Macedonia, Kožuf Mt., Dve Uši, rheohelocrenic spring, ca. 2 km from Konopište, Pesic leg. (Mac1)" [printed], "Holotype, Hydroporus macedonicus sp. n., Fery & Pesic det. 2005" [red, printed], "ref. No. MNCN-AI251, GeneBank accession numbers COI: DQ195528, 16S: DQ195529" [printed] (NMW).

P a r a t y p e: 1♂, first label as in the holotype, and a respective red paralectotype label (CHF).

N o t e s: For the description of rheohelocrenic springs see e.g. GERECKE (1996: 474).

Diagnosis: Habitus short oval, with a rather stout appearance (Fig. 1); surface somewhat depressed, considerably flatter than in *H. discretus* from central Europe which has a distinctly convex surface; discontinuity between sides of pronotum and those of elytra very weak, thus lateral outline almost continuous in dorsal view; in dorsal view sides of elytra in anterior third almost straight, and slightly diverging, rounded behind; widest shortly before end of anterior half of elytra. Upper and ventral surface black to a large extent; head with reddish brown areas, pronotum with sides dark brownish, elytron near base and on apex shining through brownish.

Head behind anterior clypeal margin and a narrow transverse fasciae on vertex reddish brown. Surface entirely microreticulated, punctate on clypeus, punctation becoming coarser on frons, absent on vertex. Between eyes and anterior clypeal margin with two large, but flat clypeal impressions, here punctation finer and denser.

Pronotum with sides almost straight and diverging backwards in posterior three quarters, curved anteriorly, posterior angles very shortly rounded. Lateral beadings distinct, approximately as broad as half diameter of antennal articles. Beadings and anterior angles

dark brownish; anterior and posterior margins narrowly and indistinctly dark brown; rest of pronotum black. Surface microreticulated to large extent, between centre of disc and posterior margin shiny on a small area. Punctation dense on disc, still denser and coarser near sides and anterior and posterior margins. Whole surface covered with fine colourless setae (< 0.1 mm).

Elytra black, basally and in particular near shoulders as well as on apex, brownish with colour shining through, transitions between brown and black areas poorly delimited; surface largely smooth and shiny, reticulated only immediately before apex; entirely covered with setae like on pronotum. Punctation simple, dense and coarse, distance between punctures more or less equals their diameter; two noticeable puncture lines on each elytron; sutural puncture lines absent; apex provided with a few very coarse punctures. In lateral view epipleural rim very weakly ascending towards humeral angle. Epipleura in lateral view not visible to shoulder (compare Figs. 180–182 in NILSSON & HOLMEN 1995).

Ventral surface to a large extent black; mouth parts reddish brown, sides of prosternum, pro- and mesocoxae, metacoxal processes and prosternal process between and behind procoxae dark brown in part; hind margins of last abdominal segments with brownish colour shining through. Gula very indistinctly more brownish than almost black genae; gula smooth, genae distinctly microreticulated. Legs and antennae reddish brown. Antennal articles slightly darkened distally beginning with fifth; third and fourth articles smaller, second and fourth to tenth articles bigger, but not much longer than wide. Protibiae with two rows of setiferous punctures on anterior face; middle of meta- and mesofemora provided with one row of punctures. Prosternal process with a ridge between procoxae, before flat, not prolonged towards base of prosternum as a narrow convexity, provided with a few transverse subbasal grooves. Blade of process lanceolate, carinate, apex shortly rounded; sides provided with a rim and some setae. Metacoxal plates, sides of metasternum, and first two abdominal segments with very coarse punctation; centre of metasternum, next to a slightly impressed midline, with finer punctures. Punctation on third to fifth visible abdominal segments less coarse; apex of last segment with punctures denser and coarser, between punctures distinctly microreticulated; fifth segment weakly reticulated, rest of venter smooth. Setae present on entire venter, similar to that of upper surface. Epipleura provided with a puncture line next to inner margin; resting surface with flat and very broad indistinct punctations. Metacoxal lines diverging forwards, not reaching hind margin of metasternum (Fig. 2); next to each line with a deeply impressed puncture line; interlinear space provided with a few strongly elongated punctures; setae present, but not conspicuous. Metacoxal processes with posterior margin not exactly conjointly truncate, hind margins of both almost straight, but forming an oblique angle (Fig. 2).

