

Mediterranean Umbraculida Odhner, 1939 (Gastropoda Opisthobranchia): diagnostic tools and new records

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ABSTRACT

Some diagnostic tools are given to distinguish juvenile shells of the Mediterranean Umbraculida Odhner, 1939 species (Gastropoda Opisthobranchia) and some new records of rare species are added.

KEY WORDS

juveniles; Mediterranean Sea; new findings; protoconch; Umbraculida.

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INTRODUCTION

The Umbraculida is a small order of opisthobranchiate molluscs represented in the Mediterranean Sea by 4 species and 2 families: Umbraculidae Dall, 1889 comprising *Spiricella unguiculus* Rang, 1828 and *Umbraculum umbraculum* (Lightfoot, 1786) and Tylodinidae Gray, 1847 with *Tylodina perversa* (Gmelin, 1791) and *Anidolyta duebenii* (Lovén, 1846).

Tylodinella trinchessii Mazzairelli, 1897 is an obscure entity put in synonymy with *T. perversa* but still poorly understood (Waren & Di Paco, 1996; Gofas, 2013).

All species share an uncoiled patelliform or shield-like shells. Aside from anatomical differences adult specimens can be easily identified by shell features (Vayssi re, 1885; Pruvot-Fol, 1954; War n & Di Paco, 1996; Vald s & Lozouet, 2000; Cachia et al., 2001; Da Silva & Landau, 2007) (Table 1, 2 and Figs. 1-9). Juvenile shells (except *S. unguiculus*) instead are not easily distinguishable from each other. Here are provide some information on the protoconch and early teleoconch morphology to set some characters useful for specific determination.

MATERIAL AND METHODS

EXAMINED MATERIAL. *Umbraculum umbraculum*: 7 shs, 0.7 mm to 4 mm, Larnaca (Cyprus), 45 m, in ARC; 3 shs, 2.2 mm to 4.7 mm Corfu (Greece), 40 m, in SBC; 2 shs, 35-65 mm, Isola delle Femmine (Palermo, Italy), 30 m, SBC; 1 sh, 51 mm, Gorgona is. (Livorno, Italy), 70/80 m, in ECC; 1 sh, 11.7 mm, Palinuro (Salerno, Italy) 30 m, in CSC; 1 sh, 11.5 mm, Acitrezza (Catania, Italy) 40 m, in CBC.

Spiricella unguiculus. 1 sh, 3.6 mm, Salina (Messina, Italy), 35 m, in PPC; 1 sh, 2.7 mm, Palinuro (Salerno, Italy), 35 m, in SBC; Castelsardo (Sassari, Italy), 50 m, 2.6 mm, in CBC; 1 sh, 2.2 mm, Tarifa (Spain), 27 m, in CSC.

Tylodina perversa. 16 shs, Palinuro (Salerno, Italy), 35 m, in SBC and CSC; 2 shs, Protaras (Cyprus), 35 m, in SBC; 2 shs, Campomarino (Taranto, Italy), in SBC; 1 sh, Krk is. (Croatia), in SBC; 22 shs, Elba is. (Livorno, Italy), in SBC; 1 sh, Capraia is. (Livorno, Italy), 260 m, in SBC; Gorgona is. (Livorno, Italy), 150 m, in CSC; 1 sh, Capraia is. (Livorno, Italy), 150 m, in CSC; 1sh, Almeria (Spain), 110 m, in APC; 2 shs, Capraia is.

(Livorno, Italy), 180 m, in APC. Shs ranging from 1.5 mm to 25 mm.

Anidolyta duebenii. 3 shs, 5 mm, 3.2 mm and 3.1 mm, Almeria (Spain), 110 m, in APC and SBC; 1 sh, 3.3 mm, Scoglio Vervece (Naples, Italy), 51 m, in APC; 1 sh, 8.3 mm, Capraia is. (Livorno, Italy), 300 m, in CSC; 2 shs, 1.3 mm and 3.2 mm, Pianosa is. (Livorno, Italy), 400 m, in RRC.

ABBREVIATIONS AND ACRONYMS. APC: Attilio Pagli collection (Lari, Italy). ARC: Alessandro Raveggi collection (Florence, Italy). CBC: Cesare Bogi collection (Livorno, Italy). CSC: Carlo Sbrana collection (Livorno, Italy). ECC: Enzo Campani collection (Livorno, Italy). PPC: Paolo Paolini collection (Livorno, Italy). RRC: Romualdo Rocchini collection (Pistoia, Italy). SBC: Stefano Bartolini collection (Florence, Italy). sh(s): shell(s)

DISCUSSION

Umbraculum umbraculum juveniles (Figs. 10–13) can be easily recognized by the protoconch size, by far the largest of the considered species. It is quite variable in size ranging from 630 μ m to 710 μ m (average 670 μ m) in maximum diameter, composed by 1.3–1.5 whorls, globose (nucleus not prominent), quickly expanding, glossy, thin and semitransparent, colour light brown. A shallow depression is present beyond the protoconch-teleoconch border. Shell up

to 3–4 mm, more elevated, somehow capuliform, quite thin, of the same color of the protoconch, then increasingly flat, greyish and thicker.

