

A new species of *Clelandella*
(Gastropoda: Trochoidea: Trochidae: Cantharidinae)
from Western Sahara

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ABSTRACT. *Clelandella artilesi* n. sp., a new species from Western Sahara is described and compared with similar species from the north-eastern Atlantic, especially off West Africa.

RESUME. Une nouvelle espèce de *Clelandella* provenant du Sahara Occidental, *Clelandella artilesi* n. sp., est décrite et comparée avec d'autres espèces similaires de l'Atlantique Nord-est, plus particulièrement au large de l'Afrique Occidentale.

INTRODUCTION

Until the next last years, there was only a few literature about the malacofauna from off former French West Africa and the species from this area were still rather poorly known (see Vilvens & Swinnen, 2007 for an abbreviated historical account of the main expeditions in this area). By now, some valuable works have highlighted the malacofauna not only from West Africa but also from adjacent Atlantic islands such as Canary Is., Madeira Is. and Cape Verde Is. (e.g. Curini-Galletti, 1985; Segers, 2002; Ardovini & Cossignani, 2004; Gofas, 2005; Rolan, 2005; Rolan & Swinnen, 2009; Segers, Swinnen & De Prins, 2009).

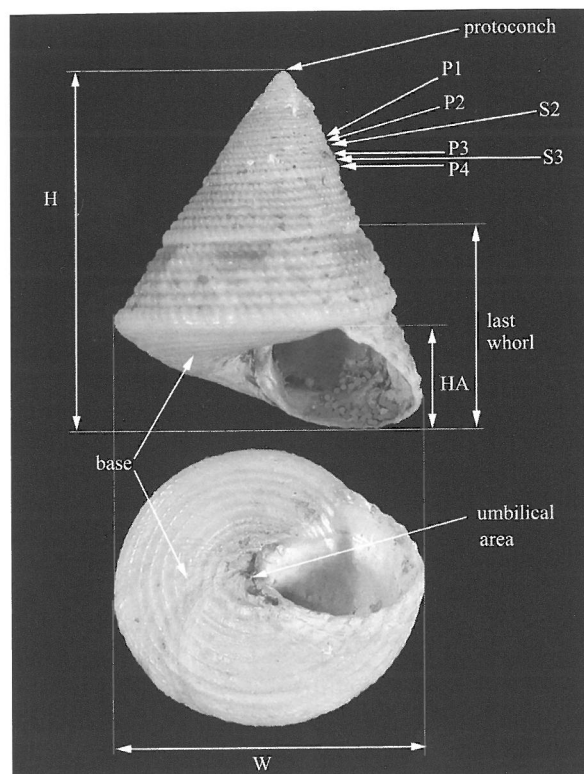
Among the species reported or newly described in all these papers and books, the Cantharidinae (accepted subfamily of the Trochidae family) species are rather numerous. This paper describes a new species that belongs to this subfamily.

Material and methods

The material studied was found by some dredging performed by dragging boats working in the Canary-Saharan fishing bank. All the shells were collected between 1993 and 2001, in an area off Western Sahara that goes from Cap Boujdour (Cabo Bojador: 22°18'N, 16°40'W) to Cap Barbas (Cabo Barbas: 26°07'N, 14°29'W), at between 50-70 m deep on sandy bottoms (see text figure 2 below).

Regarding the description methodology, the main conchological features used are (see text figure 1 below) :

- ◆ general shape of the shell;
- ◆ shape of the whorls;
- ◆ spiral cords and axial threads of the whorls;
- ◆ spiral cords on the base;
- ◆ shape of the aperture, the outer and the inner lip;
- ◆ colour pattern.



Text figure 1 : Features of Cantharidinae shells; H : height; W : width; HA : height of the aperture; P1, P2, P3, ... : primary cords; S1, S2, S3, ... : secondary cords (shell : *Clelandella miliaris* (Brocchi, 1814), Brittany, Roscoff, 9.4 x 8.0 mm).

Statistical calculations have been performed with Microsoft Excel 2003 and Tanagra 1.4, a free statistical software from Lyon II University.

Abbreviations

Repository

IRSNB : Institut royal des Sciences naturelles de Belgique, Brussels, Belgium.

MNHN : Muséum national d'Histoire naturelle, Paris, France.