♂♂: Median lobe in ventral and lateral view as in Fig. 3; paramere as in Fig. 4. First three protarsomeres distinctly broader than those of mesotarsi; protarsal claws equal, simple, evenly curved, distinctly shorter than fifth protarsomere which is shorter than second and third together; mesotarsal claws similar to those of protarsi, but longer; fifth mesotarsomere as long as second and third together.

♀♀: Not found.

Measurements: TL: holotype: 3.05 mm, paratype: 2.9 mm; MW: holotype: 1.7 mm, paratype: 1.65 mm. The ratio TL/MW can be seen as a measure of the stoutness of the

body. It has the values 1.79 and 1.76 respectively for the two specimens studied, and is thus distinctly smaller than in *H. discretus* which has a more elongate oval appearance (see below).

Distribution: Southern part of the Republic of Macedonia; near the border to Greece, Kožuf mountains, Dve Uši, near the village of Konopište; so far known only from the locus typicus.

Molecular methods

The soft tissue from the holotype was digested and the DNA isolated using a standard non-destructive phenol–chloroform extraction in the laboratory of I. Ribera (Museo Nacional de Ciencias Naturales, Madrid, Spain (MNCN)), and stored in the DNA collection with reference number MNCN-AI251. The extracted holotype is kept in the NMW. With the aim to investigate the phylogenetic position of the new species, the same mitochondrial genes as in RIBERA et al. (2003) were sequenced: a fragment of ca. 500 bp of 16S rRNA, and a fragment of ca. 800 bp of Cytochrome Oxidase I (*cox1*) (see RIBERA et al., 2003 for details of the primers used and the sequencing conditions). Sequences were submitted to GeneBank with accession numbers DQ195528 (citochrome c oxidase subunit I) and DQ195529 (16S rDNA). The sequences were manually aligned using the data matrix of RIBERA et al. (2003), and analysed in PAUP 4.0 (SWOFFORD 2002) using the same analytical procedures (see RIBERA et al. 2003 for details).

Results: The parsimony search in PAUP resulted in three equally parsimony trees of 2369 steps (Retention Index 0.43; Consistency Index 0.30), the strict consensus of which is represented in Fig. 5. *H. macedonicus* is clearly included in the extended *fuscipennis*-group of species sensu RIBERA et al. (2003), although the relationships within this group are not clearly defined, with low bootstrap values for most of the internal nodes.

Comparison with other members of the *Hydroporus planus*-group

The occurrence of lighter spots or diffusely lightened areas at the elytral base is well known in several members of the *planus*-group, even in species which usually have a uniformly dark brown or black surface. Such "forms" are treated mainly as simple colour variations, but some have even been described as species or subspecies, e. g. *Hydroporus habelmanni* Wehncke, 1876 (according to NILSSON 2001: 158, a junior subjective synonym of *Hydroporus pubescens* (GYLLENHAL 1808)) and *Hydroporus discretus tatricus* KINEL 1949. In the course of our investigations we have studied material from several members of the *planus*-group which resemble *H. macedonicus*, in particular with respect to elytral coloration and comparatively small total length. The only species which finally comes into consideration as more closely related to the new one, is *H. discretus* of which several subspecies and variations have been described (cf. NILSSON 2001: 156, 277).

In particular, we have studied populations of this species from:

Austria: Kärnten; Tirol: Innsbruck; see below under *H. discretus* ab. *woerndlei* ZIMMERMANN 1919.

Bulgaria: Pirin mountains: Lista Poliàna (NW village Pirin), Begovica (ca. 20 km NE Sandanski), and Čairski lakes (ca. 30 km NE Sandanski); Rhodope mountains: Smolyan.

Czech Republic: Beskydy mountains: Bumbálka (ca. 60 km S Ostrava).

Italy: Dolomiti: Foresta Daneveggio, and Latemar (Pampelago valley).

