

# A NEW SPECIES OF *BALCANODISCUS* RIEDEL & URBAŃSKI 1964 (GASTROPODA: PULMONATA: ZONITIDAE) FROM NORTHEASTERN GREECE

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*Abstract* A new species, *Balcanodiscus* (*Balcanodiscus*) *danyii* n. sp. is described from the Sapka Mountains in Thrakia (northeastern Greece). *B. danyii* seems to be the smallest species of the Balkan endemic genus *Balcanodiscus* Riedel & Urbański 1964. According to anatomical data, its closest related species is *Balcanodiscus cerberus* Riedel 1984. A comprehensive table is presented to summarize the main anatomical and shell characters of known *Balcanodiscus* species.

*Key words* *Balcanodiscus danyii*, new species, Zonitidae, taxonomy, Greece

## INTRODUCTION

The genus *Balcanodiscus* has a relatively narrow geographical range compared to other zonitid genera in the Balkan Region. Though our knowledge of their taxonomy and distribution has increased considerably in the last three decades (Dedov & Petrov, 2003; Riedel, 1985, 1988, 1995; Reischütz, 1983, 1986, 1988; A. Reischütz *et al.*, 2008), this genus is still far from being well explored. Due to their cryptic (subterranean) lifestyle and relatively small size (shell width 6–14 mm), *Balcanodiscus* species – especially living animals – can rarely be found. Based on anatomical characters (presence or absence of the flagellum), two subgenera – *Balcanodiscus* and *Thasiogenes* Riedel 1988 – were distinguished by Riedel (1988). As the anatomy of *B. stummerorum* A. Reischütz, P. Reischütz & Fischer 2008 is unknown, its subgeneric position remains uncertain. Except for *B. frivaldskyanus* (Rossmässler 1842), which is known from ca. 25 locations in Bulgaria (Beron *et al.*, 2004; Damjanov & Likharev, 1975; Dedov & Petrov, 2003), in northeastern Greece (Reischütz, 1988), and in eastern Serbia (P. Subai, pers. comm., 2008), *Balcanodiscus* species have very restricted ranges. *Balcanodiscus* (*B.*) *beroni* Riedel 1995 is reported from eastern Makedonia near Drama (Greece), *B.* (*B.*) *cerberus* Riedel 1985 is known from southern Thrakia, *B.* (*B.*) *magnus* Reischütz 1988 is reported from the island of Samothráki, *B.* (*Thasiogenes*) *carinatus* Reischütz 1983 and *B.* (*T.*) *difficilis* Riedel 1988

are known from the island of Thásos and *B. stummerorum* is reported from a single locality in the Pangeon Mts.

During a zoological field trip organized by the Hungarian National History Museum (HNHM) to northeastern Greece, a *Balcanodiscus* population was found in the Sapka Mts. This population could not be associated with any described species of the genus, and therefore it is described here.

## MATERIAL AND METHODS

Material was collected by hand searching. Some specimens were drowned in water and preserved in 70% ethanol for anatomical examination. Two adult specimens were dissected. The counting of the shell whorls (precision  $\pm 0.25$ ) follows Kerney & Cameron (1979). Type material was deposited in the HNHM (Budapest), in the Senckenberg Museum, Frankfurt am Main (SMF) and in the private collection of Z.P. Eröss (Budapest).

