An in-depth look to the family Fasciolariidae in Gabonese, Angolan and Namibian waters and the presentation of a new *Apertifusus* species

by Frank Nolf


Equatoriaal-Guinea
Gabon
Congo-Kinshasa
Uganda
Kenia
Nairobi
Rwanda
Burundi
Tanzania
Dar es Salaan
Angola
Zambia
Malawi
Mozambique
Harare
Namibië
Pretoria
eSwatini
Bloemfontein
Lesotho
Durban

Family FASCIOLARIIDAE Thiele, 1924 (1847)

Subfamily: Fusininae

Genus ***Apertifusus*** **Vermeij & M.A. Snyder, 2018**

Typetaxon: *Fusus meyeri* Dunker, 1869 [= *Apertifusus meyeri* (Dunker, 1869)]

Apertifusus hubrechti **Nolf, 2023**

***Apertifusus hubrechti* Nolf, 2023**
Off Luanda, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 40 fms. 1973.
51.41 mm. Holotype. RBINS-I.G.: 34638-MT.4014

***Apertifusus hubrechti* Nolf, 2023**

Off Luanda, Angola. Dredged by fishermen at a depth of 50 m. 49.59 mm. Paratype 1.

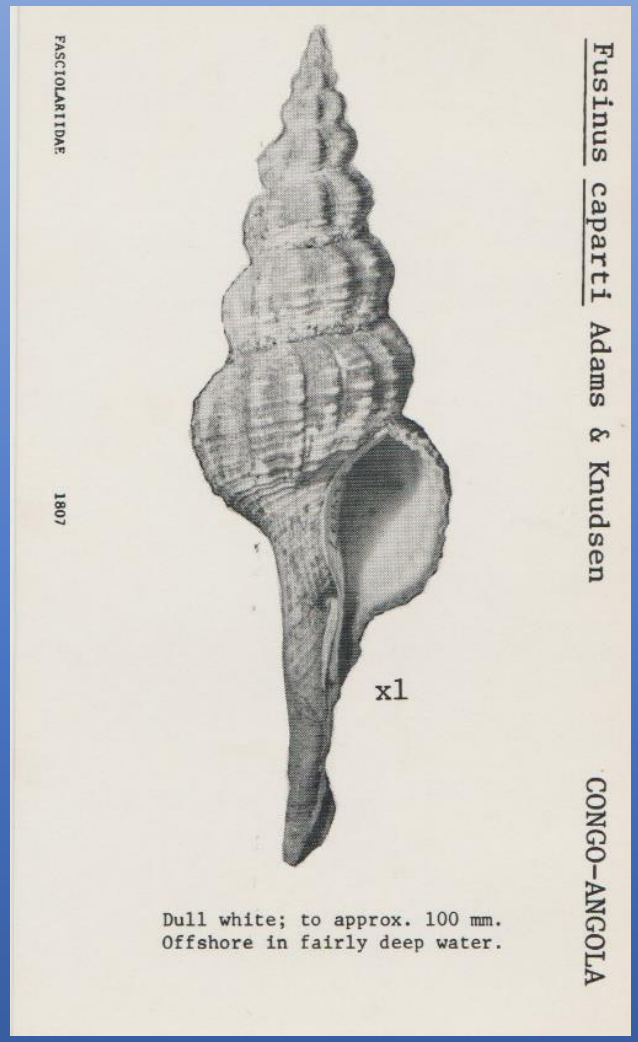
Coll. Steve Hubrecht.

***Apertifusus hubrechti* Nolf, 2023**
Quicombo, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m. 71.21 mm.
Paratype 2. Coll. F. Nolf.

***Apertifusus hubrechti* Nolf, 2023**
Quicombo, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m.
105.43 mm. Paratype 3. Coll. F. Nolf.

Protoconch of *Apertifusus hubrechti*

left: holotype – right: paratype 3



Card by S.D. Kaicher. Pack #18. FASCIOLARIIDAE. Part I. 1986.
Fusinus caparti (card 1807) (= ***Apertifusus hubrechti*** **Nolf, 2023)**

Differences with the twin species
***Apertifusus caparti* (Adam & Knudsen, 1955)**

The new species ***A. hubrechti*** has:

* a different microsculpture: each spiral cord alternates with **two thinner secondary spiral threads** in contrast with *A. caparti*, which has stronger spiral cords alternating with only **one** secondary cord;
* **axial ribs** which are **much less distinct** in contrast with *A. caparti* which has prominent cords separated by deeper interstices;
* less rounded whorls, **flattened in the upper part**;
* **less incised sutures**;
* a **straighter siphonal canal**.
* a paler and more resistant periostracum;
* a white colour, while the juvenile stage of the shells in *A. caparti* is brown coloured, or sometimes only rusty brown on the axial or between the axial ribs.

Apertifusus caparti (Adam & Knudsen, 1955)

Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m. 1970. 194.8 mm. Coll. F. Nolf.

Apertifusus caparti (Adam & Knudsen, 1955)

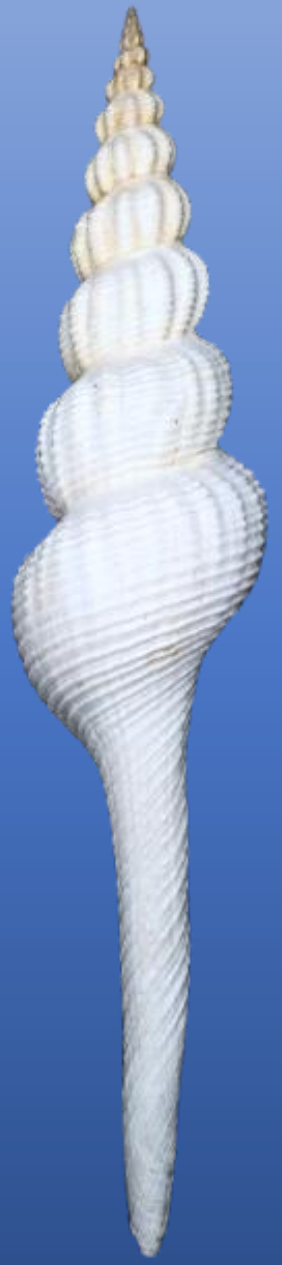
Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m. 1970. 207.3 mm. Coll. F. Nolf.