Montenegro: Komovi mountains: NE Podgorica (= Titograd); Cakor-Pass, SE Ivangrad (= Berane); Bjelasica mountains: Lalevića Dolovi, (NE Nikši), and Mojkovac (W Bijelo Polje); Durmitor mountains: Sedlo, and Veliki Štulac; Mijakoviçi, Pljevlja.

Poland: Tatra mountains; see below under *H. discretus tatricus* KINEL 1949.

Slovakia: Čadca (ca. 30 km N Zilina), and Dolné Vestevice (ca. 10 km N Partizánske); Zádiel (ca. 35 km WSW Košice).

Specimens from Bulgaria and – in particular – from Montenegro are those which mostly resemble the new species. Nevertheless, they have a less stout and more vaulted body shape, and a median lobe's shape which is closer to that of the central European *H. discretus*. In addition, A. Izquierdo and I. Ribera have studied one specimen of *H. discretus* from Montenegro (Mijakoviçi), and found that its molecular data show clearly that it is genetically different from *H. macedonicus*. At present, the population from Montenegro – and all other ones cited above – shall be treated as belonging to *H. discretus* sensu lato. Further studies are necessary to resolve what seems to be a species complex across Europe. Certainly, the external morphology and the molecular data of the Macedonian population seem to us to be sufficiently different from those of the other populations to justify the description of a new species.

The populations with a lighter elytral base from Austria and Poland have already been described under two different names, and thus shall be treated below in more detail. In particular, we take the opportunity to designate the lectotype of *H. discretus tatricus*.

Hydroporus discretus tatricus KINEL 1949 (status restored)

Hydroporus discretus tatricus KINEL 1949: 396 (orig. descr.), HOCH 1967: 253, IENIŞTEA 1978: 297.

Hydroporus discretus FAIRMAIRE & BRISOUT: GALEWSKI 1971: 14 (new synonymy), NILSSON 2001: 156.

T y p e l o c a l i t y: Poland, Tatra mountains.

L e c t o t y p e (by present designation): ♂, "Halicia [= Galizien; historical landscape in SE Poland and W Ukraine] occ., Tatra 25/7, S. Stobiecki." [hw?], "tatricus n. sp." [hw?], "Co-Typus" [red, unauthorised curatorial designation], "Lectotypus, Hydroporus discretus tatricus Kinel 1949, des. H. Fery 2005" [red, printed] (NMW).

P a r a l e c t o t y p e s: 3♂♂, 3♀♀, same label data as the lectotype, but provided with the respective red paralectotype label (NMW). 1♀, "Halicia occ., Tatra 25/7, S. Stobiecki." [hw?], "tatricus n. sp." [hw?], "Hydroporus tatricus Stob., n. sp." [hw?, same as on the first label], "Typus" [red, unauthorised curatorial designation], "tatricus, Galiz. [= Galizien] Stob." [hw?], and a red paralectotype label (NMW).

N o t e s: The lecto- and paralectotypes designated above are those specimens of which KINEL (1949: 396) reports that he has found them with the labels cited above in the "Naturhistorisches Staatsmuseum à Vienne" (= NMW). He has also studied other specimens collected by Stobiecki ("... repandu dans mainte collection privée ...") and in particular 15 specimens collected by M. Rybínski in the Tatra mountains at "Zielony Staw Gasienicowy" which were stored in the "Musée d'histoire naturelle de l'Académie des Sciences Polonaise à Cracovie [Kraków]". We were not able to study these specimens, however, they have to be considered as paralectotypes nevertheless.

Descriptive notes: The specimens studied are somewhat broader and slightly more depressed than *H. discretus* from e. g France and Germany, and thus resemble on a first glance *H. macedonicus*. The habitus, however, is distinctly more evenly rounded and less stout than in the new species. The elytral base bears up to three light brown to almost yellowish, but confused and indistinctly delimited spots, extending in some specimens

internally as far as the suture; the sides of the elytra are – in particular in the posterior third – somewhat lightened; the rest of the elytra is of a blackish brown, while the pronotum is black, except – in a few specimens – the brownish lateral bead. The aedeagus is similar to that of *H. discretus* from other regions.

