

A new species of *Bela* Leach in J.E. Gray, 1847 (Conoidea Mangeliidae) from Croatia

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ABSTRACT

Based on shell and soft parts characters, a new species of the conoidean gastropod genus *Bela* Leach in J.E. Gray, 1847 is here described from the Croatian waters. The new taxon, *Bela spatatina* n. sp., known only from the type locality (Split, Croatia), is compared with the most closely related species, *Bela fuscata* (Deshayes, 1835). The animal colour pattern, unusual for the genus *Bela*, allows an easy identification of the new species.

KEY WORDS

Gastropoda; Mangeliidae; *Bela*; new species; Croatia; Mediterranean Sea.

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INTRODUCTION

The Mangeliidae P. Fischer, 1883 are currently considered as a well-supported clade of the Conoidea (Bouchet, Kantor, Sysoev & Puillandre 2011), worthy of family ranking. It includes about 60 recognised genera among which *Bela* Leach in J.E. Gray, 1847.

Because of taxonomic uncertainty due to the lack of a proper description (only an indication of *Murex nebula* as type species in Gray, 1847b), many authors used the generic name *Bela* for unrelated species currently placed in *Propebela* Iredale, 1918 (G.O. Sars, 1878), *Oenopota* Mörch, 1852 (Dall, 1885), *Mangelia* Risso, 1826 (Risso, 1826), *Lorabela* Powell, 1951 (Thiele, 1912), *Haedropleura* B.D.D., 1883 (B.D.D., 1883) or *Curtitoma* Bartsch, 1841 (Verrill, 1880) and then used *Raphitoma* Bellardi, 1847 for species currently placed in *Bela* (Brusina, 1865, Locard, 1891).

The current concept of the genus is then based on the redescription by Powell (1966: 97) and needs a comprehensive and modern revision.

Scarponi et al. (2014) selected a lectotype of *Bela nebula* (Montagu, 1803) among materials deposited in the Montagu collection at RAMM, Exeter (EXEMS: Moll4253/5).

This lectotype designation restricts the usage of the genus *Bela* clearly separating it from the genera indicated above.

MATERIAL AND METHODS

From July 2010 to October 2013, 9 living specimens of *Bela spatatina* n. sp. were found at a depth of 0.5–2 m in Duilovo (Split, Croatia). All were collected by removing, manually or with a plastic kitchen strainer, the thin layer (5–10 cm) of fine sand in the vicinity of the *Posidonia oceanica* meadows, at a distance of 0–1 m from their edges. After photographing the animals, 3 of them were preserved in 95% ethanol. No other living specimen has been found at any of many other Croatian localities investigated. At the same site (Duilovo), and with the same method, several other species of Mangeliidae

were collected (only the number of live collected specimens is here reported): more than 200 *Bela fuscata* (Deshayes, 1835); 5 *B. zonata* (Locard, 1892); 3 *Mangelia costulata* Risso, 1826; 3 *M. pontica* Milaschewitsch, 1908 (= *M. brusinae* van Aartsen & Fehr de Wal, 1978); 5 *M. unifasciata* (Deshayes, 1835) and 2 *M. vauquelini* (Payraudeau, 1826). Furthermore, numerous specimens (more than 800, mostly alive) of *Bela fuscata* were found at various Dalmatian localities, from Mljet Island to Zadar area.

Scanning Electron Microscopy (SEM) photographs were taken by Andrea Di Giulio at the Interdepartmental Laboratory of Electron Microscopy (LIME, Università "Roma Tre", Rome, Italy), using a Philips XL30 (Figs. 9–13) and by Nanovision srl. (Brugherio, Italy), using a Hitachi TM4000Plus (Figs. 6–8). Colour photographs were taken by Stefano Bartolini (Firenze, Italy) using a Canon EOS 400D digital camera, with standard 50 mm + adapted objectives (25 and 12.5 mm) for 16 and 8 mm vintage cine camera (Figs. 1–5, 14–19); by Jakov Prkić using a Canon PowerShot A480 digital camera (Figs. 30–35); by Rino Stanić using an Olympus OM-D E-M5 Mark III digital camera with M. Zuiko Digital ED 30 mm f3.5 Macro lens and STF-8 Macro Flash (Figs. 20–22, 36, 38); by Pero Ugarković using a Nikon D90 digital camera with objective Nikon AF-s DX Micro Nikkor 40 mm f/2.8G and ring flash Nikon Speedlight SB-21 (Fig. 37); by Sigrid Hof (SMF) (Figs. 23, 24).

