Note on the presence of two species of the genus *Acesta* (Bivalvia: Pectinoidea: Limidae) along the coasts of West Africa

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Abstract

A provisional review is presented on the distribution of two *Acesta* species, ***Acesta excavata* (Fabricius, 1779)** and ***Acesta angolensis* (Adam & Knudsen, 1955)**, actually living along the coasts of West Africa. Both species are compared and extensively illustrated.

Shells of the genus ***Acesta* H. & A. Adams, 1858** are large, thin-shelled, ovate, inequilateral, ventricose, with moderate byssal gape. They have an ill-defined anterior umbonal ridge. The anterior auricle is reduced. The cardinal area is mainly posterior to the beak and the ligament pit is broad and curved (Moore, 1969).
Though we know (Marshall, 2001) animals of the genus *Acesta* can be active swimmers or byssally attached, Boss (1965) states that none of the soft parts of fifteen living specimens of *Acesta angolensis* possessed a byssus! This author supposes the animals attach byssally in the immature stage.

Introduction

The presence of two large *Acesta* species in West Africa is scarcely known among collectors, as they are not mentioned in the few available publications concerning the marine species of West Africa. Ardovini & Cossignani (West African Seashells, 2004) have illustrated only *Acesta excavata*.
More information became available due to collecting efforts by fishermen operating off the coasts of Congo and Angola in the years 1960-1973 (PEMARCO = Pêche maritime du Congo) and through recent deep-water fishing off the coasts of Mauritania.
This note will comment on the distribution of both species and we try to present a comparative iconography to enable collectors to identify and distinguish them both.
This might result in further information forthcoming on these magnificent, but elusive species.

Acesta excavata (Fabricius, 1779)

Syn. *Ostrea excavata* Fabricius, 1779
Lima solida Calcara, 1845

Distinctive features

Shell: large, oval, elongated, fairly flattened and compressed on the sides, thicker ventrally, rather heavy and solid, almost completely closed, except in the interior part.
Sculpture: several fine, small, wavy radial riblets, not very raised and concentric striae often absent in the posterior and apical part; roughly spaced out, irregular growth striae.
Ears: very unequal, reduced especially the anterior ones; the posterior ones are more developed and form an obtuse angle joined to the inferior margin.
Cardinal area: wide and deep with an oblique and elongated **chondrophore** (pit), very inequilateral.
Lunule: distinct, supplied with a typical notch in its upper third part.
Inside: smooth and shiny.
Colour: whitish, tending to grey and brown in adult specimens.
Periostracum: extremely thin, tending to grey and brown in adult specimens.
Size: height attaining about 170 mm in the northern part of the range (Norway, Iceland) and about 130 mm in West Africa. Shells from the Mediterranean Sea (Adriatic and Tyrrhenian Sea) (= ***A. excavata sublaevis* Nordsieck, 1969**) are smaller (height = from 40 to 110 mm).

Geographic range

Norway (including Lofoten Islands), Faeroe Islands, south of Iceland, Gulf of Biscay, Portugal, the Azores, the Canary Islands, Mauritania and Senegal.

This species is the largest member of the Limidae, living in the north and the middle of the East Atlantic. It is well known from northern seas, where it is trawled in rather deep water.
Belgian fishermen obtained a number of large specimens off the coast of South Iceland, but this fishery has actually ceased.
A Norwegian fisherman, Mr. Idar Pettersen, told us that he used to fish this shell at a depth of about 700 metres, together with some species of anemone which apparently shared its habitat. The meat was said to be rose coloured and edible.
The southern distribution only became known through rare and isolated finds, often the result of scientific expeditions searching for deep-water fauna.
The presence in the Canary Islands (between the islands of Tenerife and Gomera at a depth between 1340 and 1530 metres) was confirmed by Dautzenberg in 1906, through material obtained during the expedition with the yacht of Prince Albert I of Monaco.
Pallary mentions the following finds: P. Fischer in 1883 (south of Cape Bojador), A. Locard in 1898 (west of Soudan[1] at depths of 648, 640 and 2655 metres) and E. Perrier in 1886 (off the coast of Morocco and Senegal, dredged at 3200 m), in this way establishing the presence along West African coasts. Poppe & Goto (1993) were uncertain about the identity of these finds, as they stated that 'Records from West Africa probably concern another species'. All doubts were removed when commercial deep-water trawling was developed along the coasts of Mauritania and north Senegal by trawlers operating from the Canary Islands.
A considerable number of specimens of *Acesta excavata* then became available through the efforts of Spanish collectors. These were found on muddy bottoms between 800 and 900 metres[2].
Through the collecting efforts by the late Marcel Pin (Dakar, Senegal) at least one specimen was obtained, trawled off the coasts of Senegal at a depth of 200 metres in 1982 (illustrated in this paper).
According to Mr. Peter Ryall (Ghana)[3] the distribution of *Acesta excavata* extends to Ivory Coast. There are two specimens in his collection, one found off Ivory Coast, the other one from deep water between São Tomé Island and Cameroon. Unfortunately, we were unable to study both, so we cannot yet confirm that the presence of *A. excavata* has to be extended to the Gulf of Guinea. This should mean nearly in the range of *A. angolensis*!

Bathymetric distribution

In the northern part of its distribution, *Acesta excavata* occurs from 200 metres deep on, but seems to be mostly collected around 500 to 700 metres. In the southern part, it can be collected at depths of more than 2,000 metres.

Acesta excavata sublaevis (Nordsieck, 1969)

Syn. *Lima excavata sublaevis* Nordsieck, 1969

The presence of living specimens in the Mediterranean Sea was apparently only documented from 1979 onwards. Before that date, only (sub)fossil valves had been found.
F. Nordsieck introduced the subspecies name '***sublaevis***' for a record from the Gulf of Marseille in 1969, but it was not established whether it was a (sub)fossil or a recent valve. This specimen was smaller, more shiny and the notch under the anterior ear was not as incurved as in *A. excavata*.

One more specimen was recovered at 22 October 1978 off the Ligurian coast (Italy) at a depth of 550 m (Ghisotti, 1979). The shell measured 56.5 mm in height, 42.3 mm in length and his breadth was 18 mm. Another living specimen was found at a depth of 430 m in the Tuscan Archipelago (Italy) on deep corals (height: 63 mm; length: 45 mm; breadth: 23 mm) (Rocchini, 1983).

Finally, one living specimen was sampled during an experimental fishing trial, carried out by the trawler '*Albula*' (home harbour Leghorn, Italy). This fishing trial was part of a research programme.

[1] Name used by French authors in the 19th century for a region in West Africa.
[2] F. Deniz Guerra, Gran Canaria, Canary Islands, Spain, personal communication (29/08/2004).
[3] Personal communication (06/07/2003).