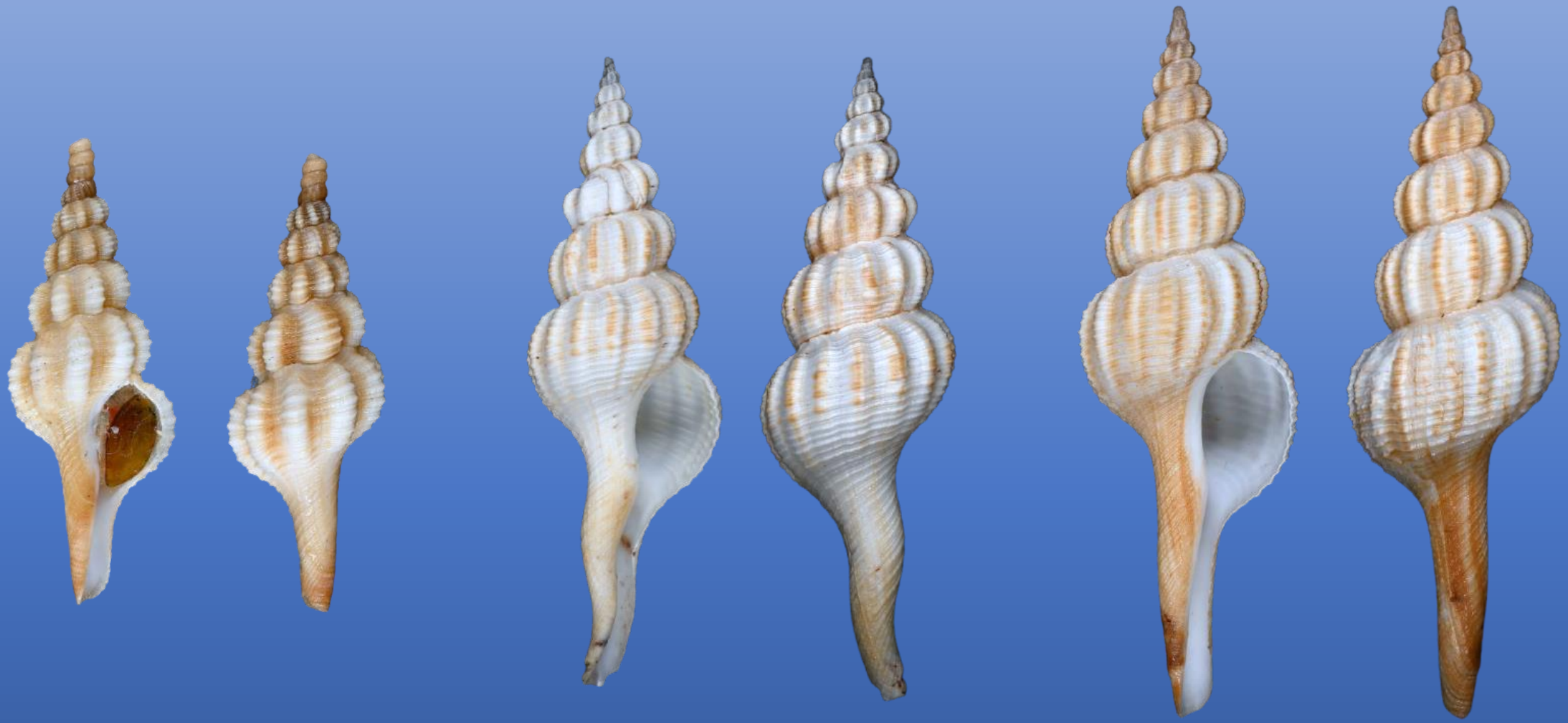
Apertifusus caparti (Adam & Knudsen, 1955)

Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m. 1970. freak specimen. 179.4 mm. Coll. F. Nolf.

Apertifusus caparti
(Adam & Knudsen, 1955)

Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 100 m. 1970. 216.8 mm. Coll. F. Nolf.





***Apertifusus caparti* (Adam & Knudsen, 1955)**

Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1970. Juvenile specimens. Left: 34.73 mm. Middle: 95.18 mm. Right: 99.17 mm. Coll. F. Nolf.

***Apertifusus caparti* (Adam & Knudsen, 1955)**

Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1970. Juvenile specimens. Left: 120.05 mm. Middle: 124.39 mm. Right: 152.75 mm.

Coll. F. Nolf.

Geographic distribution: from northern Gabon, Congo to middle Angola.

Habitat: mud or sandy mud, detritus and shell grit, stones at a depth of 45 to 230 m.

protoconch *Apertifusus caparti* (Adam & Knudsen, 1955)

Hadorn (1998) states that Adam & Knudsen (1955) were wrong in choosing their largest specimen as holotype, inducing in this way erroneous views and opinions by other authors when comparing *A. caparti* with *A. meyeri*. Obviously, these authors were mainly influenced by the size of both species, and they neglected to read the descriptions.

It was perfectly right for Adam & Knudsen (1955) to choose for the **largest specimen**, which displays all the characteristics of the species, instead of the choice for a subadult specimen, which would have caused even more confusion.

On the other hand, we can blame **Adam & Knudsen** that they have **not compared** their new species with the description of ***A. meyeri*** instead of mentioning the differences with *Fusinus perplexus* (A. Adams, 1864) (Japanese area) and '*Fusus eucosmius* Dall, 1889' [= *Aristofusus excavatus* (G.B. Sowerby II, 1880)] (West Indies area), a procedure still used nowadays by many authors when there is a lack of sufficient material to compare.

