First report and illustration of the mysterious *Drillia saulcydianum* (Recluz, 1851) (Mollusca: Gastropoda: Drilliidae) in recent literature

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Keywords: GASTROPODA, DRILLIIDAE, *Drillia saulcydianum,* Sierra Leone, West Africa.

Abstract: After more than a century, to my knowledge, a second specimen of *Drillia saulcydianum* (Recluz, 1851) was found in a shell collection. This species was neglected or erroneously identified in collections as well as in literature. After the record of this unique shell in Senegal, the second specimen originated from Sierra Leone. Both are described and figured in this paper.

Abbreviations:
FN: Private collection of Frank Nolf.
RBINS: Royal Belgian Institute for Natural Sciences.

Introduction: During a check-up of my collection of COLUMBELLIDAE I accidentally found a shell from Sierra Leone I had myself labelled as *Mazatlania sp*. However, *Mazatlania* is a typical genus of the West American East Pacific area without representatives in West Africa. So, from a closer look under magnification, it appeared to be a turrid shell. At that time I was not in possession of the work of Recluz, describing and figuring *Pleurotoma saulcydianum* and even after searching in older literature for the last months, I did not make the link with this shell. My specimen was found in 'crabbed condition' and the brown band in the middle of the last whorl was only superficially present. In the Dautzenberg collection (RBINS) the samples labelled as '*Drillia saulcydiana*' contained several specimens of different species such as *Drillia recordata* Sykes, 1905 and *Crassispira fuscobrevis* Rolán, Ryall & Horro, 2007 but none of them was the real *D. saulcydianum*. It is remarkable that we had to wait for more than a century to again get acquainted with that 'lost' species. I suspect this can be explained by the fact this animal only lives in small colonies in a region hardly accessible for fishermen and shell collectors.

Material examined: One specimen trawled at 33 m off Sierra Leone in 1990. Size: 15.34 mm. FN.

Description:

***Pleurotoma saulcydianum* Recluz, 1851**
Plate 5, fig. 6 in Recluz (1851)

'*Testa subfusiformi, turrita, transversim crebre striata, longitudinaliter plicata; anfractibus deenis, superne depressis, albido-lutescentibus, inferne spadiceo-fasciatis; plicis superioribus tuberculiformibus, in ultimo flexuosis, robustisque; anfractu infimo ventricoso, medio late fasciato; labro acuto, suturam versus late emarginato; canali brevissimo, emarginato. Hab. Le Sénégal. (Coll. Petit.)*'

This species has about 10 whorls, the last whorl occupying half the length of the whole shell. The '*Pleurotoma of Saulcy*' is nearly fusiform and turriculated, provided with many transverse, regular, distinct striae on a glossy surface, particularly at the base of the body whorl. Longitudinal folds run over the whole surface, resulting in a double row of tubercles in the upper side of each whorl, and becoming particularly robust and flexuous in the last whorl. The siphonal canal is very short and incised at the base. The aperture is oval in outline, whitish, with the central brown band partly showing through. The parietal wall on the inner lip is reflected and ends in a small, depressed knob. The external margin shows a large shallow notch below the suture.
Colour: Yellowish white with a reddish brown band at the base of each whorl, becoming a broad zone in the middle of the body whorl. This feature is hardly visible in the specimen in collection FN, as it was not caught alive.
Size: the unique Recluz specimen in collection Petit de la Saussaye measured 21 mm; in collection FN: 15.34 mm.

Plate 30, fig. 78: *Drillia umbilicata*

Plate 8, fig. 24: *Drillia dunkeri* (Weinkauff, 1876) – wrongly estimated to be an immature example of *D. umbilicata* by Tryon (1884: 179) (Tippett, 2006)

Plate 11, fig. 82: *Drillia umbilicata*

Plate 11, fig. 91: *Drillia saulcydianum*

From: Tryon, G.W., Jr., 1884. Conidae, Pleurotomidae. *Manual of Conchology, Structural and Systematic, with Illustrations of the Species*. **Vol. VI**. Tryon, Philadelphia. 413 pp, 34 pls.

Discussion:

Tryon (1884) stated that *Drillia saulcydianum* (plate 11, fig. 91) little differs from *Drillia umbilicata* Gray, 1838 (plate 11, fig. 82; plate 30, fig. 78) '*in sometimes possessing a broad indistinct central band of light chestnut*' and he continues '*the shells are adult, although not so large as the type*'. So, Tryon concluded: '*Of its identity with D. umbilicata there can be no question*.' However, we can immediately ascertain *D. saulcydianum* and *D. umbilicata* are two different species. Besides the glossy surface both species have few characteristics in common. *D. umbilicata* (Plate II, Figs 4-7) has a strongly tuberculate shoulder with the broad sinus in the outer lip produced upwards. The inner lip is thickened below, forming a false umbilicus with the axis. The brown band in the middle of the whorl is restricted to pinkish brown blotches of the same colour only visible on the distinct longitudinal folds. In *D. saulcydianum*, these folds are restricted to a double row of tubercles on each whorl. In general the outline of both species is very different.

Acknowledgements:

I am very grateful to David Monsecour for controlling the English text and to Johan Verstraeten who revised the original content.

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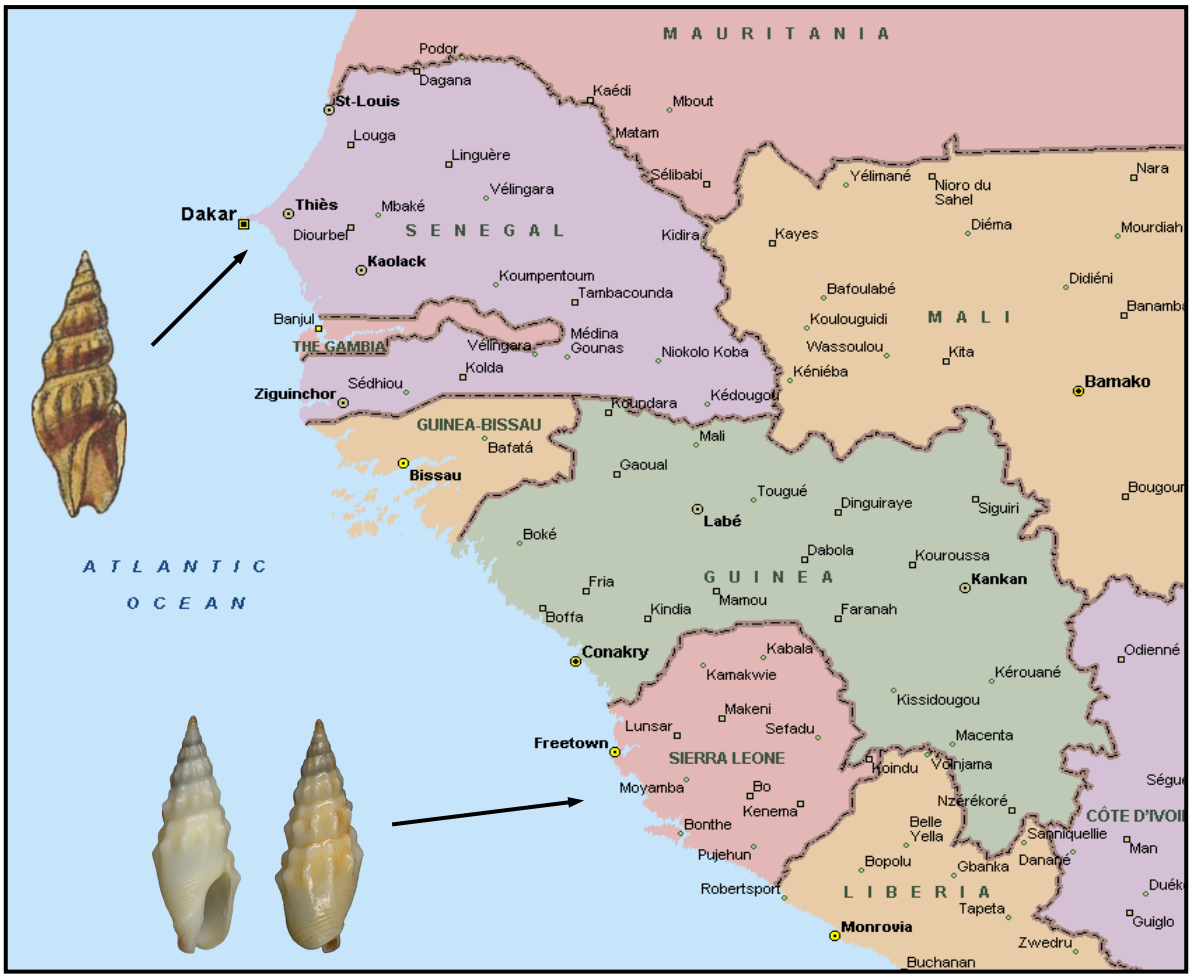

Geographic distribution of *Drillia saulcydianum* (Recluz, 1851)

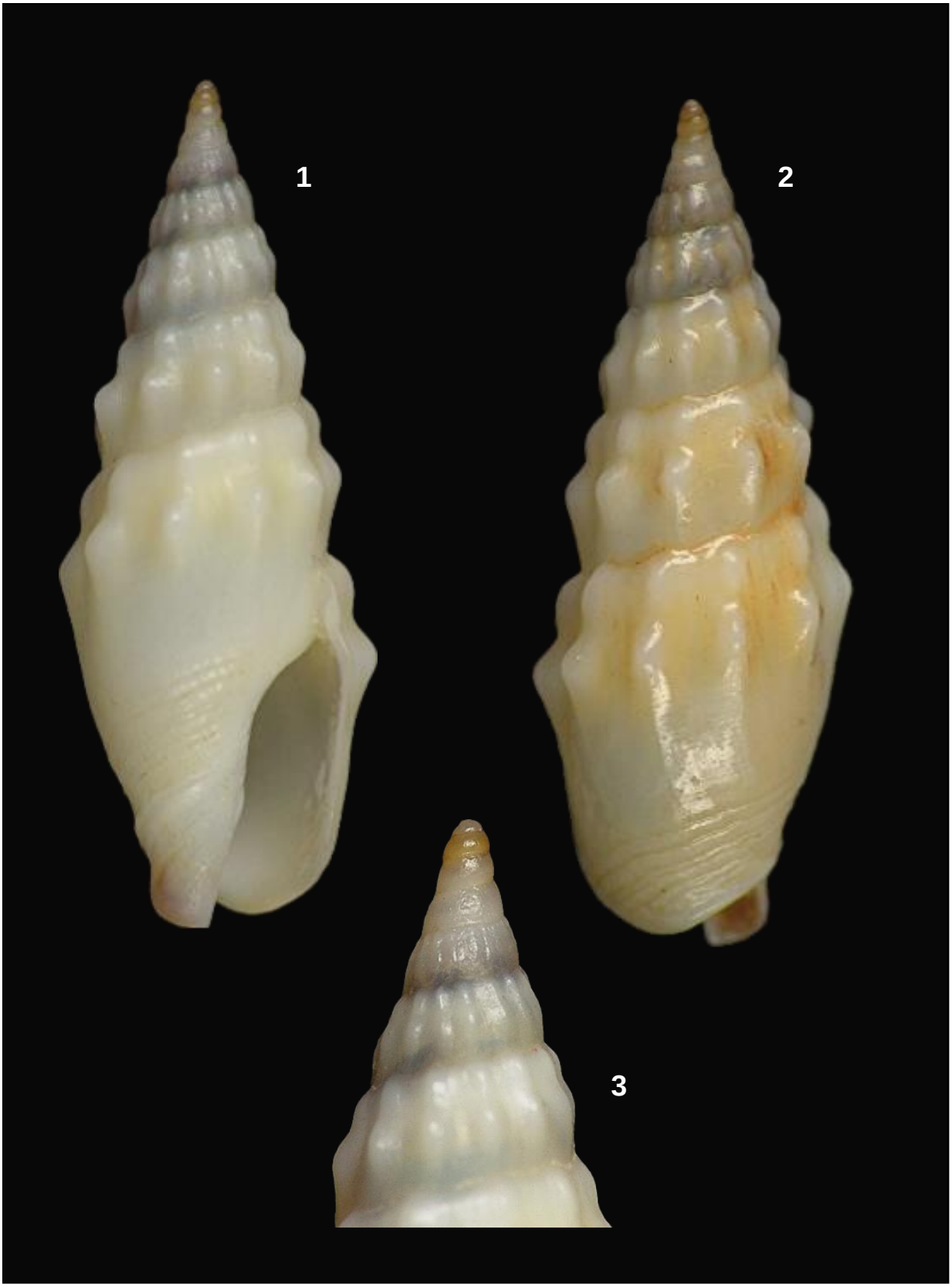

Plate I. Figs 1-3: *Drillia saulcydianum* (Recluz, 1851). Sierra Leone. Dredged at a depth of 33 m. 1990. 15.34 mm. FN.