The number of protoconch whorls has been counted according to the method of Verduin (1976).

The current systematics here adopted is based on World Register of Marine Species (WoRMS, <http://www.marinespecies.org/>; last access November 2022).

ABBREVIATIONS. PRK: Collection Jakov Prkić (Croatia). BAU: Collection of Department of Biology and Biotechnologies, Sapienza University, Rome (Italy). MNHN: Muséum National d'Histoire Naturelle, Paris (France). SMF: Senckenberg Museum, Frankfurt (Germany). sh: shell(s).

RESULTS

Systematics

(Citation of unpublished names is not intended for taxonomic purposes)

Superfamily CONOIDEA J. Fleming, 1822

Family MANGELIIDAE P. Fischer, 1883

Genus *Bela* Leach in J.E.Gray, 1847a

Bela Leach in J.E.Gray, 1847a: 270 - Type species: *Murex nebula* Montagu, 1803, by subsequent designation (Gray, 1847b)

Synonyms

Ichnusa Jeffreys, 1847: 312 (manuscript name by Clark introduced by Jeffreys in synonymy, not available).

Ishnula Gray, 1847b: 314 (manuscript name by Clark introduced by Gray in synonymy, not available).

Ginnania Monterosato, 1884: 127 - Type species: *Pleurotoma fuscata* Deshayes, 1835 by subsequent designation (Crosse, 1885).

Fehria van Aartsen, 1988: 30 - Type species: *Ginnania taprurenensis* Pallary, 1904, by original designation.

***Bela spalatina* n. sp.** Figs. 1–5, 6–13, 30, 32–35
<https://zoobank.org/act:CD8FF9A0-E93B-4014-B187-00914A660468>

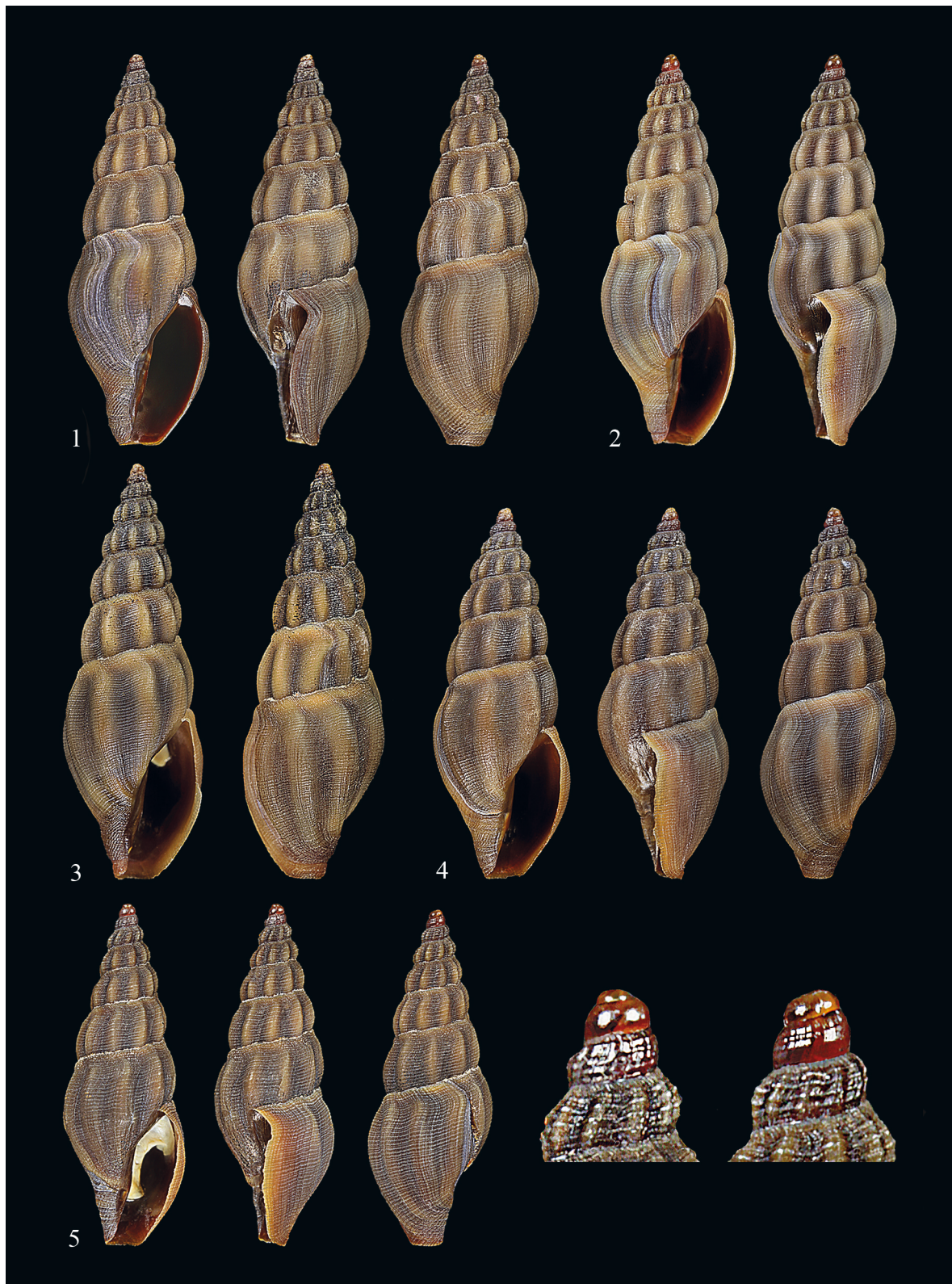
TYPE MATERIAL. Holotype (height 10.75 mm, width 3.9 mm), MNHN-IM-2000-38564; 8 paratypes: 5 sh (PRK), 3 sh (BAU: 3739–3741).

