

## On the variability of *Euthria* (Gastropoda: Buccinoidea) in the Cape Verde Archipelago, with description of a new species

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**Abstract:** A beautiful species collected in the Cape Verde Archipelago, along the shelf between Boavista and Maio, is described as *Euthria fiadeiroi* sp. nov. and compared with *Euthria abrotoma* Fraussen & Rolán, 2003, *Euthria amorimi* Fraussen, 2004 and *Euthria vandai* Rolán & Monteiro, 2007.

**Introduction:** About 22 valid *Euthria* species are known from the Cape Verde Islands, all of them endemic, forming an important radiation within the genus. Most of these species have been collected by fishermen operating in mainly deep waters during the last few decades. The shells look pretty, showing a broad array of nice colours and patterns. The high variability, however, is quite confusing and makes the shells difficult to identify. Differences and similarities in pattern, in combination with obscure or eroded sculpture, gives many of the shells a similar or distinct look whatever the species may be. This is quite frustrating to the collector who wants to identify the shells in his collection properly and it is in such context that we have heard “they are all one species”. It is therefore important to study a considerable amount of specimens, before formulating an opinion. A thorough revision of the known species from the Cape Verde Islands, showing a maximum of forms and patterns, was recently published (Fraussen & Swinnen, 2016: figs 1-116). In this publication, we also mentioned the next imaginary situation: “If it happens that an occasional specimen of *E. amorimi* without pattern is found, and that same shell has an eroded spire, thus

without the characteristics of the protoconch and upper spire whorls visible, it will be almost impossible to distinguish such shell from *E. abrotoma*.” (Fraussen & Swinnen, 2016: 22, in the comparison under *E. insalubris*) and “An occasional pale coloured specimen of *E. vandai* with pale pattern and, at the same time being eroded, thus without the characteristics of the sculpture on the upper spire whorls visible, will be almost impossible to distinguish from *E. insalubris*.” (Fraussen & Swinnen, 2016: 28). The above citation appeared to have been quite prophetic when earlier this year our friend Ramiro Fiadeiro showed us some special *Euthria* shells. While these shells look like pale *E. vandai* and some show an *E. amorimi*-like pattern while others are white, they are closer to *Euthria insalubris* instead. Again, we try to look through the wide phenotypical overlap that throws a curtain of confusion over these species. In the same publication (Fraussen & Swinnen, 2016) we concentrated on the aspect of variability (morphotypes) instead of detecting species and describing the unnamed ones. In the present paper we continue our study on this group and add a 23<sup>rd</sup> species, *Euthria fiadeiroi* sp. nov., to the fauna.

**Systematics:** The morphology of the radula indicated that the species commonly assigned to ‘**Buccinidae**’ are a heterogenic group (Finlay, 1928, and followed by Powell, 1929). Recently, this was also confirmed by molecular evidence (Galindo et al., 2016: 337-353), who elevated Pisaniinae to the family level **Pisaniidae** (Galindo et al. 2016: 341, 349). Already earlier, Finlay (1928: 250) had also introduced the family **Buccinulidae** to separate several genera, such as *Buccinulum* and *Euthria*, from **Buccinidae**. This was followed by Powell (1929). Harasewych & Kantor (1999), Kantor &

Pastorino (2009) and Pastorino (2016 and 2019), among others, also used **Buccinulidae** at the family level, for species from the southern hemisphere. Recently, molecular data published by Vaux et al. (2017, 2018) suggested that the buccinulid group itself is not monophyletic. Therefore, in the present paper, we tentatively keep the subfamily Buccinulinae, in the conservative way, but within Buccinoidea.

**Genus *Euthria*** M. E. Gray, 1850

Type species by original designation: "*Fusus lignarius* Chiaje" (this is *Fusus lignarius* Lamarck, 1816, a junior synonym of *Murex corneus* Linnaeus, 1758) from the Mediterranean, Recent.

For a discussion of the use of *Euthria* as a genus and for a comparison with radulae of related genera we refer to Shuto (1978: 358-361), Beets (1986: 92-93), Fraussen (1999: 73), Fraussen & Hadorn (1999: 120-121) and Rolán, Monteiro & Fraussen (2003: 125-126).

High infraspecific variability within *Euthria* species from the Cape Verde Islands was already briefly discussed by Fraussen & Rolán (2003: 83-84) and Fraussen & Afonso (2011: 84, 86-87). A thorough revision of the species from the Cape Verde Islands, showing a maximum of forms and patterns, was published by Fraussen & Swinnen (2016: figs 1-116).