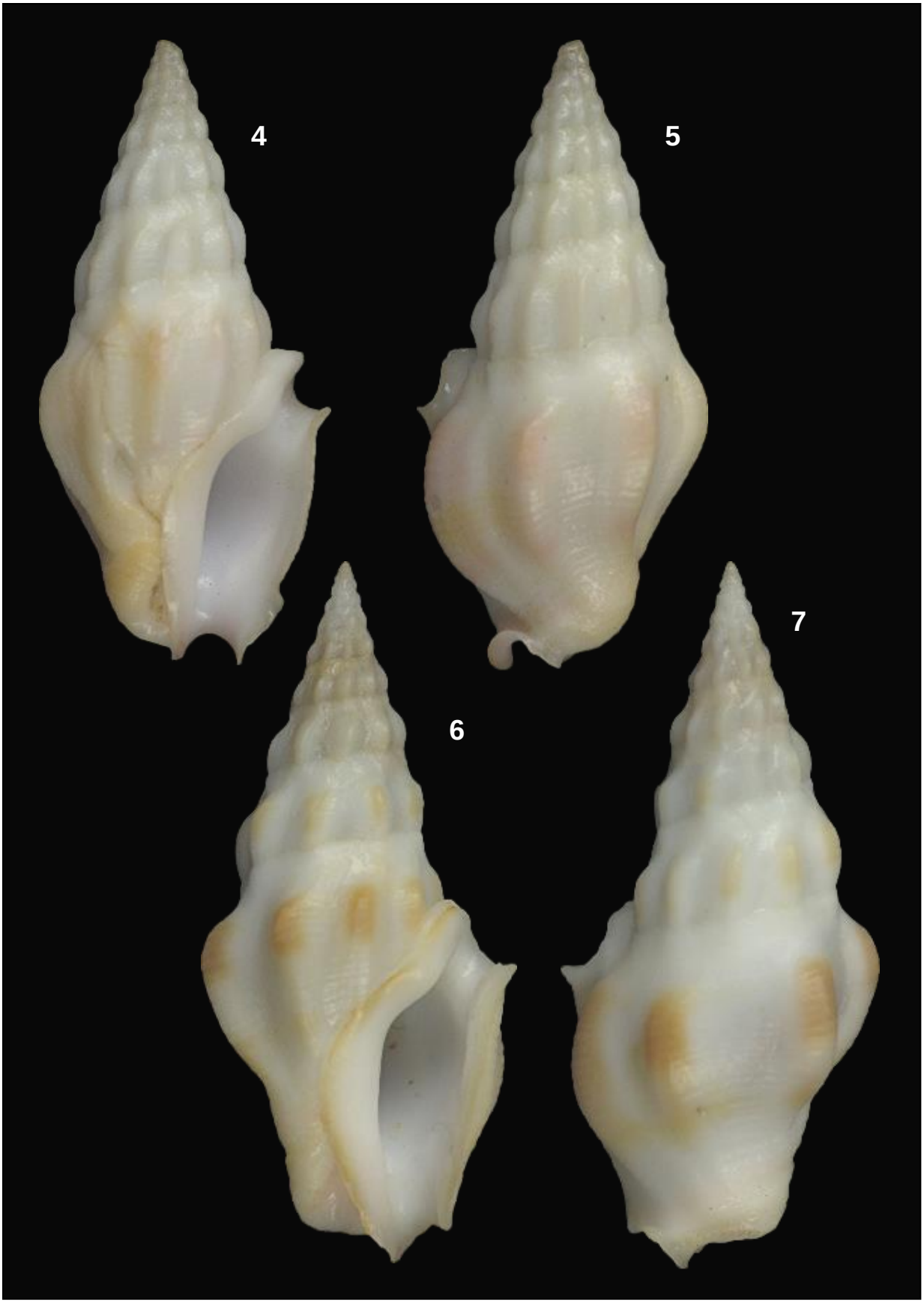

Plate II. Figs 4-7: *Drillia umbilicata* Gray, 1838. Bay of Gorée, Dakar, Senegal. Dredged at a depth of 18 m, at night. December 1980. FN; 4-5: 25.80 mm; 6-7: 28.27 mm.

Two new turrid species from West Africa: *Clavatula delphinae* and *Clavatula pseudomystica* (Mollusca: Gastropoda: Clavatulidae)

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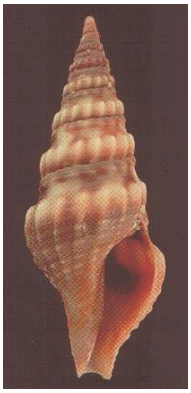
Keywords: GASTROPODA, CLAVATULIDAE, *Clavatula delphinae, Clavatula pseudomystica*, West Africa, new species.

Abstract: During the study of a sample of crabbed turrid shells from Pointe-Noire (Congo-Brazzaville) some specimens, collected by the French shell collector Paul-Henri Hattenberger could not be identified. After comparing them with similar shells from nearby West African countries it appeared to concern two new species, described and figured here as *Clavatula delphinae* and *Clavatula pseudomystica*.

Abbreviations:
FN: Private collection of Frank Nolf.
JV: Private collection of Johan Verstraeten.
PHAT: Private collection of Paul-Henri Hattenberger.
PR: Private collection of Peter Ryall.
RBINS: Royal Belgian Institute for Natural Sciences.

Introduction: During the study of *Clavatula martensi* von Maltzan, 1883 it became clear that the figure in Ardovini & Cossignani (2004) was not that species at all. Actually the specimen illustrated by the Italian authors could represent a new species.



This resulted in a complete revision of all *Clavatula* species in the collection FN by which some unidentified West African shells were linked to the juvenile specimens of a sample gathered by P.-H. Hattenberger in Pointe-Noire (Congo-Brazzaville). Two of them differed from the remaining specimens and were similar to shells from Ghana and Gabon. They appeared to belong to a new species, *Clavatula delphinae*, comparable to the recently described species *Clavatula congoensis* Nolf & Verstraeten, 2008.
Another new species, *Clavatula pseudomystica*, had to be introduced after careful comparison with turrid shells from Angolese waters.

Clavatula delphinae
(Plate I, Figs 1-8; Plate II, Figs 9-10; Plate II, Fig. 16)

Type material:
Holotype: Plage Koraf, Pointe-Noire, mouth of the Songolo-river, Congo-Brazzaville. Collected at a depth of 4 m. 1995. 13.71 mm. RBINS.

Paratypes:
1. 10.81 mm (juvenile specimen) (FN). Off Takoradi Harbour, Ghana. Dredged among shell grit, between stones, at a depth of 15 m. 8 August 1999.
2. 13.76 mm (JV). Pointe-Noire, mouth of the Songolo-river, Congo-Brazzaville. Dived in sandy mud at a depth of 4 m. 1995.
3. 14.38 mm (FN). Cap Esterias, Gabon.
4. 15.40 mm (FN). Plage Koraf, Pointe-Noire, mouth of the Songolo-river, Congo-Brazzaville. Collected in sandy mud at a depth of 4 m. 1995.
5. 16.33 mm (PHAT). Plage Koraf, Pointe-Noire, mouth of the Songolo-river, Congo-Brazzaville. Collected in sandy mud at a depth of 4 m. 1995.

Description: The protoconch consists of 2.5 glossy whorls, followed by 7 whorls in the adult stage of the largest specimens. The body whorl occupies nearly two thirds of the shell's length. An axial sculpture of numerous close-set, oblique angular ribs is present on the lower part of the whorls of the spire, extending just above the lower suture. On the last whorl these ribs (14-15) gradually become weaker from the subsutural area towards the lower part of the body whorl, where they end in two rows of small nodules. The whole surface of the last whorl and the sipho is intersected by a fair number of spiral threads. The suture is distinct and slightly undulating due to the incision of the oblique ribs followed by a weakened rounded ridge and an inconspicuous subsutural area intersected by about five very faint encircling lines. The sinus is narrow and neatly curved.
Colouration: The shell is covered by a pattern of brown and bluish grey or milky-white blotches and even more brown streaks or flammules in the subsutural zone and in the lowest part of the body whorl. A greyish-white zone runs over the oblique ribs of all the whorls and the angular knobs at the periphery of the last whorl.
The two rows of tiny nodules in the lower part of the body whorl are white.

The margin of the mouth is brown to chestnut brown, becoming dark bluish grey deeper inside the aperture. The columellar plate is white in the middle and changes into pale brown further on the parietal wall. No animals found.

Measurements: From 10 to 17 mm, maybe 30-35 mm as a maximum size.

Etymology: The name '*delphinae*' is derived from '*Delphine*', the name of my granddaughter. For convenience sake the last vocal '*e*' in '*Delphine*' has been omitted.

Habitat: In sandy mud, among stones, in the littoral to the infralittoral zone (2-10 m).

Locus typicus: Pointe-Noire, Congo-Brazaville.

Geographic range: From Ghana to Gabon and Congo-Brazzaville.

Discussion: The figure of *Clavatula martensi* by Ardovini & Cossignani (2004) could be the species described at present. As this shell measures 31 mm it can be supposed the present study only concerns small (10 to 17 mm) or nearly juvenile specimens. The larger size could result in a somewhat different ratio body whorl/total length, though most other characteristics are comparable. In fact *C. delphinae* can only be confused with the recently described *C. congoensis* Nolf & Verstraeten, 2008 [Neptunea, 7(1): 17-29] (Plate II, Figs 11-14). However, the latter has a slenderer, turriculated shell and is not as glossy. *C. delphinae* has only 9.5 whorls (protoconch included) compared to the 11 whorls of *C. congoensis*, and the number of oblique ribs on the body whorl is also lower (14-15 instead of 17-20). *C. congoensis* has a deeper subsutural excavation and more conspicuous angular oblique ribs. As to the colouration, the upper part of the excavated subsutural band is dark brown and the lower part pale grey, whereas it is light bluish grey mottled with brown flammules in *C. delphinae*. For a report on the differences between *C. congoensis* and the similar *C. lelieuri* (Recluz, 1851) see the paper on the introduction of *C. hattenbergeri* and *C. congoensis* as new species (Nolf & Verstraeten, 2008). A figure of *C. petzyae* Boyer & Ryall, 2006 (Plate II, Fig. 15) is added to consolidate the unique character of the new species.

Clavatula pseudomystica
(Plate III, Figs 17-21; Plate IV, Figs 22-25)

Type material:

Holotype: Saco Mar, Namibe, South Angola. In rock crevices. Dived at a depth of 3 m. 17.43 mm. RBINS.

Paratypes:

1. 18.21 mm (FN). Saco Mar, Namibe, South Angola. In rock crevices. Dived at a depth of 3 m.
2. 21.38 mm (FN). Cabinda, Angola. Dredged at a depth of 2-6 m. In sandy mud. 1968.
3. 27.64 mm (PR). Cacuaco, Angola. In sand, at low tide.

Description: The protoconch consists of 2.5 whorls. In the largest specimens it is followed by 6 whorls in the adult stage, while the body whorl occupies about half of the shell's length. An axial sculpture of numerous close-set, somewhat flexuous ribs is present on the lower part of the whorls of the spire, extending just above the lower suture. On the last whorl these ribs change into a series of 23-25 oblique knobs at the carina. From the shoulder onwards, about twenty spiral threads run over the lower half of the body whorl and the siphonal canal. In the middle of the last whorl a slight raised keel is present and just below midwhorl, it is supported by 2 rows of tiny white nodules. The suture is distinct and slightly undulating followed by a weakened rounded ridge and an inconspicuous subsutural area intersected by about five very faint encircling lines. The columella is weakly developed and ends in a distinct knob. It is not reflected. The sinus is neatly curved under the shallow notch of the posterior canal. In fresh specimens the whole surface is covered by an olive-brown periostracum.
Colouration: Brown to chestnut brown throughout, except the oblique ridges on the whorls of the spire, the weakened knobs at the carina and the two series of spiral ridges below the keel of the body whorl, which are creamy white. The inside of the aperture is dark bluish grey surrounded by a brown border at the margin. The lower part of the columella has a typical white blotch changing into a dark brown pattern on the parietal wall.
The animal was not studied.

Measurements: From 17 to 28 mm.

Etymology: The name '*pseudomystica*' refers to the similarity with *Clavatula mystica* (Reeve, 1843).

Habitat: In rock crevices, at a depth of 2-6 m.

Locus typicus: Saco Mar, Angola.

Geographic range: From Congo-Brazzaville to Namibe (South Angola).

Discussion: This species has a certain affinity with *Clavatula mystica* (Reeve, 1843) (Plate V, Figs 26-31) regarding general outline and the presence of oblique knobs on the carina. Yet, *C. pseudomystica* has a longer spire and thus a different ratio of body whorl/total length compared to *C. mystica*. Both have a keel in the middle of the last whorl, but in *C. mystica* it is more prominent and the latter has a typical double row of angular or sometimes rounded knobs. *C. mystica* tends to develop a false umbilicus, which is absent in *C. pseudomystica*. The colouration of both species, particularly of the columellar side, is also different. *C. pseudomystica* is rather uniformly darker coloured, while *C. mystica* is a pale cream-white shell, generally with a dark subsutural area.

Acknowledgements: I am very grateful to J.-P. Van Goethem, Thierry Backeljau and Mrs. Sablon, all from the RBINS (Brussels, Belgium), for the kind help and the possibility of studying and photographing shells from the Dautzenberg collection. Paul-Henri Hattenberger was so kind to provide samples from Pointe-Noire (Congo-Brazzaville). I thank Johan Verstraeten (Oostende, Belgium) for a critical perusal of the text and David Monsecour (Aarschot, Belgium) for carefully controlling the English translation.

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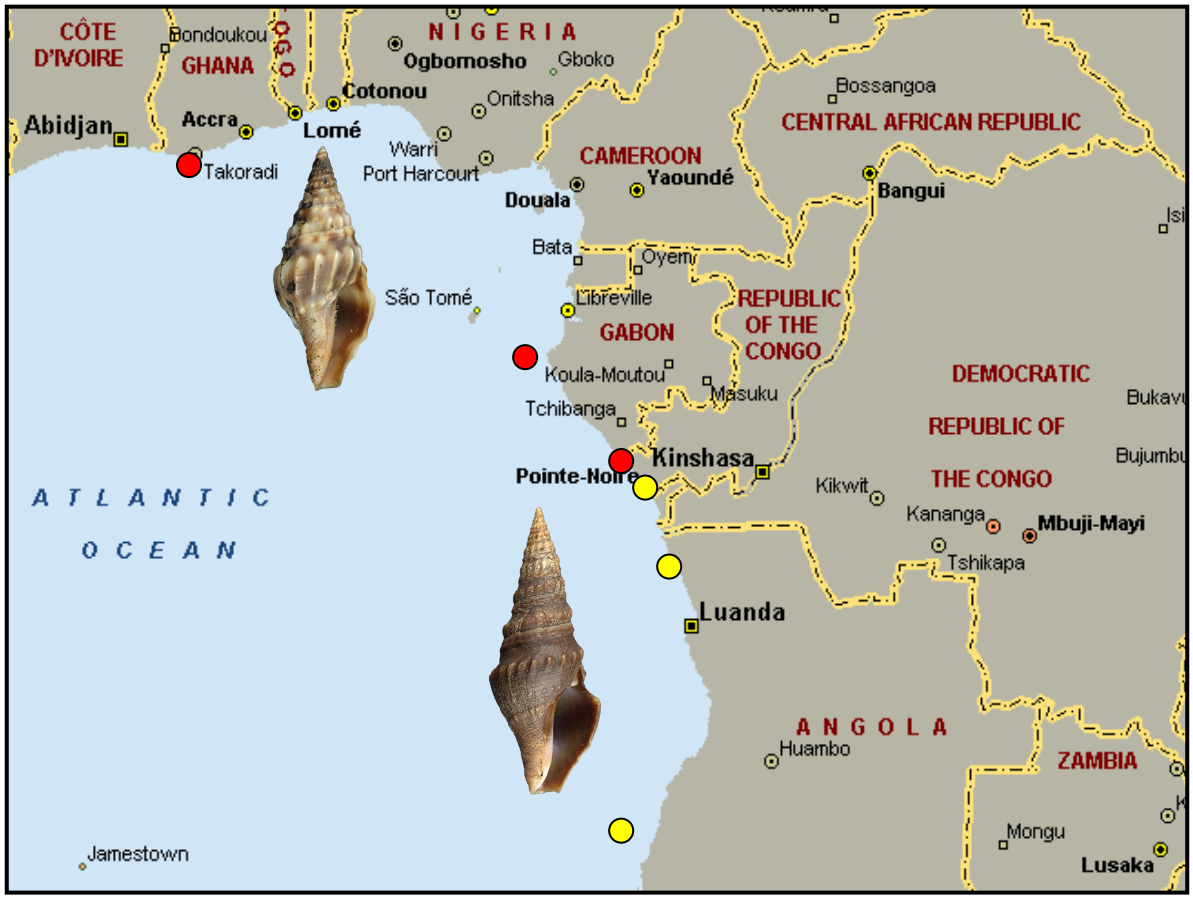

