AGARDHIELLA TUNDE SPEC. NOV. (GASTROPODA: PULMONATA: ARGNIDAE), A NEW ENDEMIC LAND SNAIL FROM ROMANIA

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Abstract Agardhiella tunde *spec. nov. is described from the Piscuri Gorge (N of Vâlcele), Vâlcan Mts., Romania. Another population of this species has been found in the Sohodol Gorge (N of Runcu) and in the Şuşiţa Valley (N of Pârvuleşti). Owing to the trapezoid shape of the aperture, this taxon resembles mainly* Agardhiella banatica *(Zilch 1958); however, it is different considering the structure of the palatal and basal folds of the aperture, and the presence of a parietal lamella and a palatal tooth. The new species and the accompanying fauna observed on its localities can, in zoogeographical terms, be well integrated into the Banaticum fauna characterized by the abundance of Carpathian and Balkan elements and endemisms.*

Key words Agardhiella, *Argnidae, new species, Romania, Banaticum*

INTRODUCTION

The genus *Agardhiella* is a well represented taxon in Romania. A large number of species have been described from the southwestern part of the Carpathians in the Banat and northwestern Oltenia (Grossu, 1968, 1986; Zilch, 1958). While searching for already known species between 2006 and 2008, a new *Agardhiella* was found in three valleys situated in the south-southeastern part of the Vâlcan Mountains.

MATERIAL AND METHODS

In the text, public and private collections where type material has been deposited are abbreviated as follows:

HNHM Hungarian Natural History Museum, Budapest, Hungary
MMMB Munkácsy Mihály Museum, Békéscsaba, Hungary
NHMW Naturhistorisches Museum, Wien, Austria
SMF Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany
DO Private collection of T. Domokos, Békéscsaba, Hungary
HO Private collection of E. Horváth, Kardoskút, Hungary
LE Private collection of J. Lennert, Békéscsaba, Hungary
PG Private collection of B. Páll-Gergely, Mosonmagyaróvár, Hungary
S Private collection of P. Subai, Aachen, Germany

Further abbreviations:
AW aperture width
AH aperture height
W shell width
H shell height
UTM Universal Transverse Mercator (map reference)

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SYSTEMATIC PART

ARGNIDAE
Genus *Agardhiella* Hesse 1923

Agardhiella tunde sp. nov.
Figs 1–2

Holotype Romania, Gorj County, Vâlcan Mts., Piscuri Valley 1.4 km north of Vâlcele (southeast of Tismana), limestone gorge of a left side stream (45º05'44.9" N, 22º58'31.8" E), 310 m, UTM FQ 59; (leg. Deli, Domokos, Páll-Gergely & Subai, 17.04.2007) HNHM 96865.

Paratypes From the type locality, leg. Deli, Domokos, Páll-Gergely & Subai, 17 April 2007. MMMB 90366/9 + 5 damaged, HNHM 96866/1,