TYPE LOCALITY. Duilovo (Split - Croatia), depth 0.5–2 m.

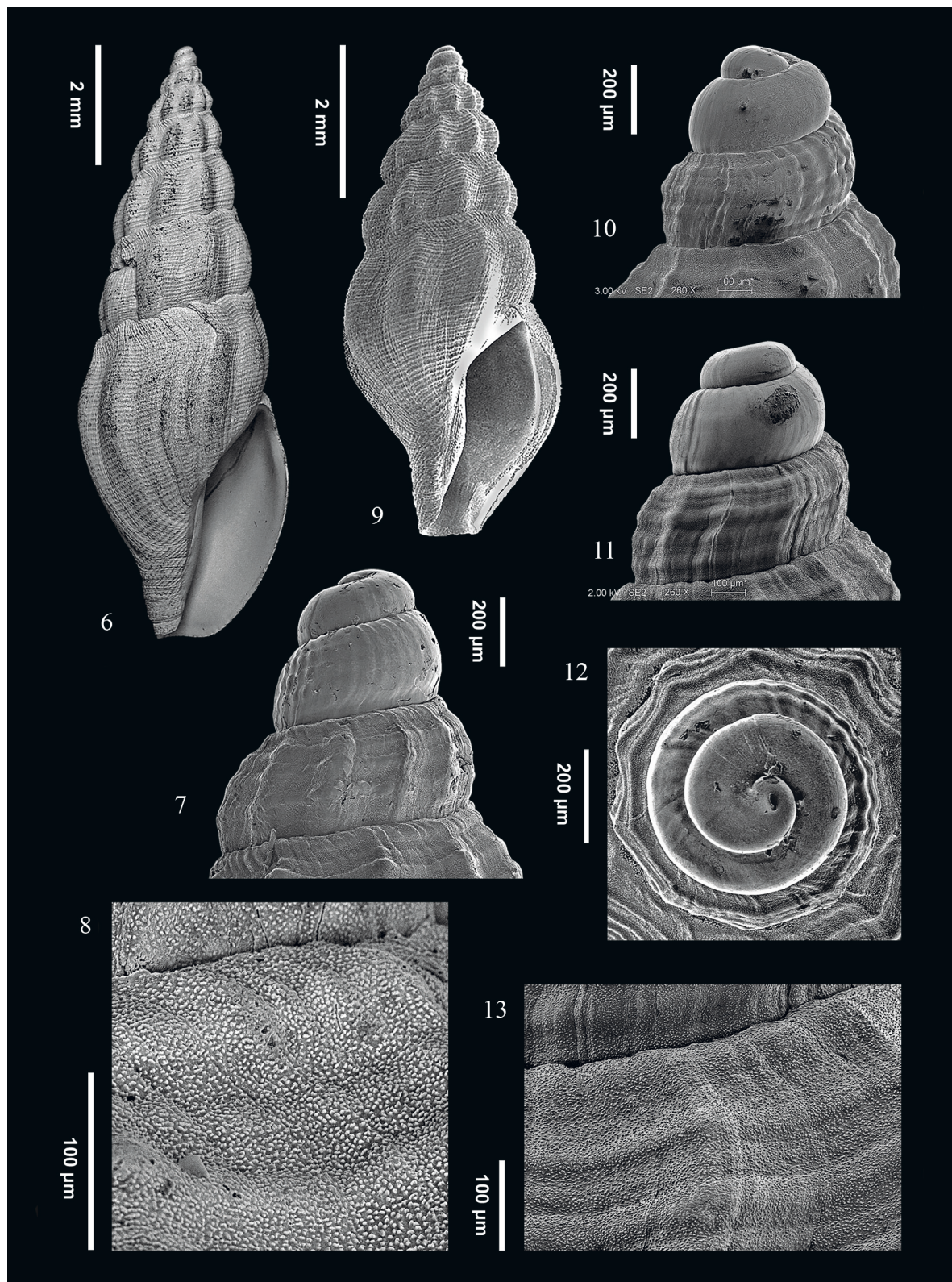
MATERIAL EXAMINED. The type material only.

