

## Taxonomy of tropical West African bivalves

### II. Psammobiidae

by Rudo VON COSEL

**Abstract.** — Of the eleven known Eastern Atlantic species of the bivalve family Psammobiidae, five are members of the European fauna and are also found in more or less long ranges on the coast of tropical West Africa. Four species are restricted to the West African tropical zone, one is exclusively European and one is only known from a small coastal strip of Northern Angola, and from Côte d'Ivoire. *Gari jousseameana* Bertin, 1880, *G. depressa* (Pennant, 1777), *G. costulata* (Turton, 1810) seem to have a disjunct distribution with a probable distribution gap within the tropical zone. Three species are new : *Gari pseudoweinkauffi* n. sp. from infralittoral sandy bottom, hitherto misidentified with the Red Sea species *G. weinkauffi* (Crosse, 1864), *G. gofasi* n. sp. from infralittoral sandy bottom of the West African tropical zone, and *Sanguinolaria africana* n. sp. also from tropical West Africa and hitherto confounded with the Caribbean *S. sanguinolenta* (Gmelin, 1791).

**Résumé.** — Onze espèces de la famille Psammobiidae sont connues de l'Atlantique orientale dont cinq en Europe et dans une partie au moins de l'Afrique Occidentale tropicale. Quatre espèces sont exclusivement tropicales, une espèce est restreinte à l'Europe et une espèce n'est connue que d'une petite partie de la côte du nord de l'Angola et de Côte d'Ivoire. *Gari jousseameana* Bertin, 1880, *G. depressa* (Pennant, 1777) et *G. costulata* (Turton, 1810) ont très probablement une distribution disjointe avec une interruption dans une partie plus ou moins grande de la zone tropicale. Trois espèces sont nouvelles : *G. pseudoweinkauffi* n. sp. des fonds sableux infralittoraux jusqu'ici confondu avec l'espèce de mer Rouge *G. weinkauffi* (Crosse, 1864), *G. gofasi* n. sp. des fonds sableux infralittoraux de la zone tropicale ouest-africaine et *Sanguinolaria africana* n. sp., de même répartition, jusqu'ici confondu avec l'espèce caraïbe *S. sanguinolenta* (Gmelin, 1791).

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Of the Psammobiidae, a family of sand-dwelling tellinacean bivalves, eleven species are now known from the Eastern Atlantic, and ten of them are present in tropical West Africa. Seven West African species are named, but some are still poorly known; the remaining three will be described here. The only non-West African species, *G. tellinella* (Lamarck, 1818) is included here to give a complete survey of the Eastern Atlantic species. Nine species belong to the genus *Gari* Schumacher, 1817, one to *Heterodonax* Mörch, 1853, and one to *Sanguinolaria* Lamarck, 1799. This genus was often treated in an own family Sanguinolariidae, but KEEN in MOORE (1969) included this as a subfamily in the Psammobiidae.

As a generic revision can be carried out only on a worldwide level, no attempt has been made here, and a conservative, noncritical systematic has been employed.

**Gari fervensis** (Gmelin, 1791)

*Tellina angulata* Born, 1780 : 30, pl. 2; fig. 5 (non Linné, 1758).

*Tellina fervensis* Gmelin, 1791 : 3235 (name on the Official List of Specific Names (ICZN, Opinion 910, 5. June, 1970).

*Tellina bornii* Gmelin, 1791 : 3231.

TYPE MATERIAL : Not localized (not in ZMC, SCHIØTTE, in litt., 10.II.90).

TYPE LOCALITY : "Oceano septentrionali".

DESCRIPTION

Shell medium-sized, up to 53 mm long, moderately solid, variable in outline, slightly inequivalve, nearly equilateral, elongate, length/width ratio ranging between 1.9 and 2.4 : 1. Valves compressed, left valve considerably to very slightly more convex than right valve, posterior end somewhat twisted to the right side and occasionally slightly gaping. Anterior margin rounded, posterior margin obliquely truncated, with sharp angles. Postero-dorsal margin straight or slightly convex, with a weak slope only, ending abruptly in the angle to the posterior truncation. Ventral margin gently convex, posteriorly bent upwards, postero-ventral margin weakly concave, ending in the sharp angle to the posterior truncation. Beaks just before the vertical midline.

Exterior with numerous, fine, concentric ridges, occasionally becoming obsolete on the left valve. Sharp keel running from the umbos to the postero-ventral angle and delimiting the postero-dorsal part with about eight radial ribs crossing the concentric sculpture and giving this part of the valves a cancellate pattern.

Hinge plate narrow, two bifid cardinals in the right valve, the posterior strongly bifid, left valve with one stronger vertical bifid cardinal and one narrow oblique-subhorizontal posterior cardinal; no laterals. Pallial sinus rounded, extending just to the level of the beaks, its ventral limb confluent with the pallial line for two thirds of its length.

Outside of valves whitish to pale violet with light to darker brownish or reddish to violet radial rays, often with lighter mottlings on them. Occasionally, only irregular mottlings are present instead of rays, with growth stages marked by darker concentric zones. Periostracum rather strong, brown to olive, normally peeling off on earlier parts of the valves. On West African specimens, periostracum very thin and transparent. Inside light to dark violet, in some specimens light brownish to yellowish, often bright yellow in Mauritanian specimens.

*Selected measurements with length/width ratio*

53.7 × 24.0 mm	North Sea (55°20' N/05°00' E)	2.2 : 1
51.0 × 24.3 mm	Roscoff, Atlantic France	2.1 : 1
50.8 × 25.8 mm	North Sea (55°35' N/04°24' E)	2.0 : 1
50.6 × 25.2 mm	Crozon, Atlantic France	2.0 : 1
49.6 × 24.0 mm	Saltcoats, Scotland	2.1 : 1
46.5 × 23.1 mm	Gullane, Scotland	2.0 : 1
45.0 × 22.1 mm	Laredo, Atlantic Spain	2.0 : 1
45.0 × 20.5 mm	Quiberon, Atlantic France	2.2 : 1
42.0 × 19.7 mm	La Franqui, Mediterranean France	2.1 : 1

