

A NEW SPECIES OF THE VALVATIFORM HYDROBIID
GENUS HAUFFENIA FROM HUNGARY
(MOLLUSCA: CAENOGASTROPODA: HYDROBIIDAE)

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The first record of a valvatiform hydrobiid species in Hungary is presented. *Hauffenia kissdalmiae* sp. n. is the eleventh species assigned to the genus and is differentiated from all known congeners. Distinguishing characters are the pegless operculum, the almost flat spire, the short, flat penis with a wide lateral lobe on the left side and a less evident one on the right, and female genitalia with a very small seminal receptacle, arising from the posterior-most point of the renal oviduct. The zoogeographic corollary of this discovery is that the distribution of the genus is now extended eastward and thus it nearly reaches the range of a large group of valvatiform and still unidentified *Hauffenia*(?) forms found in several localities in Slovakia and in a cave spring in north-eastern Hungary. Other species of the genus *Hauffenia* live in subterranean, running or interstitial water and karst spring, always in complete darkness. On the contrary, several living specimens of this new species were found in small and shallow spring on volcanic bedrock in the Börzsöny Mountain. For assessment of rarity and conservation status of the species further data from nearby localities are needed.

Key words: conservation status, geographical distribution, *Hauffenia*, Hungary, new species, valvatiform Hydrobiidae

INTRODUCTION

The genus *Hauffenia* POLLONERA, 1898 [type species *Horatia tellinii* POLLONERA, 1898 subsequent designation B. WALKER 1918] (KABAT & HERSHLER 1993) is quite speciose in Europe. A great number of described species from a number of countries stretching from Bulgaria (ANGELOV 1967) through Bosnia, Slovenia (RADOMAN 1983) and Greece (REISCHÜTZ & REISCHÜTZ 2004) to Spain have been originally placed in *Hauffenia*. This is the first record of the genus from Hungary (FEHÉR & GUBÁNYI 2001).

Unfortunately, most of the species were described without any anatomical examination, or investigation of the operculum. To date, some authors studied *Hauffenia* on the basis of the shell character only (REISCHÜTZ & REISCHÜTZ 2001, 2004). A thorough revision of the genus (BODON *et al.* 2001) showed, that without anatomical investigation is not possible to identify even the genus not the single

species. According to recent observations, the shell morphology alone is insufficient for taxonomic determination in this genus. In the lack of living specimens, the scanning electron microscopic investigation of the protoconch surface and operculum may help in identification. Nevertheless, the accurate identification should be based on genital anatomy. Hitherto all *Hauffenia* were thought to live only in subterranean, running or interstitial water and karst springs, always in complete darkness. Hence collecting living animals is difficult, which fact accounts for the paucity of anatomical data.

Fauna Europaea (BANK 2004) lists *Hauffenia jadertina jadertina* KÜSTER, 1933 from Bosnia, *Hauffenia jadertina sinjana* KÜSTER, 1933 and *Hauffenia plana* BOLE, 1961 from Croatia, and *Hauffenia edlaueri* (SCHÜTT, 1961) from Bosnia and Croatia. However, these taxa attribution to *Hauffenia* has not been proved yet (BODON *et al.* 2001).

Based on the material presented here and available data, we provide description of a new species from Hungary, and data on its distribution and proposed conservation status (FEHÉR *et al.* 2006).

MATERIAL AND METHODS

Specimens of the new species described below were collected in northern Hungary, Börzsöny Mountains, Kismaros village, 1800 m from the terminal point of the dinkey line, some 100 meters from the main surfaced road, from a small spring (ca. 4.4 liter/min.). Coordinates based on GPS data are: 47°50.35'N and 19°00.47'W, 145 m above sea level.

Seventeen empty shells (paratypes) were collected on the type locality by D. KISS and E. PETRÓ on 22.09.2006 and eight living animals, four stored in 75% ethanol in Genoa, Italy and the four in 95% ethanol for genetic study. Subsequently, Z. P. ERŐSS and E. PETRÓ collected 755 empty shells, many of them with operculum (10.12.2006). Twenty-two living animals were collected by D. KISS and E. PETRÓ on 10.02.2007 and stored in 75% ethanol. We designated 184 adult specimens as type material.