The find took place on 1 December 1992 in the northern Tyrrhenian Sea, about 10 nautical miles south of the Santa Lucia Bank (43°23'21" N. - 09°30'46" E.) at an average depth of 524 m (480-570 m).
Measurements: height = 43.6 mm; length = 31.3 mm; breadth = 15.7 mm.

In August 1992, at least four specimens were caught in living condition in the Adriatic Sea (41°28' N. - 17°50' E.) at a depth of 1160 m. Those were obtained from an Italian shell collector by J.-P. Kreps (Knokke, Belgium) and one of them is illustrated in this paper (collection F. Nolf, Oostende, Belgium). Specimens of this sample attained larger sizes than elsewhere in the Mediterranean Sea (about 110 mm).

Distinctive features

The subspecies shows the same characteristics as *A. excavata*, but these shells are generally smaller, with a more distinct radial sculpture.

Acesta angolensis (Adam & Knudsen, 1955)

Syn. *Lima angolensis* Adam & Knudsen, 1955

This large and spectacular species had almost never been mentioned in shell literature since its description fifty years ago.
The authors believe to be the first to represent this species in full colour and size, as small black and white pictures in the original publication do little justice to this extraordinary shell.
The holotype was obtained in 1948-1949 during the Belgian Oceanographic Expedition along the African coasts of the South Atlantic and is kept in the collections of the Royal Belgian Institute for Natural Sciences in Brussels. We are particularly grateful to Dr. J.L. Van Goethem and his staff for giving us the possibility to study and photograph the holotype.

Distinctive features

The species is extensively described in the original paper[4] and we will limit this note here to the most important characteristics.

Shell: very large, ventricose, slightly gaping on both sides, inaequilateral, slightly curved in front, regularly rounded at the base.
Sculpture: little developed, with a smooth centre except for a few irregular and spaced out growth lines; a very fine radial ribbing at the rear, which is hardly visible in front except near the lunule.
Ears: the posterior ear is more developed than the anterior one, which forms a more or less straight angle.
Cardinal area: very inequilateral; internal ligaments very oblique; the chondrophore forming an oblique triangle.
Hinge: ornamented with a series of very fine tubercles.
Lunule: very distinct, composed in its upper half of two excavated parts, separated by anterior auricles forming a ridge from the beaks towards the middle of the lunule; externally the lunule is bordered at both sides by a neat ridge.
Outline: rather broadly elongated.
Inside: smooth and shiny; pallial line situated at large distance of margin; adductor muscle scar is very large (about 35 mm in some specimens) and adjacent to the posterior pallial line.
Colour: yellowish white.
Periostracum: yellowish grey with brown striation perpendicular to the margin crossing the radial sculpture of anterior and posterior parts of the shell.
Size: shells attaining 150-160 mm are not unusual.

Adam and Knudsen (1955) pointed out that *A. angolensis* is closely related to *A. excavata*, the eastern north Atlantic species which ranges from Norway to the Azores in depths of 150-1450 fathoms (= 275-2654 m).

[4] Adam, W. & Knudsen, J. 1955. Note sur quelques espèces de mollusques marins nouveaux ou peu connus de l'Afrique Occidentale, Mededelingen Koninklijk Belgisch Instituut voor Natuurwetenschappen, Deel XXXI, nr.61, Brussel, p.20

According to these scientists, the differences between *A. angolensis* and *Acesta excavata* (Fabricius, 1779) can be summarized as follows:

- The posterior ear in *A. angolensis* is less angular and the anterior ear is larger; in *A. excavata* the anterior edge of the ear is reflected behind, forming a rounded groove.
- The lunule in *A. angolensis* is relatively larger, it is bordered on each side by a neat ridge and both its parts are hollow, while in *A. excavata* the lunule is flattened in its larger part.
- The cardinal area of *A. angolensis* is more developed, with rudimentary lateral teeth, which are missing in *A. excavata*.
- The ligament of *A. angolensis* is a little bit narrower.
- The radial sculpture of *A. angolensis* is less strong compared to *A. excavata*.

We agree with Boss (1965) that other morphological characteristics, including conchological measurements, offer us further parameters which may define the species.

Table I. Measurements and ratios of *A. angolensis*, *A. excavata* and *A. excavata sublaevis*. Holotype data from original description; specimens of *A. angolensis* (2-14) from Geronimo Station 249 (04°40' S. / 11°0' E.: about 55 miles west of Pointe Noire, Congo Republic (Brazzaville); specimens 15-17 from the authors' collections respectively from Morro, Angola (15), Ambriz, Angola (16) and Pointe Noire (17); those of *A. excavata*, in the collection of the U.S. National Museum (1-11), specimens from the authors' collections, namely from South Iceland (12), North Norway (13), Senegal (14), Mauritania (15) and the Adriatic Sea (*sublaevis*) (16).

	Height (mm)	Length (mm)	Breadth (mm)	Height/Length	Breadth/Height	Breadth/Length
A. angolensis						
Holotype	153	122	49	1.30	0.32	0.40
1	164	127	59	1.30	0.40	0.50
2	162	123	62	1.31	0.40	0.50
3	159	120	66	1.32	0.41	0.60
4	159	119	50	1.33	0.31	0.42
5	156	137	58	1.13	0.40	0.42
6	154	117	59	1.31	0.40	0.50
7	152	116	59	1.31	0.40	0.50
8	148	113	57	1.30	0.40	0.50
9	142	111	57	1.30	0.40	0.51
10	139	114	51	1.21	0.40	0.48
11	133	103	49	1.30	0.40	0.50
12	130	104	44	1.30	0.33	0.42
13	123	103	48	1.20	0.40	0.50
14	105	81	31	1.30	0.30	0.40
15	145.3	114.2	61.7	1.27	0.42	0.54
16	163.0	129.7	66.2	1.26	0.41	0.51
17	139.3	110.2	51.5	1.26	0.37	0.47
average				**1.28**	**0.38**	**0.48**
A. excavata						
1	135	101	62	1.33	0.50	0.61
2	122	92	60	1.32	0.50	0.70
3	121	89	48	1.40	0.40	0.53
4	115	86	46	1.33	0.40	0.53
5	106	81	42	1.30	0.40	0.51
6	105	82	52	1.30	0.50	0.63
7	104	80	46	1.30	0.44	0.60
8	103	76	39	1.40	0.40	0.51
9	91	65	35	1.40	0.40	0.53
10	80	71	39	1.30	0.43	0.54
11	88	64	35	1.40	0.40	0.54
12	151.8	116.4	69.2	1.30	0.46	0.59
13	159.2	110.0	68.7	1.45	0.43	0.62
14	129.8	98.0	57.5	1.32	0.44	0.59
15	94.2	71.9	39.6	1.31	0.42	0.55
A. excavata sublaevis						
16	107.7	81.8	46.0	1.32	0.43	0.56
average				**1.34**	**0.43**	**0.57**

Table I gives some sizes of *A. angolensis*, *A. excavata* and *A. excavata sublaevis*. The mean height/length ratio of *A. angolensis* is less than that of *A. excavata* but there is quite a significant overlap. Therefore, the ratios breadth/height and breadth/length are more useful as parameters. In these ratios, we found a smaller overlap and both of them indicate that *A. excavata* is a more bulbous shell.