Geographic distribution of *Clavatula delphinae* and *C. pseudomystica*

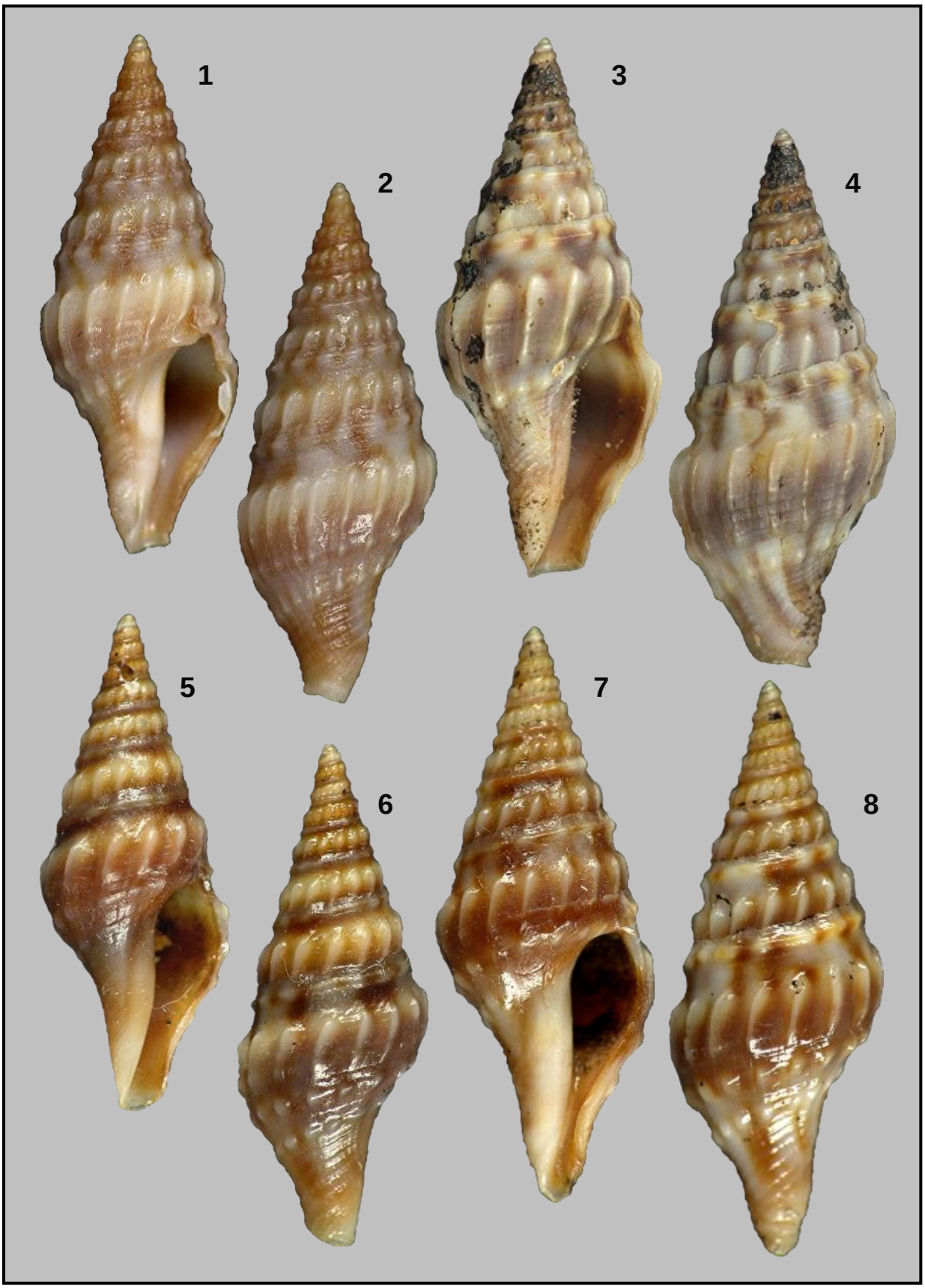

Plate I. Figs 1-8: *Clavatula delphinae*; 1-2: Cap Esterias, Gabon. Dredged. 14.38 mm. Paratype 3. FN; 3-8: Plage Koraf, Pointe-Noire, mouth of the Songolo-river, Congo-Brazzaville. Collected in sandy mud at a depth of 4 m. 1995; 3-4: Paratype 4. FN. 15.40 mm; 5-6: 13.71 mm. Holotype. RBINS; 7-8: 16.33 mm. Paratype 5. PHAT.

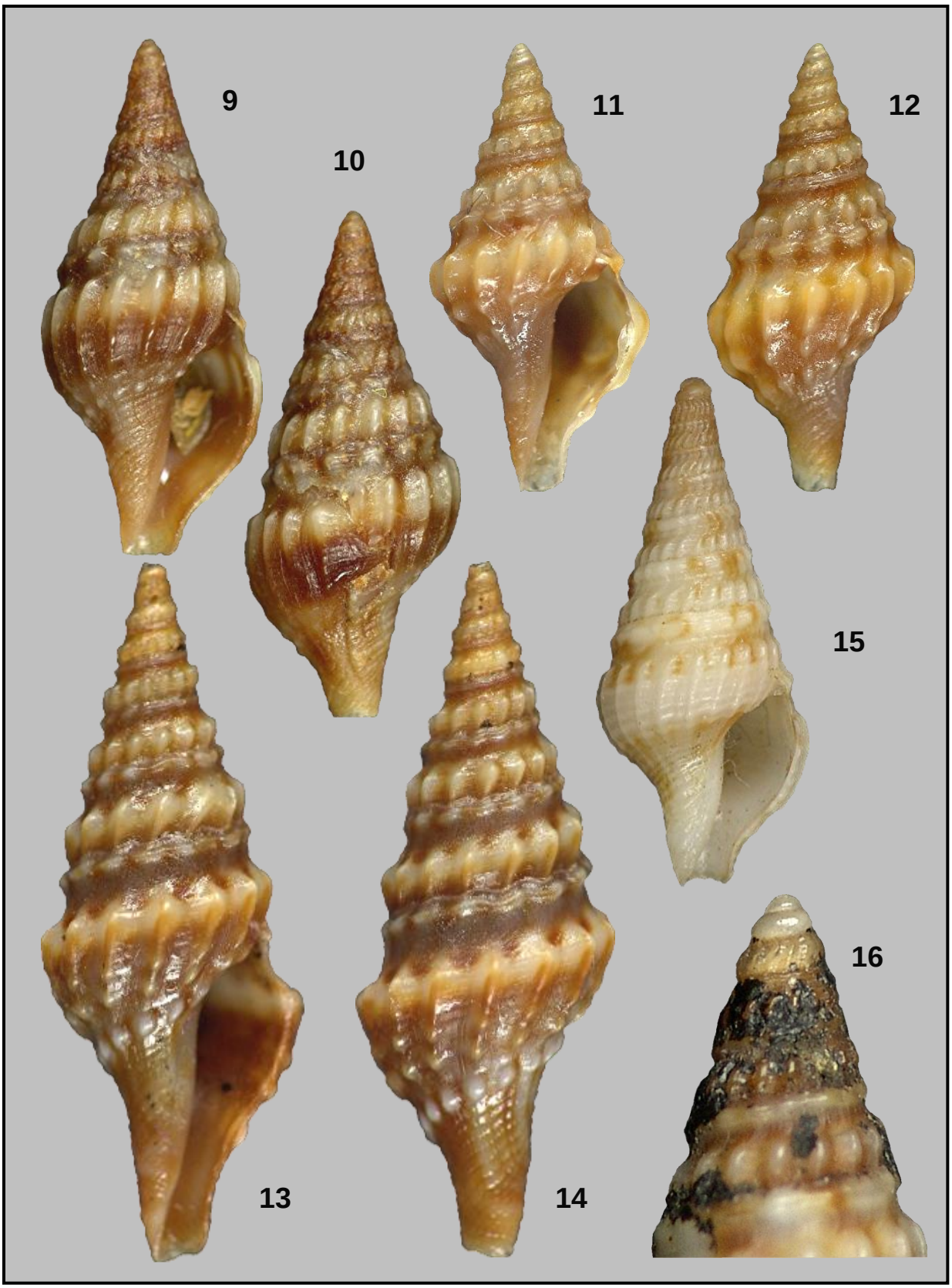

Plate II. Figs 9-10: *Clavatula delphinae*. Off Takoradi Harbour, Ghana. Dredged among shell grit between stones at a depth of 15 m. 8 August 1999. Paratype 1. 10.81 mm (juvenile specimen). FN; Figs 11-14*: Clavatula congoensis* Nolf & Verstraeten, 2007. Plage de Pointe Indienne, Pointe-Noire, Congo-Brazzaville. In sandy mud. 1995; 11-12: 8.95 mm (juvenile specimen). PHAT; 13-14: 15.95 mm. PHAT. Fig. 15: *Clavatula petzyae* Boyer & Ryall, 2006. Off Ajua Bay, Ghana. Dived under rock, in fine sand at a depth of 10 m. 10.98 mm. FN. Fig. 16: *Clavatula delphinae*. Protoconch.

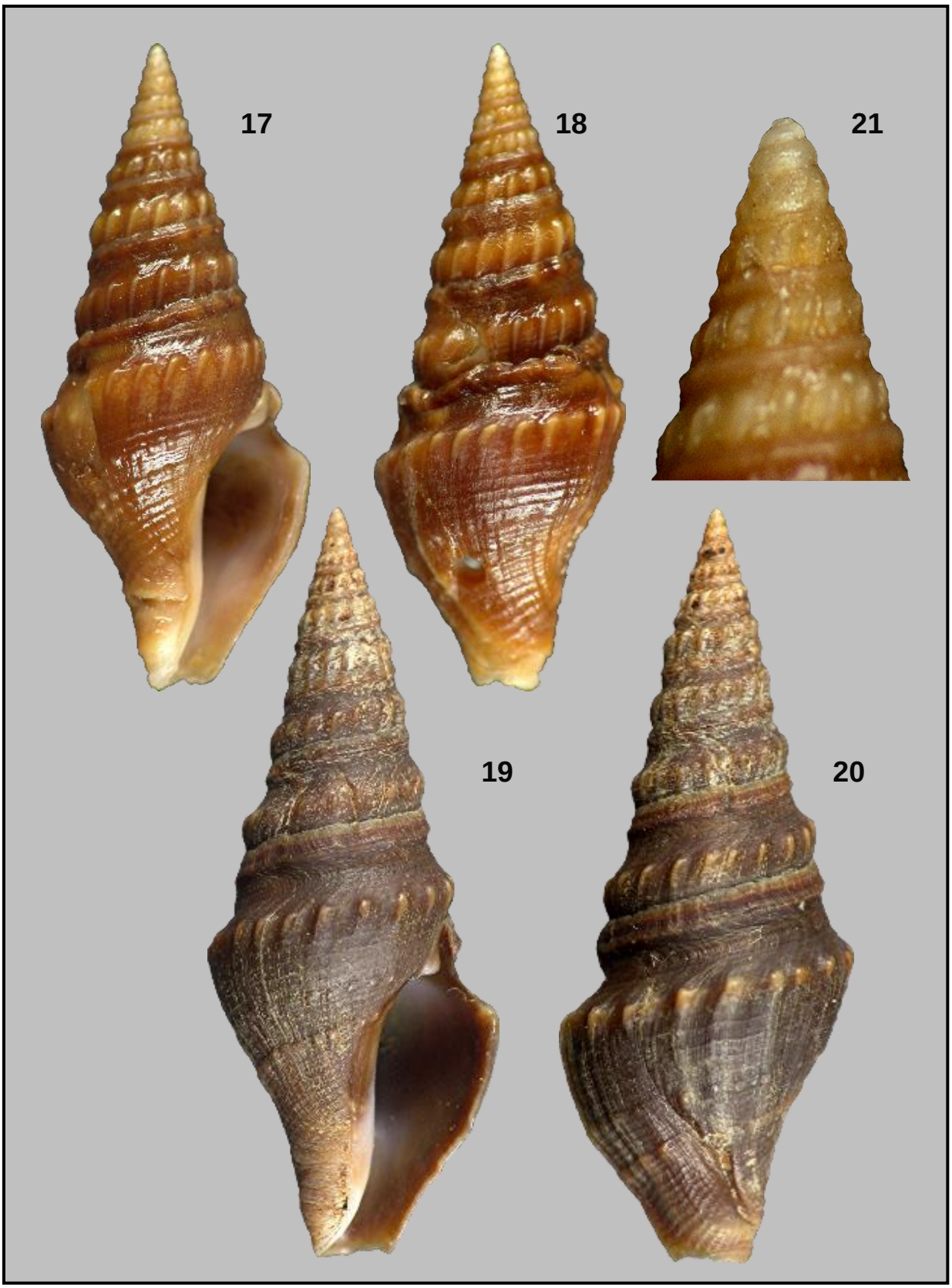

Plate III. Figs 17-21: *Clavatula pseudomystica*; 17-18: Cabinda, Angola. Collected in sandy mud at a depth of 2-6 m. 1968. 21.38 mm. Paratype 3. FN; 19-20: Cacuaco, Angola. In sandy mud, at low tide. 27.64 mm. Paratype 4. PR; 21: Protoconch.

Plate IV. Figs 22-25: *Clavatula pseudomystica.* Saco Mar, Namibe, South Angola. In rock crevices. Dived at a depth of 3 m; 21-22: 17.43 mm. Holotype (RBINS); 24-25: 18.21 mm. Paratype 1. FN.