40.4 × 20.3 mm	Douarnenez, Atlantic France	2.0 : 1
39.6 × 18.1 mm	Gullane	2.2 : 1
38.0 × 17.4 mm	La Franqui	2.2 : 1
33.6 × 16.5 mm	Guinea (10°27'N/15°43,5' W)	2.0 : 1
32.4 × 15.7 mm	Brest, Atlantic France	2.1 : 1
32.3 × 16.9 mm	B. de l'Étoile, Mauritania	1.9 : 1
31.2 × 14.6 mm	Guinea (10°27'N/15°43,5' W)	2.1 : 1
31.0 × 14.3 mm	Sète, Mediterranean France	2.2 : 1
30.8 × 15.3 mm	B. Cansado, Mauritania	2.0 : 1
29.0 × 13.7 mm	Guinea (9°55,5' N/14°27' W)	2.1 : 1
28.9 × 13.5 mm	Guinea (10°27' N/15°43,5' W)	2.1 : 1
28.0 × 12.1 mm	Ceuta, Strait of Gibraltar	2.3 : 1
26.5 × 13.8 mm	Guinea (10°00' N/14°24' W)	1.9 : 1
26.5 × 11.1 mm	Ilha de Luanda, Angola	2.4 : 1
25.0 × 11.1 mm	Baia de Sagres, Portugal	2.3 : 1
24.7 × 12.3 mm	Guinea (9°50' N/14°14' W)	2.0 : 1
24.7 × 11.8 mm	Guinea (9°42' N/13°56' W)	2.1 : 1
24.6 × 12.0 mm	Pointe-Noire, Congo	2.1 : 1
23.8 × 11.7 mm	Guinea (9°12,3' N/13°37' W)	2.0 : 1
23.7 × 11.8 mm	Abidjan, Côte d'Ivoire	2.0 : 1
23.7 × 11.6 mm	Guinea (9°50' N/14°14' W)	2.0 : 1
23.7 × 10.8 mm	Guinea (9°55' N/14°27' W)	2.2 : 1
23.3 × 11.0 mm	Alger, Algeria	2.1 : 1
23.2 × 10.7 mm	Guinea (9°30' N/14°02' W)	2.2 : 1
22.4 × 11.8 mm	Guinea (9°18' N/13°38' W)	2.0 : 1
21.7 × 11.0 mm	Guinea (9°12,3' N/13°37' W)	2.0 : 1
21.3 × 10.5 mm	Côte d'Ivoire (5°04' N/5°18' W)	1.9 : 1
20.0 × 9.5 mm	Cacuaco, Angola	2.1 : 1

**DISTRIBUTION** : Iceland (valves only, MADSEN, 1949); Faroe, Norway (70° N, HØISÆTER, 1986) and British Isles southward to Angola (Lucira); throughout the Mediterranean.

**MATERIAL EXAMINED** : **North Sea** : 55°20' N/05°00' E, 1 sh.; 55°35' N/4°24' E, 2 sh., both leg. TÜRKAY, SMF. **Great Britain** : West coast of Scotland, Saltcoats, Firth of Clyde, beach, 2 v.; East coast of Scotland, Aberlady Bay and Gullane Bay, Firth of Forth, beach, several v., all leg. B. & R. VON COSEL, X.1987, MNHN; Weymouth, 2 sh., SMF; Paignton, 1 v., leg. VON COSEL, X.1960, SMF ex author's coll.; Teignmouth, 1 sh., coll. STAADT, MNHN. **Atlantic France** : Celtic Sea, 49°09,1' N/08°10,4' W, 132 m, 1 v.; 48°39,1' N/08°37,3' W, 164 m, 1 v., both dredged R/V "Thalassa", XII.1983, leg. VON COSEL, MNHN; Roscoff, Finistère, 3 sh., old coll. MNHN; Brest, Finistère, 2 sh., coll. LOCARD, 1892; Crozon, Finistère, 2 sh., 2 v., old coll. MNHN; Douarnenez, Finistère, 5 v., coll. SOYER ex GUIDEAU, MNHN; Concarneau, Finistère, 3 v., coll. LOCARD, 1892; Quiberon, Morbihan, Plage de Conguel, on beach, 1 sh., 1 v., leg. B. & R. VON COSEL, 28.III.1987; Le Pouliguen, Loire-Atlantique, 1 sh.; Le Croisic, Loire-Atlantique, 1 sh., both coll. H. FISCHER, all MNHN. **Atlantic Spain** : Laredo, Prov. Santander, on beach, 3 sh., 3 v., leg. VON COSEL & GOFAS, 7.II.1988. Algeciras, 2 sh., leg. RÜPPELL, SMF; Ceuta, Strait of Gibraltar, Ensenada de la Almadraba, 20-45 m, numerous v., leg. BOUCHET, GOFAS & VON COSEL, V.1986, all MNHN. **Portugal** : off Burgau, near Sagres, Algarve, 35 m, 5 v.; Bay of Sagres, 20-30 m, sand, 1 sh., 3 v., both coll. mission Algarve MNHN, V.1988, MNHN. **Algeria** : Alger, 2 sh., old coll. MNHN. **Mediterranean France** : Sète, Hérault, 1 sh., coll. LOCARD, 1892; 4 sh., 1 v., coll. PETIT, 1872; La Franqui, Roussillon, on beach after storm, several v., leg. VON COSEL, 25. and 31.X.1987, all MNHN. **Mauritania** : Port-Étienne (now Nouadhibou), several sh., mission GRUVEL; Baie de l'Étoile (21° N), low water, 1 v., leg. BOUCHET, V.1983; Baie de Cansado, 10 m, 4 v., trawled, leg. BOUCHET, V.1983; 3 miles West of Kiaone, 20°02' N/16°22' W, 6 m, 1 spm., 1 v., leg. MARCHE-MARCHAD, 6.V.1965, all MNHN; Passe du Lévrier, E of Cap Blanc, 19°49' N/17°01' W, 17 m, muddy sand with shells, 3 spm., trawled R/V "Tyro", Mauritania II-Expedition, Leiden Museum, 7.VI.1988, RMNH. **Guinea-Bissau** : Bissagos, 5 v., mission L. GAIN, 1913, MNHN. **Guinea** : NW of Cap Verga, 10°21' N/14°49' W, 19 m, mixed sand, 16 spm., dredged R/V

“André Nizéry”, 18.IV.1988, leg. VON COSEL; continental shelf between Cap Verga and the border to Sierra Leone, several spm., numerous sh. and v. between 15 and 25m, dredged R/V “André Nizéry”, SEDIGUI campaign, leg. VON COSEL, IV.-V. and IX.-X.1988, MNHN. Sierra Leone : off Lumley, 4 v., leg. LONGHURST (West African Fisheries Research Institute), MNHN. Côte d'Ivoire : 4°52' N/5°57,5' W, 40 m, 1 sh.; 5°04' N/5°18' W, 30 m, 1 spm.; 5°09' N/4°39' W, 20 m, 2 v., all Guinean Trawling Survey II, leg. CHERBONNIER, 31.III.-4.IV.1964; 5°12,1' N/4°09' W, 40 m, 1 juv. spm., leg. LE LOEUFF, 23.XI.1966, all MNHN. Nigeria : 4°03' N/6°12' E, 32 m, several v., “Calypso”, Golfe de Guinée-Sta. 29, leg. MARCHE-MARCHAD, 1956, MNHN. Gabon : Libreville, Komo Rive droite, sandbank, 1 v., leg. VON COSEL, 14.XI.1985; in the Libreville Estuary, 1 sh., 2 v., leg. P. BERNARD, both MNHN. R.P. Congo : Pointe-Noire, Plage Mondaine, 1 v., leg. VON COSEL, XI.1985, MNHN. Angola : Ilha de Luanda, 40-60 m, dredged, 2 sh., 2 v., leg. GOFAS, 1982; Baía de Lucira (Bissonga), maerl, 10-20 m, dredged, 2 v., leg. GOFAS, MNHN.