It is surprising that none of the authors Adam & Knudsen (1955), Vokes (1963) and Boss (1965) remarked one of the most essential characteristics, namely the shorter cardinal area in *A. excavata* in comparison to the total length or height.

In **table II**, the following ratios were calculated: total length/length cardinal area and length/length cardinal area. Especially the latter is a very useful parameter to distinguish both species.

Table II. Measurements and ratios of *A. angolensis*, *A. excavata* and *A. excavata sublaevis*.

		Height (mm)	Total length (mm)	Length cardinal area (mm)	L/LCA	H/LCA
A. angolensis						
15	Morro, Angola	145.3	114.2	43.9	2.60	3.31
16	Ambriz, Angola	163.0	129.7	63.5	2.04	2.57
17	Pointe Noire (Congo Brazzaville)	139.3	110.2	43.4	2.54	3.21
average					**2.39**	**3.03**
A. excavata						
12	South Iceland	151.8	116.4	38.2	3.04	3.97
13	North Norway	159.2	110.0	47.7	2.31	3.34
14	Senegal, W. Africa	129.8	98.0	38.7	2.53	3.35
15	Mauritania, N.W. Africa	94.2	71.9	22.8	3.15	4.13
A. excavata sublaevis						
16	Adriatic Sea	107.7	81.8	29.3	2.79	3.67
average					**2.75**	**3.69**

Boss (1965) mentioned more differences between *A. excavata* and *A. angolensis*:

- The anteroventral ridges, which define the periphery of the lunule, are generally stronger and more angular than the less definitive ridges in *A. excavata*.
- An internal view of the shell shows that the margin of the lunule in *A. angolensis* is more concave and lacks the strong proximal lunular notch of *A. excavata*.
- *A. excavata* has a heavier and thicker shell compared to *A. angolensis*. The latter possess a thin and rather fragile shell.

Furthermore, especially in *A. angolensis*, we remarked that the lunule is provided with corrugating ribs.

Geographic range

The distribution ranges from Congo to southern Angola. As far as the authors know, the ranges of both species do not overlap. Since the description of the holotype in 1955, *Acesta angolensis* has only been collected sporadically. Between 1960 and 1973 however André Coenye, a Belgian navigating officer at the PEMARCO-fisheries (Pêche maritime du Congo), caught several large specimens off the coasts of Angola. A few specimens were obtained through local Portuguese collectors.

Bathymetric distribution

The holotype has been discovered in a depth between 400-500 metres on a sandy greenish mud bottom (10°45' S. -13°07' E.), about 40 miles west of Ponta do Morro, Angola and has been deposited in the K.B.I.N. (Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium).

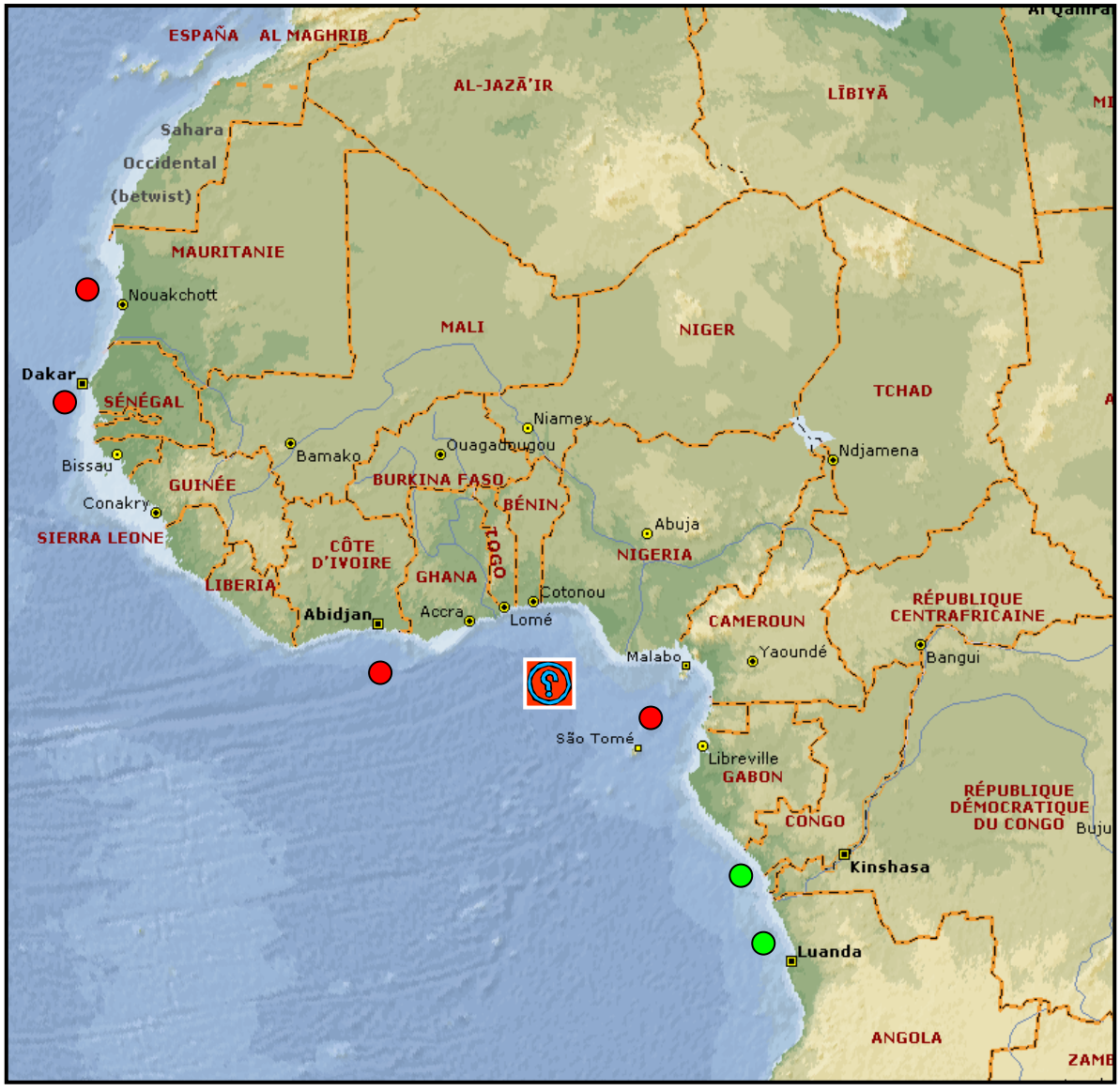
While participating in the *Equalant II* programme on 9 September 1963, the U.S. Bureau of Commercial Fisheries vessel *Geronimo* has trawled fifteen specimens of *A. angolensis*.
All specimens were taken alive in a depth of 951 metres at *Geronimo* Station 249, 04°40' S. and 11°00' E. about 55 miles west of Pointe Noire, Congo Republic (Brazzaville).
This confirms a deep-water habitat for this species. Moreover the *Geronimo* specimens increased the bathymetric range with an extra 450 metres.
Later on, several collectors were apparently able to obtain specimens taken by local fishermen at depths between 60 and 100 metres. Up to now, we have no explanation for such extensive bathymetric distribution, which is most unusual for *Acesta* species. Further research should establish if these finds are reliable.