## SYSTEMATICS

Order Stylommatophora

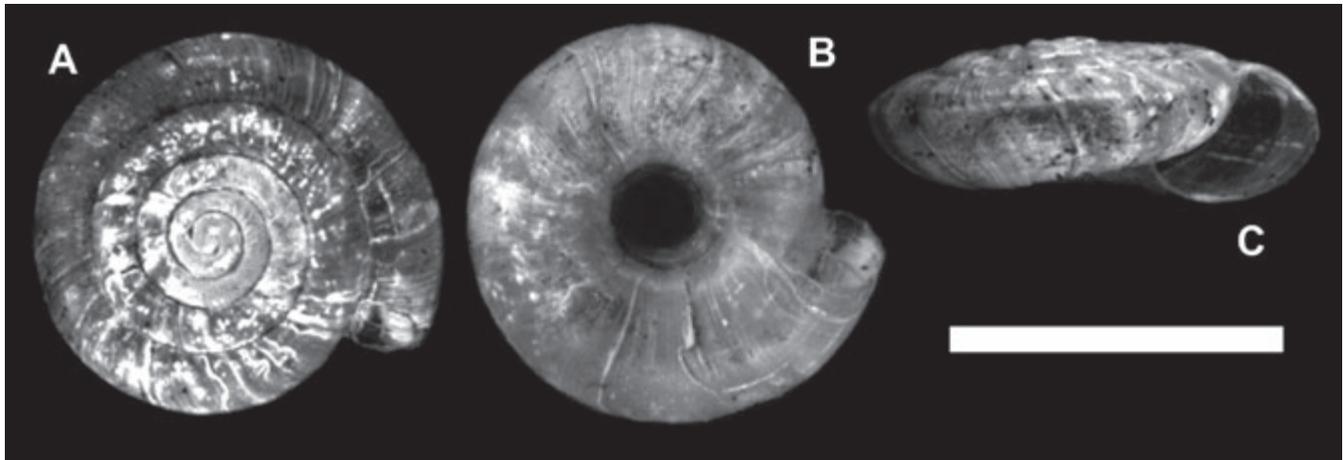
Family Zonitidae Mørch 1864

Genus *Balcanodiscus* Riedel & Urbański 1964

Subgenus *Balcanodiscus* (*Balcanodiscus*)

*Balcanodiscus* (*Balcanodiscus*) *danyii* n. sp.

Fig. 1



**Figure 1** A–C *Balcanodiscus danyii* n. sp. holotype, HNHM 97247. Scale bar indicates 5 mm.

*Holotype* 1 shell, type locality, 04.04.2007, leg: L. Dányi, Z. Fehér, J. Kontscán, D. Murányi, HNHM 97247.

*Paratypes* HNHM 97248: 17 shells (4 adults, 13 juveniles) and 2 genital dissections, leg. L. Dányi, Z. Fehér, J. Kontschán, D. Murányi, 04.04.2007; SMF 336544 (1 adult shell) Collection of Z. P. Erőss: 16 shells (4 adults, 12 juveniles), leg. Z. P. Erőss. 04.04.2007. All of the paratypes were collected in the type locality.

*Type locality* Greece, NE-part, Rhodope County, Mt. Sapka, 14 km E of Nea Sanda (altitude 660 m) 41° 07.672' N, 25° 53.223' E.

*Measurements* Shell width: 6.0–7.3 mm (major diameter) and 6.3–6.7 mm (minor diameter); Shell height: 2.3–2.8 mm.

*Diagnosis* The smallest species of the genus *Balcanodiscus*, it is about half the size of its closest relative, *B. cerberus* Riedel 1984. In size and shape it resembles *Discus ruderratus* (Férussac 1821).

#### *Description*

*Shell* (Fig. 1) Shell yellowish brown and flat, moderately depressed, consisting of  $5\frac{1}{4}$ – $5\frac{1}{2}$  whorls. Shell thin with bright, curved and obliquely irregular growth lines on dorsal side and weaker, curved lines on ventral, these being less prominent toward the umbilicus. Very fine, regular spiral structure visible at higher magnification. Shells often corroded, probably by humic acids. In apical view, body whorl at the aperture about 1.3 times wider than the penulti-