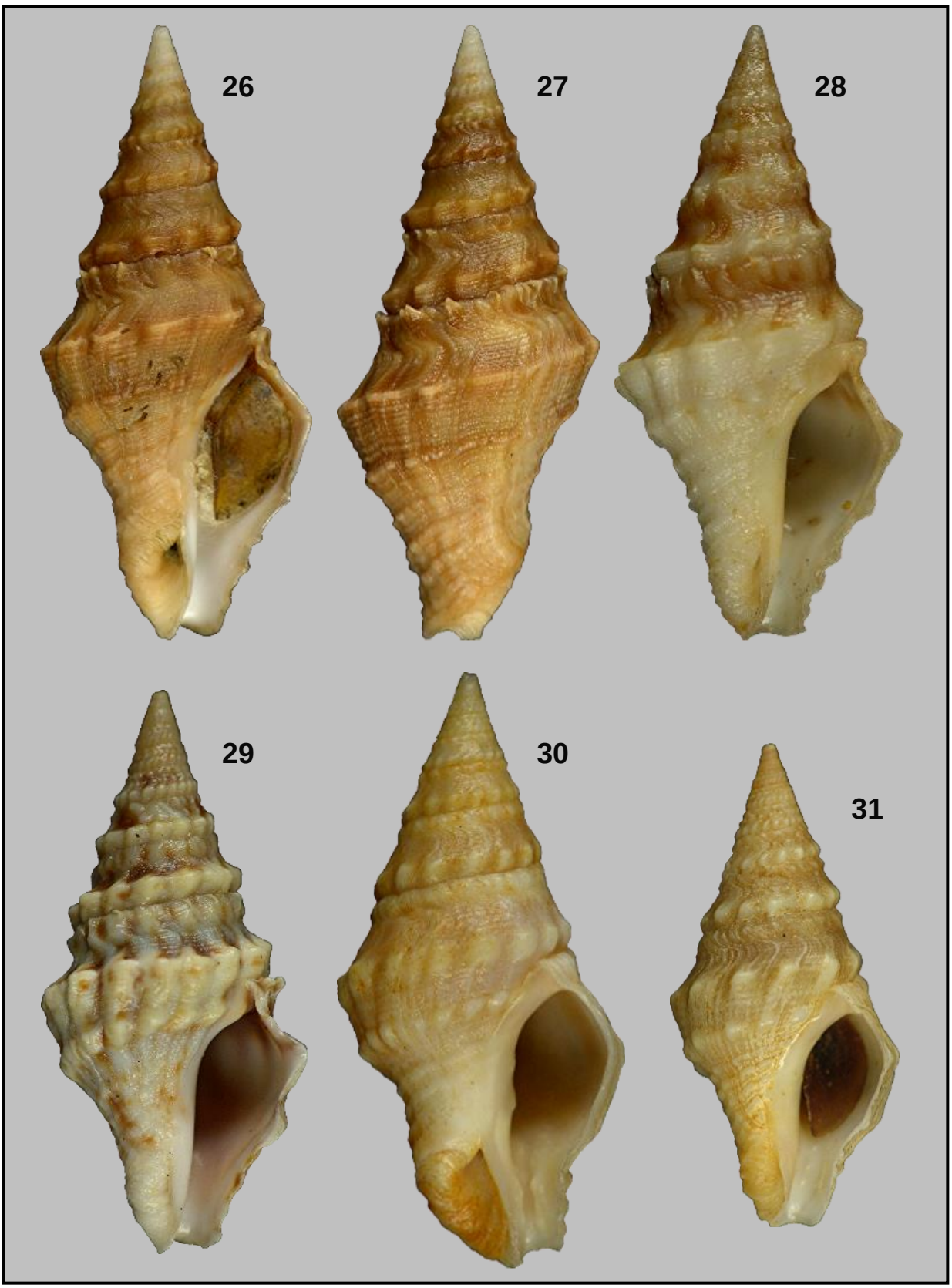

Plate V. Figs 26-31: *Clavatula mystica* (Reeve, 1843). FN; 26-27: Bay of Gorée, Dakar, Senegal. By SCUBA-diver, under stones in rocky area at a depth of 9 m. 15 March 1978. 35.67 mm; 28: Senegal. Dredged by fishermen. 35.78 mm; 29: Dredged off Abidjan, Ivory Coast. 1976. 25.91 mm; 30: Off Ambriz, Angola. Trawled by Belgian fishermen at a depth of 73 m. 1973; 28.18 mm; 31: Nouadibou, Mauritania. Trawled by fishermen. 22.89 mm.

About the true identity of *Drillia ballista* von Maltzan, 1883 *and Drillia tripter* von Maltzan, 1883 (Mollusca: Gastropoda: Drilliidae) as well as their differences compared to *D. annielonae* Nolf & Verstraeten, 2007

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Keywords: GASTROPODA, DRILLIIDAE, *Drillia ballista, Drillia tripter, Drillia annielonae*, West Africa.

Abstract: As a result of a careful investigation of the turrid material dredged by the "*Atlantide*" Expedition (ZMC) and the shells in the Dautzenberg collection (RBINS), the real status of *Drillia ballista* von Maltzan, 1883 and *D. tripter* von Maltzan, 1883 is established. Both are compared to the recently described species *Drillia annielonae* Nolf & Verstraeten, 2007.

Abbreviations:
FN: Private collection of Frank Nolf.
ZMC: Universitets Zoologisk Museum, Copenhagen, Denmark.
RBINS: Royal Belgian Institute for Natural Sciences.

Descriptions:

***Drillia ballista* von Maltzan, 1883**

Original description by von Maltzan (1883): '*T. lanceolata, gracillima, apice submamillato, cerea, unicolor. Anfr. 10-1, sub sutura carinula obtusa cingulati, caeterum striis validiusculis, plicas verticales sat numerosas (11-12 in anfractu ultimo) subobliquas, undulatas, in anfr. ultimo obsoletiores decussantibus ornati. Apert. anguste elliptica, intus concolor, canali brevi, ab apertura sat distincto, columella stricta; peristoma acutum, superne anguste et satis profunde sinuatum.*
Alt. 18.5, diam. 5.5, alt. apert. Incl. canali 7.5 mm.
Hab. Gorée.'

Remarks by von Maltzan: '*Nur in 2 leeren Gehäusen im Schlamm 25 m tief gefunden. Diese Art ist, obwohl in Gestalt und Sculptur sehr verschieden, mit der vorhergehenden (= D. tripter* – FN remark*) doch nahe verwandt und desshalb vorläufig am besten bei Drillia untergebracht*.'

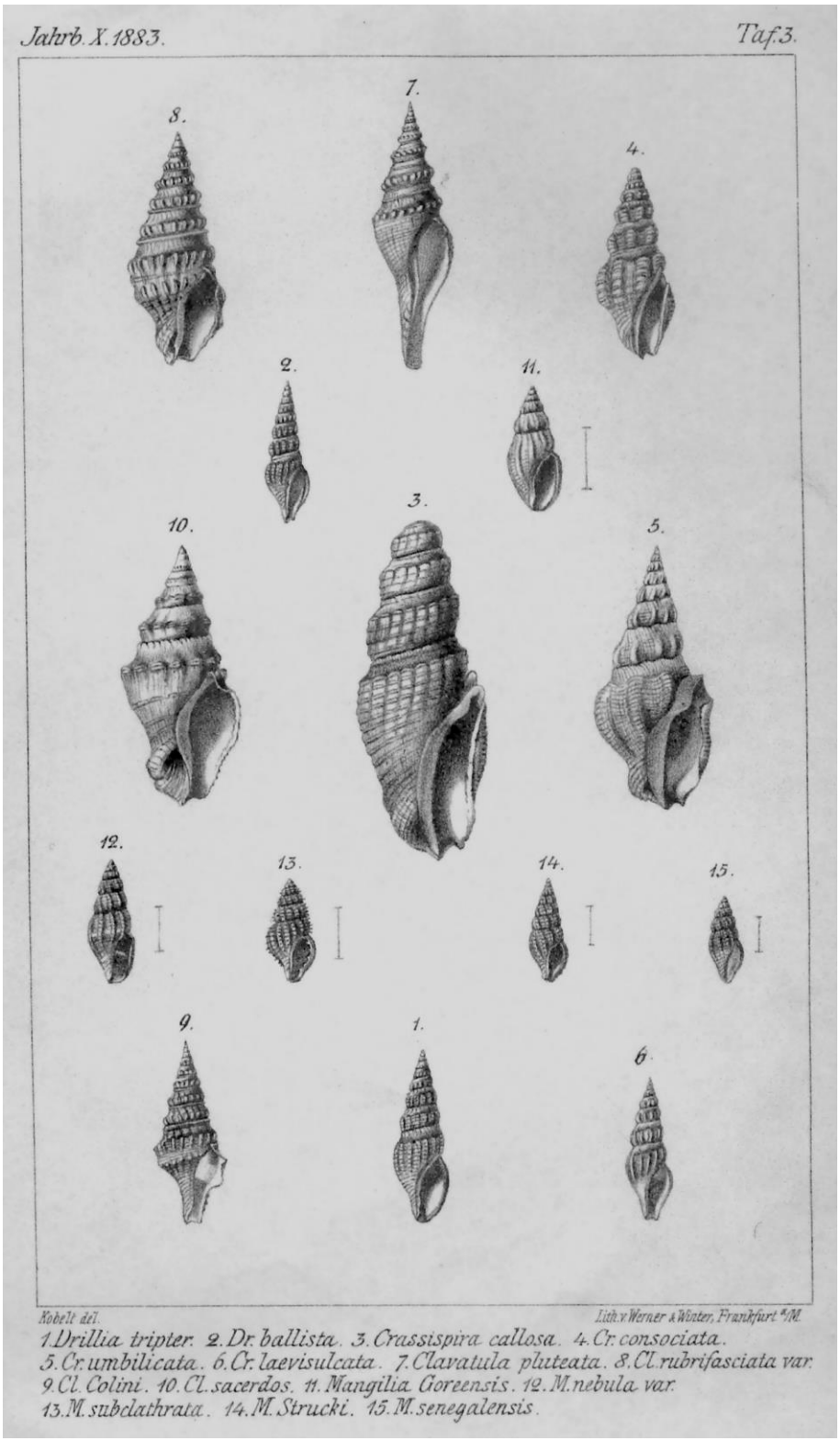
This means that only 2 empty shells were found in mud at a depth of 25 m. Although size and structure of this species are very variable, von Maltzan stated that this species is closely related to *D. tripter*.

***Drillia tripter* von Maltzan, 1883**

Original description by von Maltzan (1883): '*T. lanceolata, gracilis, pallide violacea, ad suturam hic illic obscure maculata. Anfr. 10, striis spiralibus superne nullis, inferne validiusculis, plicas verticales numerosas (17-18 in anfr. ultimo), obliquas, undulatas in anfractibus junioribus usque ad suturam pertinentes decussantibus ornati. Sculptura spiralis cum sculptura longitudinali tubercula numerosa, acutiuscula efficit. Apertura anguste elliptica intus concolor, canali brevi, lato, columella substricta; peristoma acutum, crenulatum, superne usque ad suturam late, sed non profunde sinuatum.*
Alt. 23, diam. 7, alt. apert. incl. canali 9 mm.
Hab. prope Gorée, insulam afr. occid.'

Remarks by von Maltzan: '*Von dieser zierlichen Art fand ich in einer Tiefe von ca. 20 m im Schlamm eine kleine Anzahl meist leerer Gehäuse; der Deckel veranlasst mich, sie zu Drillia zu stellen*.'

We can deduce from the German text that a few shells of this elegant species were found in mud at a depth of about 20 m. Most of them appeared to be empty. Von Maltzan relied on the operculum of the live caught specimens to classify this species as a *Drillia*. On the basis of these descriptions and figures we have to conclude that both species are very similar and it is not so evident to clearly distinguish them. Moreover, the lack of a definite and full comparison between the two species has often resulted in a serious confusion later on.



Text figure 1

From: Maltzan, H.F. von, 1883. Beiträge zur Kenntnis der senegambischen Pleurotomiden. *Jahrbücher der Deutschen Malakozoologischen Gesellschaft*, 10:115-135, pl. 3, **fig. 1: *Drillia tripter* von Maltzan, 1883; fig. 2: *D. ballista* von Maltzan, 1883.**

To avoid further confusion a detailed description of both species is presented here, based on the original text by von Maltzan, the very short sentences by Tryon (1884), the more thorough comments by Weinkauff (1875-1887) and especially on specimens in collection FN.

***Drillia ballista* von Maltzan, 1883**
(Plate I, Figs 1-5; Plate II, Figs 8-11)

Very slender, elegant shell with nipple-like apex and 10-11 whorls. The clearly incised suture is surrounded by a thickened but sharp ridge and followed by a shallow excavation. A number of 9-12 oblique broad ribs, alternating with small interstices are crossed by 16-22 spiral cords on the last whorl and 4-5 ribs on the penultimate whorl. The aperture is relatively narrow, ending in a short siphonal canal, with a sharp edge and bordered by a pretty deep sinus at the top.
The colour is uniformly white to wax-yellow or pale orange-brown.
Size: 11-18 mm.

***Drillia tripter* von Maltzan, 1883**
(Plate I, Fig. 6-7; Plate III, Figs 12-19)

Slender, elegant shell with 10 whorls. Below the clear suture there is a broad excavation with faint spiral threads. A number of 14-18 oblique ribs on the last whorl are crossed by 18-22 parallel spiral ribs causing a series of weak nodules. The mouth is oviform, with a rather short canal. The edge of the aperture is sharp and the columellar margin is reflected and thick, ending in a projecting callus at the upper shallow wide sinus.
The colour generally varies from creamy yellow to a dull violet-brown. The excavation below the suture is uniformly lilac-brown, often ornamented with sparse brown dots. A dark brown band, interrupted by cream coloured oblique ribs, follows a paler zone on the upper half of the last whorl. Interstices are sometimes provided with the remains of an olive-brown periostracum. The aperture is light brown or creamy white.
Size: 13-20 mm.

In recent literature both species have correctly been figured by Ardovini & Cossignani (2004).