Other abbreviations

H : height

W : width

TW : number of teleoconch whorls

P1, P2, P3, : primary cords (P1 is the most adapical)

S1, S2, S3, : secondary cords (S1 is the most adapical)

lv : live-taken specimen(s) present in sample

dd : only dead specimen(s) present in sample

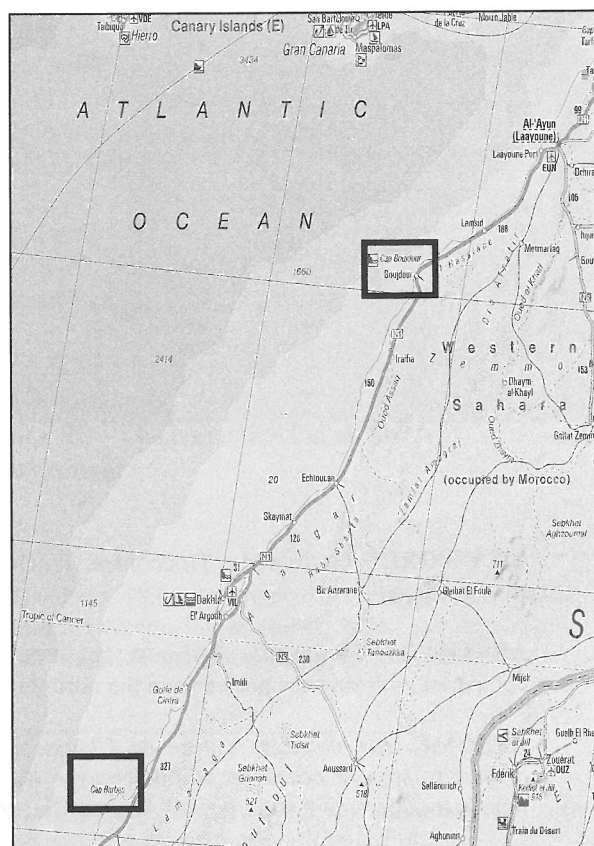
sub : subadult specimen(s)

juv : juvenile specimen(s)

SYSTEMATICS

We follow here the new classification of Williams et al. (2010) who has elevated the Cantharidini tribe (as

it was considered by Hickman & McLean, 1990 and still by Bouchet & Rocroi (2005)) at a subfamily level of the Trochidae.



Text figure 2 : Prospecting area in this paper

Superfamily : **TROCHOIDEA** Rafinesque, 1815

Family : **TROCHIDAE** Rafinesque, 1815

Subfamily : **CANTHARIDINAE** Gray, 1857

Genus : *Clelandella* Winckworth, 1932

Type species : *Trochus clelandi* W. Wood, 1828 (= *Trochus miliaris* Brocchi, 1814) (by o.d.) – Pliocene, northern Italy.

Distinctive features. Shell rather small (height up to 14 mm for the known species), elevated spire almost as high as wide, conical shape with flat whorls. Smooth protoconch with a thin terminal varix. Rather strong spiral sculpture of beaded spiral cords. Angular to subangular periphery. Interrupted peristome, aperture prosocline, rhomboidal. Base from almost flat to moderately convex. No umbilicus or umbilicus very narrow. Variable colour, with various patterns.

Remarks. Gofas (2005) described recently 4 new species from north-western Atlantic and 1 new species from eastern Mediterranean.

***Clelandella miliaris* (Brocchi, 1814)**

Figs 7-14, Text Figs 1, 3

Trochus miliaris Brocchi, 1814: 353, pl. 6, fig. 1.

Type locality: northern Italy, no specified locality; lectotype from qualification as holotype.

Trochus clelandi – W. Wood, 1828: 16, pl. 5, fig. 15.*Trochus millegranus* – Philippi, 1836: 183, pl. 10, fig. 25.*Calliostoma clelandi* – Kaicher, 1979: card#2094.*Calliostoma miliaris* – Poppe & Goto. 1991: 74, pl.6, fig. 9.*Clelandella miliaris* – Giannuzzi-Savelli et al., 1994: 88, figs.279-281.*Clelandella miliaris* – Cretella et al., 1999: 72-74, figs. 13-15, 17-18, 25, 28, 33-34.*Calliostoma miliaris* – Ardovalini & Cossignani, 2004: 71.*Clelandella miliaris* – Gofas, 2005: 134-136, figs. 1-3, 12A-B, 13A-B.*Clelandella miliaris* – WoRMS, 2011: p=taxdetails&id=141774.**Material examined. France.** Brittany, Finistère, near Ouessant, +/- 100 m, 40 dd. – Roscoff, +/- 3 m, 25 lv.**Italy.** Tuscany Archipelago, 2 lv. **Spain.** Off Malaga, 2 lv. **West Africa.** Off Mauritania, 17°45'N, 16°25'W, 3 lv, 1 juv lv.**Distribution.** North-eastern Atlantic, from Norway to West Africa and Mediterranean Sea, 35-800 m.**Remarks.** The main characteristics of this species are :

