The genus *Afer* Conrad, 1858 (Gastropoda: Buccinidae), with descriptions of a new subgenus and a new species from western Africa

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ABSTRACT. A remarkable species of *Afer* from Mauretania is described as new. The generic placement is based on protoconch morphology, which is identical to the other known *Afer* species. Conchological characteristics of the teleoconch whorl are peculiar and serve as the basis for the new subgenus *Praecantafer* subgen. nov. to accommodate the new species: *Afer* (*Praecantafer*) *echinatus* sp. nov. Species formerly assigned to *Streptosiphon* Gill, 1867 are confirmed as distinct from typical *Afer* Conrad, 1858 and the status of *Streptosiphon* is restored at the subgeneric level.

INTRODUCTION

The description of this new species is based on two specimens that were collected some 30 years apart. Both specimens originate from the by-product of fisheries surveys carried out on the rich bottoms of the coastal Sahara upwelling, extending from southern Morocco to Mauritania. The holotype was collected in 1982 onboard R/V *N'Diago* by Dr Bertrand Richer de Forges while he was working for the Centre National de Recherche Océanographique et des Pêches (CNROP) in Nouadhibou, Mauretania. The origin of the paratype is less precise. It was collected during a fishery survey carried in the 1950s onboard R/V *Président Théodore Tissier* by what was then the French Institut Scientifique et Technique des Pêches Maritimes (ISTPM); regrettably, the samples were incompletely labelled and the station data are lost, but we know that the survey sampled southern Morocco and/or Mauretania. Although the region is the target of intensive commercial fisheries, it has remained almost unexplored by academic research vessels, and the new *Afer* may be less rare than indicated by the finding of just two specimens in 30 years.

Abbreviations.

BM(NH): British Museum (The Natural History Museum), London, England
KBIN: Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium
KF: Collection Koen Fraussen, Aarschot, Belgium.
KMMA: Klaipeda Maritime Museum and Aquarium, Klaipeda, Lithuania
MNHN: Muséum national d'Histoire naturelle, Paris.France
NMBE: Naturhistorisches Museum Bern, Bern, Switzerland
ZMA: Zoologisch Museum, University of Amsterdam, Amsterdam, Netherlands
ZMB: Museum für Naturkunde (Zoologisches Museum), Humboldt Universität, Berlin, Germany

SYSTEMATICS

BUCCINIDAE Rafinesque, 1815

Genus ***Afer*** Conrad, 1858
Afer Conrad 1858. Type species: "*Fusus afer* (Lamarck)" by original designation = *Murex afer* Gmelin, 1791 (type locality: "Habitat ad Senegal").

The genus *Afer* went through a confusing taxonomic history. It was placed in several families: "Fusidae" by Tryon (1881: 69, for *Afer afer*), Buccinidae by Tryon (1881: 99, for *Streptosiphon porphyrostoma*), "Vasidae" (now Turbinellidae) by Thiele (1931: 343) and Wenz (1941: 1306), Fasciolariidae by Abbott (1959: 15), Buccinidae by MacNeil (1960: 75, with *Siphonofusus* Kuroda & Habe, 1954 a synonym of *Afer*), Turbinellidae by Abbott & Dance (1986: 210) and Vaught (1989: 52, as a subgenus of *Tudivasum* Rosenberg & Petit, 1987). Not untill 2000 (Fraussen & Hadorn, 2000: 28-42), when the radulae of the known Atlantic species were prepared and the placement in Buccinidae confirmed.
The genus was used in a broad sence by Fraussen & Hadorn (2000: 28-42) and Monsecour & Monsecour (2005: 23-32), without subgeneric splitting. In the present study *Streptosiphon* is recognized as distinct from typical *Afer* and retracted from its synonymy. *Streptosiphon* is restored at the subgeneric level. In addition, *Praecantafer* subgen. nov. is described to accommodate the peculiar *Afer* (*Praecantafer*) *echinatus* sp. nov.
Still no opportunity has appear to study the radula of *Afer cumingi* (Reeve, 1844), a species from Japan and Taiwan. *A. cumingi* is conchologically similar to the