DESCRIPTION. In square brackets the data of the holotype. Shell of medium size for the genus. Height 6.8–12.7 mm (10.75), mean 9.6 mm; width 2.45–4.4 (3.9), mean 3.49 mm; slender outline, H/D 2.29–2.98 (2.76), mean 2.70.

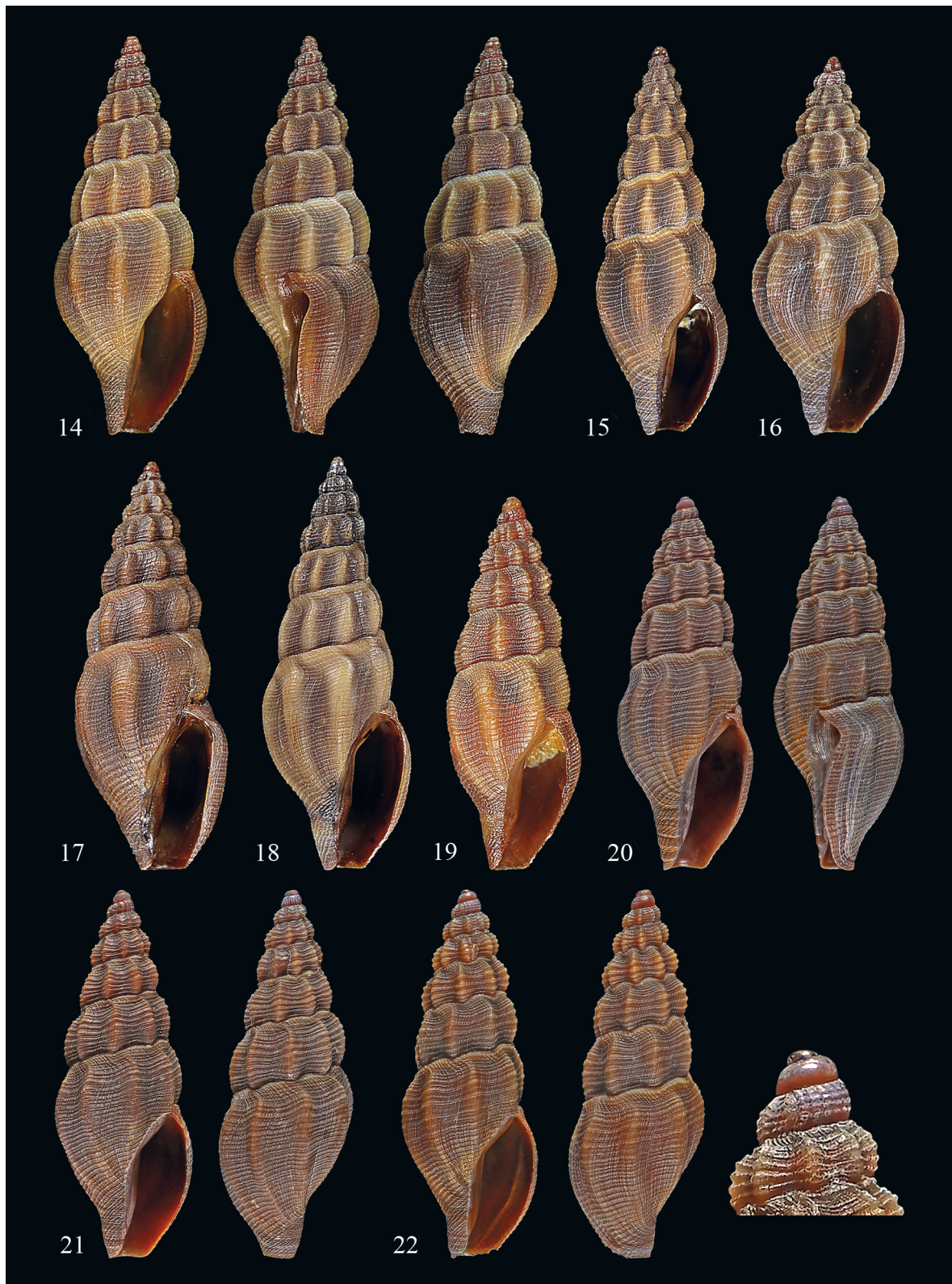
Protoconch multispiral, of 2.07 convex whorls in paratype 5, height 567 µm, maximum diameter 515 µm, diameter of the first whorl 350 µm, protoconch I of 0.71 whorls. Initially smooth, then 5 spiral cordlets gradually appearing on last half whorl, crossed by axial riblets, with tubercles at the intersections. Colour dark reddish-brown. Teleoconch of 5.2–7 (6.5), mean 6.2, slightly convex whorls, suture evident and more or less undulated. Axial sculpture of 9–11 (11), mean 9.7, broad and obtuse ribs, flexuous on the last 1–2 whorls and orthocline on the upper ones, equal to or slightly narrower than interspaces.