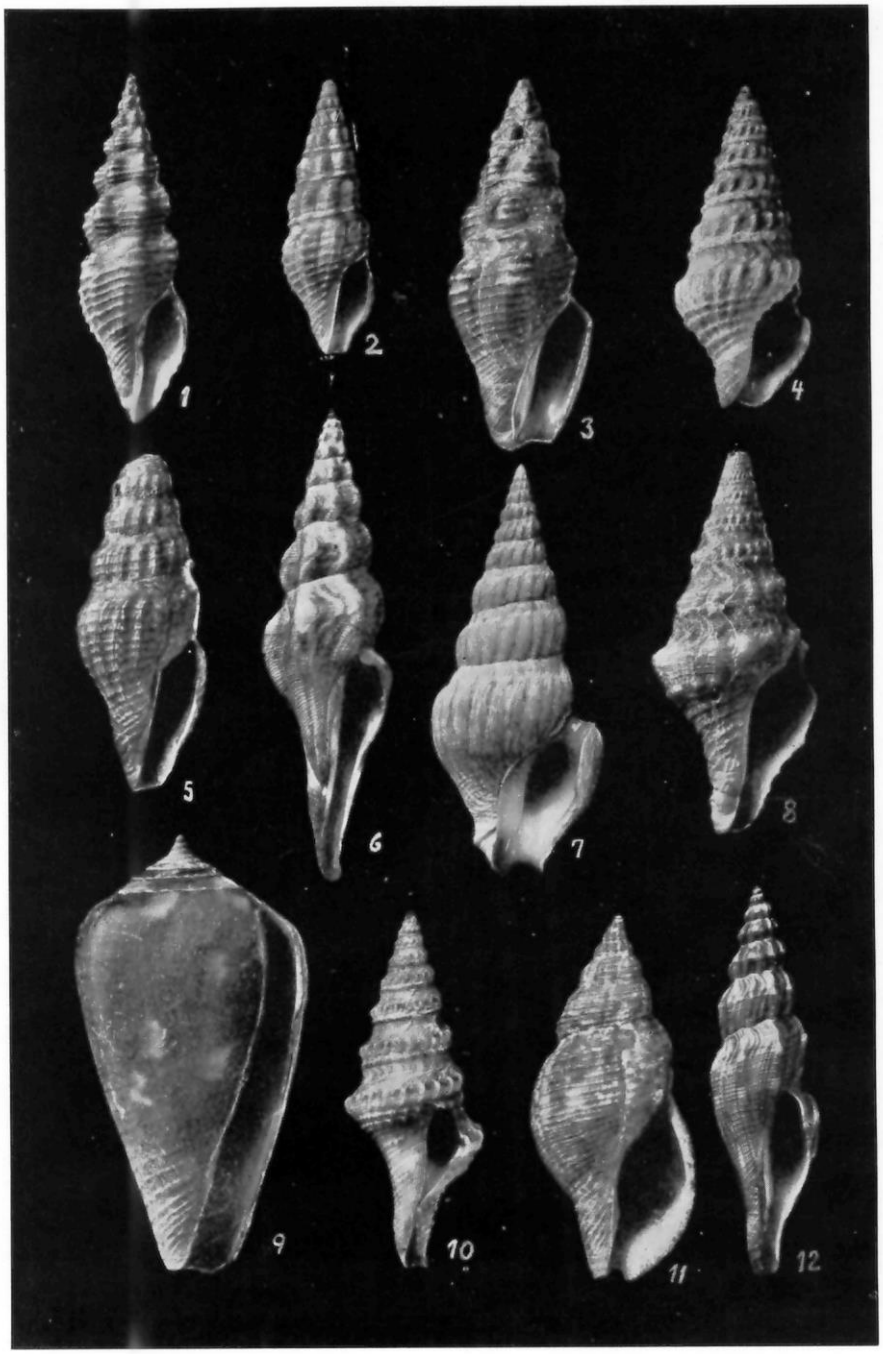
Remarks about the study of J. Knudsen
The Danish scientist J. Knudsen (1952) was the first author to publish a photograph of *Drillia ballista* (plate II, fig. 2 in Knudsen, 1952, text figure 1 in this paper). On Plate I, Figs 1-7 of the actual paper a complete survey of all the specimens collected by the "*Atlantide*" Expedition is reproduced.
For an unknown reason Knudsen was unable to study the type specimen of *D. ballista* for comparison with the "*Atlantide*" material at that moment (1952). Yet, he succeeded in obtaining the specimens from the Dautzenberg collection (RBINS) on loan. Knudsen stated that the Dautzenberg specimens '*differ in many characters considerably from the original description*'. As these shells possess more than 20 ribs on the body whorl, instead of 10-12 ribs as in *D. ballista* and the "*Atlantide*" specimens, we can conclude the Dautzenberg shells belonged to *D. tripter* von Maltzan, 1883. While studying samples in the Dautzenberg collection I personally observed that the famous Belgian shell collector was also unaware of the real identity of both *D. ballista-D. tripter* and in some cases he had added question marks on the back of the labels.
These features were confirmed by the following characteristics: the ribs in the specimens involved are narrower with broad interstices between them, whereas the ribs in the "*Atlantide*" representatives are much broader and thus very adjacent to each other. The "*Atlantide*" specimens have a strongly developed spiral sculpture, particularly across the ribs, whereas in Dautzenberg's specimens the spiral sculpture is weaker. In both samples the protoconch is without sculpture. In the "*Atlantide*" specimens it consists of two whorls, whereas the protoconch is less inflated and only 1.5 whorl is present in the Dautzenberg specimens. Based upon the description by von Maltzan (1883), Knudsen concluded that the "*Atlantide*" specimens are without doubt representatives of *D. ballista*. It is surprising that Knudsen didn't relate the Dautzenberg specimens to *D. tripter*, which was described and illustrated in the same paper by von Maltzan (1883). In the original description von Maltzan remarked that *D. ballista* is indeed a very variable species, but in fact only two (!) empty specimens were involved in his study. Knudsen for his part did a research on only three specimens. The problem with *D. ballista* is that this species is quite a rare shell, thus hard to obtain.
During careful study of the "*Atlantide*" material, kindly received on loan from the ZMC, I remarked that two different shells were present in the sample from Station 65. Plate I, Figs 1-2 (this paper) is the specimen from Station 70 and corresponds to the photograph on plate II, fig. 2 (Knudsen, 1952). This specimen was probably used by Knudsen in his discussion on the true identity of *D. ballista*. Figs 4-7 on Plate I (this paper) belong to Station 65: Figs 4-5 being another specimen of *D. ballista*, while Figs 6-7 clearly have to be attributed to another species, namely *D. tripter* von Maltzan, 1883.

It is amazing to assess that Knudsen has never established the similarity between the third different specimen in the "*Atlantide*" material and the representatives of *D. tripter* in the Dautzenberg collection. This can only be explained by the fact that Knudsen probably only claimed samples of *D. ballista* from RBINS (Brussels, Belgium) and he failed to ask for samples of *D. tripter* as well. The shells labelled '*D. tripter*' in the Dautzenberg collection are that species for sure, but perhaps another sample marked with question mark on the back ('*ex col. Bouvier, ou ballista ? von Maltz*.') was sent to Copenhagen for investigation. The latter concerns another species close to *Clavatula martensi* von Maltzan, 1883. As descriptions and figures in the paper of von Maltzan (1883) were so confusing, Knudsen probably ignored the third different specimen of the "*Atlantide*" Expedition, certainly because he was unable to study the type-material of *D. ballista*-*D. tripter* in 1952.

The presence of *D. ballista* in the "*Atlantide*" material was confirmed by Knudsen in the final publication of the results of this expedition (1956). However, in the same year Knudsen created confusion after studying a small collection of marine prosobranchs collected off Senegal and French Guinea by Dr. I. Marche-Marchad (Knudsen, 1956). He mentions *D. ballista* as a species belonging to that material, surprisingly preceding it by a question mark. Though he was able to investigate von Maltzan's type specimen of *D. ballista* at that moment, his description and figures (plate 2, figs 7-8) match *D. tripter*! Knudsen did not compare the Senegalese specimens from Marche-Marchad to the shells dredged by the "*Atlantide*" Expedition and he ignored his own conclusions made in the "*Atlantide*" report, where a completely different shell had been illustrated. He evidently neglected the comparison with *D. tripter* and he logically states in his remarks: '*It is with some hesitation that I refer the present material to D. ballista.*' The following is notable in this discussion: '*I have had the opportunity of seeing the von Maltzan's type specimen and it seemed to agree fairly well with <u>one</u> of the shells of the present material.*' Unfortunately, this specimen was not illustrated by Knudsen (1956), but the shells figured on his plate 2, figs 7-8 belong to the remaining part of the sample. Knudsen mentions the characteristics differentiating that unique individual from the other specimens in the samples involved from Gorée Bay and Madeleine Island (Senegal). He states that both the type specimen of *D. ballista* and that unique differing specimen possess a more developed spiral edge at the subsutural band and a smaller number of ribs (13, compared to 11-12 in the original description by von Maltzan) against 16-19 in the material of Marche-Marchad (the latter being the typical number of axial ribs in *D. tripter*, 17-18 as mentioned in the original description). So, I presume two different species were present in the Marche-Marchad material, namely one specimen of *D. ballista*, and eight specimens of *D. tripter*, matching the figures on plate 2 (Knudsen, 1956).
The number of spiral ridges (about 18 on the body whorl and 5 on the penultimate whorl) mentioned by Knudsen is the same as in the type specimen of *D. ballista* and the specimens of Marche-Marchad. Coincidently this is also the same number of spiral cords in shells of *D. tripter*. Moreover, the total length of the largest studied shell (22.8 mm) rather corresponds to *D. tripter* - which is a slightly larger shell - than to *D. ballista* (12.5 mm and 11.2 mm – ZMC; 14.4 mm and 17.7 mm – FN). It is unfortunate that Knudsen ends his conclusions with the statement that the differences observed between the single shell and the remaining eight specimens of the two samples involved, are '*hardly sufficient*' to separate them from each other. If he had compared the types of *D. ballista* and *D. tripter* he could have resolved the problems that he created himself. A closer look at his earlier work on *D. ballista*-specimens, collected by the "*Atlantide*" Expedition, could have avoided this doubtful identification.

From this critical discussion based upon the work of J. Knudsen, the following conclusions can be put forward:

- The specimen figured on plate II, fig. 2 in Knudsen (1952) is a specimen of *Drillia ballista*, dredged by the "*Atlantide*" at St. 70 (4° 50' N. / 2° 49' W., Ghana, from a muddy bottom at a depth of 60-65 m - 15 January 1946; size: 11.25 mm);
- One specimen from St. 65 (4° 24' N. / 7° 05' W., Ivory Coast, dredged in muddy sand at a depth of 78 m – 1 January 1946; size: 12.49 mm) is also *D. ballista*;
- The second specimen from St. 65 (size: 12.95 mm) is *D. tripter*;
- One of the specimens (Gorée Bay and Madeleine Island, Senegal) belonging to the Marche-Marchad collection and discussed by Knudsen (1956) is probably *D. ballista*;
- The remaining eight specimens in the same samples are without doubt representatives of *D. tripter.*



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Text figure 2

From: Knudsen, J., 1952. Marine Prosobranchs of Tropical West Africa collected by the “Atlantide” Expedition 1945-46. *Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kjobenhavn*. Bd. 114: 129-185, pl. II, **fig. 2** : ***Drillia ballista* von Maltzan, 1883**. Station 70.

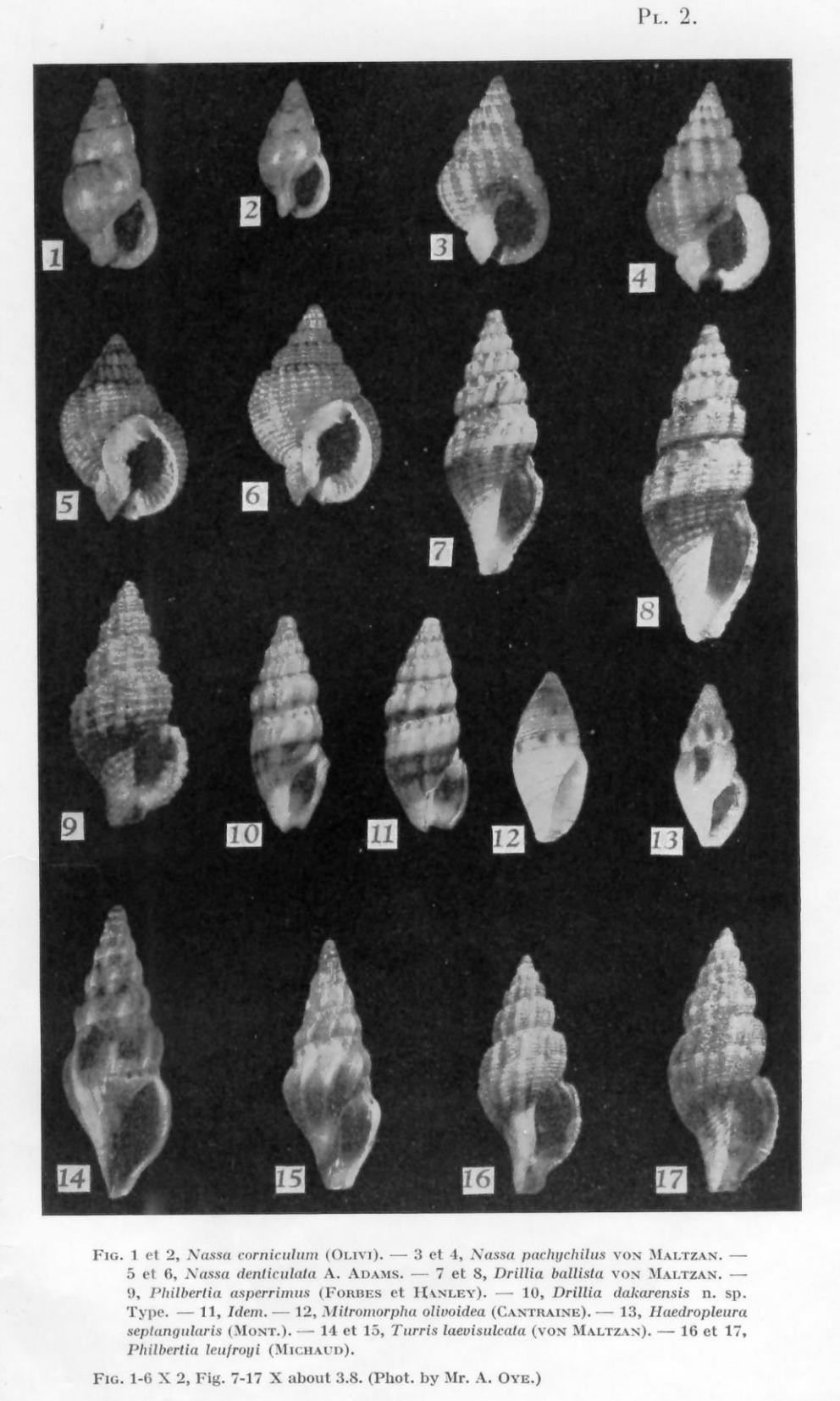

Fig. 1 et 2, *Nassa corniculum* (Olivi). — 3 et 4, *Nassa pachychilus* von Maltzan. — 5 et 6, *Nassa denticulata* A. Adams. — 7 et 8, *Drillia ballista* von Maltzan. — 9, *Philbertia asperrimus* (Forbes et Hanley). — 10, *Drillia dakarensis* n. sp. Type. — 11, *Idem*. — 12, *Mitromorpha olivoidea* (Cantraine). — 13, *Haedropleura septangularis* (Mont.). — 14 et 15, *Turris laevisulcata* (von Maltzan). — 16 et 17, *Philbertia leufroyi* (Michaud).