The collection numbers are listed in the respective section of the description of the new species.

We used three nested sieves with a smallest 400 µm mesh to collect this very small animal.

Descriptive terminology follows BODON *et al.* (2001). Lactic acid was used to clear the specimens. Scanning micrographs of the shell were taken in the Hungarian Natural History Museum, Budapest with a Hitachi SN 2600 scanning electron microscope. Unrelaxed specimens fixed in 75% ethanol were studied by light microscopy (Wild M5A). Bodies were isolated after crushing the shells and were dissected using very fine, pointed watchmaker's forceps. Images of the body and isolated parts of the genitalia were drawn using a Wild camera lucida. The anatomical parts are disposed as in life position, terms such as left, right, ventral and dorsal correspond to the left, right, ventral and dorsal sides of the snail in life position.

SYSTEMATIC DESCRIPTION

Hauffenia kissdalmae sp. n.

(Figs 1–7)

Type material: The holotype and 5 paratypes are deposited in the Mollusca Collection, Department of Zoology, Hungarian Natural History Museum (collection number of holotype: 96303, collection number of paratypes: 96304). Other paratypes were placed in the collections of M. BODON, Genoa (4 dissected specimens, 13 shells), Z. P. ERÓSS, Budapest, J. GREGO, Banska Bystrica, E. PETRÓ, Budapest, J. STEFFEK, Banska Stiavnica height: 0.63 mm; diameter 1.24 mm.

Diagnosis – The shell flat, valvatiform, thin, pale whitish with 2 1/2–3 1/4 rapidly expanding convex whorls, the spire almost flat. Umbilicus wide and deep, the aperture roundish, the protoconch malleated. The operculum round, almost multispiral with orange centre and no pegs. The penis is short and flat with a wide lateral lobe on the left side and a less evident one on the right. There is a very small stylet on the terminal portion of the penial duct.



Fig. 1. *Hauffenia kissdalmae* sp. n., paratype shell (photo by GREGO)

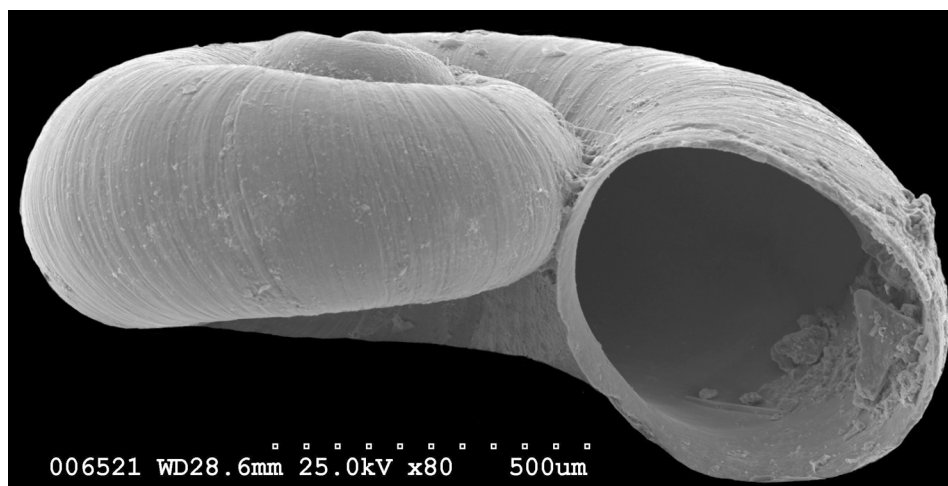


Fig. 2. *Hauffenia kissdalmae* sp. n., paratype shell frontal view (SEM photo by MURÁNYI)

Description – Shell (Figs 1, 2): The shell very small, flat valvatiform, almost planispiral, thin pale whitish; almost translucent. Spire almost flat with 2 1/2–3 1/4 rapidly expanding convex whorls; umbilicus wide and deep; aperture roundish, prosocline; peristome complete, thin and very seldom reflected at upper insertion. Surface of the shell with diffuse but regularly hatched, surface of protoconch malleated, under the SEM porous, and consists of slightly more than one whorl. The border between the proto- and teleoconch is not well separated (Fig. 7).