Differences with *A. meyeri* Dunker, 1869):

A. caparti (45-220 mm) is smaller than *A. meyeri* (175-370 mm) and has:

- less numerous and somewhat shorter, broader, **rounded** whorls;
- **less deeply incised sutures** on the upper whorls;
- a larger number of axial ribs and spiral cords per whorl;
- axial ribs always reaching from suture to suture on all whorls, except on the body whorl;
- alternating strong and thinner spiral cords.

Differences with ***Ariefusus rutilus***: larger shell, different colouration, rounded whorls, much larger number of axial ribs and different protoconch sculpture.

***Fusinus maritzaallaryae* Cossignani & Allary, 2019**

Holotype. MNHN.

(junior synonym of *Apertifusus caparti* (Adam & Knudsen, 1955).

Apertifusus maritzaallaryae (Cossignani & Allary, 2019)

The **description in Italian** of this shell completely refers to ***Apertifusus caparti* (Adam & Knudsen, 1955)**:

* based on the figures of the holotype and the three paratypes, the **number of whorls is in fact 10-11** instead of 7-8 as mentioned in the original description, the same amount as in *A. caparti* (**at most 12**);

* the **number of axial ribs** is the **same** in both species;

* the size of the type material of *A. maritzaallaryae* (94-129 mm) indicates it concerns **juvenile forms**;

* the **only difference** with *A. caparti*, mentioned by the authors, is the presence of less distinct **brown coloured axial ribs**, which is a **typical characteristic of juvenile specimens of *A. caparti***;

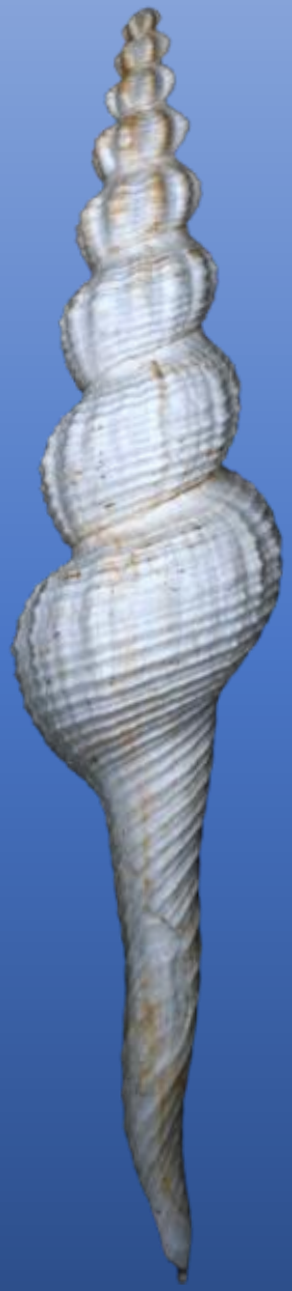
* very small specimens of the latter have very accentuated axial ribs, which become less distinct as they get bigger, a typical feature in the genus *Apertifusus* (Vermeij & Snyder, 2018), while spiral ribs become more important;

* the type locality Cabo de São Braz is not in the southern Angola (‘*sud Angola*’) but south of Luanda (middle Angola).

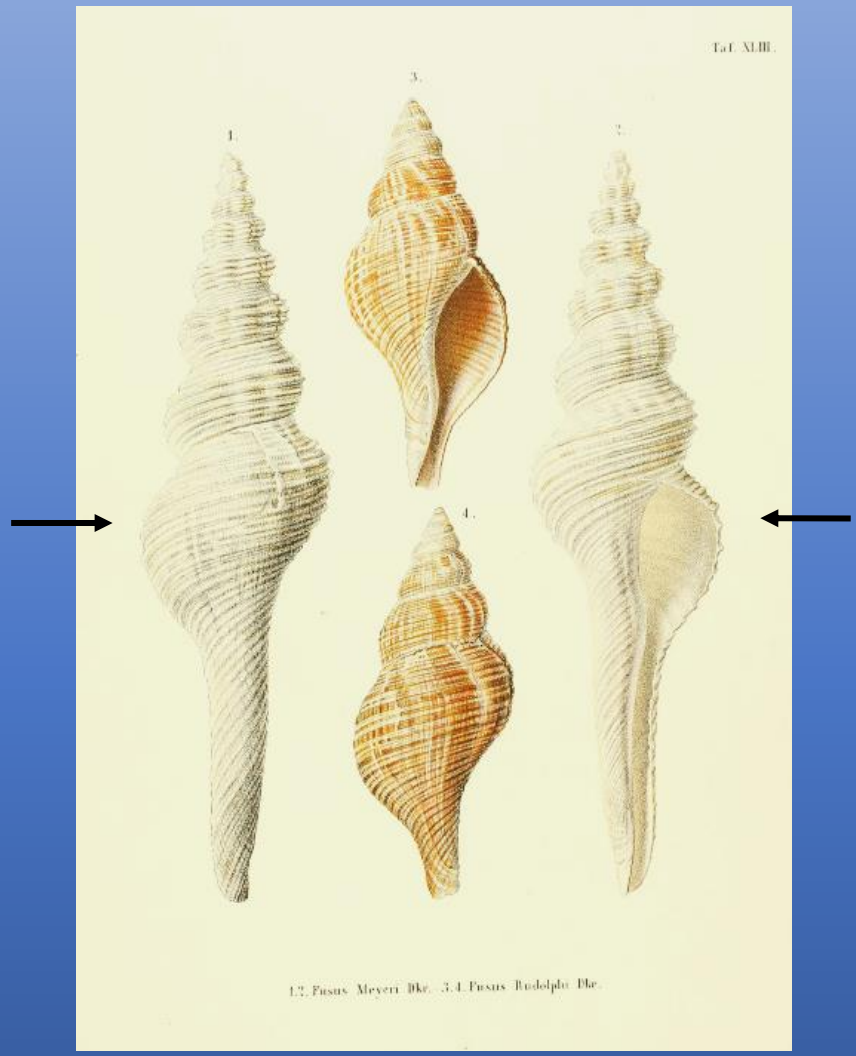
Conclusion: No commentary was given by Cossignani and Allary to convince us of the differences between the two forms, except a detailed image of the suture of *A. caparti*, as a result of which we can only conclude ***A. maritzaallaryae* is a junior synonym of *A. caparti*.**

Apertifusus meyeri
(Dunker, 1869)
Off Libreville, Gabon.
Trawled by fishermen at 60 km offshore.
214.4 mm. Coll. F. Nolf.