***Euthria fiadeiroi* sp. nov.**

Figs 1-13

**Type material: Holotype:** 35.0 mm, in Muséum national d'Histoire naturelle, Paris, MNHN IM-2000-34884; **Paratype 1:** 38.9 mm, in coll. Ramiro Fiadeiro, Portugal; **Paratypes 2-5:** 29.4-35.5 mm, in coll. Frank Swinnen; **Paratypes 6-9:** 29.4-34.9 mm, in coll. Koen Fraussen, KF-8064; **Paratype 10:** 34.3 mm, in coll. José Rosado, Mozambique; **Paratype 11:** 34.1 mm, in coll. Sandro Gori, Italy; **Paratypes 12-13:** 37.4-37.6 mm, in coll. Steve Hubrecht, Belgium.

**Type locality:** Cape Verde Archipelago, southeastern slope of Boavista, 15°96-98'N, 22°65-67'W, in lobster traps set at about 150 m deep.

**Range:** Only known from the type locality. We have not seen this species, or similar-looking shells, from Joao Vicente Valente Bank (50-200 m) that connects Boavista with Maio. The absence of records south of Boavista may suggest that *E. fiadeiroi* is endemic to the slope east of Boavista.

Most *Euthria* shells that are available in collections have a quite correct locality on the label. Yet, detailed data that allow for a study on how morphotypes are distributed along the slopes of the islands and the banks are rarely known. It may be interesting to plot the localities of *Euthria* species on bathymetric maps, in order to find out patterns in distribution. Quite a few of the species have a restricted bathymetric range and the complex geological formations along Boa Vista and Maio may restrict the distribution of some species while, on the other hand, offering possibilities for endemism.

**Description:** Shell of medium size, holotype 35.1 mm in height, thick, solid. Shape broadly fusiform, rather semi-oval with moderately high spire, siphonal canal rather short, broad, open. Whorls laterally somewhat flattened with moderately broad, but weak subsutural concavity. Protoconch (paratype 2) 1.4 mm in diameter, consisting of 2 whorls, first whorl slightly flattened. Surface smooth, glossy. Transition to teleoconch indistinct, marked by the sudden presence of the first axial rib. Teleoconch consisting of 6½ whorls. First teleoconch whorls eroded (holotype), but 4 fine spiral cords visible in paratype 4. Second whorl with 4 such spiral cords, a fifth spiral cord partly concealed under suture of following whorl, a secondary spiral cord appearing in abapical interspace. Spiral cords gradually growing broader and flat, occasionally obscure. Penultimate whorl with 5 or 6, body whorl with about 13 broad, flat, hardly visible spiral cords. First and second teleoconch whorl with 11 (paratype 7) to 12 (paratype 2) sharp axial ribs, interspaces slightly broader. Second whorl with 12 (paratype 7) to 14 (paratype 2), third whorl with 17 axial ribs, interspaces of equal size. Fourth whorl with about 22 weak axial ribs (paratype 2) or smooth (paratype 7). Axial ribs gradually becoming weaker along fourth whorl, fifth whorl smooth. Body whorl with fine, obscure incremental lines and usually a well-developed pre-labral varix. Aperture semi-ovate. Outer lip thick, with 8 (paratype 2) to 10 (holotype 1) internal spiral lirae. Outer edge thick, smooth, glossy, white, usually with fine, reddish brown dots according to the external spiral pattern. Columella smooth with a single, weak, but broad abapical knob on transition to siphonal canal. Callus thin, smooth, white; outer edge transparent, showing underlying pattern. Siphonal canal rather short, broad, open. Aperture together with siphonal canal longer than 1/2 of total shell length.

Background colour white to snow-white, occasionally pink (paratype 8). Protoconch white (paratype 2). Pattern consisting of fine, interrupted reddish brown spiral lines, the spots axially aligned, usually with only a few spots present and leaving broad white interspaces (holotype), occasionally with a dense row of such spots (paratype 6), occasionally with almost full lines (paratype 3), occasionally without pattern (paratype 1). Subsutural

spiral cord ornamented with same pattern, but with broader spots. The pattern is more prominent along the periphery of the body whorl. Tip of siphonal canal usually dark purplish brown.

Operculum corneous, pale to dark brown, semi-oval, abapical margin rather pointed, with terminal nucleus.

Periostracum and radula unknown.

**Comparison:** *Euthria fiadeiroi* sp. nov. is characterised by the presence of spiral cords along all whorls in combination with a pattern of fine spiral lines consisting of small dots or fine interrupted lines, by the dark tip of the siphonal canal and its rather stretched shape.

*Euthria fiadeiroi* sp. nov. shows some variation in apical angle or slenderness. The spiral sculpture is quite conform along the spire, with smooth, but well-visible spiral cords, sometimes slightly smoother or obscure because of erosion, but along the penultimate whorl the spiral sculpture may be weaker and along the body whorl occasionally absent or invisible. The pattern is, like in most deep-water *Euthria* species from the archipelago, ranging from pale with a few spots, to dark with more spots.

*Euthria vandai* Rolán & Monteiro, 2007 (Figs 14-15) is similar in sculpture, but differs in shape by its deeper subsutural concavity and in pattern by its broader dots.