BIOTOPE : Clean, fine to coarse sand, also sand with calcareous algae or shell debris; from extreme low water mark to 40-50 m. In tropical West Africa only offshore from 10 m downwards to about 35-40 m.

#### REMARKS

The West African specimens of *Gari fervensis* are considerably smaller (20-33 mm), and often somewhat shorter and broader than specimens from northern Europe (up to 53 mm long), their postero-ventral sinuosity is deeper. As the transition between the large northern specimens and the smaller and thinner shelled subtropical and tropical specimens is continuous, there is no reason for separating the west African and the European form taxonomically.

#### *Gari jousseaumeana* Bertin, 1880

*Gari jousseaumeana* Bertin, 1880 : 115-116, pl. 5, fig. 7a-b.

TYPE MATERIAL : Holotype in MNHN.

TYPE LOCALITY : Not given, here selected Nouadhibou, Mauritania.

#### DESCRIPTION

Shell medium-sized, up to 65 mm long, moderately thick, very faintly inequivalve, nearly equilateral, elongate, length/width ratio 2.0-2.3 : 1. Valves compressed, right valve only very slightly more convex than left valve, posterior end only very weakly twisted to the right side. Anterior margin well rounded, posterior margin obliquely truncate. Postero-dorsal margin straight to somewhat convex with a weak slope only and with the angle to the posterior truncation always rounded. Ventral margin gently convex, posteriorly passing a very shallow depression and ending behind it in a very sharp angle to the posterior truncation. Beaks about in the middle, or only very slightly anterior to the vertical midline.

Exterior with numerous, regular, prominent, concentric ridges, a few of them uniting on the posterior part. Sharp keel running from the umbos to the postero-ventral angle and delimiting the postero-dorsal part of the valve, on which the concentric sculpture is

particularly coarse. This sculpture is crossed by one conspicuous radial rib which ends in a weak angle on the posterior margin above the postero-ventral angle.

Hinge plate narrow, with two cardinals in the right valve, the posterior one strongly bifid, the anterior one slightly bifid. On the left valve, one stronger vertical, bifid cardinal and one small narrow, blade-like, more subhorizontal posterior cardinal; no laterals. Pallial sinus moderately broad, well rounded and ending at beak level or very slightly beyond it, ventral limb partly confluent with with the pallial line.

Background colour of valves whitish to violet or light yellowish. Colour of radial rays irregular purple, violet, pinkish or light brown, mostly interrupted or becoming more or less intense, often intensively coloured only on growth zones. There are also occasional, irregular, pale brownish to pink streaks and zigzags. Periostracum thin and pale brownish, retained only on the marginal part of the shell. Interior pinkish or pale to intensive violet, with intensely coloured parts of the rays on the exterior showing through. Hinge plate whitish.

*Selected measurements and length/width ratio*

64.4 × 33.0 mm	Nouadhibou, Mauritania	2.0 : 1
58.7 × 27.6 mm	Nouadhibou	2.1 : 1
54.3 × 23.7 mm	Guinea (9°31' N/14°46' W)	2.3 : 1
51.6 × 23.7 mm	Guinea (9°54' N/15°10' W)	2.2 : 1
51.3 × 22.7 mm	Guinea (9°54' N/16°01,5' W)	2.3 : 1
50.8 × 23.1 mm	Guinea (10°00' N/15°40' W)	2.2 : 1
49.5 × 23.6 mm	Guinea (9°12' N/14°15,1' W)	2.1 : 1
48.1 × 21.1 mm	Guinea (10°12' N/16°03' W)	2.3 : 1
47.7 × 23.0 mm	Guinea (9°24' N/14°21' W)	2.1 : 1
47.0 × 21.8 mm	Baie de Gorée, Sénégal	2.2 : 1
44.8 × 20.6 mm	Casamance (12°43' N/17°21,2' W)	2.2 : 1
44.7 × 19.2 mm	Guinea (9°42' N/15°33' W)	2.3 : 1
42.7 × 20.0 mm	Guinea (9°06,6' N/14°04' W)	2.1 : 1
41.1 × 17.8 mm	Guinea (9°36' N/15°18' W)	2.3 : 1
37.3 × 16.2 mm	Guinea (9°35,9' N/15°40,2' W)	2.3 : 1
35.6 × 15.6 mm	Guinea (9°42' N/15°31,7' W)	2.3 : 1
34.4 × 15.8 mm	Guinea (9°30' N/15°00,4' W)	2.2 : 1
32.2 × 15.4 mm	Lucira, Angola	2.1 : 1
30.5 × 13.7 mm	Guinea (9°42' N/15°31,7' W)	2.2 : 1
29.8 × 15.0 mm	Ilha de Luanda, Angola	2.0 : 1
29.5 × 12.7 mm	Guinea (9°42' N/15°33' W)	2.3 : 1
28.6 × 13.7 mm	Ilha de Luanda	2.1 : 1
25.0 × 12.4 mm	Lucira	2.0 : 1

DISTRIBUTION : Mauritania (Cap Blanc) to southern Angola (Lucira, Moçâmedes).

MATERIAL EXAMINED : The holotype. **Mauritania** : Banc d'Arguin, 20°20'N/16°22' W, 10 m, 2 v., 1965, leg. MARCHE-MARCHAD, MNHN. **Sénégal** : South of Madeleines Is., Dakar, 40 m, 1 v., leg. MARCHE-MARCHAD, 3.III.1953; Baie de Gorée, 33-35 m, 1 juv. sh., leg. MARCHE-MARCHAD; Baie de Gorée, 1 sh., 1 v., 1 fragm., leg. LEUNG TACK, 1983; Casamance, 12°43' N/17°21,2' W, sand, 34 m, 1 fresh sh., 1 fragm., trawled R/V "Louis Sauger", leg. VON COSEL, 28.III.1988, all MNHN. **Guinea** : SW of Rio Pongo, 9°54' N/16°01,5' W, mixed sand, 39 m, 1 fresh sh., 1 v., 1 fragm., trawled R/V "André Nizéry", SEDIGUI Sta. 443 CH, 24.V.1988; 9°45' N/15°55,5' W, 35 m, sand, 1 juv. spm., SEDIGUI Sta. 445, 25.V.1988, both leg. VON COSEL; continental shelf between Cap Verga and the border of Sierra Leone, several v., 35-45 m, R/V "André Nizéry", leg. VON COSEL, IV.-V. and IX.-X.1988, all MNHN. **Northern Angola** : Ilha de Luanda, sand, 40-60 m, 1 sh., 7 v.; Baia de Corimba, Luanda, sand with shells, 10-20 m,

8 partly juv. sh. ; off Mussulo, Luanda, muddy sand, 90-100 m, 1 old v. **Southern Angola** : Baia de Lucira, prov. Moçâmedes, maerl, 10-20 m, 6 partly juv. v. ; Lucira (Santa Marta), 40 m, 1 adult, 4 juv. v. ; Baia de Moçâmedes, 5-10 m, 1 juv. v., all leg. GOFAS 1981-86, MNHN.