Apertifusus meyeri
(Dunker, 1869)
Off Libreville, Gabon.
Trawled by fishermen at 60 km offshore.
222.5 mm. Coll. F. Nolf.



Apertifusus meyeri
(Dunker, 1869)
Off Libreville, Gabon.
Trawled by fishermen at 60 km offshore.
170.0 mm. Coll. F. Nolf.



Fusinus meyeri. In: Dunker, W., 1869. *Novitates Conchologicae. Mollusca Marina. Beschreibung und Abbildung neuer oder wenig gekannter Meeres-Conchylien*. Abt. II: Meeres Conchylien. Pl. XLIII, figs 1-2

Characteristics:

* large, heavy shell;

* the **largest *Apertifusus* species** in W African waters (175-370 mm);

* protoconch: $1^{1/2}$ whorls, last whorl sculptured with numerous very fine indistinct axial riblets;

* 10-12 convex whorls, separated by **deep sutures**;

* **last whorls partly loosened**;

* axial ribs slightly granulose, very dominant in the first teleoconch whorls, less distinct and even nearly disappearing from the 9^{th} whorl;

* 18-25 **protruding** axial ribs (on last whorl) crossed by many parallel spiral cords;

*** siphonal canal large and elongate**, straight or slightly distorted;

* aperture narrow, elongate;

* colour white, first teleoconch whorls brown coloured;

* periostracum very flaky, olive-brown and wrinkled;

* operculum relatively thick, solid, oblong and slender.

Geographic distribution: from Sierra Leone, Ivory Coast, Ghana, through the Gulf of Guinea, Gabon and northern Angola. Depth: from 20 to 100 m.

Specimens of ***Apertifusus meyeri*** have **usually been overlooked** or misidentified in literature, a.o. by Bernard (1984), Nicolay & Berthelot (1996) and Cherbonnier (1965) who confused it with *A. caparti*.

A. meyeri differs from ***Ariefusus rutilus*** by the **much larger shell**, the completely **different protoconch** and the **different axial and spiral sculpture**. The whorls of *A. rutilus* are angular and deeply incised to the sutures. The first teleoconch whorls of the juvenile and subadult stage of many specimens are rather similar in both species. This characteristic has never been remarked by previous authors and could *eventually* refer to a **common ancestor**. This is an argument to be considered in a revision of the genera in FASCIOLARIIDAE.

Genus ***Ariefusus*** **Vermeij & M.A. Snyder, 2018**
Typetaxon: *Fusinus rutilus* Nicolay & Berthelot, 1996

Ariefusus rutilus
(Nicolay & Berthelot, 1996)
Gabon. Trawled by fishermen.
1982. 141.20 mm. Coll. F. Nolf.

Description:

* protoconch **mamilliform**, consisting of two whorls;
* shell fusiform, elongate;
* teleoconch of about ten whorls;
* **first teleoconch whorls very angular**, **last whorls more rounded** and **always deeply incised to the sutures**;
* last whorl, making a sharp curve to the axis;
* **axial sculpture**, clearly prevailing on the spiral one, is made of sharply rounded prominent ribs forming **axially elongate nodes at periphery**;
* last whorl with 17 axial ribs;
* spaces between ribs are slightly larger than the ribs themselves;

* the whole surface of the teleoconch is sculptured with numerous thin spiral threads, crossing over the axial cords;
* on the siphonal canal, the axial cords become longer and thinner, while the spiral ribs become thicker;
* aperture ovoid;
* **siphonal canal very long**, either straight or slightly sinuous;
* operculum corneous, elongate-ovoid, dark brown with slight longitudinal striae and a basal nucleus;
* periostracum never observed;
* background colour creamy white, **axial ribs rusty brown**.

Ariefusus rutilus is without doubt different from the sibling species *Apertifusus caparti* and *A. meyeri*, particularly by its **special profile of axial sculpture and deeply incised sutures, and the brown coloured axial ribs.**

The latter two species have rounded whorls, of which the spiral ribs are prevailing on the axial cords. This axial sculpture is strong only in the first teleoconch whorls and is gradually fading out in the last whorls. The differences between these two species are constant.

General conclusion

The genus ***Apertifusus*** in West Africa contains two sibling species, expanded with a third new representative species. There was really no reason for Vermeij & Hadorn (2018) to create a new genus ***Ariefusus*** for one recent and two extent species.

It would be wiser to keep all sibling species in the same genus. **Modern systematics** are evolving in a way to create **as much genera as species exist**. I do agree that '*strongly and axially elongate nodes at shoulder angulation*' is an important characteristic, but the early whorls (from 7 to 9) of *Apertifusus meyeri* have a nearly similar outline as in *Ariefusus rutilus*. The penultimate and the last whorl of *A. meyeri* are different.

Some authors created confusion between *A. caparti* and *A. meyeri* in the past, probably by a lack of material or insufficient knowledge of the original descriptions and type material. Most of the images available on the internet, referring to *A. caparti*, are in fact specimens of *A. meyeri*, even specimen 96761 of NMR, used by **WoRMS**.