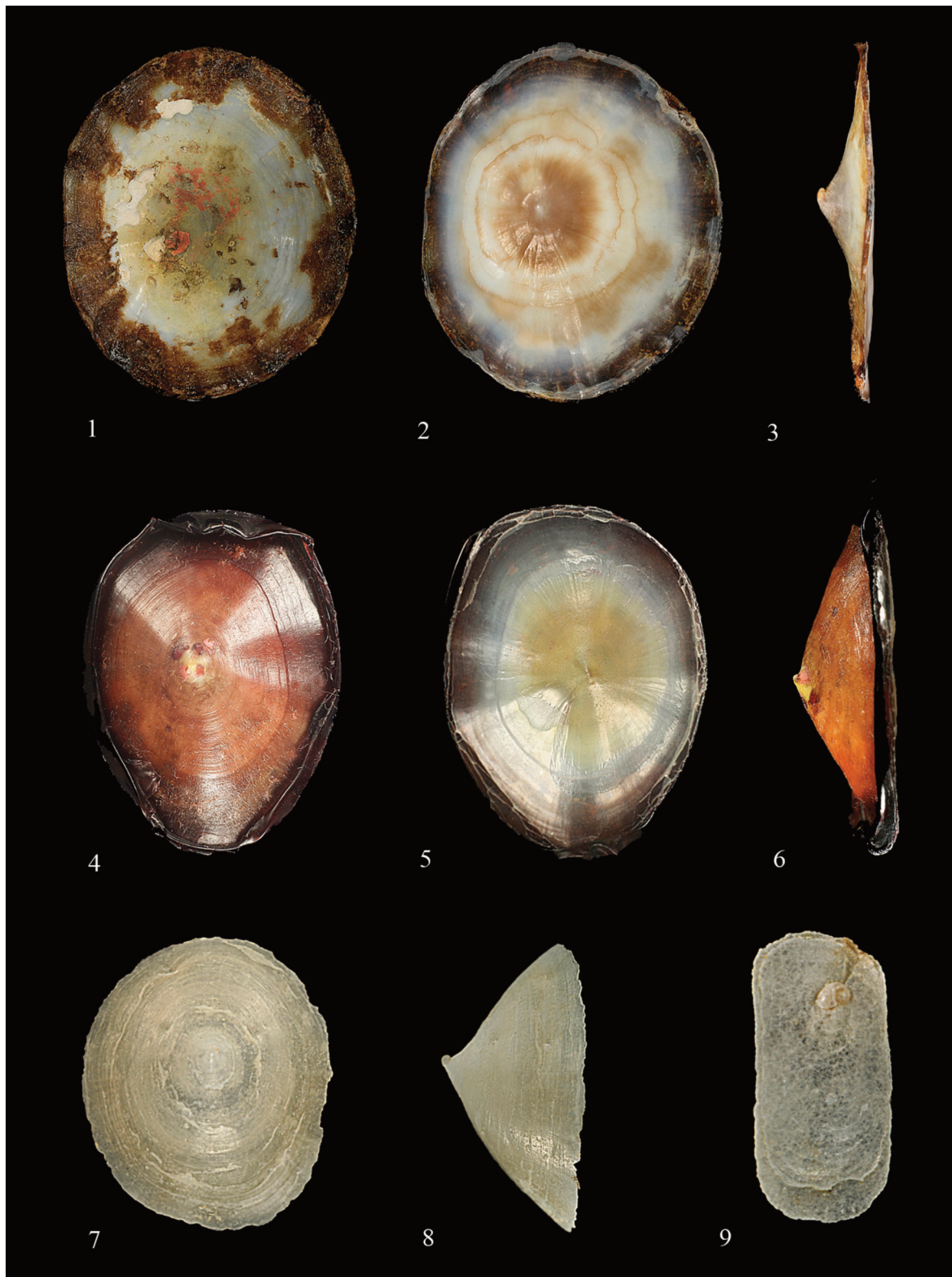
Spiricella unguiculus juveniles are unmistakable, having basically the same silhouette of adult shells with the protoconch arranged in the horizontal plane, adherent to the surface of the teleoconch.