**BIOTOPE** : Mixed clean sand, also with calcareous algae and shell debris; from 10 to 50 m, mostly between 35 and 45 m, not common.

#### REMARKS

This species is close to *G. fervensis*, but it differs by its more pronounced and coarser sculpture, the slightly more elongate shape, the rounded dorsal corner of the posterior truncation and the single radial rib crossing the concentric sculpture on the postero-dorsal part. In general, the coloration is more vivid than in *G. fervensis*. West African *G. fervensis* are considerably smaller and broader than *G. jousseaumeana*.

The largest specimens (60 mm) are known from Mauritania, and specimens from Angola attain only half this size (25-32 mm). The present material indicates a possible distributional gap between the southern part of Guinea and Angola. The species was neither found by LE LOEUFF off Côte d'Ivoire nor is it among material collected by P. BERNARD in Gabon nor the material collected by myself in Cameroon and Congo. Slight difference in shell form, expressed in outline, coloration and form of the pallial sinus, suggest that the populations from Mauritania to Guinea and from Angola may represent two allopatric subspecies. However, the extent of variation and distribution remains too imprecisely known to confirm this suspicion. The southernmost locality in Guinea coincides with the southernmost occurrence of upwelling water during the Northern winter period (February).

*Gari uniradiata* (Brocchi, 1814) from the Italian Pliocene (fig. see SACCO, 1901 : pl. 1, fig. 21-28) is most probably an ancestor of *G. jousseaumeana*. It is shorter than *G. jousseaumeana* and has less pronounced sculpture. A very close Indo-Pacific species is the rare *Gari insignis* (Deshayes, 1854) which has, however, two radial ribs on the postero-dorsal area. Like *G. jousseaumeana*, *G. bicarinata* (Deshayes, 1854) from East Africa and Madagascar has only one radial rib on the postero-dorsal area, there is, however, a distinct, radial rib just in front of the posterior angle; moreover, the concentric ridges are slightly more oblique.

#### ***Gari pseudoweinkauffi* n. sp.**

*Gari weinkauffi* auct. (non Crosse, 1864) : NORDSIECK, 1969 : 124-125; PARENZAN, 1976 : 324, fig. 281; PIANI, 1980 : 198; BRUSCHI *et al.*, 1985 : 59.

*Gari fervensis* auct. (non Gmelin, 1971).

**TYPE MATERIAL** : Holotype MNHN, West of Rio Dubréka estuary, Guinea, 9°42' N/15°31,7' W, 35 m, mixed sand with shells and shell debris, live-collected, alcohol-preserved, dredged R/V "André Nizéry", SEDIGUI-Sta B 12 DW, leg. VON COSEL, 29.X.1988. Paratypes : West of Kabak Island, Guinea, 9°18,5' N/14°54' W, 43 m, mixed sand, 1 spm SMF, 1 spm. ZMC, 1 spm. Natal Museum, all dried, SEDIGUI-Sta. 136; 9°19' N/14°56,5' W, 49 m, mixed sand, 3 spm., MNHN, alcohol-preserved, SEDIGUI-Sta. 135, both collected by bottom-grab, R/V "André Nizéry", leg. VON COSEL, 15.V.1988; West of Conakry, Guinea, 9°30' N/15°00,4' W, 37 m, mixed sand, 1 spm., 1 fresh sh., MNHN, SEDIGUI-Sta. B 10 DW, dredged R/V "André Nizéry", leg. VON COSEL, 29.X.1988.

**TYPE LOCALITY** : West of Dubréka Estuary, Guinea.

DESCRIPTION

Shell small, up to 28 mm long, moderately thick, slightly inequivalve, nearly equilateral, elongate, length/width ratio 1.9-2.3 : 1. Valves rather compressed, left valve more convex than right valve and slightly overlapping it. Posterior end more or less twisted to the right side, not gaping. Anterior margin rounded, posterior margin oblique, postero-dorsally gently rounded, postero-ventrally with a rounded corner. Ventral margin convex, posterior depression very shallow or absent. Beaks about in the middle, or very slightly behind the vertical midline.

Exterior with numerous, concentric ridges, on the anterior part of the valves flat, broad and touching each other, from the middle towards posterior gradually separating and becoming narrow and more lamellar, especially on the postero-dorsal part of the valve, which is separated by the rounded posterior angle running from the beaks to the postero-ventral corner. No prominent radial ribs on the postero-dorsal part, but 10-14 fine, irregular, radial threads, on the left valve sometimes only waves, occasionally radial sculpture absent.

Hinge plate narrow but strong, with two cardinals in the right valve, the posterior more bifid than the anterior, left valve with a strongly bifid, vertical cardinal and a small, narrow subhorizontal posterior cardinal; no laterals. Pallial sinus broad, rounded, towards the end slightly tapering, ending more or less anterior of the beaks, its ventral limb confluent with the pallial line from the level of the beaks towards posterior.

Outside of valves white to pink or pale violet, often with brownish or reddish brown rays, frequently breaking into isolated streaks and spots, rarely uninterrupted. Unicoloured specimens are not uncommon. Occasionally irregular pale brownish zigzags. Periostracum not seen. Inside white to pink or pale violet, rays on outside showing through. Often a pink spot under the ligamental area.

*Selected measurements with length/width ratio*

28.2 × 12.7 mm	Casamance (12°55,5' N/17°33' W)	2.2 : 1
26.2 × 12.8 mm	Guinea (9°48' N/15°15' W)	2.0 : 1
26.2 × 12.0 mm	Banc de Seminole, Sénégal	2.2 : 1
25.8 × 11.8 mm	Ceuta north, Strait of Gibraltar	2.2 : 1
24.8 × 11.2 mm	Ceuta south	2.2 : 1
24.5 × 11.2 mm	Guinea (9°30' N/15°09,6' W)	2.2 : 1
24.0 × 12.6 mm	Banc de Seminole	1.9 : 1
23.7 × 10.7 mm	Ceuta south	2.2 : 1
23.5 × 11.0 mm	Guinea (9°30' N/14°59,5' W)	2.1 : 1
22.8 × 10.7 mm	Guinea (9°42' N/15°27' W)	2.1 : 1
22.5 × 10.0 mm	Guinea (9°12' N/14°37,5' W)	2.3 : 1
22.3 × 10.3 mm	Guinea (9°36' N/15°18' W)	2.2 : 1
22.2 × 10.4 mm	Guinea (9°42' N/15°54,5' W)	2.1 : 1
21.9 × 10.4 mm	Guinea (9°02' N/13°59' W)	2.1 : 1
21.6 × 10.0 mm	Abidjan, Côte d'Ivoire	2.2 : 1
21.2 × 9.6 mm	Guinea (9°48' N/14°44' W)	2.2 : 1
21.4 × 9.4 mm	Mauritania (18°00' N/16°14' W)	2.3 : 1
20.5 × 9.7 mm	Guinea (9°03' N/13°56' W)	2.1 : 1
20.5 × 9.4 mm	Sénégal (14°32' N/17°13,5' W)	2.2 : 1
20.2 × 9.5 mm	Sénégal (14°17,2' N/17°13,5' W)	2.1 : 1
20.2 × 9.2 mm	Guinea (9°30' N/15°00,4' W) (paratype MNHN)	2.2 : 1