Fig. 1-6 X 2, Fig. 7-17 X about 3.8. (Phot. by Mr. A. Oye.)

Text figure 3

From: Knudsen, J., 1956b. Remarks on a Collection of Marine Prosobranchs from Senegal. *Bulletin de l'Institut d'Afrique Noire*. Tome XVIII, série A, n°2, pl. 2, **figs 7-8: *Drillia tripter* von Maltzan, 1883 (wrongly illustrated under the name *Drillia ballista* von Maltzan, 1883)**

	D. annielonae	*D. ballista*	*D. tripter*
number of whorls	8-9	10-11	10
number of oblique ribs on body whorl	8-10; well defined	9-12	14-18
number of oblique costae on penultimate whorl	8	9	12
number of primary spiral cords on last whorl	13-17; rounded	16-22; very angular	18-22
number of primary spiral cords on penultimate whorl	7-9	4-5	5-7
other characteristics	spire is narrow and elongate	ridge below suture; some specimens may be very elongate; narrow aperture	broad excavation below suture; oviform aperture
colour	white, creamy white or shaded with brown between the white costae	creamy white; occasionally with traces of an olive-green periostracum	creamy yellow or dull violet-brown; pale zone on upper half of body whorl/ dark brown band below; often spotted with brown dots
geographic range	off Luanda, North Angola	from Senegal to Ghana	from Senegal to Ivory Coast
size	15-23 mm	11-18 mm	13-20 mm

Table I: Comparison between a few characteristics of *D. annielonae*, *D. ballista* and *D. tripter*

Acknowledgements:
I am very grateful to J.-P. Van Goethem, Thierry Backeljau and Mrs. Sablon, all from the RBINS (Brussels, Belgium), for the kind help and the possibility to study and photograph shells from the Dautzenberg collection. Many thanks to Johan Verstraeten (Oostende, Belgium) for a critical lecture of this paper and to David Monsecour (Aarschot, Belgium) for carefully perusing the English text.

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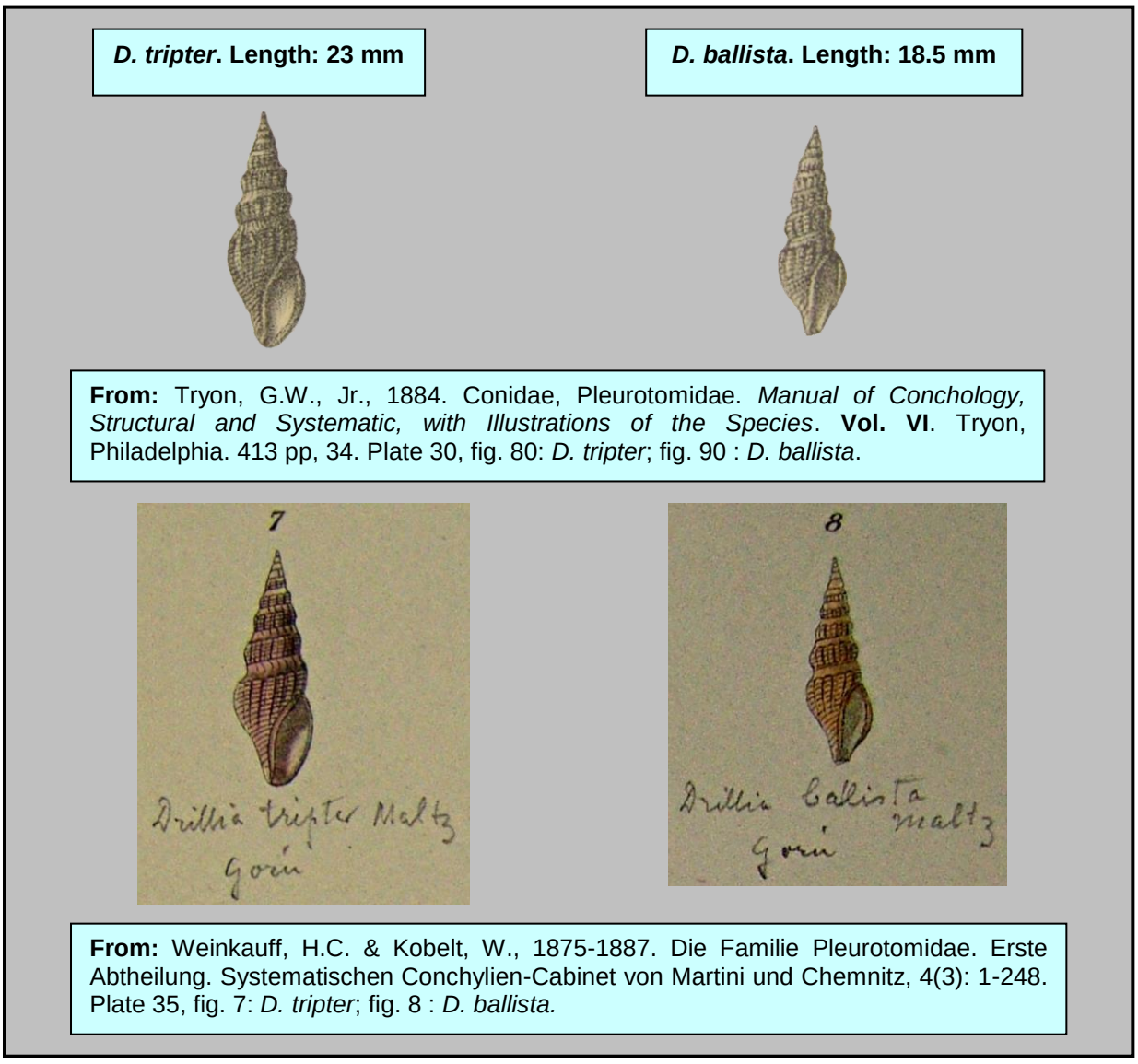

Text figure 4

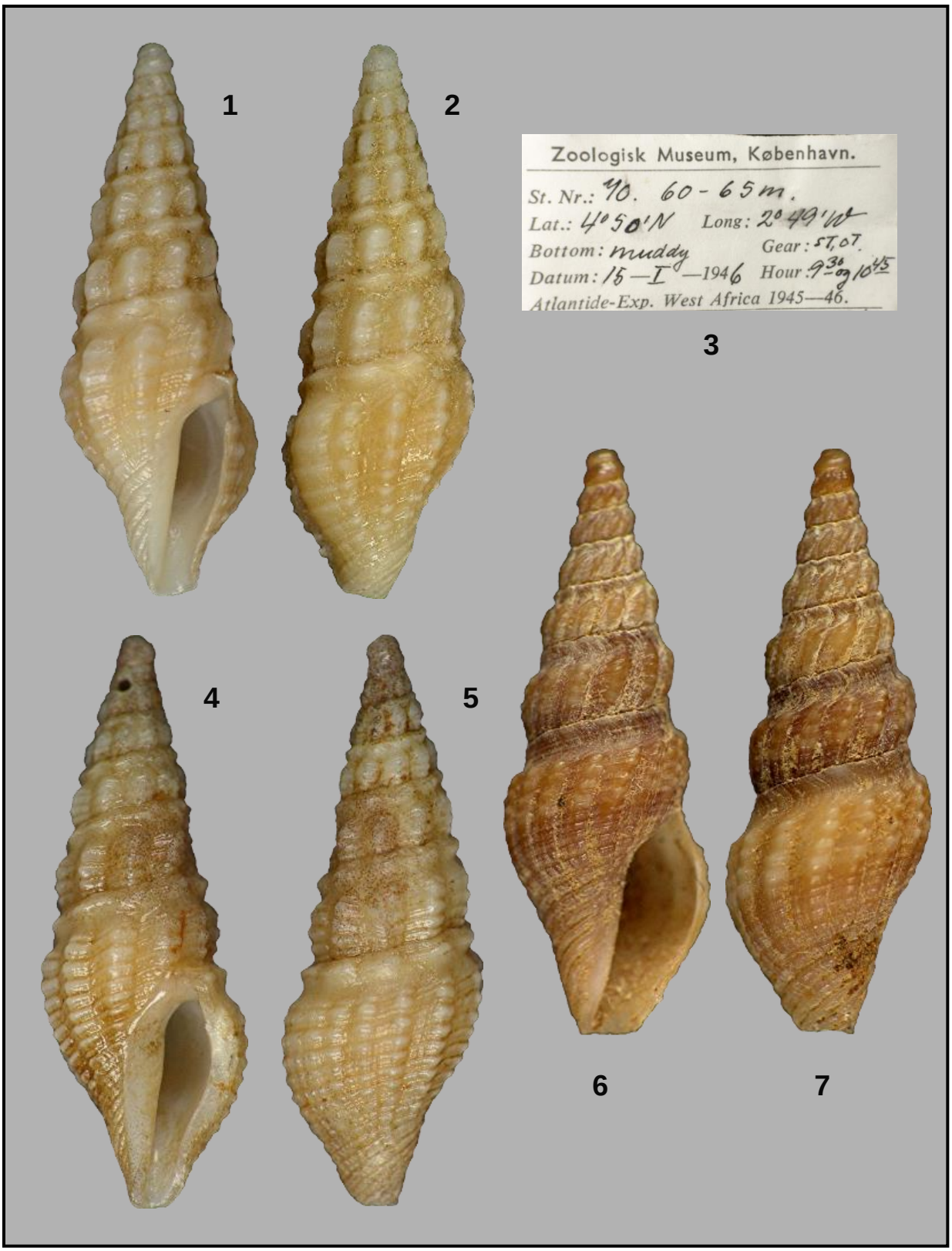

Plate I. Figs 1-2: *Drillia ballista* von Maltzan, 1883. 4°50' N./ 2°49' W. Ghana. "*Atlantide*" Expedition. Station 70. Dredged in mud at a depth of 60-65 m. 15 January 1946. 11.25 mm. ZMC. Fig. 3: label of *Drillia ballista* (ZMC). Figs 4-5: *Drillia ballista* von Maltzan, 1883. 4°24' N./ 7°05' W. Ivory Coast. "*Atlantide*" Expedition. Station 65. Dredged in muddy sand at a depth of 78 m. 11 January 1946. 12.49 mm. ZMC. Figs 6-7: *Drillia tripter* von Maltzan, 1883. 4°24' N./ 7°05' W. Ivory Coast. "*Atlantide*" Expedition. Station 65. Dredged in muddy sand at a depth of 78 m. 11 January 1946. 12.99 mm. ZMC.

Plate II. Figs 8-11: *Drillia ballista* von Maltzan, 1883. Off Gorée Island, Dakar, Senegal. Dredged at a depth of 20 m. FN; 8-9: 14.55 mm; 10-11: 17.75 mm.

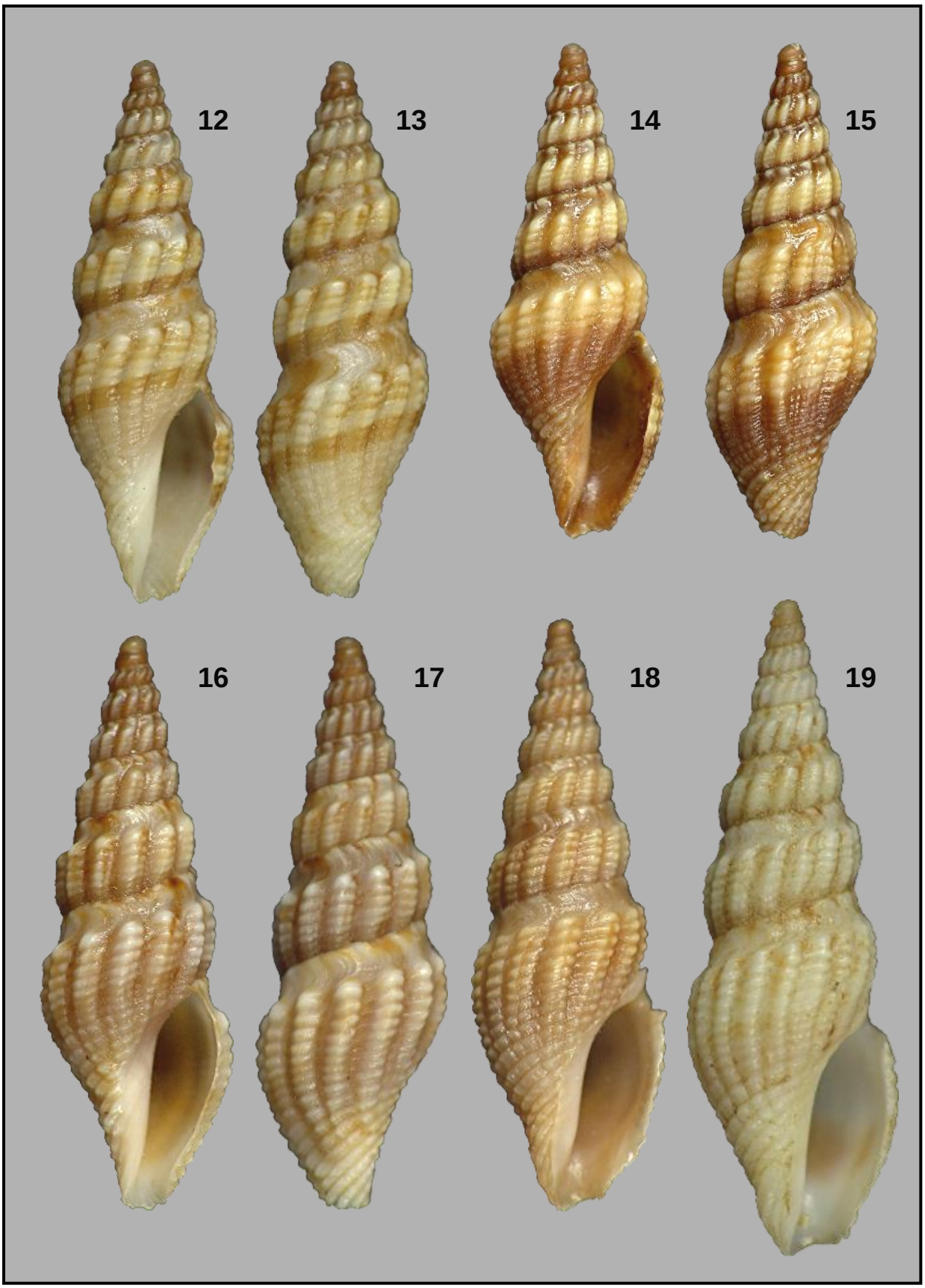

Plate III. Figs 12-19: *Drillia tripter* von Maltzan, 1883. FN; Figs 12-13: M'Bour, Senegal. Dredged at a depth of 37 m. December 1980. 16.05 mm; 14-19: Off Gorée Island, Dakar, Senegal. Dredged in rubble at a depth of 18 m. January 1996; 14-15: 13.78 mm; 16-17: 16.77 mm; 18: 18.75 mm; 19: 18.91 mm.