Figures 1–5. *Bela spatatina* n. sp., Split (Croatia), 0.5–2 m. Fig. 1: holotype MNHN-IM-2000-38564, h: 10.75 mm. Fig. 2: Paratype 2, h: 10.75 mm. Fig. 3: paratype 1, h: 11.9 mm. Fig. 4: paratype 3, h: 9.85 mm. Fig. 5: paratype 4, h: 8.75 mm.



Figures 6–13. *Bela spalatina* n. sp., Split (Croatia), 1–2 m. Figs. 6–8: paratype 2, h: 10.75 mm. Figs. 9–13: paratype 5, h: 6.8 mm. Figs. 6, 9: frontal view of shell; Figs. 7, 10: dorsal view of protoconch; Fig. 11: frontal view of protoconch; Fig. 12: apical view of protoconch; Figs. 8, 13: microgranules on shell surface.



Figures 14–22. *Bela fuscata* (Deshayes, 1835), Croatia. Fig. 14: Split, 2 m, h: 10.5 mm; Figs. 15, 16: Duće, 0.5 m, h: 9.8 mm and 8.7 mm; Fig. 17: Zaton, 0.5 m, h: 11.1 mm; Fig. 18: Split, 2 m, h: 11.6 mm; Fig. 19: Ugljan Island, 0.5 m, h: 8.3 mm; Figs. 20–22: Brač Island, 3 m, h: 8.3 mm, 7.7 mm and 7.6 mm.



Figure 23, 24. *Bela formica* F. Nordsieck, 1977. Fig. 23: holotype (SMF 341608), Saronicos, Greece, h: 9.8 mm; Fig. 24: original label. Photos courtesy: Sigrid Hof (SMF).

Spiral sculpture of numerous, very fine and closely set cordlets, equal in strength on the last 2 whorls, slightly more marked and less closely set on the upper ones, with very weak tubercles at the intersections with growth lines, those at the sub-sutural area slightly bigger. Extremely dense microgranules (Figs. 8, 13) on the whole surface. Last whorl 57–60% [59%] of total height in larger shells, up to 65% in smaller ones. Aperture 38–40% [39%] of total height in larger shells, up to 47% in smaller ones; narrow oval in shape; columella straight and opisthocline, slightly angulated adapically; outer lip with a thin edge, flexuous in lateral view, smooth internally; anal sinus weak and narrow; siphonal canal short, rather wide and open.

Shell colour uniformly dark brown or with axial ribs slightly paler than the interspaces.

Animal colour is completely opaque white, except the tips of tentacles which are translucent. Foot is very large, shield-shaped, broad and with nearly straight anterior edge, pointed posteriorly; cylindri-

cal tentacles bear black eyes about 3/4 of their length from the base, their distal part is short and much narrower than the lower part; the tube-like siphon is long and with a slit on the underside; operculum absent.

DISTRIBUTION. This species is so far known only from the type locality, in Croatia (Adriatic Sea).