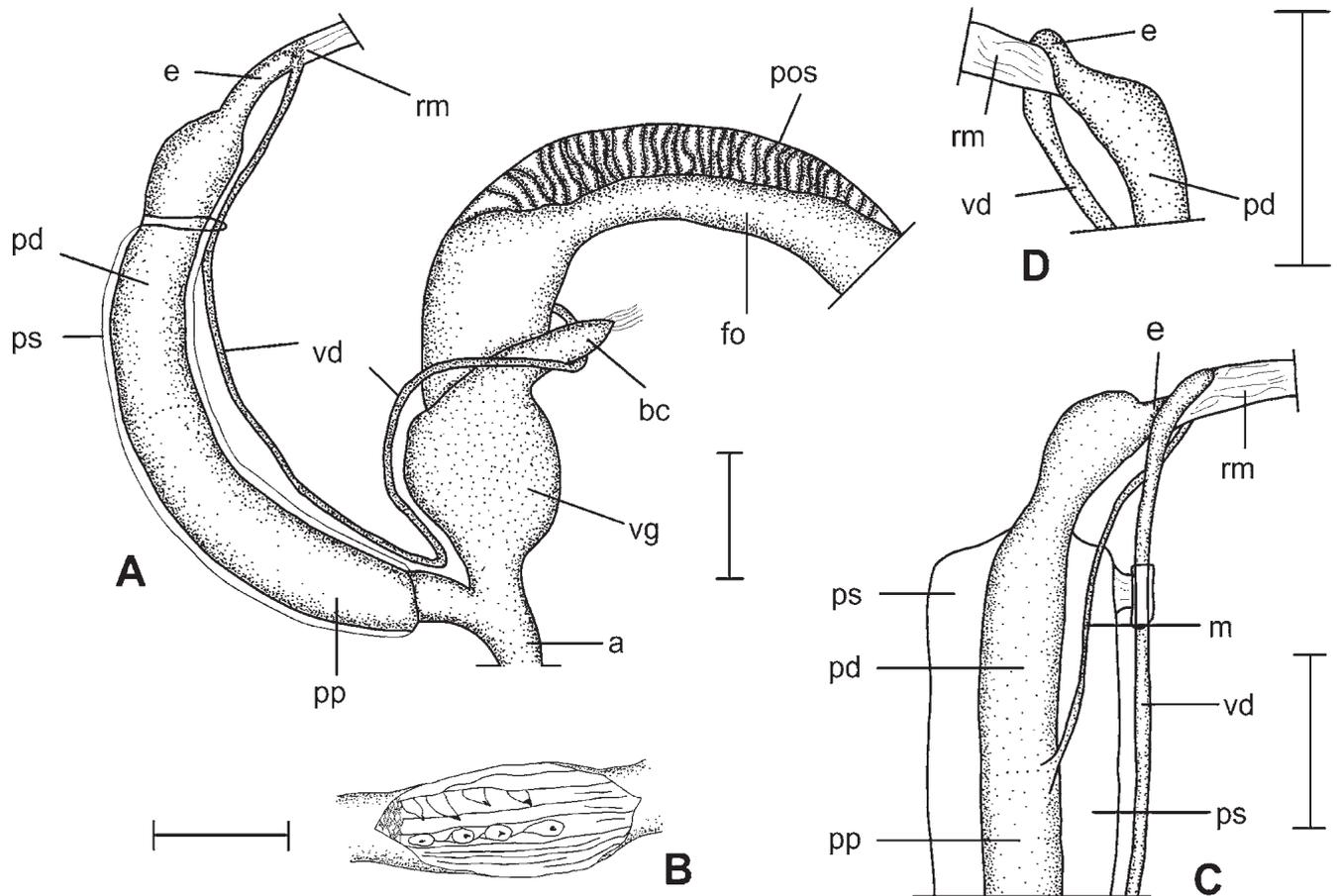
mate whorl. Body whorl angulate, earlier whorls keeled. Umbilicus very deep and moderately wide, about one fourth shell diameter.

*Body* Colour yellowish to white. Tentacles short with black eye spots.

*Genital anatomy* (Fig. 2) Two specimens dissected. Penis long and, except for apical part, covered with a penial sheath. Vas deferens connects to distal end of penial sheath. Inner structure of proximal part of penis characterized by sharp brownish talons of different sizes arranged in two main lines, with some smaller talons broken during preparation. In two dissected specimens fourteen and fifteen talons respectively found. Inner structure of distal part of penis finely papillate, the two different landscapes of penis wall changing abruptly, without transitional zone. Border between proximal (clawed) and distal (papillate) sections of penis indicated by a broken line (Fig. 2C). Thin muscle fibre connects epiphallus with penis. This inserts on border between proximal and distal parts of penis. Epiphallus very short. Flagellum absent. Retractor muscle of penis inserts on epiphallus-penis transition. Vagina less than half penis length. Vaginal gland thick, ball-like. Bursa copulatrix very short and slender.

*Derivation of name* The new species is dedicated to and named after our colleague and friend László Dányi, entomologist (HNHM, Budapest).