Recently, a new erratic conclusion was made by **Cossignani & Allary (2019)** by introducing '***Fusinus maritzaallaryae***' as a new species, which is no more than a **small specimen of *Apertifusus caparti* (Adam & Knudsen, 1955)** as such to be regarded as a **junior synonym** of the latter.

Comparative able with differences between *Apertifusus* and *Ariefusus* species from Gabonese and Angolan waters

	Apertifusus caparti	*Apertifusus hubrechti*	*Apertifusus meyeri*	*Ariefusus rutilus*
Locality	Gabon, Congo, northern Angola	middle Angola	from Sierra Leone to southern Gabon	Gabon
Depth	45-230 m	100 m	20-100 m	35-50 m
Size	25-220 mm	40-105 mm	175-370 mm	100-200 mm
Teleoconch whorls	11-12, very rounded	8-9, rounded but flattened in upper part of whorls	10-12, first whorls very angular, later whorls partly loosened	10, all whorls very angular, axial sculpture
Sutures	not deeply incised	rather indistinct	deeply incised	very deeply incised
Spiral cords	primary cords, separated by one thinner secondary thread	each primary cord followed by two thin secondary threads	primary cords, separated by none or one thinner secondary thread	thin spiral cords, evenly spaced

	Apertifusus caparti	*Apertifusus hubrechti*	*Apertifusus meyeri*	*Ariefusus rutilus*
Axial cords	18 regularly spaced spiral ribs on body whorl	14-17 on body whorl, disappearing in later stage	18-25; slightly granulous, dominant in first whorls, diminishing afterwards	17 sharply rounded ribs with elongate nods at periphery on last whorl
Siphonal canal	straight or slightly sinuous	straight	large, elongate, straight or slightly distorted	very long, straight, slightly sinuous at end
Aperture	ovoid, nearly circular	ovoid	narrow, elongate	large, nearly circular
Periostracum	flaky, wrinkled	very thin, resistant	flaky, wrinkled	?
Colour	white; axial ribs or interstices in juvenile specimens sometimes brown coloured	completely white	white; first teleoconch whorls brown	creamy white with rusty brown axial ribs

Genus *Viridifusus* Snyder, Vermeij & Lyons, 2012
Typetaxon: *Fusus buxeus* Reeve, 1847

***Viridifusus albinus* (A. Adams, 1856)**
Cape Fria, Namibia.
Trawled by Belgian fishermen
(PEMARCO) at a depth of 80 m. 1963.
97.19 mm. Coll. F. Nolf.

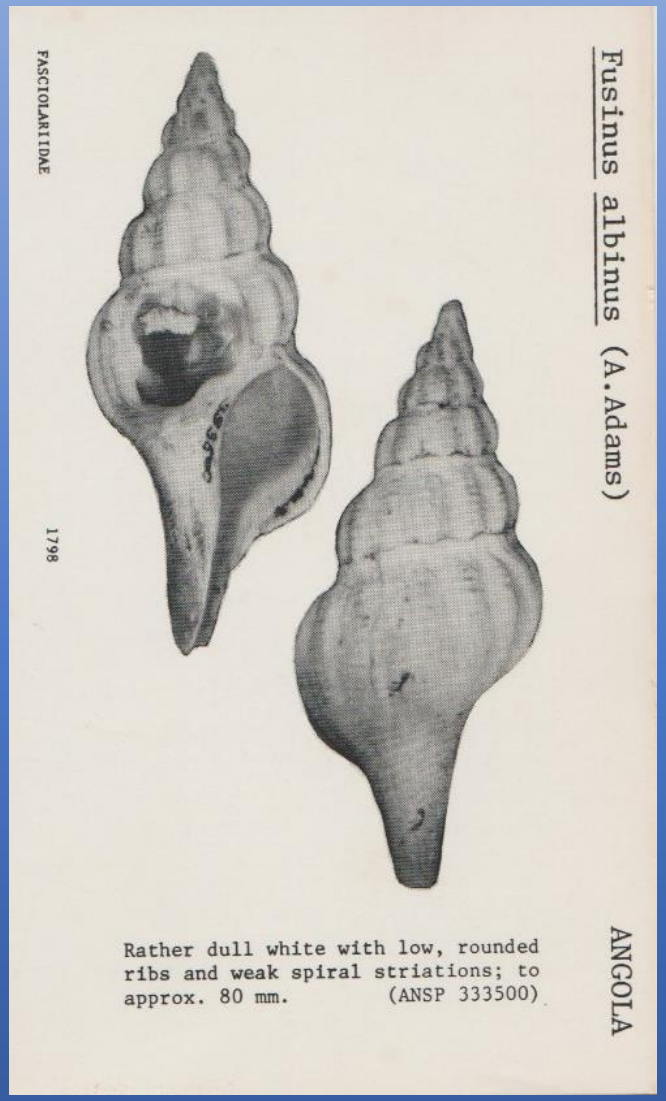
***Viridifusus albinus* (A. Adams, 1856)**