Distribution map

Acesta angolensis (Adam & Knudsen, 1955)

Acesta excavata (Fabricius, 1779)

= doubtful locality



Acesta excavata **(Fabricius, 1779)**

Acesta excavata sublaevis **(Nordsieck, 1969)**

Table III. Comparison of the main characteristics of *A. excavata* and *A. angolensis*

	A. excavata	*A. angolensis*
posterior ear	-	less angular
anterior ear	anterior edge of ear is reflected behind forming a rounded groove	larger
lunule	**typical notch** in its upper third part	slightly larger, bordered on each side by a neat ridge; both its parts are hollow provided with rather corrugating ribs
cardinal area	no lateral teeth; **rather small in proportion to total length**	more developed with rudimentary lateral teeth; **broader**
ligament	-	a little bit narrower
radial sculpture	**many fine wavy radial riblets**	**less defined obsolete ribbing**
shell outline	**elongated and rather bulbous**	**ventricose and rather flattened**
shell structure	**thick and heavy**	**thin and fragile**
colour	whitish	yellowish white
periostracum	very thin, tending to grey and brown	yellowish or greenish grey with brown striation
range	North Atlantic to Senegal including the Mediterranean Sea; Ivory Coast and Gulf of Guinea (?)	Congo Republic (Brazzaville) and Angola

Conclusion

In fact, there are few differences between the two *Acesta*-species in the East Atlantic. We can suppose the two species have the same ancestor such as many other species in this region, e.g. *Talochlamys pusio* (Linnaeus, 1758) and *Talochlamys multistriata* (Poli, 1795) or *Bolma johnsoni* (Odhner, 1923), *Bolma rugosa* (Linnaeus, 1767), *Bolma jacquelineae* (Marche-Marchad, 1957) and a new to be described *Bolma sp.* (in preparation).

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Acesta excavata (Fabricius, 1779)

***Acesta excavata* (Fabricius, 1779)**

Grindavick, S. Iceland.
Trawled by a Belgian fisherman at 250 m.
1975.

151.8 mm

Collection F. Nolf (Oostende, Belgium).

***Acesta excavata* (Fabricius, 1779)**

Vestfjorden, N. Norway.
Trawled by a local fisherman at 375 m.
March 1990.

159.2 mm

Collection F. Nolf (Oostende, Belgium).

***Acesta excavata* (Fabricius, 1779)**

Off Senegal, W. Africa.
Trawled by a fisherman at 200 m.
1982.

129.8 mm

Collection F. Nolf
(Oostende, Belgium).

***Acesta excavata* (Fabricius, 1779)**

Nouakchott, Mauritania, N. W. Africa.
Trawled by a fisherman at 500 m.
November 2000.

94.2 mm
Collection J. Verstraeten
(Oostende, Belgium).

Acesta excavata sublaevis (Nordsieck, 1969)

Acesta excavata sublaevis
(Nordsieck, 1969)

Adriatic Sea, Italy.
41° 28' N. / 17° 50' E.
Dredged at 1160 m.
August 1962.

107.0 mm

Collection F. Nolf (Oostende, Belgium).

distinct radial sculpture

Acesta angolensis (Adam & Knudsen, 1955)

Acesta angolensis
(Adam & Knudsen, 1955)

Trawled off Morro, Angola at 460 m.

145.3 mm

Collection F. Nolf (Oostende, Belgium).

Acesta angolensis
(Adam & Knudsen, 1955)

Ambriz, Angola.
Dredged by a Belgian fisherman
(PEMARCO) at 450 m.
1970.

163.0 mm

Collection F. Nolf (Oostende, Belgium).

Acesta angolensis (Adam & Knudsen, 1955)

***Acesta angolensis* (Adam & Knudsen, 1955)**

Pointe Noire, Republic of Congo (Brazzaville).
Trawled by a local fisherman at 60-100 m.
1990.
139.3 mm
Collection J. Verstraeten (Oostende, Belgium).

Acesta angolensis (Adam & Knudsen, 1955): holotype

***Acesta angolensis* (Adam & Knudsen, 1955)**

Station 88 (10° 45' S. – 13° 07' E.), about 40 miles of Ponta do Morro, Angola.
Belgian Oceanographic Expedition in the African Coastal Waters of the South Atlantic (1948-1949).
Dredged on a sandy greenish mud bottom at a depth between 400-500 m.
153 mm
K.B.I.N. (Koninklijk Belgisch Instituut voor Natuurwetenschappen), Brussels, Belgium.

Acesta angolensis (Adam & Knudsen, 1955): holotype

***Acesta angolensis* (Adam & Knudsen, 1955)**

Station 88 (10° 45' S. – 13° 07' E.), about 40 miles of Ponta do Morro, Angola.
Belgian Oceanographic Expedition in the African Coastal Waters of the South Atlantic (1948-1949).
Dredged on a sandy greenish mud bottom at a depth between 400-500 m.
153 mm
K.B.I.N. (Koninklijk Belgisch Instituut voor Natuurwetenschappen), Brussels, Belgium.

Comparison between *Acesta excavata* and *Acesta angolensis*

inside of right valve

elongated shell outline

Acesta excavata (Fabricius, 1779)
Grindavick, S. Iceland.
Trawled by a Belgian fisherman at 250 m.
1975.
151.8 mm
Collection F. Nolf (Oostende, Belgium).

ventricose shell outline

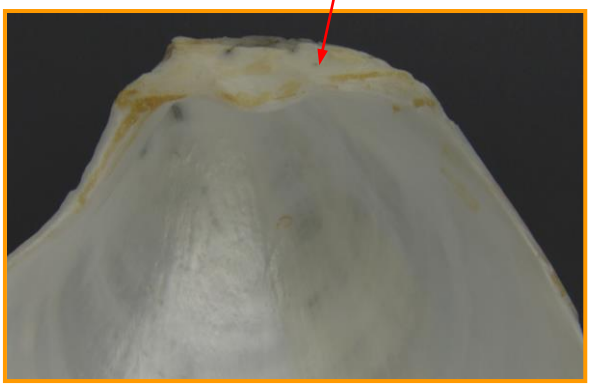
Acesta angolensis (Adam & Knudsen, 1955)
Morro, Angola
Trawled by a fisherman at 460 m.