*Habitat* The snails were found in an oak forest, under and among stones, approximately 30–50 cm beneath the surface of the soil.



**Figure 2** *Balcanodiscus danyii* n. sp. genital anatomy (paratype, HNHM 97248). **A** genital anatomy, **B** inner structure of the penis, **C** details of the penis and the epiphallus, **D** transition of the penis and epiphallus. Abbreviations: a atrium; bc bursa copulatrix; e epiphallus; fo free oviduct; m muscle between the penis-epiphallus transition and the penis; p penis; pd distal part of the penis; pp proximal part of the penis; pos prostatic portion of the ovi-sperm duct; rm retractor muscle of the penis; ps penial sheath; vd vas deferens; vg vaginal gland. Scale bars indicate 1 mm.

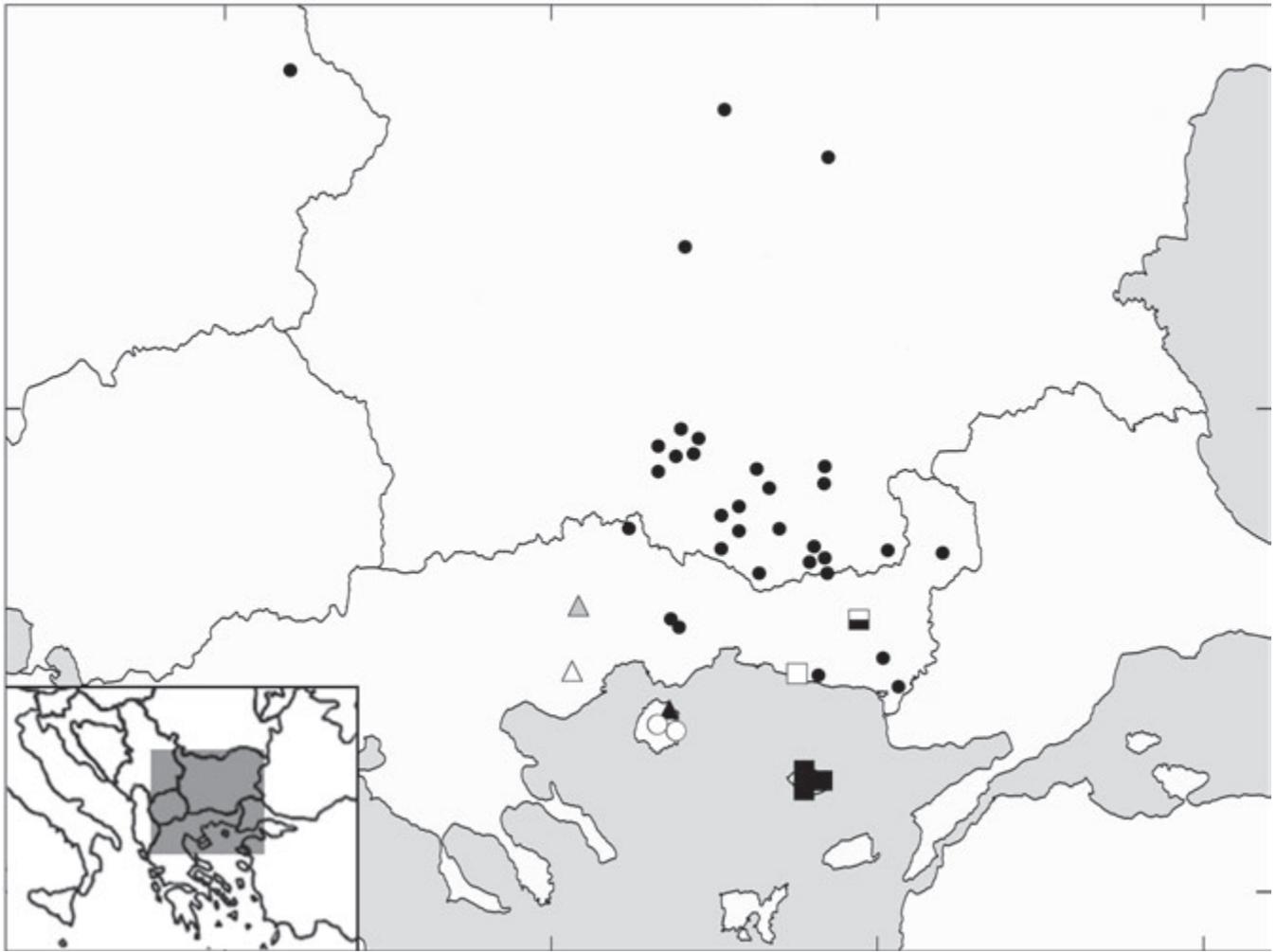
**Geographic range** The new species is known only from the type locality (Fig. 3).