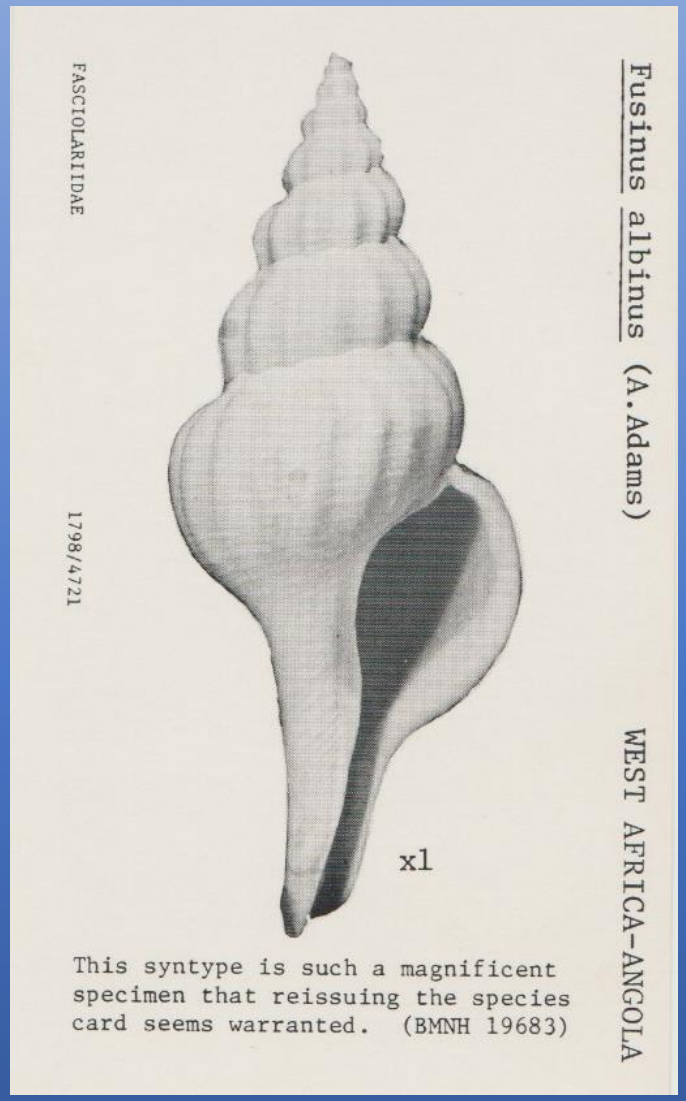
Cape Fria, Namibia.

Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1963. Left: 108.36 mm. Right: 117.85 mm.

Coll. F. Nolf.

Viridifusus albinus (A. Adams, 1856)
Cachama, Benguela Province, S Angola.
Dived at a depth of 32-36 m. December 2018. 53.34 mm. Juvenile stage. Coll. J. Verstraeten.





S.D. Kaicher. Pack #18. FASCIOLARIIDAE. Part I. 1986. Pack #46. FASCIOLARIIDAE. Part II;
Left: ***Fusinus albinus*** (card 1798 – ANSP 333500);
Right: ***Fusinus albinus*** [card 1798/4721 – syntype (one from a lot 3) - BMNH 19683)]

Viridifusus mollis (A. Adams, 1856)

***Viridifusus mollis* (G.B. Sowerby III, 1913)**

Left: Bay of Namibe, Angola. Dredged at a depth of 18 m in muddy sand. 45.36 mm. Coll. F. Nolf;
Right: off Ascension Island. 89.46 mm. Coll. F. Nolf

***Viridifusus mollis* (G.B. Sowerby III, 1913)**

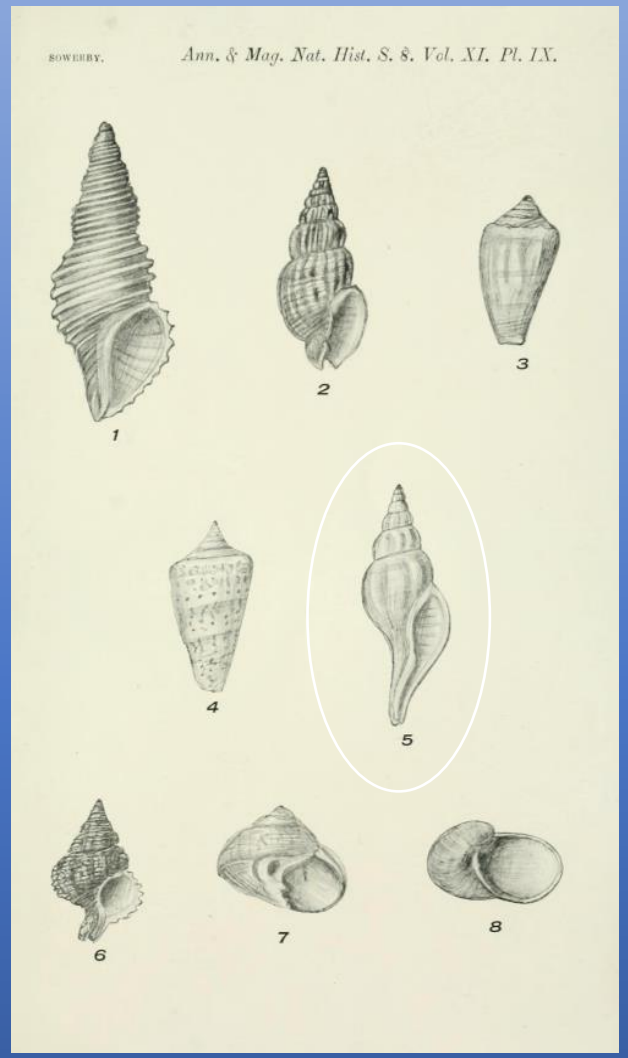
Lobito, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1963.

Coll. F. Nolf.