20.1 × 9.2 mm	Sénégal (14°06,6' N/17°05,4' W)	2.2 : 1
19.8 × 9.2 mm	Guinea (9°18' N/14°48' W)	2.2 : 1
19.8 × 8.9 mm	Guinea (9°42' N/15°31,7' W) (holotype)	2.2 : 1
19.0 × 8.9 mm	Guinea (9°42' N/15°39,5' W)	2.1 : 1
19.0 × 8.5 mm	Guinea (9°25,2' N/15°05' W)	2.2 : 1
18.9 × 8.8 mm	Guinea (9°42' N/15°30' W)	2.1 : 1
18.3 × 8.4 mm	Guinea (9°19' N/14°56,5' W) (paratype MNHN)	2.2 : 1
18.0 × 8.4 mm	Guinea (9°18,5' N/14°54' W) (paratype SMF)	2.1 : 1
17.4 × 8.2 mm	Guinea (9°18,5' N/14°54' W) (paratype Natal M.)	2.1 : 1
16.0 × 7.4 mm	Guinea (9°19' N/14°56,5' W) (paratype MNHN)	2.2 : 1
15.0 × 7.1 mm	Guinea (9°19' N/14°56,5' W) (paratype MNHN)	2.1 : 1
14.3 × 6.6 mm	Guinea (9°18,5' N/14°54' W) (paratype ZMC)	2.2 : 1
9.2 × 4.5 mm	Palmeirinhas, Angola	2.0 : 1

**DISTRIBUTION** : Southern Mediterranean along the North African coast as far East as Oran ; Strait of Gibraltar to Côte d'Ivoire and southward to northern Angola, becoming rarer in the southern part of its distribution area.

**MATERIAL EXAMINED** : **Algeria** : Oran, coll. Deshayes, MNHN. **Spain** : Ceuta, Ensenada de la Almadraba, 20-36 m, numerous v. : Ceuta, Playa Benitez, 15-25 m, 11 v., leg. BOUCHET, GOFAS & VON COSEL, V.-1986. **Canary Islands** : South of Lanzarote, 28°50' N/13°50' W, 30 m, sand with calcareous algae, 2 v., 1 fragm. ; 28°50' N/13°51' W, 36-47 m, sand with calcareous algae, 5 v. ; SW of La Palma, 28°39' N/17°58' W, 50-150 m, 1 v., all R/V "Tydeman", CANCAP 4-Expedition, 14.V and 3.VI.1980, RMNH ; S of Fuerteventura, 28°12' N/14°01' W, sand, 28 m, 3 v., R/V "Tydeman", CANCAP 2-Expedition, 26.8.1977, RMNH. **Mauritania** : Cap Blanc, 21°17,1' N/17°10,2' W, 50 m, numerous v. ; 21°16,1' N/17°10,0' W, 58 m, 8 v., both R/V "Meteor", cruise 36, 3.III.1975, both SMF ; Port-Étienne (now Nouadhibou), 1 v., mission GRUVEL 1909 ; off Banc d'Arguin, 20°30' N/17°13' W, 36 m, coarse sand with shell gravel, 1 spm., R/V "Tyro", Mauritania II-Expedition, 18.VI.1988 ; RMNH : Cap Timiris, 19°05' N/16°26' W, 22 m, 1 v., dredged trawler "Léon Coursin", leg. MARCHE-MARCHAD, 22.II.1957 ; 19°00' N/16°30' W, 31 m, 1 spm., R/V "N'Diogo", Sta. 299, leg. RICHER DE FORGES, 1982 ; Nouakchott, 18°00' N/16°14' W, 30 m, 2 spm., R/V "N'Diogo", Sta. 258, leg. RICHER DE FORGES, 1982, all MNHN. **Sénégal** : North of Dakar, 14°50' N/17°29' W, 150 m, 1 v., dredged "Tenace", 15.III.1967 ; South of Madeleines Is., 49 m, several sh. and v. ; SW of Cap Manuel, 50 m, numerous v., dredged R/V "Gérard Tréca", 20.II.1956 ; Dakar, Anse Bernard, 6-8 m, 2 v., dredged R/V "Gérard Tréca", 4.X.1956 ; Banc de Seminole, 43-45 m, 5 v. ; South of Gorée, 50 m, 9 v., dredged R/V "Gérard Tréca", 5.VII.1955, all leg. MARCHE-MARCHAD, MNHN ; South of Gorée, 14°35,8' N/17°26,8' W, 36 m, 3 adult, 3 juv. spm. ; 14°33,2' N/17°20' W, 40 m, 1 spm. ; 14°32' N/17°13,5' W, 28 m, 2 spm. ; M'Bour, 14°26,6' N/17°12,2' W, 27 m, 1 spm. ; 14°26,6' N/17°14,9' W, 35 m, 2 spm. ; 14°24' N/17°13,5' W, 35 m, 1 spm., all leg. LEUNG TACK, 1983-4, MNHN ; M'Bour, 14°13' N/17°24' W, 65-70 m, 6 v., leg. MARCHE-MARCHAD, MNHN ; Casamance, 12°55,5' N/17°33' W, 65-75 m, 1 spm., R/V "Calypto" Sta. 4, leg. MARCHE-MARCHAD, 16.V.1956 ; 12°44,5' N/17°27,3' W, 40 m, fine sand, several v., dredged R/V "Louis Sauger", leg. VON COSEL, 28.III.1988, both MNHN. **Guinea** : Conakry, 1 v., mission L. GAIN, 1913 ; continental shelf between Cap Verga and the border to Sierra Leone, 15 spm. (incl. type mat.), numerous sh. and v. from 156 stations of the SEDIGUI campaign, 30-56 m, bottom grab and dredge, R/V "André Nizéry", leg. VON COSEL, IV.-V. and IX.-X.1988, all MNHN. **Côte d'Ivoire** : Abidjan, continental shelf (no precise locality), 1 sh., leg. LE LOEUFF, MNHN. **Angola** : Off Ambrizete, 7°07' S/12°21' E, 80 m, 2 v., leg. GOFAS, 1983 ; Palmeirinhas (Buraco), N-Angola, infralittoral soft bottom, 1 juv. spm., leg. GOFAS, 1983-4, both MNHN.

**BIOTOPE** : Clean fine to coarse sand, 20-70 m and occasionally deeper, most common between 30 and 45 m.

**DERIVATIO NOMINIS** : The name means "false *weinkauffi*" and reminds that this species has at several occasions been mistaken as *G. weinkauffi*.