- height up to 14 mm, width up to 13.8 mm;
- a high spire, a conical shape, with up to 7 flat whorls;
- strongly prosocline axial threads and up to 8 spiral cords, granular by intersection with axial threads; on first whorl, 4 cords P1, P2, P3 and P4 appearing immediately, smooth; P1 slightly weaker than other cords; cords granular by intersection with axial threads as soon as second whorl; secondary cords S2 and S3 appearing by intercalation; P4 thicker on third whorl, dividing into 2 cords on fourth whorl, up to 10 cords on last whorl of big specimens, producing a thick rim making carina;
- columella nearly straight, oblique, with a weak median swelling;
- base almost flat, with 8 to 13 granular spiral cords;
- no umbilicus or very narrow umbilicus reduced to a small slit.

Nicklès (1950) reviewed the known marine species of Western and Equatorial Africa but curiously didn't mention this species. Kaicher (1979) still used the synonym name. At last, Cretella et al. (1999) produced an accurate study of this species.

This is a variable species (Gofas, 2005) regarding size and colour, also sometimes with a slightly

cyrtocnoidal shape instead of a conical one and a subangular instead of angular periphery (some specimens from western Africa). Gofas mention even (without illustrations) some specimens from Ivory Coast with a narrow umbilicus.

***Clelandella artilesi* n. sp.**

Figs 1-4, Table 1, Text Fig. 2, 3

Type material. Holotype (6.9 x 7.2 mm) IRSNB IG.31784/MT2330 for database DaRWIN. Paratypes: 1 MNHN 23351, 2 coll. F. Deniz Guerra, 2 coll. F.Swinen, 1 coll. C.Vilvens.

Type locality. West Africa. Off Western Sahara, 50-60 m.

Material examined. West Africa. Off Western Sahara, 12/1999, 50-60 m, 2 dd sub, 3 dd juv. - Off Western Sahara, 7/2001, 50-60 m, 3 dd (with holotype and 2 paratypes). - Off Western Sahara, 1993-1999, 50-70 m, 15 dd, 7 dd sub, 2 dd juv (with 4 paratypes).

Distribution. West Africa, off Western Sahara, 50-60 m.

Diagnosis. A typical cantharid species with an elevated, conical spire, up to 6 even granular spiral cords on the whorls, an angular periphery, up to 6 or 7 smooth spiral cords on the base and a very narrow or closed umbilicus.

Description. *Shell* of moderate size for the genus (height up to 7.2 mm, width up to 5.1 mm), higher than wide, conical; spire elevated, height 1.2x to 1.4x width; angulate periphery; umbilicus closed or very narrow.

Protoconch about 180 µm wide, of 1 to 1.25 whorls, rounded, smooth with a thin, straight terminal lip.

Teleoconch of up to 6.9 whorls; two first whorls convex, other whorls almost straight, with spiral cords first smooth, granular later and axial threads much more stronger on abapical whorls than on adapical whorls. Suture visible, not canaliculated. First whorl convex, without axial sculpture and 4 smooth cords Pi (i=1,2,3,4) appearing almost immediately, P1 slightly later and weaker; interspace between cords about 1.5 larger than cords; all cord brown except P1 lighter; axial threads very weak, hard to detect; suture impressed, not canaliculated. On second whorl, S2 appearing at first midwhorl, S3 at second midwhorl, both quickly similar to Pi; all cords still smooth. On third whorl, all cords more or less similar in size, except P4 slightly stronger; distance between cords similar to cords; S4 may appear, partly covered by next whorl; weakly prosocline axial threads clearly visible on abapical part, especially between S3, P4 and S4. Shape of whorl weakly convex, almost straight near end. On fourth whorl, axial thread stronger between spiral cords; threads still weakly prosocline;

cords subgranular. On next whorls, spiral cords granular; interspaces almost as wide as cords, except interspace between S3 and P4 slightly greater. On last whorl, beads of P4 (sometimes also of S3) sharp; S4 appearing, thin, almost smooth to weakly subgranular, close to P4.