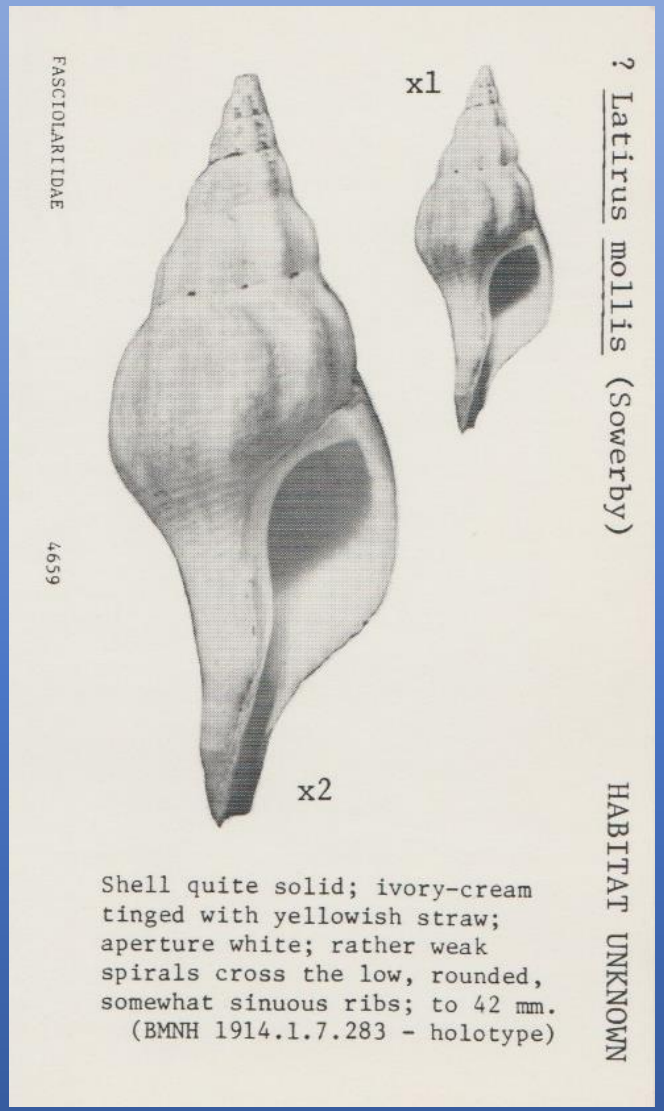
Left: 105.63 mm; Right: 121.45 mm.

***Viridifusus mollis* (G.B. Sowerby III, 1913)**

Lobito, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1963. 124.03 mm. Coll. F. Nolf.



***Latirus mollis*.** In: Sowerby, G.B. III, 1913. Descriptions of eight new marine Gastropoda mostly from Japan. *Annals and Magazine of Natural History. Series 8,* **11**. Pl. 9, fig. 5.



S.D. Kaicher. Pack #18. FASCIOLARIIDAE.
Part II: ***Latirus mollis*** (card 4659 - BMNH 1914.1.7.283 – holotype)

Comparison between *V. albinus and V. mollis*:

The **differences** noticed by **Hadorn (1997)**, concerning the number and structure of the axial ridges, the convex character of the whorls, the size of the specimens, the shape of the aperture and its outer lip **are not convincing**, **probably due to a lack of enough specimens from different localities**. Anyway, they are not useful to separate both sibling species.

The following **differences** are proposed to distinguish both *Viridifusus* species from each other.

***Viridifusus mollis*:**

* has a **very heavy shell** which weighs half as much as specimens of *V. albinus* of the same size, which have a slender outline;
* has a **shorter siphonal canal**;
* has on the other hand a **remarkable prominent body whorl**: the average ratio of last whorl/total length is **0.74** (0.73; 0.73; 0.73; 0.75; 0.77) compared to **0.70** (0.70; 0.70; 070) in ***V. albinus***;
* has **axial ribs** that are broad and irregular, **from suture to suture**, **sharply pointed at the periphery** and different from those in ***V. albinus***, whose **cords start from a cavity under the suture**;
* possesses **spiral cords**, which are weak and nearly visible in the last two whorls;
* has a **more oval aperture** than *V. albinus*;
* is definitively not so small as generally assumed and adult specimens can grow even larger than *V. albinus* specimens.

Conclusion

The **original descriptions** of ***V. mollis*** and ***V. albinus*** are **very short and cryptic**. A picture of *V. mollis* is available, but type locality as well as type material were not mentioned. *V. albinus* on the other hand, was not figured, but well represented by three syntypes.

Recent literature about these Angolan-Namibian FASCIOLARIIDAE is **superficial and confusing** (Hadorn, 1998) **or even lacking** (Mallard & Robin, 2005; 2017).

Probably for the first time, several specimens of both *V. albinus* and *V. mollis* were now at hand to be studied. The opportunity was taken to proceed to a detailed description of the two species and to publish enough data to establish a comparative identification table to differentiate both siblings, which are very similar species. At first glance one could even suppose they belong to only one species, but it turns out there are enough differences to separate them and to conclude they represent two species.

Comparative table with differences between *Viridifusus albinus* and *Viridifusus mollis*

	Viridifusus albinus	*Viridifusus mollis*
Locality	southern Angola, Namibia	Ascension, Angola, northern Namibia
Depth	5-90 m	5-80 m
Size	90-118 mm	43-124 mm
Teleoconch whorls	8; very convex; body whorl: 70% of total length	7; body whorl swollen, it takes 75% of total length
Spiral cords	fine threads, each primary cord separated by one secondary thread	weak, nearly visible in last two whorls, evenly spaced
Axial cords	start from a cavity beneath the sutures, most developed at periphery	run from suture to suture; irregular, very distinct, sharp pointed at periphery

	Viridifusus albinus	*Viridifusus mollis*
Siphonal canal	strong, short	very short
Aperture	nearly circular	oval
Periostracum	?	velvety, with microscopic small hairs
Colour	white or yellow-brown	white or yellow-brown
Protoconch		

***Hemipolygona armata* (A. Adams, 1855)**

Quicombo, Angola. Trawled by fishermen. 1990.

48.07 mm. Coll. F. Nolf.

***Pseudofusus* cf *rostratus* (Olivi, 1792)**

Moita Seca, Angola.

Trawled by Belgian fishermen (PEMARCO) at a depth of 80 m. 1963.

33.58 mm. Coll. F. Nolf.

***Fusinus zebrinus* (Odhner, 1923)**

Praia Amelia, Benguela, southern Angola.
Between rocks in coarse sand at a depth of 4 m.
September 1996. 42.30 mm. Coll. F. Nolf.