## REMARKS

Like the preceding species, specimens of *G. pseudoweinkauffi* n. sp. have been misidentified as "*G. fervensis*". From *G. fervensis*, *G. pseudoweinkauffi* differs by being more elongate and more inflated, the posterior truncation has no sharp angles but rounded corners. The radial ribs on the postero-dorsal part of *G. pseudoweinkauffi* are more numerous and much thinner than in *G. fervensis*. On the anterior part of the valves, the concentric ridges are flat without free interspaces, whereas in *G. fervensis* they are narrower with interspaces. European *G. fervensis* are considerably larger, but most specimens from West Africa attain only the same size as *G. pseudoweinkauffi*. *G. jousseameana* is close, but it attains larger adult size and is more compressed, with a more prominent sculpture and a postero-dorsal part with the typical, single, radial rib delimited by a sharp keel, whereas the delimitation in *G. pseudoweinkauffi* is smooth and rounded.

*G. weinkauffi* Crosse, 1864 is an Indo-Pacific species (figure of holotype in WARÉN, 1980, pl. 8, fig. 11-13; actual specimen not examined), an observation which had already been pointed out by BERTIN (1880). The name has erroneously been used for the Eastern Atlantic species (see synonymy), probably on the base of the erroneous type locality "Alger" of *G. weinkauffi*. A specimen of *G. weinkauffi* figured in "La Conchiglia" (Anonymus, 1979 : 21, fig. 8) is reported as "originating from Algiers..., uncommon" without any further comments. As there does not exist any confirmation of the occurrence of this species in the Mediterranean, I consider this record very dubious.

*G. pseudoweinkauffi* was not collected by P. BERNARD in Gabon, nor by myself in Cameroon and the P.R. Congo. Only one juvenile and two valves were taken by S. GOFAS during five years of intensive collecting on the coast of Angola.

A close fossil species is *G. affinis* Dujardin, 1835, from the northern Italian Pliocene (illustrations see SACCO, 1901, pl. 1, fig. 29-39). It is quite variable, the typical form (SACCO, 1901, fig. 29-32) has the same size, but is slightly higher than the Recent species, and a "var. *major*" Bronn, 1831 (SACCO, fig. 35-39) is more than twice the size (52 mm), but is otherwise quite similar to the Recent *G. pseudoweinkauffi*.

## **Gari intermedia** (Deshayes, 1855)

*Psammobia intermedia* Deshayes, 1855 : 319.

TYPE MATERIAL : Two syntypes in BM(NH) 1984 284 1/2, syntype 1 is figured by REEVE, 1856 : *Psammobia*, pl. 4, sp. 25.a.

TYPE LOCALITY : Coast of Portugal.

## DESCRIPTION

Shell medium-sized, up to 60 mm, moderately thick and solid, variable in outline, slightly inaequivalve, nearly aequilateral, oval, length/width ratio 1.6-2.0 : 1. Valves rather inflated, right valve slightly more convex than left valve, posterior end weakly gaping and twisted to the right side. Anterior margin rounded, posterior end obliquely truncated with rounded angles.

Postero-dorsal margin straight, occasionally weakly concave, ventral margin gently convex. In adult specimens, beaks 0-3 mm before the vertical midline.

Exterior with conspicuous, coarse, irregular, wave-like concentric ribs, some bifurcating on the postero-dorsal slope. Umbonal area smooth with irregular growth lines. Weak, rounded keel running from the beaks to the postero-ventral corner.

Hinge with two cardinals in the right valve, the posterior one bifid. Left valve with one strong, vertical, slightly bifid cardinal and one thin, thread-like, diagonal, posterior cardinal. Pallial sinus somewhat variable, the end rounded, ending just in front of the level of the beaks or extending slightly beyond it, the ventral limb in its greater part confluent with the pallial line.

Exterior whitish to pale rose with slightly darker concentric zones and rose to pinkish radial rays. Periostracum strong, olive greenish to greyish brown, on the middle part of the valves often peeling off. Interior mostly pale violet to pinkish, sometimes deep violet to brownish violet or reddish, external pattern only occasionally showing through, mostly along the ventral margin.

*Selected measurements and length/width ratio*

54.7 × 32.2 mm	Port-Étienne, Mauritania	1.7 : 1
52.1 × 29.8 mm	Baia Matiota, Cape Verde Islands	1.7 : 1
52.0 × 29.1 mm	Las Palmas, Canary Islands	1.8 : 1
50.6 × 28.2 mm	Port-Étienne	1.8 : 1
48.9 × 29.8 mm	Baie de Gorée, Sénégal	1.6 : 1
48.2 × 27.1 mm	M'Bour, Sénégal	1.8 : 1
44.3 × 25.5 mm	Olhão, Portugal	1.8 : 1
42.6 × 24.1 mm	Baia Matiota	1.8 : 1
40.5 × 24.6 mm	Alger, Algeria	1.7 : 1
39.3 × 22.5 mm	Baia Matiota	1.7 : 1
38.1 × 23.0 mm	Baie de l'Étoile, Mauritania	1.7 : 1
37.3 × 21.4 mm	Figueirinha, Portugal	1.7 : 1
37.0 × 20.2 mm	Sénégal (14°26,5' N/17°05,5' W)	1.8 : 1
35.7 × 20.4 mm	Baie de l'Étoile	1.8 : 1
35.5 × 18.2 mm	Baia Matiota	2.0 : 1
33.1 × 19.4 mm	Baie de l'Étoile	1.7 : 1
29.6 × 16.1 mm	Las Palmas, Canary Is. (CANCAP 4)	1.8 : 1

**DISTRIBUTION** : Portugal (as far north as Setubal (NOBRE, 1938-40)) to Sénégal (14° N), southwestern Mediterranean to Alger, Canary Islands, Cape Verde Islands.

**MATERIAL EXAMINED** : **Portugal** : Figueirinha, prov. Setubal, on beach, 1 v., leg. GOFAS, VI.1988, MNHN; Baleeira port, Sagres, Algarve, 2-4 m, 3 v., 1 sh., coll. mission Algarve MNHN, V.1988; Faro, Algarve, 1 sh., 1 v., coll. PETIT; Tavira, Algarve, 2 sh.; Ria Formosa, Algarve, 1 v.; Olhão Channel, 6 m, 2 sh., all coll. mission Algarve MNHN, VI.1988, all MNHN. **Algeria** : Alger, 2 sh., MNHN. **Morocco** : Tanger, 1 v., coll. SOYER; Rabat, 2 v., leg. BELLON, both MNHN. **Canary Islands** : Las Palmas, Gran Canaria, 1 fresh sh., from fisherman, 1965, MNHN ex author's coll.; Las Palmas, Gran Canaria, sandy lagoon, 0-5 m, 1 sh.; Arinaga, E-coast of Gran Canaria, sandy bay with seagrass, 0-5 m, 1 v., both leg. CANCAP 4-Expedition (littoral sta.), 28.III.-4.V.1980, RMNH. **Mauritania** : Port-Étienne (now Nouadhibou), 5 sh., 1 v., mission GRUVEL; Baie de l'Étoile (21° N), marée, 3 v., leg. BOUCHET, V.1983; Pointe Rey, 2 v., Mission GRUVEL, 7.IV.1908; beach between El Mamghar and El Mahara, 1 v., mission GRUVEL, 1908, all MNHN; West of Tiouilfit, 18°50' N/16°80' W, sand with hard bottom, 15 m, 1 spm., R/V "Tyro", Mauritania II-Expedition Leiden Museum, 8.VI.1988, RMNH. **Cape Verde Islands** : São Vicente, Baia Matiota, Mindelo, 2-3 m, sand, 3 sh., 4 v.; Baia Porto Grande, on beach west of Mindelo,