145.3 mm
Collection F. Nolf (Oostende, Belgium).

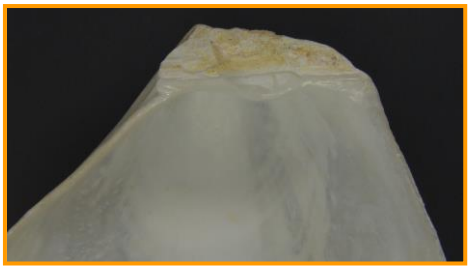
typical notch in the lunule

edge of anterior ear is reflected

cardinal area: broader



Acesta excavata: inside the right valve



Acesta excavata **(Fabricius, 1779)**
Vestfjorden, N. Norway.
Trawled by a local fisherman at 375 m.
March 1990.
159.2 mm
Collection F. Nolf (Oostende, Belgium).

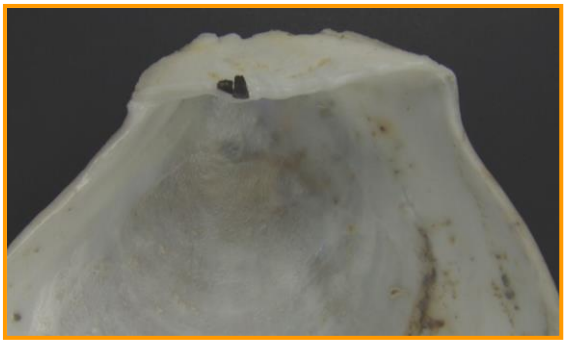
Acesta excavata **(Fabricius, 1779)**
Senegal, W. Africa.
Trawled at 200 m.
1982.
129.8 mm
Collection F. Nolf (Oostende, Belgium).

Acesta excavata sublaevis **(Nordsieck, 1969)**
Adriatic Sea, Italy.
41° 28' N. – 17° 50' E.
Dredged at 1160 m.
August 1962.
107.7 mm
Collection F. Nolf (Oostende, Belgium).

Acesta angolensis: inside the right valve

posterior end

Acesta angolensis (Adam & Knudsen, 1955)
Ambriz, Angola.
Trawled by a fisherman at 450 m
in green muddy sand.
1970.
163.0 mm
Collection F. Nolf (Oostende, Belgium).