The protoconch is slightly larger in combination with a lower number of whorls (1.5 to 1.8 mm in diameter for about  $1\frac{3}{4}$  to 2 whorls in *E. vandai* instead of 1.4 mm for 2 whorls in *E. fiadeiroi* sp. nov.).

*Euthria amorimi* Fraussen, 2004 (Fig. 16) may be similar or occasionally identical in pattern, but differs in shape by its more constricted base (rather than stretched), the slightly smaller protoconch with a lower number of whorls (1.3 mm in diameter for  $1\frac{1}{4}$  whorls in *E. amorimi*, instead of 1.4 mm for 2 whorls in *E. fiadeiroi* sp. nov.) and its smooth surface with a much finer spiral sculpture consisting of numerous obscure spiral threads.

*Euthria insalubris* Fraussen & Rolán, 2003 (Fig. 17) is similar in shape but differs in sculpture by its weak spiral cords on the 3 upper spire whorls only and by its weaker axial sculpture consisting of fewer ribs (9 on the first, 10 on the second teleoconch whorl, instead of 11 or 12 on the first and 12 to 14 on the second in *E. fiadeiroi* sp. nov.). The protoconch of *E. insalubris* has a slightly lower number of whorls ( $1\frac{3}{4}$  instead of 2). The pattern of *E. insalubris* may be variable, as is usual in most *Euthria* species, but as far as we can judge the spots are larger (also see Fraussen & Swinnen, 2016: fig. 69-73).

*Euthria darwini* Monteiro & Rolán, 2005 differs in its more accentuated spiral sculpture consisting of evenly spaced spiral cords of equal strength and its slightly smaller adult size.

<i>Euthria</i>	<i>vandai</i>	<i>amorimi</i>	<i>insalubris</i>	<i>fiadeiroi</i> sp. n.
protoconch	1 $\frac{3}{4}$ - 2 whorls Ø 1.5 – 1.8 mm	2 $\frac{1}{4}$ whorls Ø 1.3 mm	1 $\frac{3}{4}$ whorls Ø 1.3 mm	2 whorls Ø 1.4 mm
teleoconch size of holotype	6 whorls 36-37 mm	6 $\frac{1}{2}$ whorls 41mm	7 whorls 30.9 mm	6 $\frac{1}{2}$ whorls 35.1 mm
subsutural: slope spiral cord	concave broad	weakly concave absent	weakly concave absent	weakly concave broad but weak
spirals on:				
1 <sup>st</sup> whorl	5	numerous	4	4
2 <sup>nd</sup> whorl	5	numerous	4 – 5	4 (- 5)
3 <sup>rd</sup> whorl	4 - 5	numerous	4 – 5	4 – 5
penultimate wh.	9 - 10	numerous or smooth	3 or smooth	5 - 6
axials on:				
1 <sup>st</sup> whorl	10 - 11	10	9	11 – 12
2 <sup>nd</sup> whorl	10 – 12	11-12	10	12 – 14
3 <sup>rd</sup> whorl	smooth	smooth	12 (obscure)	17
penultimate wh.	smooth	smooth	smooth	smooth
pattern	mainly dots	fine lines, occas. interrupted	mainly absent	interrupted fine lines, occas. absent
type locality	“off Boavista”, 275-365	“off Sal Island”, 120-200 m	no details	SE Boavista, 150 m

**Etymology:** *Euthria fiadeiroi* sp. nov. is named after our friend Ramiro Fiadeiro, owner of caboverdeshells.com, for his contributions to the knowledge of Mollusca and for sharing his feeling for the minute details and the visual beauty of shells with scientists and collectors.

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#### Plate:

- 1-13:** *Euthria fiadeiroi* sp. nov.,  
Cape Verde Archipelago, between Boavista and  
Maio, 150 m.  
**1-3:** holotype, 35.0 mm, MNHN IM-2000-34884.  
**4-6:** paratype 1, 38.9 mm, in coll. Ramiro Fiadeiro.  
**7-9:** paratype 6, 32.7 mm, in coll. Koen Fraussen,  
KF-8064.  
**10-11:** paratype 8, 32.2 mm, in coll. Koen  
Fraussen, KF-8064.  
**12-13:** paratype 2, 33.6 mm, diameter of proto-  
conch: 1.4 mm, in coll. Frank Swinnen.
- 14-15:** *Euthria vandai* Rolán & Monteiro, 2007.  
**14:** Holotype, 37.2 mm, off Boavista, 275-365 m.  
**15:** Holotype of *E. josepedroi* Rolán & Monteiro,  
2007, 36.4 mm, off Boavista Island, 275-365  
m.
- 16:** *Euthria amorimi* Fraussen, 2004  
Holotype, 30.1 mm, Cape Verde Archipelago,  
northern part, in lobster trap, 50-150 m deep, MNHN  
24753.
- 17:** *Euthria insalubris* Fraussen & Rolán, 2003  
Holotype, 30.9 mm, from fishermen, without exact  
information about locality.