Aperture roundly rhomboidal; outer lip thin; inside nacreous.

Columella nearly straight, only slightly oblique, with a weak basal swelling forming a kind of blunt tooth.

Base weakly convex, with thin axial threads on whole surface and with 6 or 7 rather low, spiral cords; cords

similar in size to the cords on whorls, weakly subgranular by intersection with axial threads; interspaces between cords greater than or equal to cords; axial threads much thinner and more crowded than axial threads on whorls.

No umbilicus or very narrow umbilicus reduced to a small slit.

Colour of teleoconch pinkish white, sometimes with brownish flames on first whorls only and with brownish dashes on peripheral cords, or sometimes with brownish flames on the whole whorls; protoconch off-white.

	TW	H	W	H/W	TW/H
holotype IRSNB	6.9	7.2	5.1	1.41	0.96
paratype MNHN	6.7	5.9	4.9	1.20	1.14
paratype FDG-1	6.5	5.8	4.6	1.26	1.12
paratype FDG-2	6.4	6.8	5	1.36	0.94
paratype FS-1	6.6	6.4	5	1.28	1.03
paratype FS-2	6.5	6.2	4.9	1.27	1.05
paratype CV	6.5	6.2	4.7	1.32	1.05
<i>means</i>	6.59	6.36	4.89	1.30	1.04
<i>minima</i>	6.40	5.80	4.60	1.20	0.94
<i>maxima</i>	6.90	7.20	5.10	1.41	1.14
<i>standard deviation</i>	0.17	0.50	0.18	0.07	0.07

Table 1. – *Clelandella artilesi* n. sp.: Shells measurements in mm for types (FDG : F. Deniz Guerra coll.; FS : F. Swinnen coll.; CV : C. Vilvens coll.).

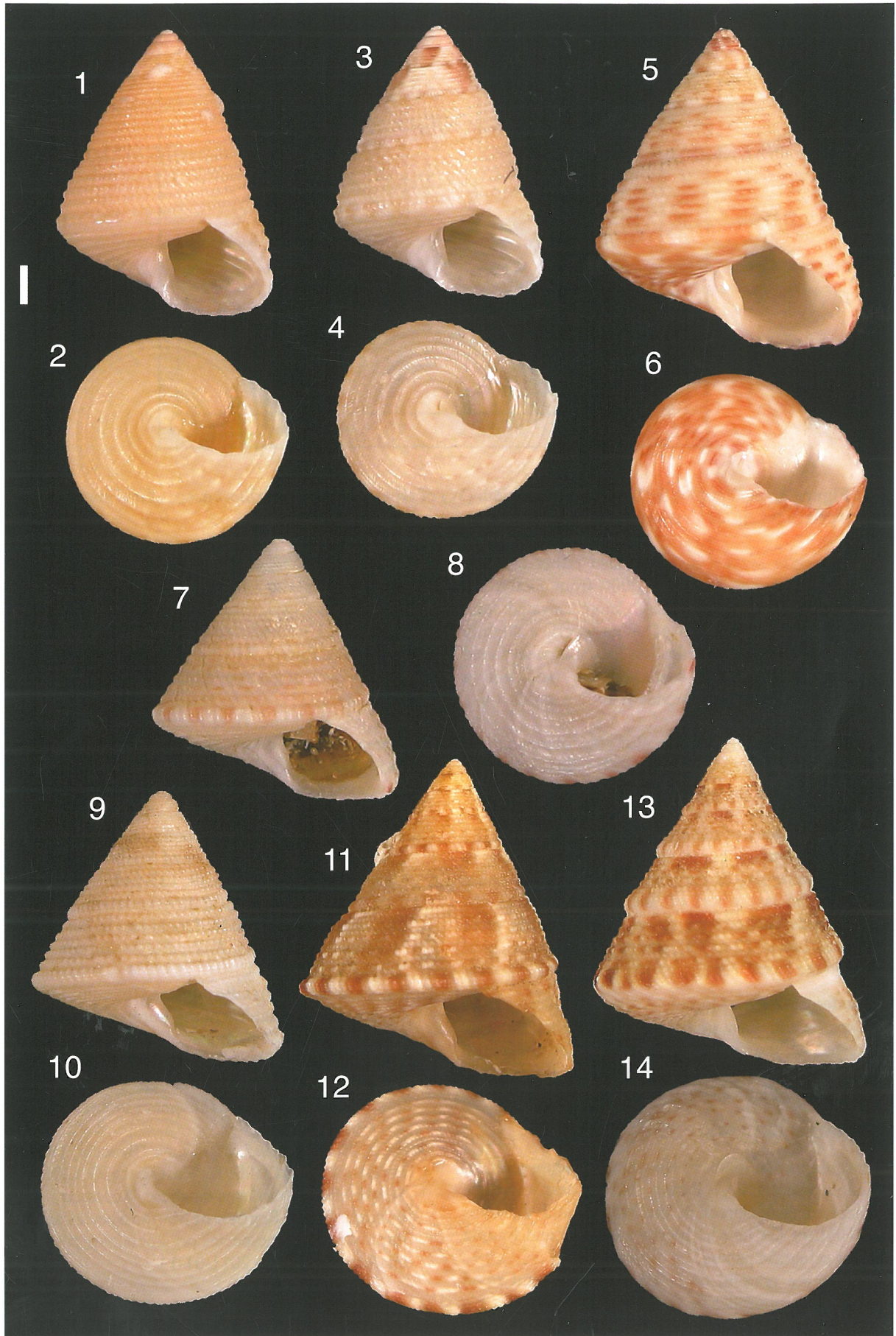
Discussion. The new species is close to *Clelandella miliaris* (Brocchi, 1814) (Figs 7–14) but differs from it mainly by a greater height/width ratio (about 1.30 instead of about 1.15 for *C. miliaris* – see scatter plot there under showing the different slope for the regression lines), a spiral cord P4 similar in size to the