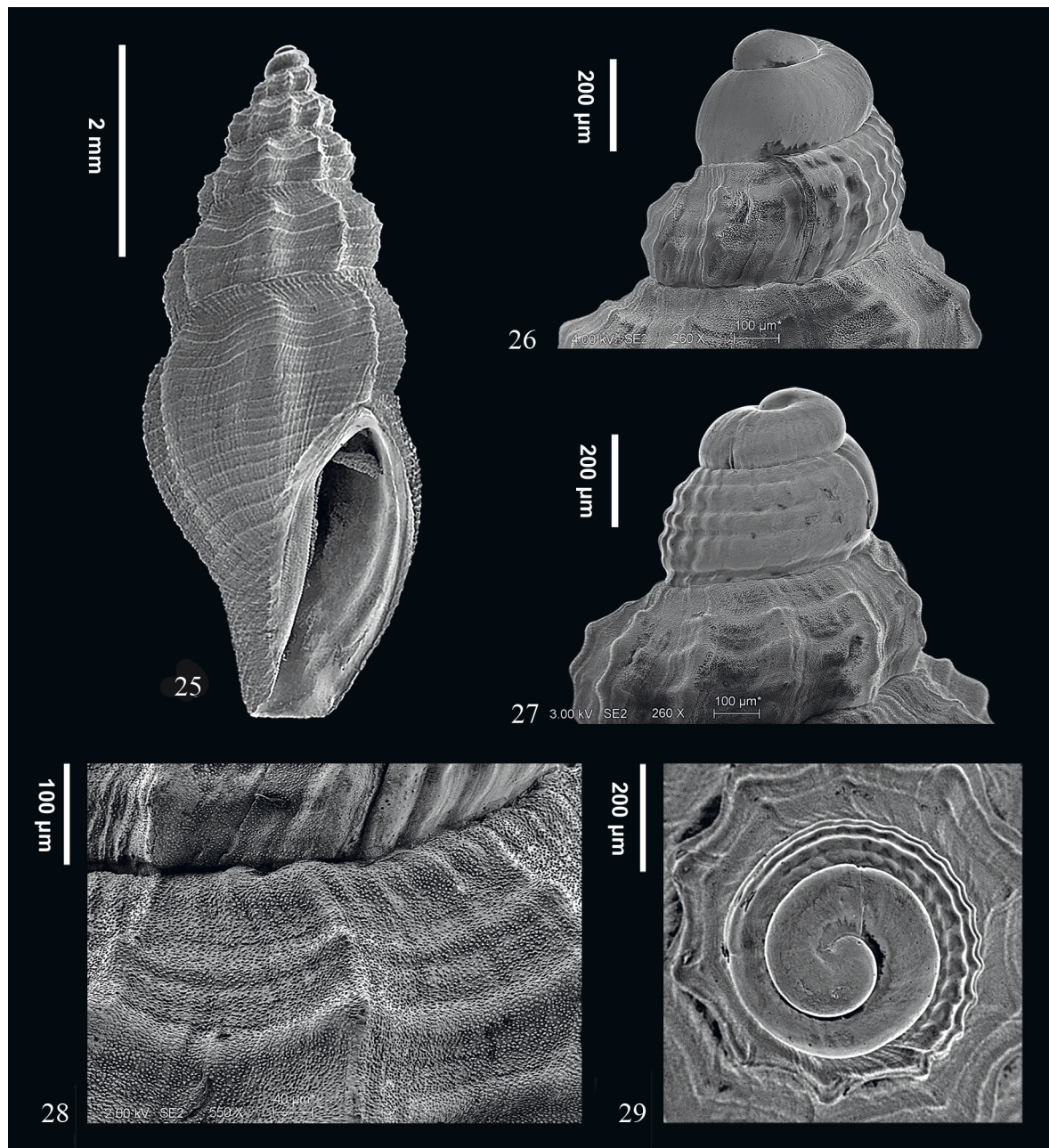
ETYMOLOGY. Named after the Italian word “Spalato” (one of the historical names of Split), referring to the locality where the species was collected.

REMARKS. Shells of live collected specimens are much darker, and fade relatively soon after being dried. Some of the European *Bela* species, especially *B. fuscata* (Deshayes, 1835) and *B. nebula* (Montagu, 1803), are quite hard to correctly identify, due to the shell similarity and intraspecific variability, and also because their geographical distribution is not well known. As in many other

cases of marine gastropods, also the Recent *Bela* spp. were described on the basis of shell morphology only, and moreover, the type materials are often lost or badly preserved. These facts increase the problems in taxonomy and species delimitation.