Measurements: TL: 3.2–3.3 mm, MW: 1.7–1.8 mm; TL/MW: 1.83–1.94.

Notes: GALEWSKI (1971: 14) treated Kinel's taxon as a synonym of *H. discretus* without giving any reason for this. With respect to the considerable external differences to typical *H. discretus discretus* from France (locus typicus: "Marly", ca. 200 km NNE Paris; see BALKE & FERY 1993) we propose to revoke Galewski's synonymisation and to keep the original status of *H. discretus tatricus* until the Polish and further European population have been investigated by means of molecular methods.

Hydroporus discretus ab. *woerndlei* ZIMMERMANN 1919

Hydroporus discretus ab. *woerndlei* ZIMMERMANN 1919: 174 (orig. descr.), ZIMMERMANN 1920: 83, ZIMMERMANN 1931:142, NILSSON 2001: 277.

M a t e r i a l s t u d i e d: A u s t r i a: 2♂♂, "Tirol [printed], Innsbruck [hw?]", "Hallerau, 8.9.[19]12" [hw?], "Type" [round, light blue-green label, hw Zimmermann], "Samml. A. Zimmermann" [printed], "Paratypus" [red, printed; unauthorised curatorial designation] (ZSM). 2♂♂, "Innsbruck" [hw Zimmermann], "Type" [round, light blue-green label, hw Zimmermann], "Samml. A. Zimmermann" [printed], "Paratypus" [red, printed; unauthorised curatorial designation] (ZSM). N o t e s : All four "typical" specimens from the ZSM are rather immature. 1♂, "Amraser Au, 5.IX.[19]24" [hw Wörndle], "Innsbruck, A. Wörndle" [printed], "Hydroporus discretus ab. Woerndlei Zim." [hw?], "Co-Typus" [red, unauthorised curatorial designation] (NMW). 1♀ "Amr. Au" [hw Wörndle], "Innsbruck, A. Wörndle" [printed], "Hydroporus discretus a. Woerndlei Zim." [hw?], "a Wörndlei Zim." [hw?], on reverse "piceus Sturm l. c. 66."[printed], "Co-Typus" [red, unauthorised curatorial designation] (NMW). N o t e s: M. Kahlen kindly communicated that the locality "Amraser Au" was once a real "beetle paradise", a river pasture on the left side of the river Inn, east of Innsbruck, in Austria; altitude 565 m, co-ordinates ca. 47.16N 11.26E. Today this locality has been totally destroyed by a highway, a sewage plant, industrial factories, etc. 1♂, 3♀♀, "Welsberg, Ti. [= Tirol], Ganglbauer" [printed], the male with additional "R. Mouchamps det., Hydroporus discretus ab. wörndlei Zimm." [hw Mouchamps in part] (NMW). 1♂, "Kaernten [= Kärnten, province in Austria], 18 Diener 98 [= collector Diener, 1898]" (CHF).

Descriptive notes: *H. discretus* ab. *woerndlei* is a taxon of infrasubspecific rank (cf. article 45.6.2 of the ICZN). The specimens studied have an oval elongate and vaulted habitus which equals that of *H. discretus discretus* from e. g. France and Germany. Mature specimens have dark brownish elytra, and a black pronotum with its lateral beading sometimes brownish. The base of the elytra is light brown, and some specimens have a rather distinct yellowish brown spot on the shoulders. The aedeagus is similar to that of *H. discretus* from other regions.

Measurements: TL: 3.0–3.35 mm, MW: 1.6–1.75 mm; TL/MW: 1.82–1.94.