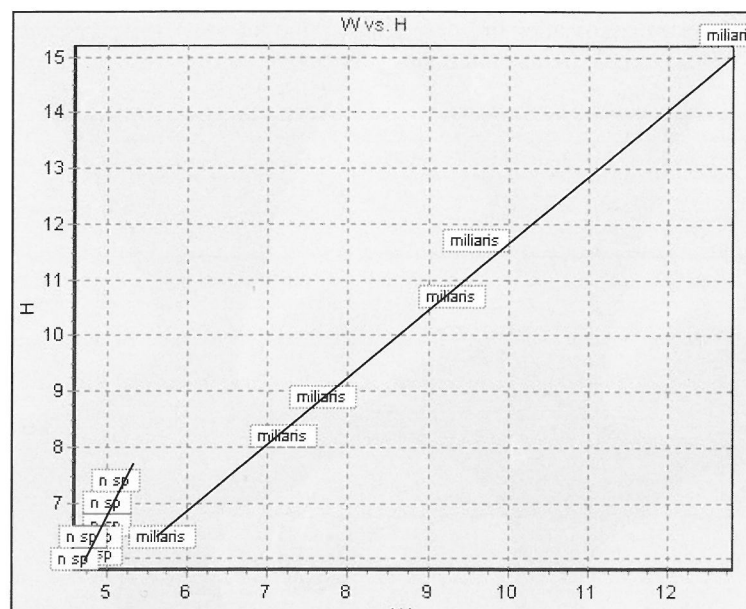
other cords (instead of being much stronger, producing usually a prominent peripheral rim) never divided in or covered by thinner spiral cords (3–10 such cords are present on *C. miliaris*), axial threads weakly prosocline with an angle of about 30° with vertical (instead of 45°).

Plate 1. Figures 1–12. Scale bar: 1 mm.

1–4. *Clelandella artilesi* n. sp., West Africa. Off Western Sahara, 50–60 m. **1–2.** Holotype IRSNB (IG.31784), 7.2 x 5.1 mm. **3–4.** Paratype MNHN (23351), 5.9 x 4.9 mm.

5–6. *C. madeirensis* Gofas, 2005, holotype MNHN, Madeira archipelago, off Porto Santo, 430 m, 8.3 x 7.0 mm. **7–14.** *C. miliaris* (Brocchi, 1814). **7–8.** Off Mauritania, 6.2 x 5.7 mm. **9–10.** France, Brittany, Finistère, near Ouessant, 8.7 x 7.7 mm. **11–12.** Italy, Tuscany Archipelago, 9.1 x 7.1 mm. **13–14.** Spain, off Malaga, 15.2 x 12.8 mm.