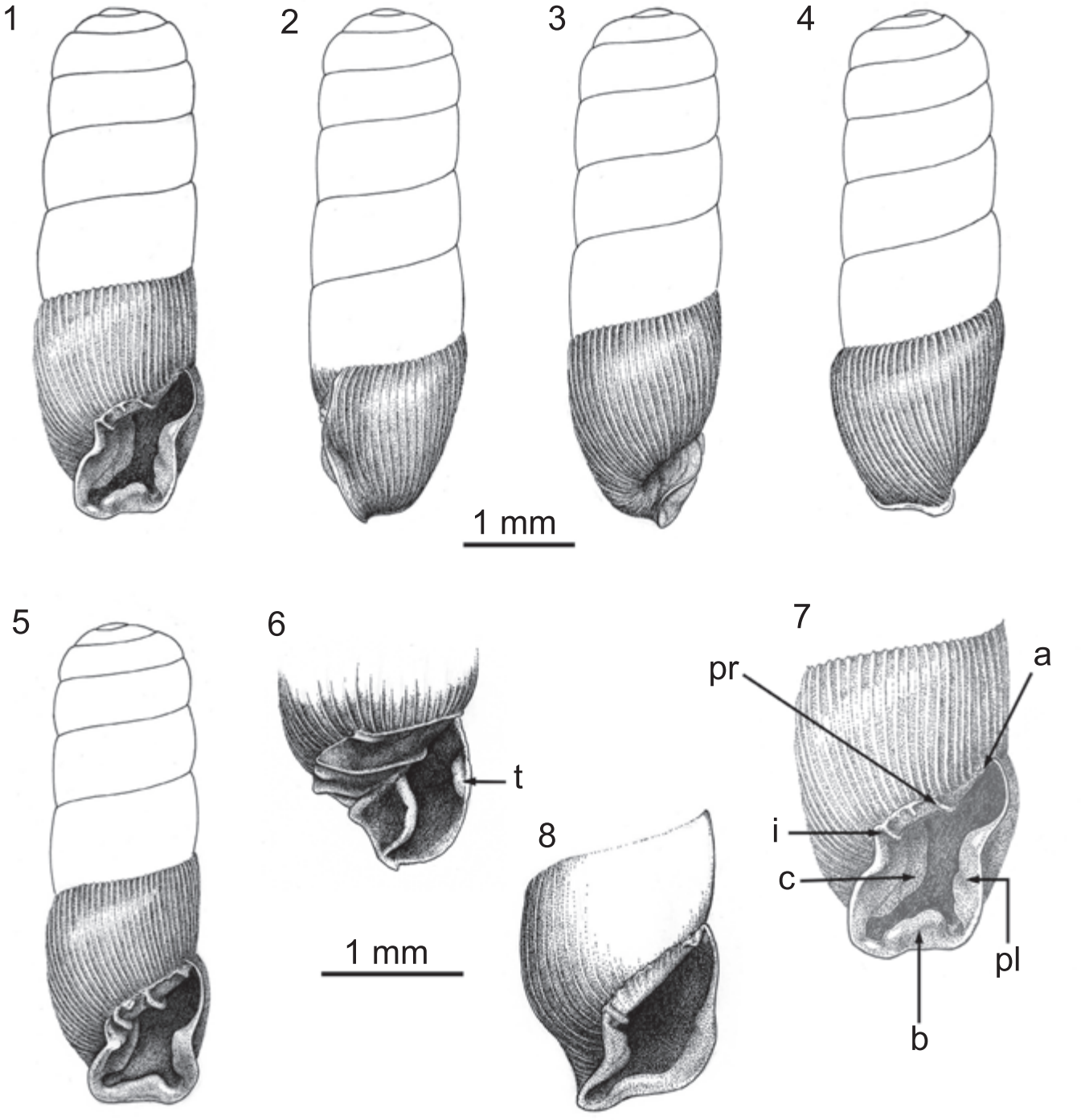

Figure 1 *Agardhiella tunde* spec. nov. 1–4: holotype; 5: paratype from the Sohodol Gorge; 6: paratype from the Sohodol Gorge, inner structures of the last whorl with the palatal tooth (t); 7: apertural structures of *A. tunde* spec. nov., a: angular lamella, pr: parietal lamella, i: infraparietal lamella, c: columellar lamella, b: basal fold, pl: palatal fold; 8: aperture of *A. banatica* (Zilch 1958).

NHMW/1, SMF 330758/1, S 21177/23 + 1 damaged, DO/9 + 1 damaged, PG/8 + 2 damaged. Piscuri Valley, 1.4 km north of Vâlcele, flotsam of the Piscuri Stream, UTM FQ 59, leg. Deli, Domokos, Páll-Gergely & Subai 17.04.2007. MMMB 90367/1. Vâlcan Mts., Sohodol Gorge 8 km north of Runcu at a limestone cliff, (approx.) 500 m alt., UTM FR 60, leg. Boldog, Deli & Kóra 06.07.2007. MMMB 90368/8 + 3 damaged, S 21104/3, leg. Deli, Horváth, Lennert, Páll-Gergely

Figure 2 The occurrences of *Agardhiella tunde* spec. nov. (squares; type locality: square with dot) and *A. banatica* Zilch (triangles) in the Banaticum (Soós, 1943; encircled area). The upper inset shows the zoogeographical regions of the Carpaticum, namely the Northern Carpathian (C1), the Eastern Carpathian (C2), the Banaticum (C3), the Biharicum (C4) and the Tansylvanian Basin (C5) subregions, and their relation to the Pannonicum (P) region. The lower inset indicates the position of the Carpaticum in Europe.

& Subai 03.05.2008. MMMB 90421/4, S 21173/45 + 11 damaged, HO/4, LE/4, PG/4. Sohodol Gorge, limestone cliff 3.5 to 4 km north of Runcu, 450 m alt., UTM FR 60, leg. Boldog, Deli & Kóra 06.07.2007, MMMB 90369/11 + 2 damaged. Sohodol Gorge, limestone cliff 1,2 km north of Runcu, 410 m alt., UTM FR 60, leg. Boldog, Deli & Kóra 06.07.2007. MMMB 90370/38 + 38 damaged, HNHM 96867/1, NHMW/1, SMF 330759/1, S 21105/2 + 1 damaged, leg. Deli, Horváth, Lennert, Páll-Gergely & Subai 03.05.2008. MMMB 90422/2 + 4 damaged, S 21174/37 + 9 damaged, HO/1 + 1 damaged, LE/1 + 1 damaged, PG/1 + 1 damaged. Vâlcan Mts., Şuşiţa Seacă Gorge, limestone cliff 2 km north of Pârvuleşti, UTM FR 70, leg. Deli, Horváth, Lennert, Páll-Gergely & Subai 03.05.2008. MMMB 90420/35 + 2 damaged, HNHM/1, S 21176/61, HO/25 + 3 damaged, LE/25 + 3 damaged, PG/25 + 3 damaged.