West African species, but the lower columellar tooth is folded in a particular way similar to the genus *Tudicla* Röding, 1798. Further study is needed to confirm the generic placement of this species.
In the present paper only the Recent species are discussed.
Wenz (1941) considered the following two fossil taxa as subgenera of *Afer*. Further study is required to either confirm their subgeneric status or to recognize them as distinct genera:
Hercorhyncus Conrad, 1868 (type species: *Fusus tippanus* Conrad, 1860) from the Cretaceous of the USA, placed in Vasidae, as subgenus of *Afer*, by Wenz, 1941; placed in Fusininae, by Sohl 1964a (220) & 1964b (376); placed in Fasciolariidae (Cretaceous Group) by Snyder (2003: 237).
Streptopelma Cossmann, 1901 (type species: *Peristernia linteus* Tate, 1888) from the Eocene of Australia, placed in Vasidae, as subgenus of *Afer*, by Wenz, 1941; placed in Fasciolariidae (Peristernia Group) by Snyder (2003: 311).

Diagnosis. Shell thick, solid. Shape broadly fusiform or slender, siphonal canal rather long, open. Protoconch typical, papilliform, higher than broad, whorls smooth and glossy. Teleoconch whorls usually with angular shoulder. Sculpture consisting of, usually dominant, spiral cords in combination with axial ribs. Aperture oval, columella curved, callus narrow and thin or broad and thick. Outer lip thick, usually with numerous internal knobs, occasionally smooth.
Radula typical buccinid. Central tooth with broad base (rather triangular or semi-oval), tricuspid. Lateral teeth with 3 pointed cusps, outermost cusp largest.

Comparison. The genus *Afer* is characterized by the multispiral, papilliform protoconch, higher than broad, smooth, glossy, with nicely rounded tip.
Serratifusus Darragh, 1969 (type species: *Fusus craspedotus* Tate, 1888, OD, from the Miocene of southeast Australia) differs in having a smaller protoconch with a deviated axis for the first whorl, an even longer siphonal canal which may be bended or torsed and a radula with more rectangular central cusp. The genus *Serratifusus* has, together with *Afer* (and especially its subgenus *Praecantafer* subgen. nov. described below), a quite columbariid shape: a rather short spire and a long siphonal canal.
Euthria M. E. Gray, 1850 (type species: "*Fusus lignarius* Chiaje", this is *Fusus lignarius* Lamarck, 1816, a junior synonym of *Murex corneus* Linnaeus, 1758, from Mediterranean Sea) has a similar radula and may have a similar shape and pattern but differs in having a smaller protoconch, usually a shorter siphonal canal and an outer lip which has a smooth inside or with lesser pronounced internal lirae.
Euthriostoma Marche-Marchard & Brebion, 1977 (type species: *Euthriostoma gliberti* Marche-Marchard & Brebion, 1977, by original designation) differs in having a small protoconch. The shells are easily recognized by the large, heavy, white shells with high spire.

Range. West Africa, from Ivory Coast in the south (*A.* (*A.*) *afer*) to Morocco (Agadir) in the north (*A.* (*Streptosiphon*) *lansbergisi*). Maybe also West-Pacific [should "*Afer*" *cumingi* (Reeve, 1844) be shown to be referable to this genus].