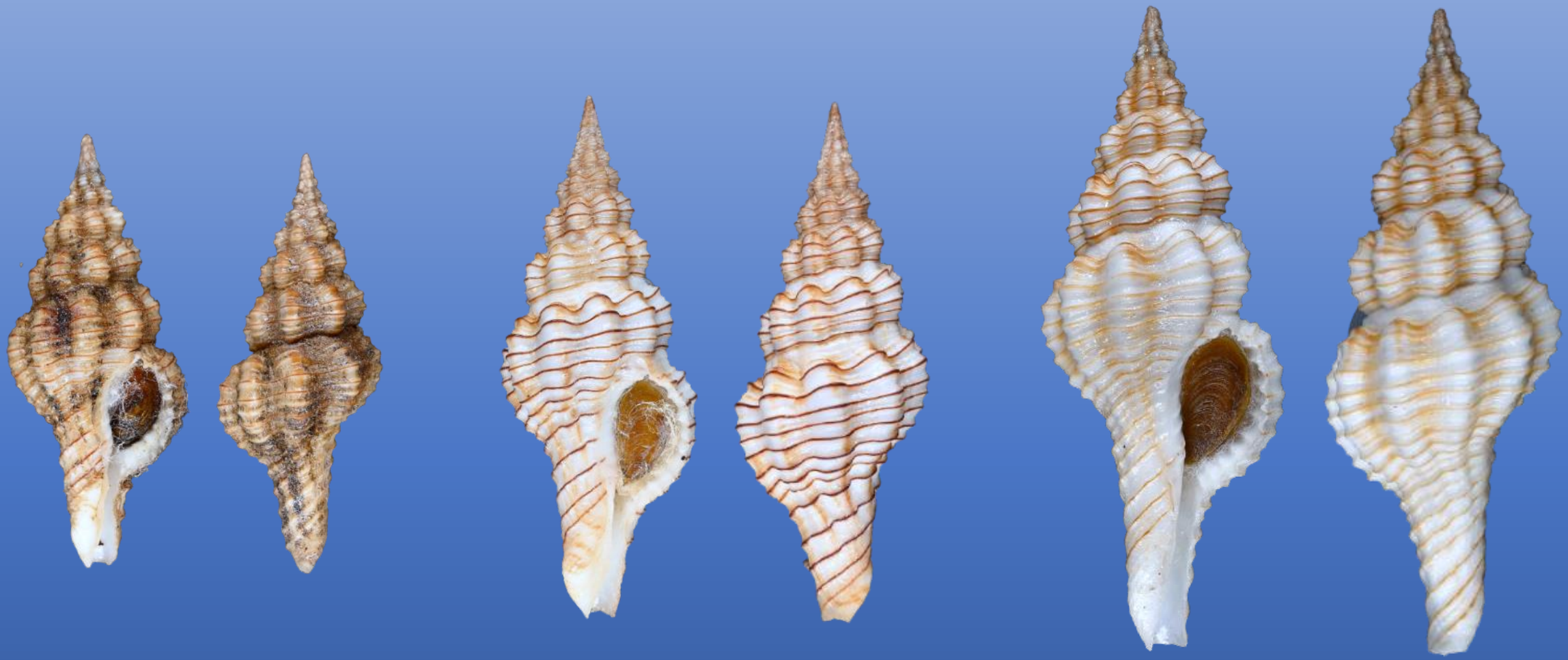
***Fusinus stanyi* Fraussen & Swinnen, 2006**

Moita Seca, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 92 m. 1973. Paratype 2. 39.18 mm. Coll. F. Nolf.

***Polygona filosa* (Schubert & Wagner, 1829)**

Luanda Bay, Angola. Dived at a depth of 4 m.

60.94 mm. Coll. F. Nolf.



***Polygona filosa* (Schubert & Wagner, 1829)**

Off Mayumba, Gabon. 03°30’ S/ 10°20’ E. Trawled by local fishermen. 1985.

Coll. F. Nolf.

From left tot right: 45.02 mm, 50.86 mm, 58.56 mm.

Final conclusion:

* The genus ***Apertifusus*** is represented in the area between northern Gabon and southern Angola by **three species**:

- ***A. caparti* (Adam & Knudsen, 1955)**
- ***A. meyeri* (Dunker, 1869)**
- ***A. hubrechti* Nolf, 2023**

Fusinus maritzaallaryae* Cossignani & Allary, 2019** stands for small, juvenile or semi-adult specimens of ***Apertifusus caparti, and as such has to be regarded as a **junior synonym** of the latter.

The genus ***Ariefusus*** is present by only one species:
***A. rutilus* (Nicolay & Berthelot, 1996).**

However, the question is whether it was necessary to create a new genus for only one recent species and two extinct species, especially because *Apertifusus meyeri* displays the same characteristics - typical for *Ariefusus* - in the first teleoconch whorls.

* The genus ***Viridifusus*** is represented in the investigated area by two species:

- ***V. albinus* (A. Adams, 1856)**
- ***V. mollis* (G.B. Sowerby III, 1913)**

Most authors, who wrote about these species, possessed only very few specimens at hand, especially juvenile or subadult representatives of *V. mollis* or white coloured specimens of *V. albinus*. So, they created a wrong image about these species, of which both white and yellow-brown coloured specimens exist. Moreover, adults of *V. mollis* grow larger than generally known, and they reach the same size as *V. albinus*. A different view is needed to separate them and a superficial assessment following obscure original descriptions should be avoided.

A unique specimen of possibly ***Pseudofusus rostratus*** **(Olivi, 1792)** was studied, but more material and deeper investigation will be needed to confirm if this was really an extension of the geographic range.

Specials thanks go to André Coenye, Steve Hubrecht, Johan Verstraeten and Jan Libbrecht, all from Belgium.