Type locality Romania, Gorj County, Vâlcan Mts., Piscuri Valley 1.4 km north of Vâlcele (southeast of Tismana), limestone gorge of a left side stream (45°05′44.9″ N, 22°58′31.8″ E), 310 m, UTM FQ 59.

Measurements H 4.0–5.3 mm, D 1.5–1.7 mm, AH 1.3-1.8 mm, AW 0.8–1.2 mm, measurements of the holotype: H 4.9 mm, W 1.6 mm, AH 1.6 mm, AW 1.1 mm.

Diagnosis An *Agardhiella* species with trapezoid aperture, infraparietal, angular and parietal lamellae. Differs from *A. banatica* (Zilch 1958) by the presence of a palatal tooth, and well-developed basal and palatal folds. Columellar lamella strong, with nearly semicircular shape. Columellar margin is depressed at its upper, whilst inflated at its basal end.

Description The medium-sized shell consists of 6½ to 7¾ almost flat whorls. The last whorl contributes approximately 50% of the shell height. Following the smooth part (¾) of the first whorl, the shell surface is densely ribbed. The number of ribs on the last whorl is 66 to 110 (15–26 per mm). Between the main ribs small riblets can be detected with high magnification. The umbilicus is very narrow, fissure-like, and often hidden by the columellar margin. In front view the aperture has a trapezoid (in some cases almost rhomboid) shape. There is a well developed parietal callus along the upper margin of the aperture, leaning sharply towards the columellar margin. In the centre of the parietal callus a slightly oblique, well developed parietal lamella of uniform height stretches deep into the interior of the shell. The infraparietal and angular lamellae can be found at an approximately equal distance from the parietal lamella. These lamellae are also well developed and penetrate deep inside. Between the infraparietal and parietal lamellae two or more additional short lamellae can also be seen in most specimens. There is a short sinulus above the angular fold at the apertural margin. A small tooth can be observed on the inner, palatal side of the last whorl, hidden behind the columella and the columellar lamella. The columellar margin widenes as a lobe, its upper third is dented and slightly thickened, while the basal part widens out. The semicircular columellar lamella stretches deep obliquely into the aperture. The basal and palatal rims of the peristome are almost entirely straight, but behind them the aperture wall is strongly impressed, forming emerging folds on the inside. This palatal fold is often divided into two to three lumps and occupies ⅔ to ½ of the palatal margin. The basal fold is located in the centre of the basal margin, covering two-thirds of it. The margins on the two sides of the basal fold are not thickened and lean slightly outward. On the neck side the central part of the palatal margin bulges slightly, whereas the upper part of the columellar margin bulges more definitely forward.

Derivation of name The new species was named after the author's wife, Tünde Dobó. The name Tünde originates from the Hungarian word "tündér" (fairy), meaning: "lady of ethereal beauty".

Habitat Subterranean species, living in the cracks of limestone rocks and in the soil, among larger pieces of stones, between roots.

Geographic range This species is known from a narrow range between Vâlcele and Pârvuleşti, situated in the southern limestone region of the Vâlcan Mountains, in Southwestern Romania.

DISCUSSION

Within the genus *Agardhiella* only *A. banatica* has a similar, trapezoid-shaped aperture (Zilch, 1958: Plate 12, Fig. 4-4a). This species, however, does not have a parietal lamella and its parietal callus is less developed. While its infraparietal lamella is stronger, no other small folds can be observed between this and the angular lamella. The basal and palatal folds are missing. The columellar lamella is high at its basal part, whereas it becomes hidden above by the columella. The columellar margin is not widened, and from the neck side it looks almost straight. A unique feature of *A. tunde* spec. nov. is a small tooth on the lateral wall.

Apart from *A. banatica* and *A. tunde* spec. nov., all other *Agardhiella* species of the Banat possess U-shaped apertures. Of these, *A. angustistoma* (Grossu et Negrea 1968), *A. grossui* (Zilch 1958), *A. lamellata* (Clessin 1887) and *A. reinhardti* (Zilch 1958) have angular, parietal, infraparietal and columellar lamellae. The lamellar structure of *A. lamellata* resembles that of *A. tunde* spec. nov., but its palatal and basal folds develop only to dot-like small teeth. In *A. angustistoma*, *A. grossui* and *A. reinhardti* the palatal folds are similar to that of the new species, but their basal folds are absent and the palatal wall of their apertures is strongly impressed. *A. armata* (Clessin 1887), *A crassilabris* (Grossu et Negrea 1968), *A. densicostata* (Grossu et Negrea 1968) and *A. nana* (Grossu et Negrea 1968) lack both columellar lamella and basal fold, whereas their palatal folds are reduced to tiny teeth. *A. caesa* (Westerlund 1871) is close to *A. armata* but, in addition to the basal fold, it also lacks the parietal fold and parietal lamella. In Romanian specimens of *A. parreyssi* (L. Pfeiffer 1848) all lamellae are absent. *A. incerta* Grossu 1986 is thought to be a neotenic species, in which lamellar structures are completely reduced.