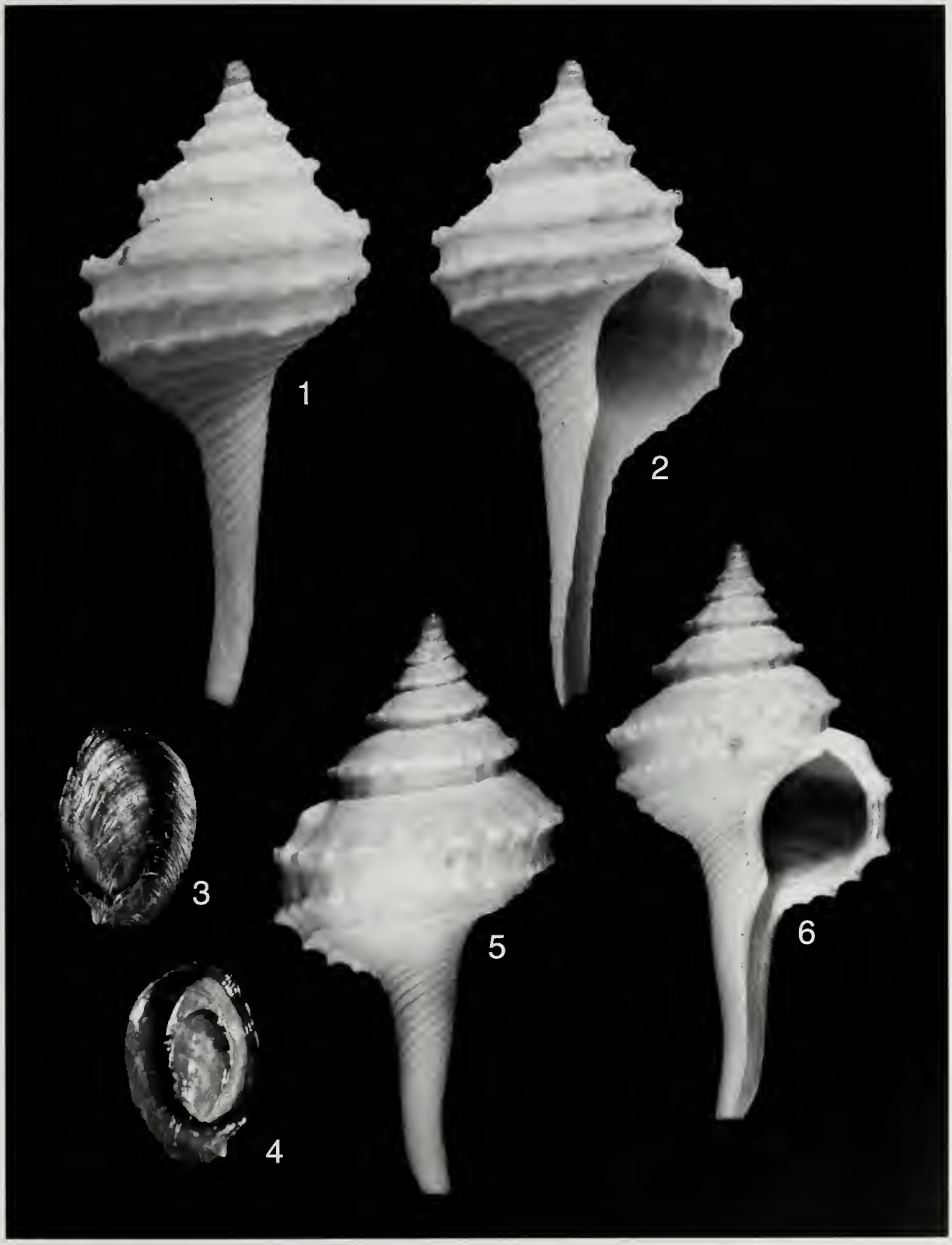
Subgenus ***Afer*** Conrad, 1858
Figs. 7-8

Diagnosis. Shell thick, solid. Shape from moderately slender with short spire to elongate with elegant spire, siphonal canal long, open. Protoconch typical for genus. Whorls with slightly angular shoulder, sculpture consisting of sharp spiral cords with broad interspaces and of narrow, rather sharp axial ribs. Aperture oval, columella gently curved, callus narrow and rather thin, outer lip thick with numerous internal knobs, edge sharp.
Radula typical buccinid. Central tooth rather triangular, base concave, top slightly elevated, tricuspid, cusps of equal size, central cusps eventually slightly larger. Lateral teeth with 3 pointed cusps, outermost cusp largest.

Comparison. The subgenus *Afer* is characterized by the sharp spiral sculpture and the narrow columellar lip. The radula of *A.* (*A.*) *afer* is similar to the radula of *Euthria cornea* (Linnaeus, 1758), as figured by Cooke (1917, fig. 1), with a rather triangular central tooth with concave base. For differences with *Streptosiphon* and *Praecantafer* subgen. nov. See comparisons under those subgenera.