2 v.; Ilha do Sal, Baia Mordeira, on beach, 3 sh., 3 v., fragm.; Baia Algodoeiro, on beach, 4 v., all leg. B. & R. VON COSEL, 16.XII.1978-4.I.1979, MNHN ex author's coll. **Sénégal**: Gorée, 2 juv. sh., coll. H. FISCHER; Cap Vert Peninsula, 2 sh., coll. MAUNY, 1964; Baie de Gorée, 1 sh., coll. MARCHE-MARCHAD, 1.VI.1954; Somone, on beach, 7 sh., leg. LEUNG TACK, 1983; M'Bour, on beach, 1 v., leg. VON COSEL, 22.III.1988; off M'Bour, 10 m, 2 sh., leg. PIN, 1987; Joal, 14°26,5' N/17°05,5' W, 10,5-11 m, 1 v.; Saloum, 14°2,5' N/17°09' W, 24 m, 1 fresh sh., both dredged trawler "Henri Gomis", leg. BODARD, all MNHN.

**BIOTOPE** : Mixed and coarse sand, also with shell debris, 1-25 m.

#### REMARKS

This species is characterized by its peculiar, coarsely corrugated, concentric ribs which in that form are unique among *Gari*, but more frequent in Semelidae. Very young specimens (up to 10 mm) can be confused with juvenile *G. depressa*, but the latter is slightly more elongate. The two species co-occur only in southern Portugal, the southwestern Mediterranean and northern Morocco. *G. intermedia* is a subtropical species which is endemic to the NW-African upwelling zone and has this distribution pattern in common with e.g. the venerid *Pitar tumens* (Gmelin, 1791). This, however, goes northward to Agadir only. *G. pseudoweinkauffi* has the same distribution as *G. intermedia* in the north (extreme SW Mediterranean), but is also present in the tropical zone.

### ***Gari depressa* (Pennant, 1777)**

*Tellina depressa* Pennant, 1777 : 73, pl. 47, fig. 27.

*Solen vespertinus* Gmelin, 1791 : 3228.

*Psammobia florida* Lamarck, 1818 : 513.

**TYPE MATERIAL** : In PENNANT collection, BM(NH), actual specimen not examined.

**TYPE LOCALITY** : Not given.

#### DESCRIPTION

Shell medium-sized, up to 60 mm long, moderately thick and solid, very slightly inequivalve, nearly equilateral, elongated-oval, length/width ratio 1.8-2.0 : 1. Valves moderately compressed, right valve slightly more convex than the left valve, posterior end weakly gaping and sometimes slightly twisted to the right side. Anterior and posterior end rounded, ventral part of the posterior end with a rounded angle. Antero-dorsal margin somewhat convex, postero-dorsal margin straight to slightly convex, ventral margin gently convex. Beaks in adult specimens 1-3 mm before the vertical midline.

Exterior glossy, with irregular, concentric growth lines and occasional ridges and a weak, rounded posterior angle running from the beaks to the postero-ventral corner. Postero-dorsal slope on the earlier part near the beaks with faint radial ridges which are only visible under a lens ( $\times 10-20$ ) and become obsolete towards the margin.

Hinge plate narrow, two cardinals in the right valve, the anterior one less bifid than the posterior one. Left valve with one stronger, nearly vertical bifid cardinal and one thin, blade-

like diagonal-subhorizontal, posterior cardinal. Pallial sinus broad and at the end well rounded to slightly angular, extending slightly beyond the level of the beaks, its ventral limb confluent with the pallial line for three fourth of its length.

Exterior of valves whitish to cream-yellowish or light rose, often with darker concentric zones. Purple, lilac or light brownish rays, often with lighter streaks and mottlings. Periostracum strong, olive green to brownish, often peeling from the anterior and middle part of the valves, and remaining on the postero-dorsal and ventral part. Interior light to dark violet, sometimes with yellowish zones or rays, yellowish with violet rays, entirely cream, whitish (northern specimens), yellowish or, more rarely, light orange. Nymphal plate mostly white.

*Selected measurements with length/width ratio*

60.4 × 32.9 mm	Cherbourg, Atlantic France	1.8 : 1
60.2 × 32.2 mm	Binic, Atlantic France	1.9 : 1
60.0 × 31.4 mm	Futungo, Angola	1.9 : 1
56.2 × 30.0 mm	Naples, Italy	1.9 : 1
55.0 × 30.5 mm	Carnac, Atlantic France	1.8 : 1
54.7 × 29.5 mm	Lanzarote, Canary Islands	1.9 : 1
53.9 × 30.0 mm	Penthièvre, Atlantic France	1.8 : 1
52.7 × 28.3 mm	Le Croisic, Atlantic France	1.9 : 1
52.2 × 26.8 mm	Cancale, Atlantic France	1.9 : 1
51.2 × 27.3 mm	Dunkerque, Atlantic France	1.9 : 1
51.0 × 28.0 mm	Wimereux, Atlantic France	1.8 : 1
50.6 × 26.2 mm	Baia de Lobito, Angola	1.9 : 1
50.5 × 26.2 mm	Olhão, Portugal	1.9 : 1
50.0 × 28.4 mm	Marseille, Mediterranean France	1.8 : 1
46.8 × 26.0 mm	La Seyne, Mediterranean France	1.8 : 1
46.2 × 24.4 mm	Calais, Atlantic France	1.9 : 1
44.4 × 22.8 mm	Locmariaquer, Atlantic France	1.9 : 1
43.8 × 22.1 mm	Bou Grara, Tunisia	2.0 : 1
41.8 × 22.6 mm	St. Jean de Luz, Atlantic France	1.8 : 1
41.0 × 22.8 mm	Cadaques, Mediterranean Spain	1.8 : 1
40.1 × 21.6 mm	Djerba, Tunisie	1.9 : 1
39.9 × 20.0 mm	Baia de Lobito	2.0 : 1
36.7 × 19.2 mm	Baia de Sta. Maria, Angola	1.9 : 1

DISTRIBUTION : Norway (66°-67° N, HØISÆTER, 1986), West coast of Ireland and Great Britain southward to Morocco (Essaouira/Mogador, PASTEUR-HUMBERT, 1962) and Canary Islands; Mediterranean; northern and southern Angola (Cacuaco — Santa Maria); South Africa (False Bay — Port Alfred (KILBURN & RIPPEY, 1982)).