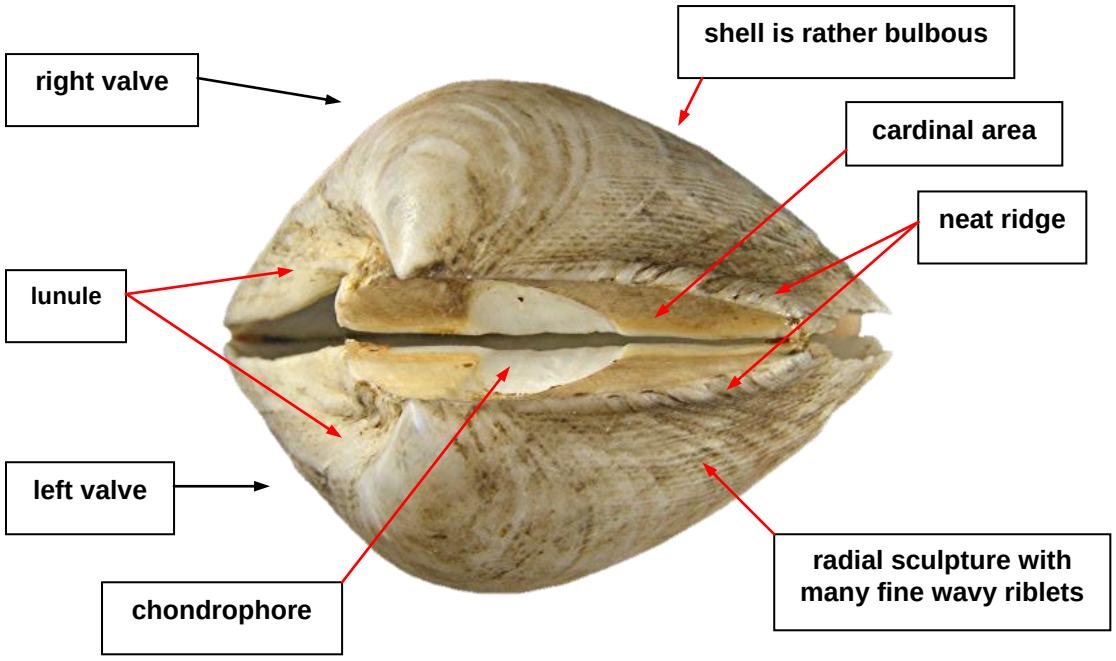


no lunular notch

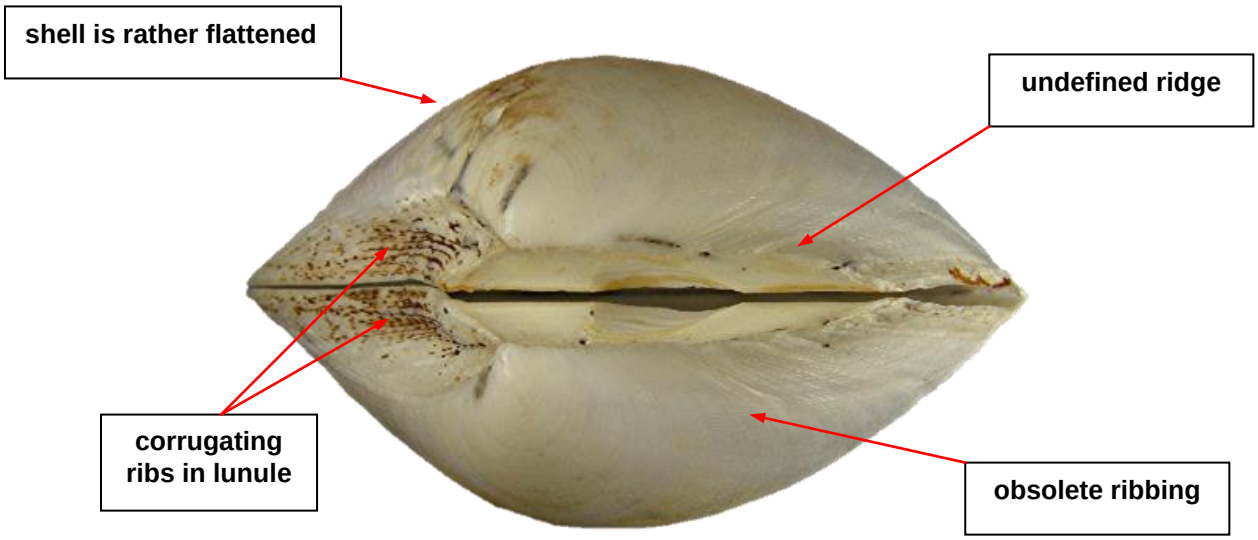
anterior end

Acesta angolensis (Adam & Knudsen, 1955)
Pointe Noire, Republic of Congo (Brazzaville).
Trawled by a local fisherman at 60-100 m.
1990.
139.3 mm
collection J. Verstraeten (Oostende, Belgium).

More differences between
Acesta excavata and *Acesta angolensis*



Acesta excavata **(Fabricius, 1779)**
Vestfjorden, N. Norway.
Trawled by a local fisherman at 375 m.
March 1990.
159.2 mm
collection F. Nolf (Oostende, Belgium).



Acesta angolensis **(Adam & Knudsen, 1955)**
Morro, Angola.
Trawled by a fisherman at 460 m.
145.3 mm
collection F. Nolf (Oostende, Belgium).

Acesta excavata **(Fabricius, 1779)**
Senegal, W. Africa.
Trawled at 200 m.
1982.
129.8 mm
Collection F. Nolf.

Acesta excavata **(Fabricius, 1779)**
Nouakchott, Mauritania, N. W. Africa.
Trawled at 500 m.
November 2000.
94.2 mm
Collection J. Verstraeten.

Acesta excavata sublaevis **(Nordsieck, 1969)**
Adriatic Sea, Italy.
41° 28' N. – 17° 50' E.
Dredged at 1160 m.
August 1962.
107.7 mm
Collection F. Nolf.

Acesta angolensis **(Adam & Knudsen, 1955)**
Ambriz, Angola.
Trawled by a fisherman at 450 m
in green muddy sand.
1970.
163.0 mm
Collection F. Nolf.

Acesta angolensis **(Adam & Knudsen, 1955)**
Holotype, K.B.I.N., Brussels, Belgium.
Station 88 (10° 45' S. – 13° 07' E.), about 40 miles
of Ponta do Morro, Angola.
Belgian Oceanographic Expedition in the African
Coastal Waters of the South Atlantic (1948-1949).
Dredged on a sandy greenish mud bottom
at a depth between 400-500 m.
153 mm

Acesta angolensis **(Adam & Knudsen, 1955)**
Pointe Noire, Republic of Congo (Brazzaville).
Trawled by a local fisherman at 60-100 m.
1990.
139.3 mm
Collection J. Verstraeten.

Comparison of the lunule

Acesta excavata **(Fabricius, 1779)**
Grindavick, S. Iceland.
Trawled by a Belgian fisherman at 250 m.
1975.
151.8 mm
collection F. Nolf (Oostende, Belgium).

shell is more bulbous

Acesta excavata sublaevis **(Nordsieck, 1969)**
Adriatic Sea, Italy.
41° 28' N. – 17° 50' E.
Dredged at 1160 m.
August 1962.
107.7 mm
collection F. Nolf (Oostende, Belgium).

shell is more flattened

Acesta angolensis **(Adam & Knudsen, 1955)**
Morro, Angola.
Trawled by a fisherman at 460 m.
145.3 mm
Collection F. Nolf (Oostende, Belgium).

corrugating ribs

Acesta angolensis **(Adam & Knudsen, 1955)**
Holotype, K.B.I.N., Brussels, Belgium.
Station 88 (10° 45' S. – 13° 07' E.), about
40 miles of Ponta do Morro, Angola.
Belgian Oceanographic Expedition in the African
Coastal Waters of the South Atlantic (1948-1949).
Dredged on a sandy greenish mud bottom
at a depth between 400-500 m.
153 mm

An overview of the genus *Afer* Conrad, 1858 (Gastropoda: Buccinidae)

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The genus *Afer*

Key words

MOLLUSCA, GASTROPODA, BUCCINIDAE, *Afer*

Abstract

As no book or article gives a complete overview of the small genus *Afer* Conrad, 1858 and species are often confused, this article aims at helping both scientists and collectors to identify all members of the aforementioned genus in an easy way. For that purpose, all species are discussed in alphabetical order and clearly illustrated. Some remarks are added for individual species as well as for the genus as a whole. Moreover, the history of the genus is briefly discussed.

History of the genus

The genus *Afer* was introduced by Conrad (1858) to accommodate three species: *A. afer* (Gmelin, 1791) (originally described as *Murex afer*), *A. cumingii* (Reeve, 1848) (originally described as *Fusus cumingii*) and *A. porphyrostoma* (Reeve, 1847) (originally described as *Fasciolaria porphyrostoma*) within the family **Turbinellidae** Swainson, 1840 (synonym: **Vasidae**). Since then, many authors have discussed the generic placement of *Afer* within different families [for an overview, we refer to Fraussen & Hadorn (1999)]. A fourth species was added to the genus in 1993, when A. Delsaerdt described *A. lansbergisi* as belonging to the family **Turbinellidae**. A correct generic placement appeared in 1999, when Fraussen & Hadorn examined the radula of the western African species *A. afer*, *A. lansbergisi* and *A. porphyrostoma*: they proved *Afer* to belong to the family **Buccinidae** and added a fifth and up to now last species to the genus: *A. pseudofusinus*.

General remarks

Conchologically speaking, all *Afer* species share the adapical denticle with the parietal ridge and the abapical denticle on the columella, slightly above the onset of the siphonal canal. They share this feature with species in the genus *Euthria* M.E. Gray, 1850. Therefore, these two genera may be close relatives, an opinion shared by K. Fraussen[1]. However, the investigation into this relationship is beyond the scope of the present article.

Four of the five species, belonging to the genus *Afer*, live on and off the coast of western Africa, which is really the geographical centre of the genus. *A. cumingii* is a Pacific species (for further discussion: see the alphabetical overview).

Alphabetical overview

Afer afer (Gmelin, 1791)

Original reference

Systema Naturae XIII: 3558, species 128.

[1] Personal communication

Type material

As Gmelin only referred to a figure by Adanson (1757) when describing his *Murex afer*, the shell on which this figure was based is accepted as the type. This shell is in the collection of the Muséum national d'Histoire naturelle, Paris, France.