Figures 1-6

1-6. *Afer* (*Praecantafer*) *echinatus* sp. nov.,
1-2. Mauretania, continental shelf, N. O. "N'diago" stn. 85, 20°07'N, 17°38'W, 200 m, holotype MNHN 9964, 26.7 mm; **3-4.** operculum of holotype; **5-6.** Dredged between Morocco and Senegal, R. V. "Président-Theodore-Tissier" cruise, paratype MNHN 9965, 29.5 mm.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Range. West Africa, mainly from Senegal. *A.* (*A.*) *afer* is known from as south as Ivory Coast. *A.* (*A.*) *pseudofusinus* is known from as north as northern Mauritania and from fisherman off the Canary Islands. The next two species are included in the subgenus.

Afer* (*Afer*) *afer (Gmelin, 1791)
Figs. 7-8

Murex afer Gmelin, 1791: 3558, sp. 129 (type locality: Senegal "Habitat ad Senegal").
The specimen figured by Adanson (1757, pl.8, fig.18 "Lipin") is considered the type. This specimen is probably lost.

Afer* (*Afer*) *pseudofusinus Fraussen & Hadorn, 2000

Afer pseudofusinus Fraussen & Hadorn, 2000: 32-34, figs. 1-3, 5-6 (type locality: continental shelf off Mauritania, Meteor stn. 60.78, 17°17' N, 16°28' W, 95 m deep).
Holotype MNHN 6315.

Subgenus ***Streptosiphon*** Gill, 1867
Figs. 9-10

Streptosiphon Gill, 1867: 152, as genus, type species by original designation: *Tudicla porphyrostoma* (Reeve, 1847).

Diagnosis. Shell thick, solid. Shape moderately slender with short, conical spire, siphonal canal long, open. Protoconch typical for genus. Whorls with slightly angular shoulder, smooth, sculpture consisting of fine spiral lines as interspaces and of broad, rather blunt axial ribs. Aperture oval, columella gently curved, callus broad and rather thick, forming a wide inner lip, outer lip thick with numerous internal knobs, edge sharp.
Radula typical buccinid. Central tooth broad, weakly curved, tricuspid, cusps of equal size. Lateral teeth with 3 pointed cusps, outermost cusp largest.

Comparison. *Streptosiphon* is characterized by its rather smooth shell and the broad columellar lip. The radula of *A.* (*S.*) *porphyrostoma* is similar to the radula of *Buccinulum vittatum* (Quoy & Gaimard, 1833) as figured by Cooke (1917, figs. 4-5) (his fig. 4 being forma *littorinoides*), with a broad, rather oval central tooth.
The subgenus *Afer* can be distinguished by its sharper spiral sculpture, its narrow inner lip (callus) and in having a radula with a more triangular central tooth with a more concave base and sharper edges. For differences with *Praecantafer* subgen. nov. see comparisons under that subgenus.

Range. West Africa. *A.* (*S.*) *porphyrostoma* is known from Senegal. *A.* (*S.*) *lansbergisi* is known from Mauritania in the south, along Western Sahara, to Morocco (Agadir) in the north. The next two species are included in the subgenus.

Afer* (*Streptosiphon*) *porphyrostoma
(Reeve, 1847)
Figs. 9-10

Fasciolaria porphyrostoma Reeve, 1847: pl.5, sp.11 (type locality: "Eastern Seas" is erroneous).
Sometimes, and also by Reeve himself, referred to "Adams & Reeve, Voy.Sam.", meaning the publication of "The Zoology of the Voyage of H.M.S. Samarang" in 1848-1850. The author of this species however is Reeve, 1847.
Probable holotype in BM(NH), nr. 1875.12.10.163 (Delsaerdt, 1993: 91).

Junior synonym: *Tudicla recurva* A. Adams, 1854: 135-136, sp. 26, pl.28, fig.4 (type locality: "Senegal").
5 syntypes in BM(NH) nr. 1992158.