In our study of the Mediterranean Mangeliidae, we have included a combination of shell features

along with colour patterns of the soft parts, resulting more appropriate to delimit and recognize each species. Such approach allowed us to recognize *B. spalatina* n. sp. as an undescribed species, due to its peculiar animal colour that is unique among all Mediterranean *Bela* spp.: all others species have animals with blotches and spots on semi-transparent



Figures 25–29. *Bela fuscata* (Deshayes, 1835), Split (Croatia), 1.5 m, h: 6.6 mm. Fig. 25: frontal view of shell; Fig. 26: frontal view of protoconch; Fig. 27: dorsal view of protoconch; Fig. 28: microgranules on shell surface; Fig. 29: apical view of protoconch.

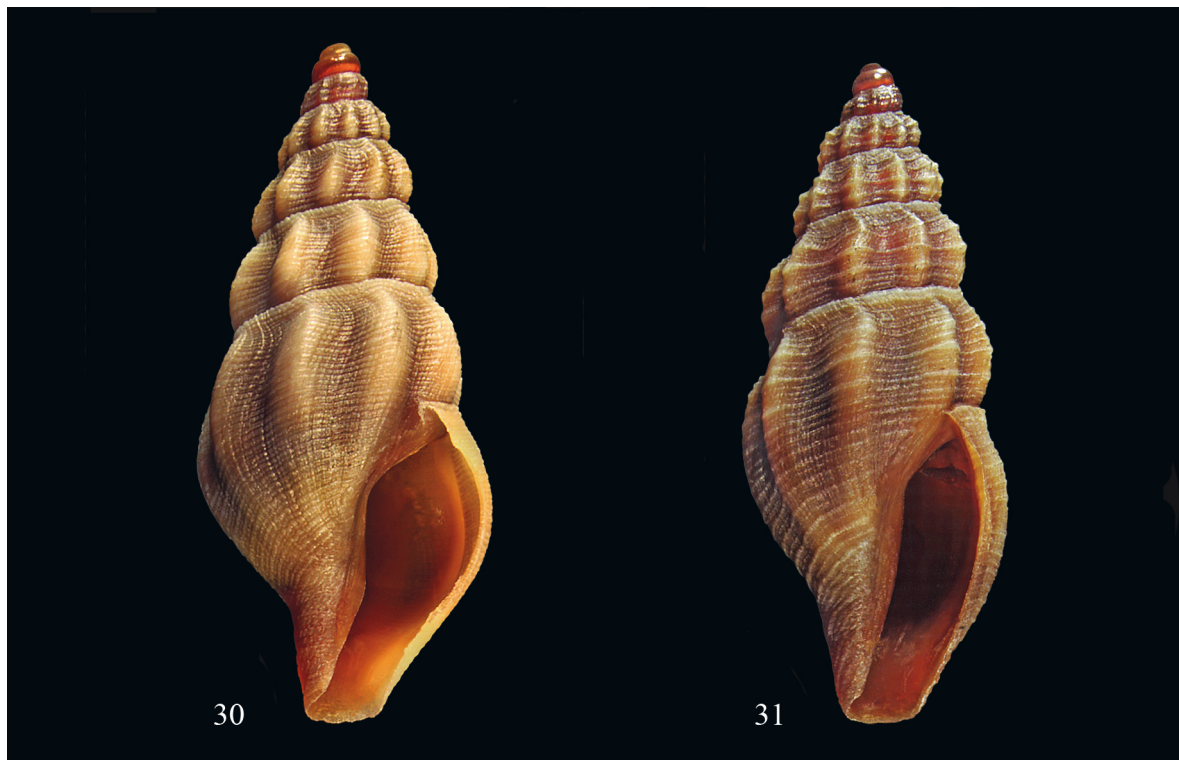


Figure 30. *Bela spalatina* n. sp., Paratype 5, h: 6.8 mm, Split (Croatia), 1 m.

Figure 31. *Bela fuscata* (Deshayes, 1835), Split (Croatia), 1.5 m, h: 6.6 mm.

background, whereas the new species is completely opaque white.

In Croatian waters of the Adriatic Sea only species of *Bela* with multispiral protoconch have been recorded so far: *B. cycladensis* (Reeve, 1845), *B. fuscata* (Deshayes, 1835), *B. menkhorsti* van Aartsen, 1988, *B. spalatina* n. sp. and *B. zonata* (Locard, 1891). Among them, the most similar to *B. spalatina* n. sp. is *B. fuscata*, all others being clearly different based on shell features and animal colour pattern.