Distinctive features

All **whorls** wear strong knobs on the shoulder. These are rather low in number (7-9 on body whorl) and very pronounced when compared to the other species in the genus.
Knobs extended downwards, especially the knob closest to the lip: almost or really reaching the siphonal canal, giving the outer lip a very swollen appearance.
Spiral sculpture on body whorl very distinct: many fine, but elevated spiral ribs with broad interspaces. This sculpture also covers the siphonal canal, yet decreasing towards its end.
Columellar callus smooth, except for a rather weak adapical knob with parietal ridge.
The abapical denticle is very weak, sometimes even absent. Inner lip with lirae running into the aperture as far as one can see.
Siphonal canal long, straight, half-open, slightly recurved, becoming somewhat broader near the end.
Colour yellowish brown with white. Ribs often with very fine darker spots. Aperture and columella white. Siphonal canal abapically ending in a darker blotch.

Geographical range

From Cap Timiris, Mauritania and Senegal to Guinea (data based on collection labels and literature).

Remarks

Type species of the genus *Afer* (Conrad, 1858).

***Afer afer* (Gmelin, 1791)**
Bay of Gorée, Senegal, W. Africa.
Taken by a diver at 11 m, in sand.
1972.
on the left: 28.0 mm
left below: 30.0 mm
right below: 33.0 mm

***Afer afer* (Gmelin, 1791)**
Bay of Gorée, Senegal, W. Africa.
Taken by a diver at 11 m, in sand.
1972.
on the left: 33.0 mm
on the right: 34.0 mm

Afer cumingii (Reeve, 1848)

Original reference

Conchologia Iconica or Illustrations of the Shells of Molluscous Animals**.** Fusus. Pl. 17, sp. 67.

Type material

Syntypes in The Natural History Museum, London, United Kingdom.

Distinctive features

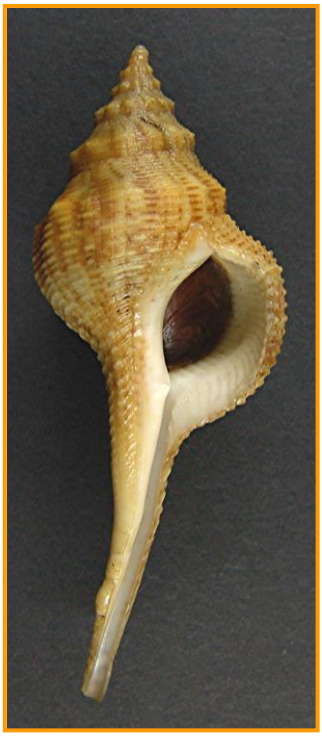
Body whorl and 1-2 further postnuclear whorls with a line of very small knobs on the shoulder, sometimes interrupted by smooth areas without knobs. **Further postnuclear whorls** with smooth shoulder.
Spiral sculpture well developed: numerous well-pronounced spiral ribs on last 3-4 teleoconch whorls, less developed on other whorls. Spiral ribs on shoulders best developed, which gives the shoulder an angular appearance. Interspaces slightly broader than ribs themselves. All whorls are clearly lined by a swollen sutural band. Spiral sculpture continuing on siphonal canal, yet decreasing in strength and leaving the lower 1/3 of the siphonal canal smooth.
Siphonal canal straight, long, half-open.
Columellar callus very thin between the adapical and the abapical denticle, leaving the spiral sculpture visible. Adapical and abapical denticle as well as parietal ridge strongly developed. Inner lip with many lirae running into the aperture as far as one can see.
Basic **colour** creamish white, with a scattered light to dark brown pattern. Smooth lower part of siphonal canal purplish brown.

Geographical range

From northern Taiwan down to southern Vietnam.

Remarks

This is the only species known to occur beyond the western African region as it lives in the Pacific Ocean from northern Taiwan[2] down to southern Vietnam[3]. It is the only species whose position within the genus only relies on conchological features and studying the radula should clarify its generic position. Unfortunately, we did not have radula at our disposal.
Nevertheless, it has the adapical denticle with parietal ridge and the distinctive abapical denticle on the columella present in all *Afer*. This excludes the species from the turbinellid genus *Tudicula* H. & A. Adams, 1863, which many think it really belongs to. The latter genus also always has an extended columellar plate with folds, which is absent in all members of the genus *Afer*. However, because of the possible aforementioned relationship to other genera in the buccinid family, we cannot confirm its present generic position with certainty.



***Afer cumingii* (Reeve, 1848)**
Trawled off S.W. Taiwan
at a depth of 110 m.
79.0 mm

***Afer cumingii* (Reeve, 1848)**
Trawled off S.W. Taiwan
at a depth of 110 m.
77.0 mm

[2] 'Japan to Taiwan' according to Abbott & Dance (1986), however Okutani (2000) does not mention it.
[3] Collection data of the present authors.

Afer lansbergisi Delsaerdt, 1993

Original reference

Gloria Maris 31(6): 89-96

Type material

Holotype in Maritime Museum and Aquarium of Klaipeda, Lithuania.

Distinctive features

All whorls wear numerous knobs on the shoulder.
Spiral sculpture on body whorl very distinct: very fine grooves above the shoulder, yet broad ribs between the shoulder and the siphonal canal.
Siphonal canal itself with high, very distinct ribs, which are narrower than the ones on the body whorl. Siphonal canal broad, half-open, slightly recurved, always ending in a brown blotch.
Columellar callus smooth, except for the adapical and abapical denticle and the parietal ridge present in all species of the genus. Inner lip smooth or with hardly visible lirae, near the onset of the siphonal canal slightly swollen. The outer lip too is rather swollen.
Colour greyish with brown spiral lines (usually on the ribs) to uniformly light brown. Aperture white, columella purplish, sometimes with a silvery overcast (especially near the transition to the siphonal canal).

***Afer lansbergisi* Delsaerdt , 1993**
Off Dakar, Senegal, W. Africa.
Trawled by fishermen.
1967.
39.5 mm

Afer lansbergisi **Delsaerdt , 1993**
Mauritania, N.W. Africa.
Trawled by fishermen in 60 m of water.
1978.
41.5 mm

Geographical range

From Western Sahara, Mauritania and Senegal to Guinea and Sierra Leone (data based on collection labels and literature).

Remarks

This species was often confused with *A. porphyrostoma* and misidentifications are still present in many collections. An example can be found in Abbott & Dance (1986), p. 210, bottom row, species on the left: the name given is *A. porphyrostoma*, but the pictured shell is *A. lansbergisi*. For the reasons for the confusion, we refer to Delsaerdt (1993).