**Comparisons** Based on the main characteristics of the genital anatomy, *B. cerberus* is the closest relative of the new species. *B. danyii* has a shorter vagina and smaller bursa copulatrix. There are fewer talons on the inner penis wall; *B. danyii* n. sp. has 14–15, whereas *B. cerberus* has 21–25 (Riedel, 1984). *B. cerberus* is almost twice as large as the new species, and its shell sculpture is also significantly different. The sculpture of *B. cerberus* is regularly and very finely ribbed, whereas is rougher and not so regular in the new species. The body whorl of *B. danyii* is 1.3 times wider than the penultimate whorl; this ratio is only 1.1 in *B. cerberus*. The body as well as the retractor muscle of the eyes in each observed

*B. danyii* specimen were colourless, while they were found to be light brown in *B. cerberus* material collected at Maronia Cave (collection number: HNHM 97420).

## DISCUSSION

The principal genital and shell characteristics of known *Balcanodiscus* species are presented in Table 1. Shell characters are usable for distinction at the species level, however genital anatomy also has an important diagnostic value. Genital features are essential for subgeneric classification and to reveal intra-generic relationships. A missing flagellum indicates that the new species belongs to the *Balcanodiscus* subgenus *Balcanodiscus*.



**Figure 3** Distribution of the genus *Balcanodiscus* Riedel & Urbański 1964. Grey triangle: *B. beroni* Riedel 1995; white square: *B. cerberus* Riedel 1985; semi-filled square: *B. danyii* n. sp.; white circle: *B. difficilis* Riedel 1988; black triangle: *B. difficilis* Riedel 1988 and *B. carinatus* Reischütz 1983; black spot: *B. frivaldskyanus* (Rossmässler 1842); black square: *B. magnus* Reischütz 1988; white triangle: *B. stummerorum* A. Reischütz, P. Reischütz & Fischer 2008.

**Table 1** Main characteristics of the genital anatomy and the shell of *Balcanodiscus* species. Abbreviations: BC bursa copulatrix; F flagellum; E epiphallus; P penis; V vagina; VD&P junction of the penis and the vas deferens; W% ratio of the width of the last whorl and the penultimate whorl in upper view; \* anatomy unknown.

Species	BC	F	E	P	V	VD&P	shell width (mm)	shell height (mm)	number of whorls	W%
<i>beroni</i>	long (slim)	no	long	long	long	bottom of P	6.7–8.7	3.5	5.5–6	1.7
<i>carinatus</i>	moderately long	yes	long	very long	long	bottom of P	10.2	4	6.25	1.1
<i>cerberus</i>	short	no	short	long	long	end of P	max 14	4.6	6–6.5	1.1
<i>danyii</i> n. sp.	short	no	short	long	short	end of P	max 7	3	5.25–5.5	1.3
<i>difficilis</i>	small, oval	yes	long	long	long	just before the end of P	11.1	4.8	6–6.25	1.1
<i>frivaldskyanus</i>	short	no	medium	very long	short	middle of P	9–10.5	4.5	5.75–6	1.1
<i>magnus</i>	very small	no	long	very long	long	end of P	Max 14	4.9–5.5	6–6.5	1.1
<i>stummerorum</i>	*	*	*	*	*	*	9.4	4	5.5	1.7

Including *B. danyii*, there are eight known *Balcanodiscus* species. Except for *B. frivaldskyanus*, these are narrow range endemics, most of them being found only in their type locality. Due to their cryptic habits, it is feasible that the ranges of the known species will be extended in the future and further undescribed species may be found.

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