Deshayes (1835: 177) described *Pleurotoma fuscata* from Morée (Greece). Among various features typical of the genus *Bela*, he also wrote that the shell is of a uniform dark brown colour and its top is very pointed; the reported size is 13 x 5 mm. According to Della Bella et al. (2015), the type material seems to be lost, but as *B. fuscata* is the only species with a dark brown shell and multispiral protoconch that lives in the Greek waters our interpretation of Deshayes' species is based also on this fact.

Nordsieck (1977a: 42) introduced the subspecies *B. ginnania formica* as a replacement name

for *B. formicaria* Forbes, 1844 non Sowerby, 1834, providing a short description and distribution in the Adriatic and Aegean Seas. His figure (Nordsieck, 1977a: pl. 10, fig. 76) shows a specimen (h: 9 mm) from Hvar Island (Croatia). Later in the same year he raised the taxon to the species level (Nordsieck, 1977b: 139). The holotype SMF 341608 (Figs. 23, 24) from Saronicos, Greece (h: 9.8 mm) has a multispiral protoconch, almost uniform brownish colour, and the spiral sculpture consists of relatively strong cordlets alternating with thin ones. These features unambiguously show that the holotype belongs to *B. fuscata*, making *B. formica* a junior synonym (new synonymy).

In Croatian waters, *B. fuscata* (Figs. 14–22, 25–29, 31, 36–38) is very common; it lives shallowly buried in fine sand or muddy sand, mostly in shallow water, especially in the intertidal zone (0–1 m), where populations with more than 500 specimens can be found within relatively small spots. We have studied more than 1000 live collected specimens and noticed that the colour pattern of the soft parts is slightly variable. The animal is usually semi-



Figure 32–35. *Bela spatatina* n. sp., Split (Croatia), 0.5–2 m. Fig. 32: paratype 1, h: 11.9 mm; Fig. 33: holotype, h: 10.75 mm; Fig. 34: paratype 4, h: 8.75 mm; Fig. 35: paratype 7 (BAU_3739), h: 12.7 mm.

transparent white with opaque white blotches or spots on the upper side of foot, lateral sides of body, tentacles and siphon. The ventral side of the foot is mostly white, sometimes white-yellowish and very rarely pale greenish. The spots on the siphon can be white, yellowish or pale orange. The

large opaque blotches on the foot and sides of the body are always white and are always present, no specimen without them has been found. The shell height is usually up to 12–13 mm, rarely up to 15 mm. Its colour is always uniform dark brown or brown-blackish in live collected specimens, while



Figures 36–38. *Bela fuscata* (Deshayes, 1835), Croatia. Fig. 36: Stari Trogir, 0.5 m, h: 8 mm; Fig. 37: Split, 2 m, h: 10.5 mm; Fig. 38: Stari Trogir, 0.5 m, h: 8.2 mm.

empty shells can sometimes be much paler, especially those collected on beaches exposed to the sunlight for a long time (such shells can become also reddish, orange or even yellowish). The H/D ratio is rather variable (for example see Figs. 15, 16). The axial ribs are usually much narrower than the interspaces, but can also be almost equal to them. The spiral sculpture consists of fine cordlets alternating with a variable number of stronger ones. The growth lines are sometimes quite strong giving the surface a rough appearance (Fig. 19), a feature mentioned by Nordsieck for his *B. formica*. The whole surface of the teleoconch is covered with microgranules (Fig. 28). The protoconch is multispiral and dark brown or reddish-brown in colour; the protoconch measurements of the photographed specimen (Figs. 25–29) are: 2.19 whorls, protoconch I of 0.77 whorls, height 545 µm, maximum diameter 485 µm, diameter of the first whorl 325 µm.

Bela spalatina and *B. fuscata* were found in sympatry only at Duilovo (Split), while at many other Croatian localities investigated only numerous specimens of *B. fuscata* were found. Their shells are similar in size, outline and colour, also the protoconchs are similar, but in *B. fuscata* it has slightly more whorls, and is slightly smaller in height and diameter. The microgranules on the teleoconch surface are slightly bigger and less dense in *B. fuscata*. The difference in spiral sculpture is the most important shell feature that allows distinguishing these two species: in *B. spalatina* all cordlets are always very fine and equal in strength, while in *B. fuscata* they alternate in strength and are less numerous (see Figs. 30, 31). Occasionally, also *B. fuscata* have very fine cordlets on the two last whorls, but also in such cases it is easily distinguished from *B. spalatina* because the spiral cords on the upper whorls are much stronger and their number is lower. Of course, the easiest way to identify both species is by looking at their animal coloration, the difference being so evident that even at sea they can be identified without any problem.

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