Compared to the type series of *A. tunde* spec. nov., the specimens collected in the Sohodol Gorge and in the Şuşiţa Valley have a slightly more slender shape and trapezoidal aperture and their basal rim is nearly perpendicular to the axis of the shell. The palatal fold occupies the basis of the palatal part, and the shell is more densely ribbed (86 to 110 ribs on the last whorl, 20–26 ribs per mm). The shape of the aperture in specimens from the Piscuri Valley is rhombus-like, the basal and parietal rims running almost in parallel. The palatal fold runs along ⅔ of the palatal side, and the ribbing of the last whorl is less dense (66 to 83 ribs, 15–18 ribs per mm).

As the rib density is known to be highly variable in other *Agardhiella* species (e.g. *A. armata* (Clessin)), the Piscuri population seems to be well within the variability range of the new species.

Regarding their ecology, *Agardhiella* species show a preference for rock surfaces or subterranean habitats. They live mainly in the cracks of limestone rocks and in the soil, among larger stones, often between roots. According to Grossu and Negrea (1968), these are troglophilic animals. In the Zărand Mountains, live individuals of an unidentified *Agardhiella* species were also found on acidic, metamorphic rocks. This indicates that, notwithstanding the previous assumptions (Grossu & Negrea, 1968; Grossu, 1993), limestone is not the only suitable substrate for *Agardhiella* species.

The genus *Agardhiella* is distributed in the mountainous regions of the Balkan Peninsula and the southern Carpathians (Fehér & Erőss, 2009; Gittenberger, 1975; Grossu 1987, 1993; Irikov & Georgiev, 2008; Jaeckel *et al.* 1957; Stankovic *et al.* 2006, Subai, 1999, 2008; Tomić, 1959). Apart from some widely distributed, relatively variable species (e.g. *A. truncatella* (L. Pfeiffer 1841)), the genus consists of endemic species with restricted ranges. Highest intra-specific variability and highest species number (15) can be found in Romania (Bank, 2007). Of the Romanian species, 13 inhabit the western parts of the Southern Carpathians, in particular those belonging to the Banat and the adjacent northwestern regions of the Oltenian Mountains (Grossu, 1993).

The newly described species was found to be accompanied by several endemic species characteristic of this subregion (*Agardhiella caesa* (Westerlund 1861), *Orcula jetschini* (M. Kimakowicz 1883), *Aspasita triaria trinodis* (M. Kimakowicz 1883), *Alopia subcosticollis grossuana* Nordsieck 1977, *Bulgarica rugicollis* (Rossmässler 1836), *Vitrea jetschini* (M. Kimakowicz 1890), *Troglovitrea argintauri* Negrea & Riedel 1968), and by species of Carpathian (*Lozekia transsilvanica* (Westerlund 1876), *Drobacia banatica* (Rossmässler 1838), *Faustina faustina* (Rossmässler 1835)), as well as Balkan distribution (*Pomatias rivulare* (Eichwald 1839), *Platyla banatica* (Rossmässler 1842), *Platyla similis* (Reinhardt 1880), *Macedonica marginata* (Rossmässler 1835), *Cattania trizona* (Rossmässler 1837)). The faunal composition fits well the zoogeographical concept of Soós (1943: 456, Fig. 22), who divided the Carpathian Basin into two biogeographical regions, namely Pannonicum and Carpathicum. The latter consists of five sub-regions, of which Banaticum (Soós, 1943) has a typical Carpathian fauna accompanied by numerous elements of Balkan origin and a number of endemisms. This zoogeographical picture becomes ever more colourful considering that some of the Banatic elements of Balkanic origin come from the Illyrian region of the west Balkans (e.g. *Cattania trizona*), while most of them are derived from the eastern (Moesian) regions of the peninsula (e.g. *Macedonica marginata*).

Among the endemisms of the Banaticum the genus *Agardhiella* stands out with its diversity and high number of the species. With *Agardhiella tunde* spec. nov., the number of species known from this faunistic region amounts to 14. The discovery of this new species is a further indication that in Europe its southeastern parts are among the regions richest in endemic species.

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