Dimensions $n = 30$ (at 3 1/4 whorls): Shell – height: 0.65–0.95 mm, mean: 0.77 mm, SD: ± 0.08 ; diameter: 1.39–1.63 mm, mean: 1.49 mm, SD: ± 0.07 ; aperture: height 0.56–0.67 mm, mean: 0.60 mm, SD: ± 0.035 ; diameter 0.59–0.71 mm, mean: 0.65 mm, SD: ± 0.035 .

Operculum (Fig. 3.): orange, more coloured in the centre, almost multispiral, rather thick but thin at the edges, without peg but with a very small, rudimentary pimple at the centre.

External features: body unpigmented (only a few traces of orange pigment on the visceral sac); eye spots absent.

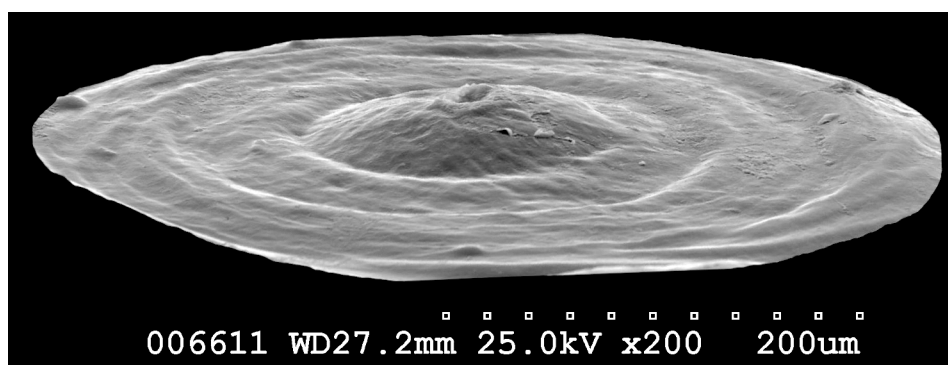


Fig. 3. *Hauffenia kissdalmae* sp. n., operculum inner side (SEM photo by MURÁNYI)

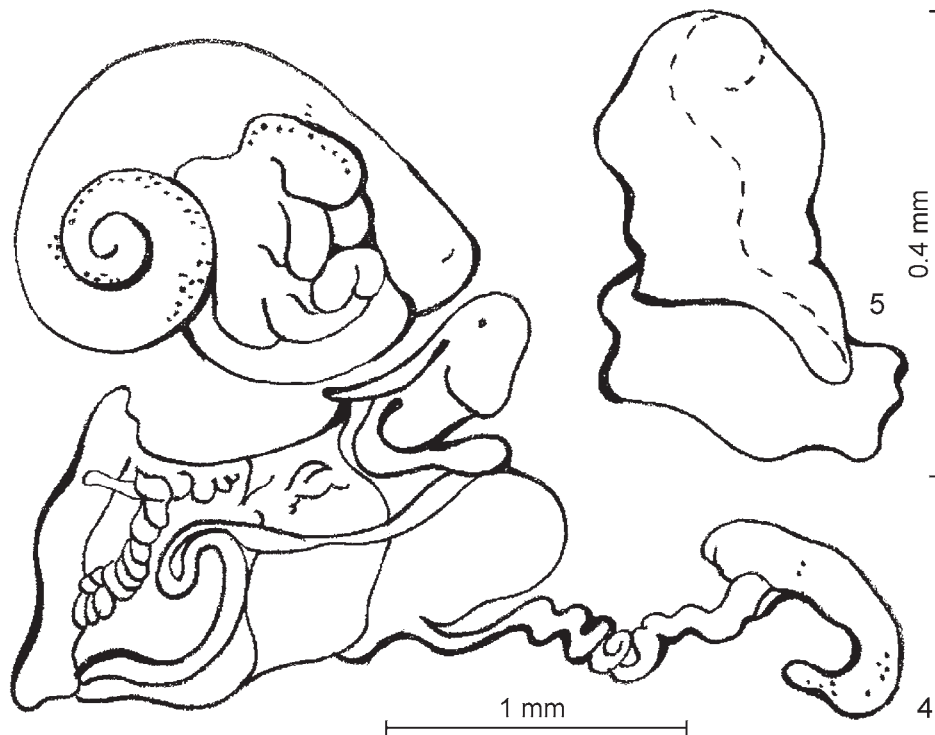
Male genital system (Figs 4, 5): penis rather short, flat, with a blunt apex and one wide lateral lobe on the left side; another less evident lateral lobe is present on the right side; penial duct in the central portion of the penis; globular mass of refringent cells inside penis apex to right of penial duct; terminal portion of penial duct with very small stylet.