Zusammenfassung

Aus dem Kožuf-Gebirge im Süden der Republik Mazedonien - nahe der Grenze zu Griechenland - wird *Hydroporus macedonicus* nov. spec. beschrieben, eine Art, die durch ihren gedrungenen Habitus auf den ersten Blick z. B. an *Hydroporus kraatzii* SCHAUM 1867 aus der *Hydroporus longulus*-Gruppe erinnert. Die neue Art gehört jedoch eindeutig in die *Hydroporus planus*-[oder *fuscipennis*-]Gruppe, und zwar in die Nähe von *Hydroporus discretus* FAIRMAIRE & BRISOUT

1859. Sowohl externe Merkmale als auch die Untersuchung der DNA zeigen, dass *H. macedonicus* insbesondere mit südost-europäischen Populationen des *H. discretus* s. l. verwandt, aber dennoch spezifisch verschieden ist. Da die Zeichnung der Flügeldecken - aufgehellte Schultern auf schwarzbraunem Grund - an zwei weitere Taxa erinnern, wurden auch typische Exemplare von diesen Untersucht: *Hydroporus discretus* ab. *woerndlei* ZIMMERMANN 1919 und *Hydroporus discretus tatricus* KINEL 1949. Für letzteren wird der Lectotypus designiert.

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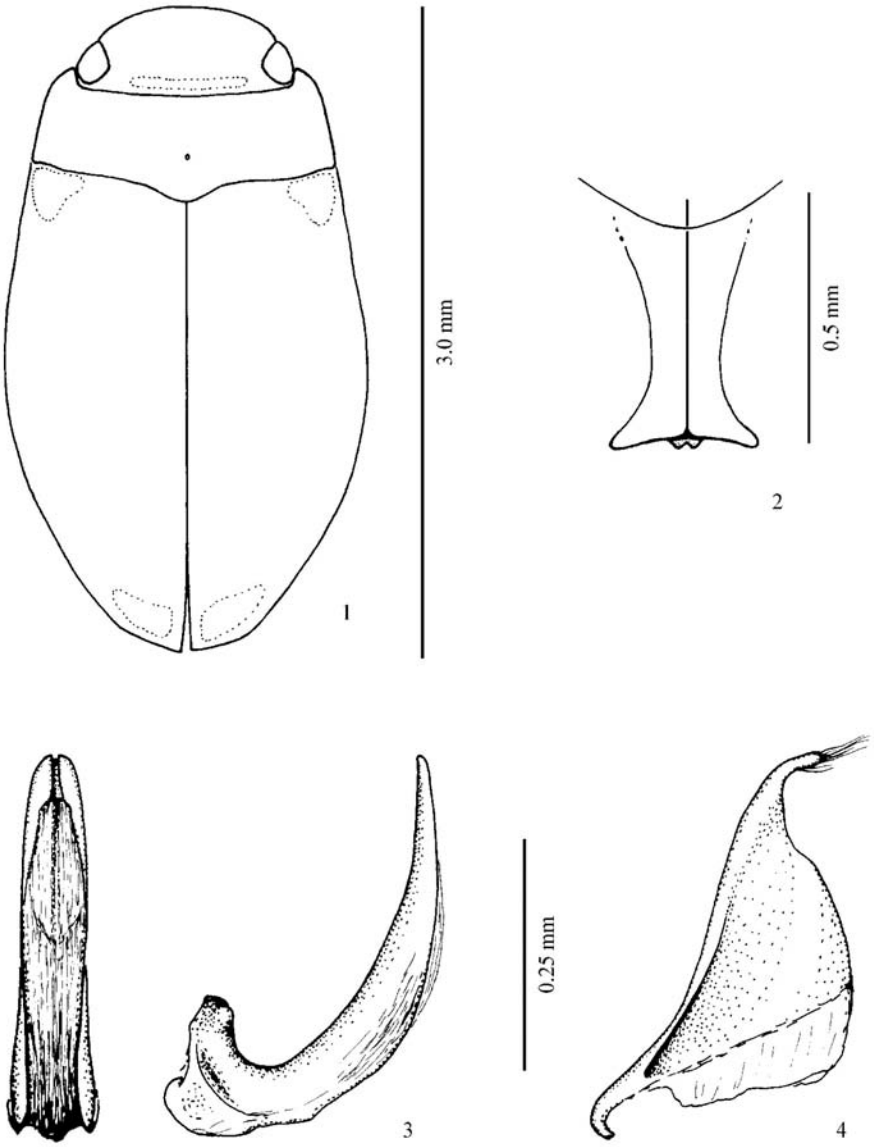

Figs. 1-4: *Hydroporus macedonicus* sp.n.: (**1**) habitus; the dotted lines indicate the areas with brownish coloration; (**2**) metacoxal processes (schematic); (**3**) median lobe of aedeagus in ventral and lateral view; (**4**) paramere.