Tyrodina perversa juveniles (Figs. 14, 16, 19) are similar in outline to *U. umbraculum* but the protoconch is smaller, ranging from 360 μ m to 400 μ m (average 370 μ m) in maximum diameter. It is composed by 0.9–1.1 whorls, globose (nucleus not prominent), not quickly expanding. It is quite protruding, glossy, thick, not transparent, white or yellowish uniform in colour. Teleoconch is thickened in apical region becoming thinner toward the margin, its profile is very variable, from extremely flat to rather conical. Colour varies from white to brownish. The muscle scar marks are obvious and often make internal surface quite uneven.

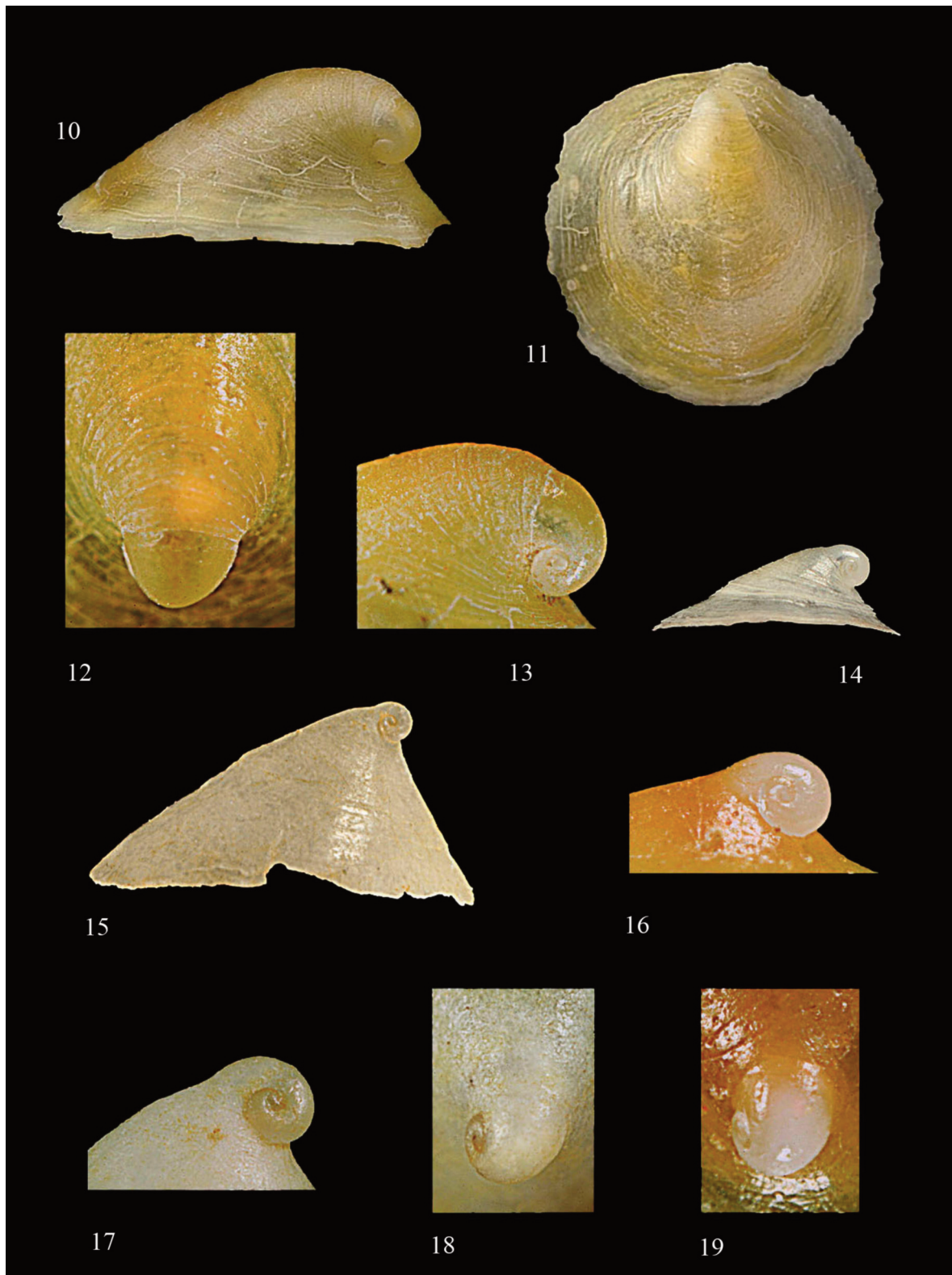
Anidolyta duebenii juveniles (Figs. 15, 17, 18) have a protoconch ranging from 350 μ m to 400 μ m (average 370 μ m) in maximum diameter composed by 0.9–1.1 whorls, substantially comparable to *T. perversa* in size and form, but some slight differences can be detected: the nucleus is tinged while the remaining of the protoconch and teleoconch are white, the protoconch whorl increases less than *T. perversa* so the apex has apparently a more prominent aspect, whit a clear “neck” on the protoconch-