Text Figure 3 : Scatter plot for height (H) and width (W) of types *Clelandella artilesi* n. sp. of and some examined specimens of *C. miliaris*.

Clelandella artilesi n. sp. is also rather close to *Jujubinus catenatus* Arduvini, 2006 from Sicily, but this similar in size species has a more elevated spire (with a greater H/W ratio of about 1.50), a slightly cyrtconoidal shape, a transversely elongated flared aperture, thinner spiral cords on the base and a different coloration with reddish brown cords on a light green background.

The new species may also be compared to *Clelandella madeirensis* Gofas, 2005 (Figs 5–6) from Madeira, but this species is slightly greater (height up to 8.3 mm for a similar number of whorls), has a different ontogeny of the cords (S3 appearing first, S2 later and 2 tertiary cords appearing and growing to reach the same size as the other cords, giving 9 spiral cords on the last whorl of the holotype), lacks the axial threads between the spiral cords and has more numerous (up to 12 or 13), uneven and thinner spiral cords on the base.

Etymology. After Miguel Artiles, collector from Arinaga, South East of the Island of Gran Canaria, interested in the marine malacofauna of the entire world and occasional collaborator of the third author for the study of land shells from Canarias.

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REFERENCES

- Arduvini, R. & Cossignani, T. 2004. *West African Seashells*. L'informatore Piceno, Ancona. 319 pp.
- Bouchet, P. & Rocroi, J.P. 2005. Classification and nomenclator of gastropod families. *Malacologia* 47 (1–2): 1–397.
- Cretella, M., Scillitani, G. & Picariello, O. 1990. The systematic position of "*Trochus*" *miliaris* Brocchi, 1814 (Gastropoda: Trochidae); morphological and biological evidences. *Lavori della Società Italiana di Malacologia* 23: 51–81.
- Curini-Galletti, M. 1985. Taxonomic notes on Trochidae : two new species of *Jujubinus* from the Canary Islands. *Basteria* 49: 133–144.
- Gofas, S. 2005. Geographical differentiation in *Clelandella* (Gastropoda: Trochidae) in the Northeastern Atlantic. *Journal of Molluscan Studies* 71: 133–144.
- Gofas, S. 2009. *Clelandella miliaris* (Brocchi, 1814). In: taxonomic database of the European Marine Mollusca of the Department of Systematics & Evolution of the Muséum national d'Histoire naturelle, Paris. Accessed through: CLEMAM at <http://www.somali.asso.fr/clemam/biotaxis.php> on 2011-01-13.
- Gofas, S. 2010. *Clelandella miliaris* (Brocchi, 1814). In: Bouchet, P.; Gofas, S.; Rosenberg, G. (2010) World Marine Mollusca database. Accessed through: World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdet&id=141774> on 2011-01-13

- Hickman, C.S. & Mc Lean, J.H. 1990. Systematic revision and suprageneric classification of trochacean gasteropods. *Natural History Museum of Los Angeles County Science Series* VI+169 pp.
- Kaicher, S.D. 1979. *Card catalogue of world-wide shells*. Trochidae Part 1. Pack #21. Cards 2072-2177.
- Nicklès, M. 1950. *Mollusques testacés marins de la côte occidentale d'Afrique*. Ed. P. Lechevalier. 269 pp.
- Rolan, E. 2005. *Malacological fauna from the Cape Verde archipelago*. Conchbooks, Hackenheim. 455 pp, 82 plates.
- Rolan, E. & Swinnen, F. 2009. Two new species of the genus *Jujubinus* from the Canary Archipelago. *Gloria Maris* 48(1): 1-9.
- Segers, W. 2002. On some shallow-water marine molluscs of the Azores. *Gloria Maris* 41(4-5): 84-104
- Segers, W., Swinnen, F. & De Prins, R. 2009. *Marine molluscs of Madeira*. Snoek Publishers, Zwijndrecht. 611 pp, 90 plates.
- Vilvens, C. & Swinnen, F. 2007. Description of a new *Solariella* species (Gastropoda: Trochoidea: Solariellidae) from the Azores. *Novapex* 8(3-4): 123-126.
- Williams S.T., Donald K.M., Spencer H.G. & Nakano T. 2010. Molecular systematics of the marine gastropod families Trochidae and Calliostomatidae (Mollusca: Superfamily Trochoidea). *Molecular Phylogenetics and Evolution* 54: 783-809.