Further notes on the distribution of *Colubraria canariensis* Nordsieck & Talavera, 1979

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Keywords: GASTROPODA, COLUBRARIIDAE, *Colubraria canariensis*, distribution, West Africa.

Abstracts: The distribution of *Colubraria canariensis* Nordsieck & Talavera, 1979 along the West African coast as far as Angola, as well as the off-shore islands, is discussed. Notes on its occurrence in specific countries and references from literature are added.

Abbreviations:
DM: Private collection of David Monsecour.
FN: Private collection of Frank Nolf.
JV: Private collection of Johan Verstraeten.
PR: Private ciollection of Peter Ryall.

Discussion: Soon after Monsecour & Monsecour (2006) published their article about the distribution of *C. canariensis* in West Africa, the first and second author re-evaluated available information and publications, which are the basis of this present paper. As a result some interesting additional data concerning this species' occurrence along this part of the African coast can be documented and new literary references appertaining thereto were examined.

When Monsecour & Monsecour (2006) stated that "*except for records from Senegal, no records from the African mainland have yet been confirmed*" they were unaware of the record by Rolán & Ryall (1996) who cited "*Colubraria* cf. *canariensis*" from Angola. The second author kindly provided the Monsecour brothers with two specimens from his collection and a comparison of these specimens (Ghana: Plate IV, Figs 31-32) with specimens from the Canary Islands (Plate I, Figs 3-8) and Senegal (Plate II, Figs 11-16) lead to the conclusion that they indeed all belonged to *C. canariensis*. This means an even wider range for the species than the one indicated by Monsecour & Monsecour (2006), who established its southern limit as São Tomé & Principé islands (Plate IV, Figs 27-32); this limit is hereby extended to northern Angola (text figure). As all three specimens from Angola at hand were reliably obtained by the second author we can conclude they are valid records and, furthermore, not isolated records.

A second step in linking the Angolan records to the previously known records was established when we examined Bernard (1984), another work unknown to Monsecour & Monsecour (2006). He listed and illustrated "*Colubraria reticulata* (Blainville, 1826)" from Gabon. Whilst not being able to examine the actual specimens, we confirm from the excellent figures of Bernard (n°104, p.64) that they are in fact also *C. canariensis*. He indicated his specimens were collected from depths between -4 and -50 metres in both northern and southern Gabon and recorded a specimen with the incredible size of 64 mm.

Moreover, the P. Ryall-collection contains a number of specimens from other localities that further link the Angolan and Gabonese populations to the previous records established by Monsecour & Monsecour (2006). We can now confirm the occurrence of *C. canariensis* in Ghana (Mudrachmi Point; dredged at 25-35 metres: Plate III, Figs 23-24; Plate IV, Figs 25-26) and Ivory Coast (Vridi Canal, Abidjan; by scuba-diving at 30-40 m: Plate III, Figs 21-22). We therefore surmise that *C. canariensis* inhabits the entire West African coast from Senegal all the way down to northern Angola but due to its scarcity few specimens are collected. Monsecour & Monsecour (2006) already established the northernmost locality as Madeira (Bay of Funchal, dredged at 13-14 metres deep: Plate I, Figs 1-2).

Concerning the off-shore islands, Monsecour & Monsecour (2006) already established its occurrence in the São Tomé & Principé Islands where it has been live taken on hard substrates at -5/25 metres (Plate IV, Figs 27-32). It is the only place in the whole West African province where more than a handful of specimens have been collected. In the Cape Verde Archipelago, (Plate III, Figs 17-20) as along mainland Africa, it remains uncommon.

For this reason, Rolán (2005) was only able to examine and illustrate a subadult specimen (plate 42, n°611) and reached the erroneous conclusion that it was *C. obscura* (Reeve, 1844). He does however state '*With larvae of long plankotrophic development, probably only one species is present in this (West African) area*', estimating '*This genus (Colubraria) needs a revision because different taxa have been used fot the Africican populations*'. Both present authors have recently been able to acquire adult specimens from the Archipelago (dredged at a depth of 30-40 metres, St. Vincent Channel: Plate III, Figs 17-18; snorkelled at -1 metre under rocks, Tarrafal Bay, Santiago Island: Plate III, Figs 19-20) and specimens from Santa Maria Bay, Sal island (18 metres deep, under rocks with sand) have been confirmed by Alex Trentcart. After examining the material at hand, we can confirm it is indeed the same species that inhabits the mainland of West Africa.

It is worth noticing that specimens from Angola (e.g. Palmarinhas, Benguela) are closer to specimens from Senegal than to those from nearby São Tomé Island; in fact all specimens from the mainland area covering thousands of kilometres are very homogeneous, even considering the variability of depth at which they have been found (-4 metres mentioned by Bernard to -120 metres for one of our specimens from Luanda). Specimens from the Cape Verde Islands are a little variable being slightly elongate in shallow water specimens (-1 metre) whilst more globose in deep water specimens (-35/40 metres). Shells from the São Tomé area (Plate IV, Figs 27-32) are of small size and rather variable. We suspect that the conditions of life in these islands explain these differences in shell morphology due to their restriction in an isolated area.

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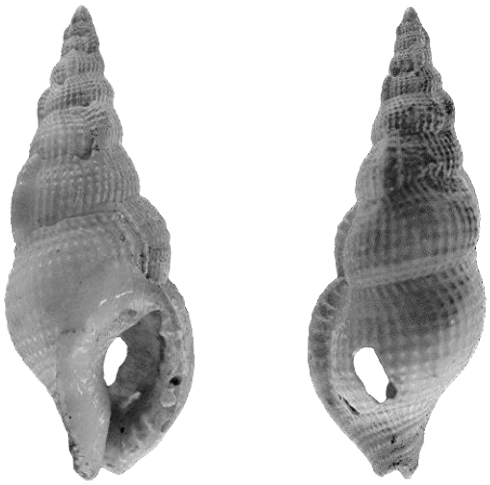
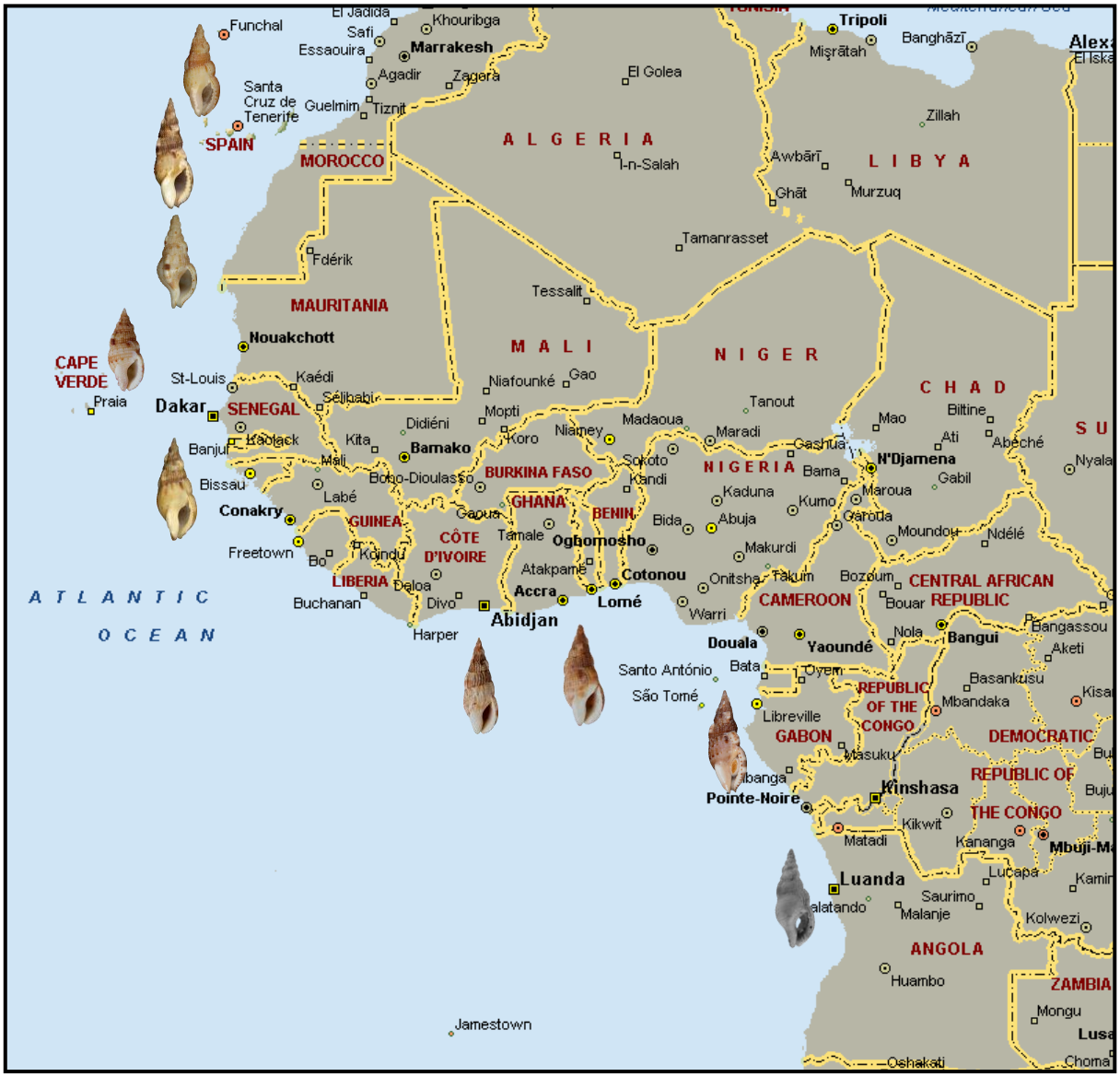


Text figure: *Colubraria canariensis* Nordsieck & Talavera, 1979. Luanda, Angola. Dredged at a depth of 120 m. 26.8 mm. PR.



Geographic distribution of *Colubraria canariensis* along the West African coast

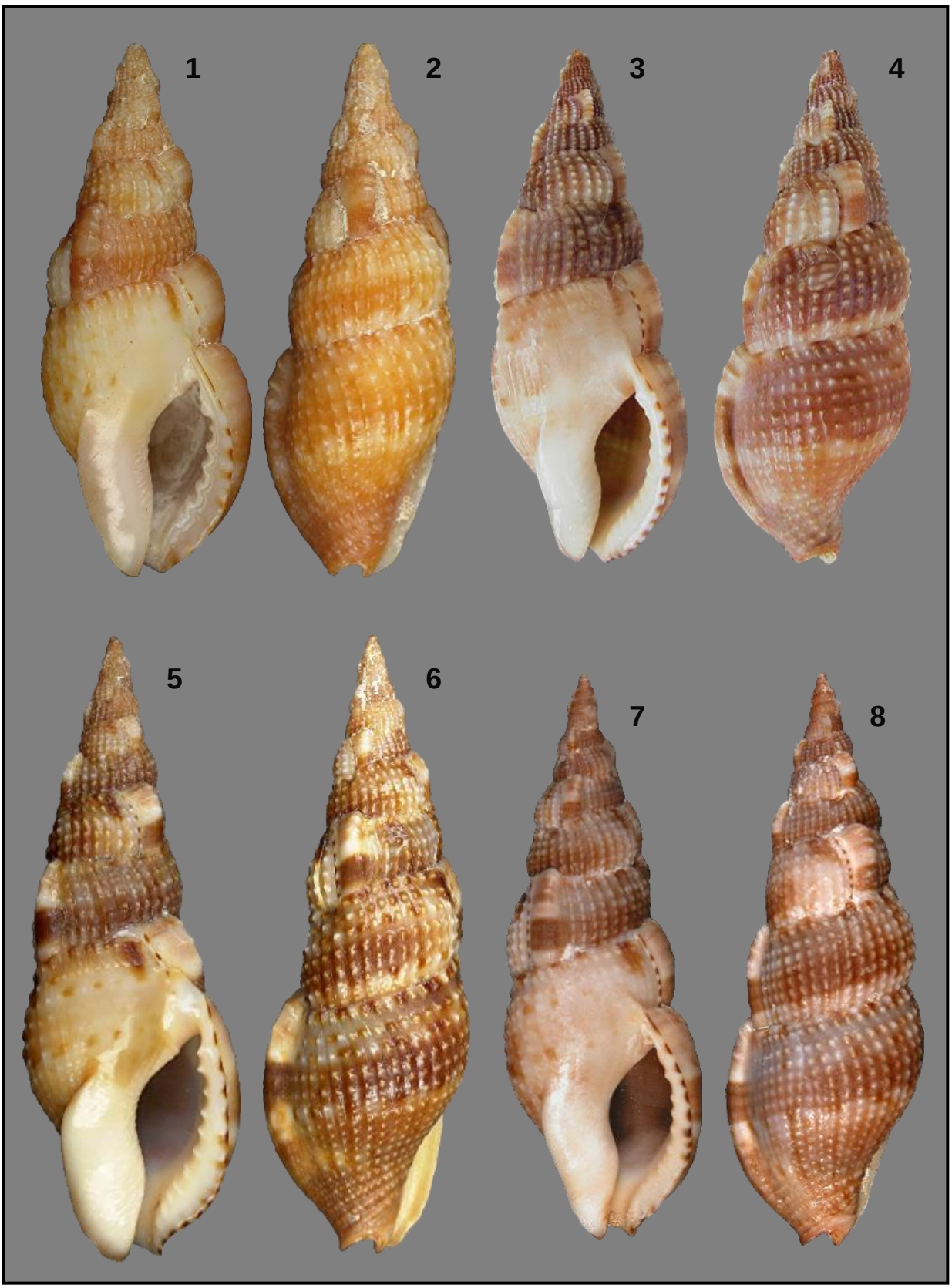


Plate I. Figs 1-8: *Colubraria canariensis* Nordsieck & Talavera, 1979; 1-2: Bay of Funchal, Madeira. Dredged at a depth of 13-14 m. 7 October 1987. 41.74 mm. JV; 3-4: Gran Canaria, Canary Islands. Trawled at a depth of 60 m. 41.2 mm. PR; 5-6: La Palma, Canary Islands. Trawled on a muddy sand bottom at a depth of 40m. 47.98 mm. FN; 7-8: Puerto del Carmen, Lanzarote, Canary Islands. Dredged at a depth of 50-75 m. 44 mm. DM.