Shell features	<i>Umbraculum umbraculum</i>	<i>Spiricella unguiculus</i>	<i>Tyrodina perversa</i>	<i>Anidolyta duebenii</i>
Size (average)	50-70 mm	4-7 mm	15-20 mm	8-10 mm
Outline	oval	subrectangular	oval	oval
profile	depressed	depressed, arched	Conical to depressed	regularly conical
apex	pointed, slightly excentric	flat, strongly excentric	pointed, slightly excentric	pointed, slightly excentric
surface	dull, with only concentric growth lines	Quite glossy, with only concentric growth lines	glossy, with only concentric growth lines	glossy, with only concentric growth lines
colour	grey-yellowish	grey-yellowish	whitish-yellowish	white
Periostracum	Thick, felt-like, dark brown	Thin, transparent	Thick, membranaceous, purple-reddish, often banded	thin, transparent
Muscle scar	Circular, discontinuous, many strong scars	horseshoe-shaped	Circular, complete, quite strong, with sinus	Circular, complete, very faint, no sinus

Table 1. Shell features of the Mediterranean Umbraculida (adult shells).



Figures 1–3. *Umbraculum umbraculum*, Isola delle Femmine, Palermo, Italy, 65 mm (Figs. 1, 2), 35 mm (Fig. 3). Figs. 4–6. *Tyrodina perversa*, Krk is., Croatia, 25 mm. Figs. 7–8. *Anidolyta duebenii*, Capraia is., Livorno, Italy, 8.3 mm. Fig. 9. *Spiricella unguiculus*, Castelsardo, Sassari, Italy, 2.6 mm.



Figures 10–13. *Umbraculum umbraculum* juvenes, Corfu, Greece, 4 mm. Figures 14, 16, 19. *Tyrodina perversa* juvenes, Elba island, Italy, 1.8 mm (Fig. 14), 3.6 mm (Figs. 16, 19). Figures 15, 17, 18. *Anidolyta duebenii* juvenes, Almeria, Spain, 3.2 mm.

teleoconch border. The teleoconch is more elevated, regularly conical, uniformly thin. The muscle scar forms a complete circle, it is very weak and almost invisible.

Umbraculum umbraculum and *T. perversa* young shells could be mistaken but protoconch size is resolute, also muscle scar sinus is important, already visible in few mm specimens. *T. perversa* and *A. duebenii* are obviously the most difficult species to separate having the protoconch of the same size but the colour of the nucleus and prominence could be useful tools to distinguish them. Moreover shell profile, thickness and muscle scars help distinguishing also very small shells. *Anidolyta duebenii* records are deeper than 100 m (the Naples record is unusually shallow) but bathymetry is misleading in order to separate it from *T. perversa*, as dead specimens of the latter can be found at depths greater than 250–300 m. Most *A. duebenii* records examined in collections are actually *T. perversa* originating from deep water.

Spiricella unguiculus is a very rare species, with a lusitanian distribution, recorded in literature for few scattered shells. Its biology and ecology are virtually unknown as no living specimens have been found so far. Its systematic position in Umbraculidae is doubtful judging by shell characters and only tentative lacking anatomical and molecular data (Tringali, 1990; Da Silva & Landau, 2007 and references therein; Cossignani & Ardovalini, 2011). With the present note its range is extended to northern Sicily and southern Spain.

1. Protoconch larger than 600 µm..... <i>Umbraculum umbraculum</i>
- Protoconch smaller than 600 µm.....2
2. Protoconch smaller than 350 µm, recumbent..... <i>Spiricella unguiculus</i>
- Protoconch larger than 350 µm, raised.....3
3. Protoconch color uniform, less prominent..... <i>Tylodina perversa</i>
- Protoconch nucleus tinged, more prominent..... <i>Anidolyta duebenii</i>

Table 2. Key of the Mediterranean Umbraculida based on the protoconch features.

Anidolyta duebenii is an uncommon species living in deepwaters, spanning from Norwegian Sea to Lusitanian seamounts and Mediterranean Sea (Warén & Di Paco, 1996; Beck et al., 2006). The few mediterranean records are from Spain and Corsica (Warén & Di Paco, 1996; Peñas et al., 2006; Peñas et al., 2008). It's now reported from Gulf of Naples and confirmed from Northern Tyrrhenian Sea.

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