Female genitalia: with proximal seminal receptacle and a bursa copulatrix arising from distal renal oviduct; seminal receptacle very small, arising from the posterior-most point of the renal oviduct; bursa copulatrix very small but longer than seminal receptacle, not dilated at apex, arising very close to point at which oviduct enters albumen gland portion of pallial oviduct; seminal groove running along ventral side of capsule gland. Capsule gland portion of pallial oviduct protrudes into pallial cavity, has subterminal, slit-like genital pore and ends a short distance from pallial margin (Fig. 6).

Stomach without posterior caecum; intestine with well developed S-like bent on pallial wall.

Osphradium elongated. Ctenidium consists of 12–16 triangular lamellae.

Etymology – This species was named after DALMA KISS who discovered the small spring, which is now the type locality.



Figs 4–5. *Hauffenia kissdalmae* sp. n., paratype, male: 4 = genitalia (after the drawing of BODON), 5 = penis with lobes (after the drawing of BODON)

DISCUSSION

Comparisons – The conchologically and geographically closest species *Hauffenia danubialis* (HAASE, 1993) from Austria differs in male genital anatomy:

- whereas *Hauffenia kissdalmae* sp. n. has a very small stylet in the terminal position of penial duct, *H. danubialis* has a much bigger and longer, ca. 15 μm (HAASE 1993), and massive stylet;
- the new species has a rather short, flat penis with a blunt apex, a wide lateral lobe on the left side and a less evident one on the right. The penis of the Austrian species has the shape of an isosceles triangle and has no lobes (HAASE 1993: fig. 10).

The penis of *Hauffenia wienerwaldensis* HAASE, 1992 has no lobes, but on the operculum, has a very reduced peg. Stylet of the penis of this species is well developed and the peristome of adults is often detached from the penultimate whorl.

In another comparison with two pegless more remote Slovenian species, *Hauffenia erythropomatia* (HAUFFEN, 1856), while of the same diameter, has a much higher spire, height = 0.73–1.13 and the penis has 2–3 (or one, according to BOLE, 1993: fig. 1C) small rather obvious knob-like lobes on the left side near to the apex (BODON *et al.* 2001). *Hauffenia subpiscinalis* (KUŠČER, 1932), the largest

member of the genus, which shell is nearly two times greater in diameter, is another pegless species from Slovenia. Its spire is considerably raised, not flat. The protoconch has a different sculpture.

Remarks – As all hydroboids, the *Hauffenia kissdalmae* sp. n. is gonochoristic, resembling to its closest relatives and although first all the living animals we found were males, and we thus examined only male genitalia, these male genital characters are quite sufficient to assign the new species to *Hauffenia*, later operculum and female genitalia verified previous statements, e.g. seminal receptacle being very small, arising from oviduct level with end of loop.