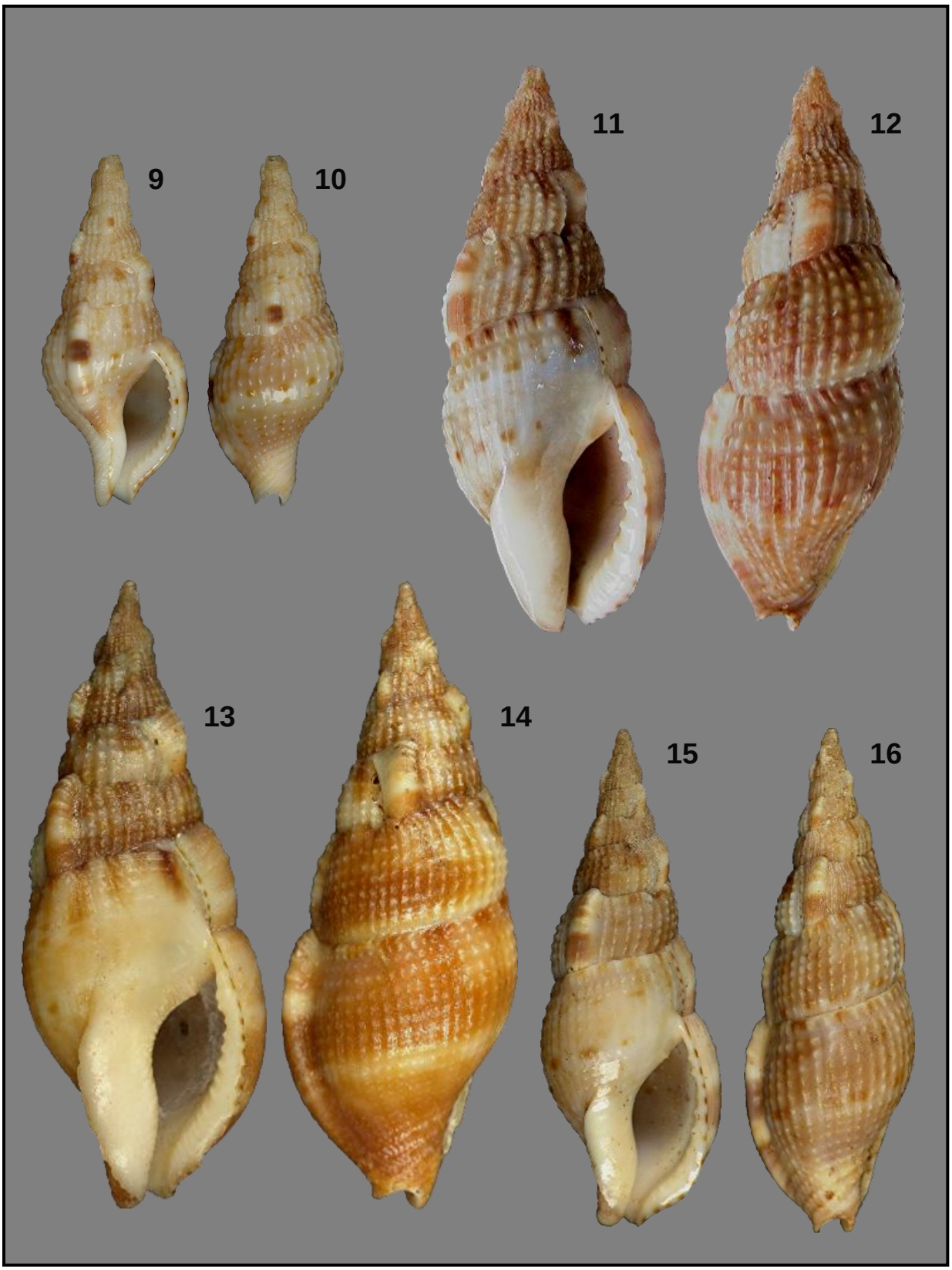


Plate II. Figs 9-16: *Colubraria canariensis* Nordsieck & Talavera, 1979; 9-10: Essaouira, Morocco. 23.90 mm. JV; 11-12: Cap de Naze, Senegal. Trawled at a depth of 38 m. 40.7 mm. PR; 13-14: Cap de Naze, Senegal. Dredged at a depth of 28 m. 1982. 45.48 mm. FN; 15-16: Off Dakar, Senegal. October 1992. 31.46 mm. JV.

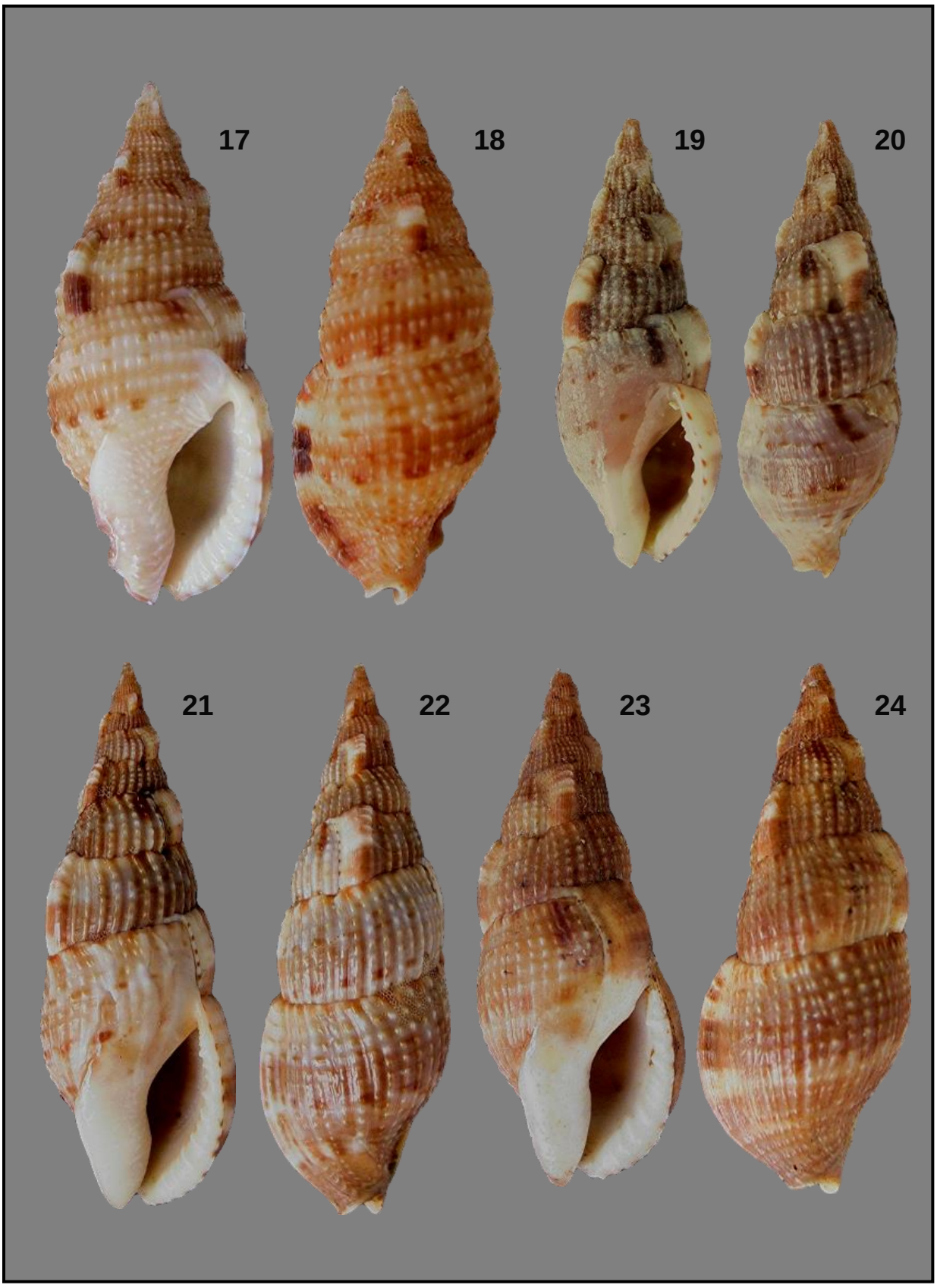


Plate III. Figs 17-24: *Colubraria canariensis* Nordsieck & Talavera, 1979; 17-18: São Vicente Channel, Cape Verde Islands. Dredged at a depth of 35 m. 39.7 mm. PR; 19-20: Baia Tarrafal, Santiago Island, Cape Verde Islands. 33.4 mm. PR; 21-22: Vridi Channel, Abidjan, Ivory Coast. By scuba-diving at a depth of 30 m. 45.5 mm. PR; 23-24: Mudrachmi Point, Ghana. Dredged at a depth of 35 m. 39.8 mm. PR.

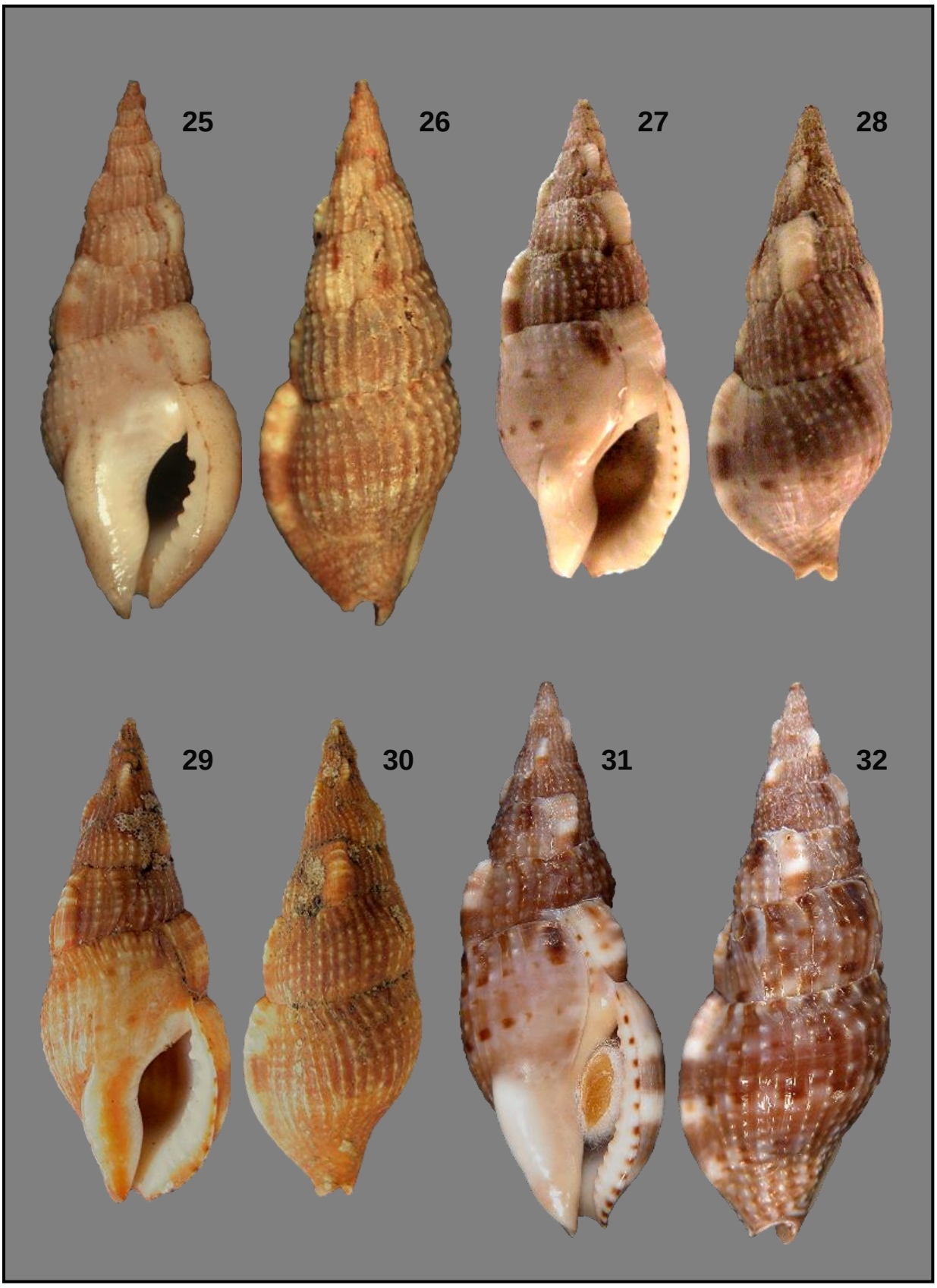


Plate IV. Figs 25-32: *Colubraria canariensis* Nordsieck & Talavera, 1979; 25-26: Mudrachmi Bay, Ghana. Dredged at a depth of 30-35 m. 39 mm. DM; 27-28: Praia Emilia, São Tomé Island. Dived at a depth of 10 m. 33.9 mm. PR; 29-30: Esprainha, São Tomé Island. Dived at a depth of 5 m. 33.5 mm. PR; 31-32: Cabras Island, São Tomé & Principe. Dived at a depth of 10-15 m. 35 mm. DM.