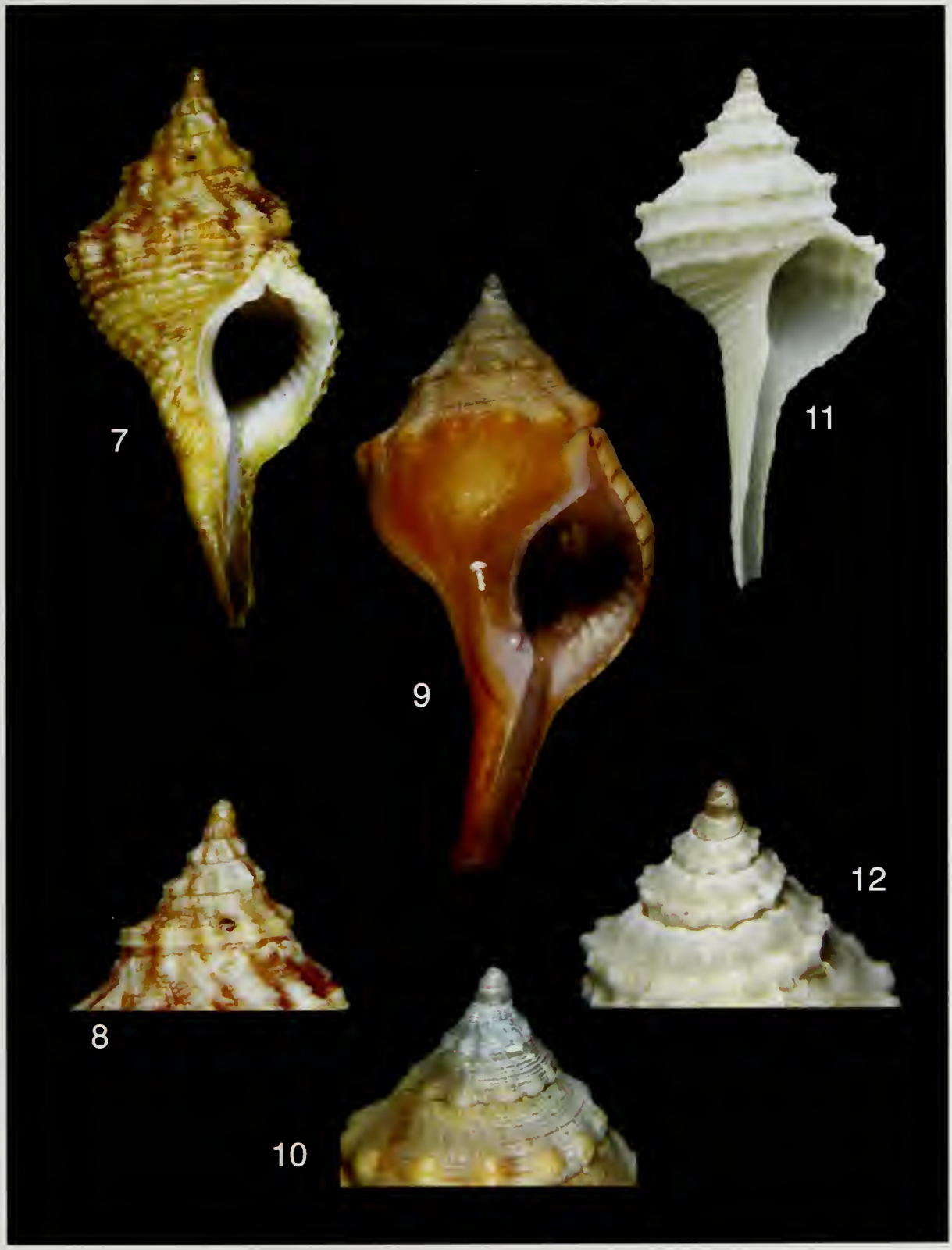
Afer* (*Streptosiphon*) *lansbergisi Delsaerdt, 1993

Afer lansbergisi Delsaerdt, 1993: 89-96, 5 figs. (type locality: "near the coast of Sierra Leone, in 15-40 m depth").
Holotype in KMMA, nr. KJM 7642

For the history of the confusion between *A. porphyrostoma* and specimens of *A. lansbergisi*, see Delsaerdt (1993: 92).