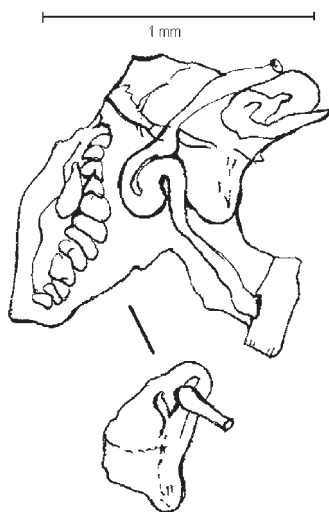


Fig. 6. *Hauffenia kissdalmae* sp. n., paratype, female genitalia (after the drawing of BODON)



Fig. 7. *Hauffenia kissdalmae* sp. n., paratype, surface of protoconch (SEM photo by MURÁNYI)

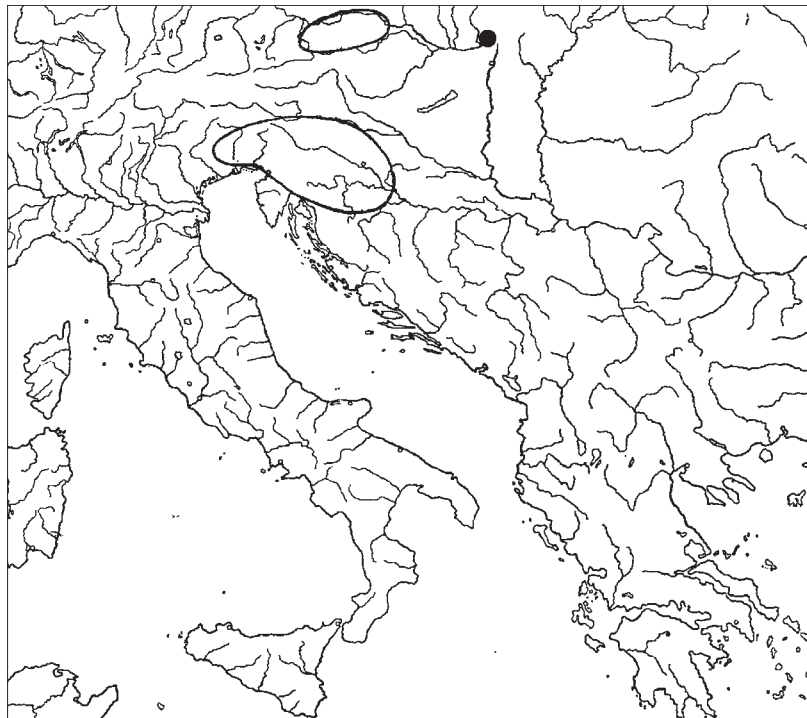


Fig. 8. Geographic range of the genus *Hauffenia* POLLONERA, 1898

Compared to all its known congeners, the biotope of *H. kissdalmae* sp. n. is quite distinctive. The spring is in a volcanic mountain, on andesite bedrock, not on limestone. As the spring is located within a populated settlement (is threatened by habitat destruction) and collections have been made there for many years, it suggests that other new forms could be found in inhabiting similar habitats in the region by using similar collecting methods with very fine mesh. It is surprising that the new species can be found in large numbers, which is not the case with its congeners according to the literature

Due to lack of more distribution data, the rarity of the species cannot be estimated, however, we strongly recommend the maximal 11 score MRI (Mollusc Rarity Index) introduced by SÓLYMOS (SÓLYMOS 2004, SÓLYMOS *et al.* 2005).

Zoogeographical analysis – The zoogeographic corollary of this discovery is that the distribution of the genus is now extended eastward (Fig. 8.) and thus it nearly reaches the range of a large group of unidentified *Hauffenia*(?) forms found in many places in Slovakia and in a cave spring in NE Hungary. Sporadic data are insufficient for a detailed zoogeographical analysis. Although, based on the layout of drainage areas in the surrounding territory, and the unidentified forms known from Slovakia (ŠTEFFEK 2002, ŠTEFFEK & GREGO 2002) and Hungary (FORRÓ & MAJOROS 2006) it is plausible, that closest relatives of *Hauffenia kissdalmae* are distributed in the Vienna Basin (HAASE 1992, 1993) and the new species is the easternmost member of this clade. Besides this, connections with Slovakian forms cannot be excluded based on current knowledge.

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