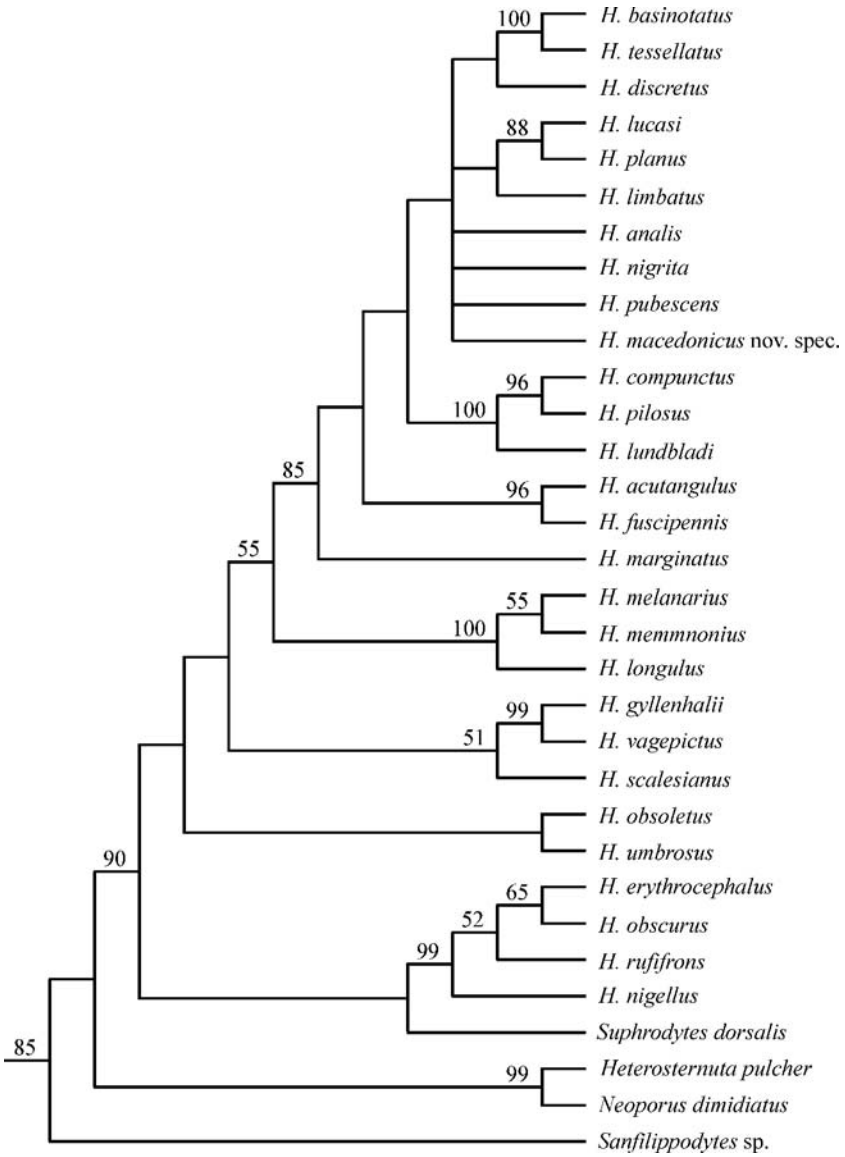

Fig. 5: Strict consensus of the three most parsimonious trees obtained from the data used in RIBERA et al. (2003) plus the equivalent sequences of *Hydroporus. macedonicus* sp.n., using gaps as a fifth character (outgroups omitted). Numbers above nodes are non-parametric bootstrap support values. See RIBERA et al. (2003) for details of the specimens and analytical methods used.