Figures 7-12

7-8. *Afer* (*Afer*) *afer* (Gmelin, 1791), 34.6 mm, Ø protoconch 1.5 mm, Gorée, Senegal, KF nr. 2959.
9-10. *Afer* (*Streptosiphon*) *porphyrostoma* (Reeve, 1847), 38.7 mm, Ø protoconch 1.7 mm, M' Bour, Senegal, 10-20 m, KF nr. 2360.
11-12. *Afer* (*Praecantafer*) *echinatus* sp. nov., holotype, 26.7 mm, Ø protoconch 1.3 mm, off Mauretania, 200 m, MNHN.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Praecantafer subgen. nov.

Type species. *Afer* (*Praecantafer*) *echinatus* sp. nov.

Diagnosis. Shell thin but solid. Shape columbariiform, spire rather short, siphonal canal long, straight, open. Protoconch rather papilliform, higher than broad, typical for genus. Whorls with angular shoulder. Sculpture consisting of at least 2 pronounced, peripheral spiral cords with broad interspaces. Spiral cords on base and siphonal canal weaker. Axial sculpture consisting of sharp spines on top of spiral cords. Aperture oval, columella gently curved, callus narrow and rather thin, outer lip usually thick without internal knobs, edge blunt.

Comparison. The subgenus *Afer* differs from *Praecantafer* in having a larger number of spiral cords, a shorter siphonal canal, an outer lip with internal lirae and a sharp edge. The subgenus *Streptosiphon* differs in having a smoother sculpture, a usually shorther siphonal canal, an outer lip with internal lirae and a sharp edge.

Range. Only known from the type species. Off West Africa, in deep water.

Etymology. *Praecantafer* subgen. nov. is named after the Latin expression *praecantare* (verb), meaning "bewitching" which refers to the enchanting shell.

Afer* (*Praecantafer*) *echinatus sp. nov.
Figs. 1-6, 11-12.

Type material. Holotype, 26.7 mm, Mauretania, continental shelf, N. O. "N'diago" campagne 1981 stn. 85, 20°07'N, 17°38'W, 200 m, MNHN 9964.
Paratype, 29.5 mm, R. V. "Président-Theodore-Tissier" cruise, dredged between Morocco and Senegal, MNHN 9965.

Type locality. Mauretania, continental shelf, N. O. "N'diago" campagne 1981 stn. 85, 20°07'N, 17°38'W, 200 m.

Range. Only known from the type material.

Description. Shell thin, fragile, up to 29.5 mm in length. Shape columbariiform, with broad, short spire, siphonal canal elongate. Aperture together with siphonal canal equal to or slightly longer than 2/3 of total shell length.
Protoconch big, rather papilliform, consisting of 2 1/2 smooth whorls, covered by minuscule holes. Diameter 1.3 mm, length: 1.6 mm. Transition to teleoconch abrupt, marked by a sharp edge.
Teleoconch consisting of 4 1/2 whorls. First 1/4 whorl well convex with 8 broad, weak, spiral cords, interspaces a fine groove. Remaining whorl suddenly becoming angulate, gradually stronger, forming a carina. Penultimate whorl with a second carina partly concealed under lower suture. Body whorl with 3 strong carinae which are ornamented with sharp axial lamellae and 12 smoother spiral cords of different strength on base and siphonal canal.
First 1/8 teleoconch whorl smooth, following 1/8 weakly waved. Further worls stringly knobbed on the carinae. Subsutural slope smooth, suprasutural part slightly waved.
Aperture round. Outer lip thin, simple, edge sharp. Columella smooth (holotype, subadult). Paratype with 2 small abapical columellar knobs, 1 small adapical columellar knob and some irregular lirae, columellar lip thin, sharp. Siphonal canal long, slender, open.
Operculum corneus, pale brown, ovate, nucleus terminal.
Animal and radula unknown.

Comparison. *Afer* (*Praecantafer*) *echinatus* sp. nov. is characterized by the columbariid shape with a long siphonal canal and a rather broad spire with sharp spiral cords and short spines.

Etymology. *Afer* (*Praecantafer*) *echinatus* sp. nov. is named after the Latin expression *echinatus* (adjective), meaning "with spines" or "spiny".

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