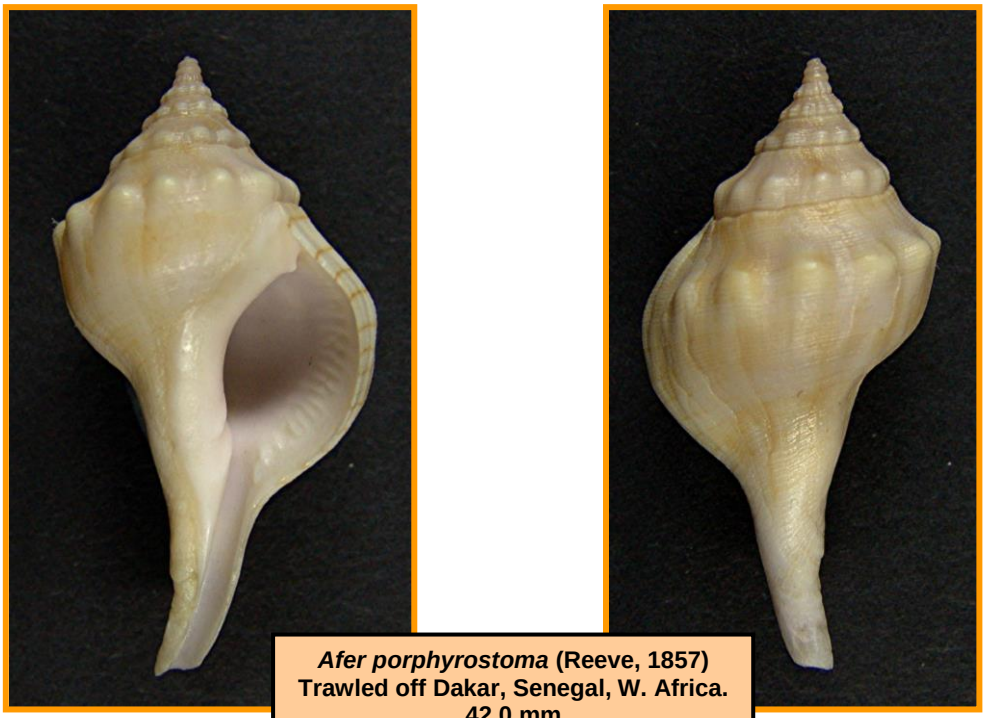
Afer porphyrostoma (Reeve, 1847)

Original reference

Conchologia Iconica or Illustrations of the Shells of Molluscous Animals. Vol. IV: Fasciolaria. Plate V, species 11.

Type material

The probable holotype (see Delsaerdt, 1993) was originally kept in the collection Belcher, which was sold to Mrs. Lombe-Taylor. This collection is now kept in The Natural History Museum, London, U.K.



***Afer porphyrostoma* (Reeve, 1857)**
Trawled off Dakar, Senegal, W. Africa.
42.0 mm

Distinctive features

All whorls wear numerous small knobs on the shoulder.
Spiral sculpture confined to numerous very fine cords, no axial ribs present, which gives the shell a smooth appearance. The cords continue on the siphonal canal.
Siphonal canal long, slender, half-open, slightly recurved and slightly deviated.
Columellar callus thick, smooth, except for a very distinct adapical denticle with parietal ridge and one or two smaller abapical denticle(s). The upper abapical denticle then shows a small, foldlike ridge running into the aperture. Inner lip with fine lirae, running a few millimetres into the aperture. Outer lip clearly swollen.
Colour creamish yellow to light brown with a typical pattern of very fine dark brown axial bands. Aperture and columella pinkish purple, margins and lirae white.

Geographical range

Mauritania, Senegal and Guinea Bissau (literary data and collection labels).

Remarks

The habitat 'Eastern Seas' mentioned by Reeve (1847) and later copied by Sowerby (1882) is incorrect as the species only lives on the western African coasts.

Afer pseudofusinus Fraussen & Hadorn, 1999

Original reference

Gloria Maris 38(2-3): 28-42

Type material

Holotype in Muséum national d'Histoire naturelle, Paris, France

Distinctive features

Body whorl rounded and without knobs, **other whorls** shouldered and with numerous small knobs.
Spiral sculpture consisting of well-visible spiral cords on all whorls. Interspaces broad and shallow, on body whorl much broader than on other whorls.
Siphonal canal long, straight, half-open, yet gradually becoming narrower.
Columellar callus smooth, except for the adapical and abapical denticle present in all species of the genus. Inner lip with fine lirae reaching a few millimetres into the aperture.
Colour yellowish to light brown. Knobs lighter. Aperture and columella white and sometimes the base colour shines through, especially where the callus is very thin (usually near the parietal ridge). Some specimens show two lighter coloured bands on the body whorl.

***Afer pseudofusinus* Fraussen & Hadorn , 1999**
St. Louis, Senegal, W. Africa.
Dredged at 190 m.
1978.
above: 57.0 mm
on the left: 61.0 mm

Geographical range:

From Meteor Station (17°17' N.), Mauritania, Senegal, Sierra Leone to Canal de Vridi, Ivory Coast and 'Gulf of Guinea' on the continental shelf in depths between 84 and 300 m (see original description).

Acknowledgements

We would like to thank Mr. K. Fraussen (Aarschot, Belgium) for access to his personal library and for his enjoyable knowledge of the family **Buccinidae**, which he passed on to us during the many hours spent together discussing and studying conchological and malacological subjects. We are thankful to Ms. K. Way (NHM, London, UK) for museum collection data on *A. cumingii* as well as for bibliographical help, and to Mr. A. Delsaerdt (Aarschot, Belgium) and Mr. F. Nolf (Oostende, Belgium) for their critical reading of the manuscript. The latter also provided additional digital photographs of shells in his personal collection.

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Plate: the genus *Afer* Conrad, 1858

***Afer afer* (Gmelin, 1791)**. Gorée Bay, Senegal. Dredged by fishermen at 12-18 m. – June 2001.
***Afer cumingii* (Reeve, 1847)**. Nha Trang, Vietnam. Dredged by fishermen – October 2001.
***Afer lansbergisi* Delsaerdt, 1993**. Conakry, Guinea. Dredged by fishermen – October 2001.
***Afer porphyrostoma* (Reeve, 1847)**. Petite Côte, Senegal. Dredged by fishermen at 15 m. – April 2003.
***Afer pseudofusinus* Fraussen & Hadorn, 1999**. Cayar, Senegal. Trawled at 110 m. – September 2000.

All pictured shells on this plate in the **Monsecour-collection**; digital photographs by the authors.

Afer afer **(Gmelin, 1791)**

Afer lansbergisi **Delsaerdt, 1993**

Afer pseudofusinus **Fraussen & Hadorn, 1999**

Afer porphyrostoma **(Reeve, 1847)**

Afer cumingii **(Reeve, 1847)**

Genus *Afer* Conrad, 1858