MATERIAL EXAMINED : **Great Britain** : Herm Is., Channel Islands, 3 sh., coll. STAADT, 1969, MNHN. **Atlantic France** : Dunkerque, Nord, 1 sh.; Calais, Pas-de-Calais, 1 sh.; Wimereux, Pas-de-Calais, 2 sh., all coll. LOCARD, 1892; Cabourg, Calvados, 3 sh., coll. BOURGUIGNAT, 1872; Cherbourg, Manche, 2 sh., coll. LOCARD, 1892; Granville, Manche, 1 sh., old coll. MNHN; Cancale, Ille-et-Vilaine, 1 sh., coll. LOCARD, 1892; St. Malo, Ille-et-Vilaine, numerous sh. and v., leg. H. FISCHER, 1906; Le Val André, Côtes-du-Nord, 8 sh., coll. LAVEZZARI; St. Quay, Côtes-du-Nord, 1 sh., coll. DENIS; Binic, Côtes-du-Nord, on beach, 6 sh. (4 with moribund animal), coll. STAADT; Roscoff, Finistère, several sh., old coll. MNHN; Brest, Finistère, 1 sh., coll. LOCARD, 1892; Concarneau, Finistère, 5 sh.; île de Groix, 1 sh.; Quiberon, Morbihan, 1 sh., all coll. LOCARD, 1892; Penthièvre, Morbihan, Atlantic side of Quiberon Peninsula, beach, 1 sh., 1 v.; Baie de Quiberon side of the peninsula, low tide, 1 sh., both leg. B. & R. VON COSEL, 29.III.1987; Quiberon, Plage de Conguel, 1 sh., leg. B. & R. VON COSEL, 28.III.1987;

Carnac, Morbihan, 2 sh., old coll. MNHN; Locmariaquer, Morbihan, 1 sh., leg. BOUCHET, 1979; Le Croisic, Loire-Atlantique, 1 sh., coll. LOCARD, 1892, 1 sh., coll. H. FISCHER; Noirmoutier, Vendée, several sh., old coll. MNHN; La Rochelle, Charente-Maritime, 5 sh., coll. FLEURIAU; Ile de Ré, 2 sh., coll. LOCARD, 1892; St. Jean-de-Luz, Basses-Pyrénées, several sh., coll. H. FISCHER, 1898, all MNHN. **Portugal** : Olhão, Algarve, east of harbour, sand, low water, 1 spm.; Olhão Channel, 3-7 m, sand with *Zostera*, 1 sh., both coll. mission Algarve MNHN, 6.1988, MNHN. **Atlantic Spain** : El Pineo, Ceuta, Strait of Gibraltar, 9-10 m, sand, 1 sh., leg. BOUCHET, V.1986, MNHN. **Tunisia** : NW of Bou Grara Sea, Gulf of Gabes, sand, 10-15 m, numerous sh. and v.; Ajim Canal, Djerba, sand, 10-32 m, several sh. and v.; Borj Djillidj, Djerba, *Posidonia*, 0-8 m, 1 spm., all leg. BOUCHET & WARÉN, 1982, all MNHN. **Yugoslavia** : Zadar, 5 sh., 1 v., SMF. Rovinj, shallow water, sand, 1 v., IX.1968, SMF ex author's coll. **Italy** : Trieste, 1 sh., leg. STOSSICH, 1871, SMF. Venice, 1 sh., coll. BALLOT, 1887; Gulf of Naples, 1 sh., coll. SCACCHI, 1840; Naples, 2 juv. sh., coll. LOCARD, 1892, all MNHN. **Mediterranean France** : Cannes, Alpes-Maritimes, 1 v., old coll. MNHN; Toulon, Var, 1 sh.; St. Mandrier, Var, 1 sh.; La Seyne, Var, 1 sh.; Sète, Hérault, 1 sh., all coll. LOCARD, 1892; La Franqui, Roussillon, on beach, 2 v., leg. VON COSEL, 31.X.1987; Porto Nuovo, Corsica, on beach, 2 sh., 2 v., leg. F. & C. MONNIOT, XII.1988; Ajaccio, Corsica, 1 sh., coll. LOCARD, 1892, all MNHN. **Mediterranean Spain** : Cadaques, Costa Brava, 1 sh., coll. STAADT, MNHN; Balears : Mahon, Menorca, 1 sh., leg. HESSE, 1882, SMF. **Canary Islands** : Lanzarote ("Golfo"), 1 sh., coll. H. FISCHER, MNHN; Las Palmas, Gran Canaria, 28°09' N/15°26' W, 5 m, sandy lagoon, 3 v., leg. CANCAP 4-Expedition Leiden Museum (littoral sta.), 28.-30.IV.1980, RMNH. **Angola** : Cacuaco, Bengo, 5-10 m, 1 v.; Futungo, Luanda, intertidal, 2 v.; Baia de Corimba, Luanda, 10-20 m, 1 juv. spm., 2 sh., 9 v., all leg. GOFAS, 1981-84, MNHN; Baia de Lobito, Benguela, on beach, 1 sh., 1 v., mission GRUVEL, 20.V.1910, MNHN; Santo Antonio, Benguela, 5-10 m, 1 v.; Baia de Santa Maria, Benguela, sand, 1-2 m, 1 sh., both leg. GOFAS, 1981-84, MNHN.

**BIOTOPE** : In mixed and coarse sand, from 1 to about 50 m, rarely exposed at spring tide low water.

#### REMARKS

This species is cold- to warm-temperate and has a disjunct distribution with a pronounced gap comprising the southern part of the NW-African upwelling zone as well as tropical West Africa. It is not known at the moment if there is another gap between Angola and South Africa or if the species has a continuous range from Angola to Port Alfred. There are very slight differences between the northern and the southern populations of *Gari depressa*, mostly in the pallial sinus, but they are even less evident than in *G. jousseaumeana* and do not justify taxonomic separation at species or subspecies level.

#### *Gari castrensis* (Spengler, 1794)

*Solen castrensis* Spengler, 1794 : 110.

**TYPE MATERIAL** : Holotype in ZMC (fig. 18, actual specimen not examined).

**TYPE LOCALITY** : "Fra Kysten Guinea".

#### DESCRIPTION

Shell medium-sized, up to 60 mm long, thin but strong, inequilateral, oblique-oval, length-width ratio 1.7-1.9 : 1. Valves moderately compressed, right valve generally slightly more convex than left valve, shells occasionally equivalve. Posterior end slightly gaping. Anterior

margin rounded, dorsally more convex than ventrally, postero-ventral margin well convex, postero-dorsal margin with a rounded angle. Beaks in adult specimens 4-6mm before the vertical midline.

Exterior with very fine, dense, irregular growth lines, on the postero-dorsal part fine, but more prominent, concentric ridges. Hinge plate narrow, right valve with two cardinals, left valve with one nearly vertical and one thin, blade-like, diagonal posterior cardinal. Pallial sinus at the end well rounded, extending to or 1-2 mm behind the level of the beaks in adult specimens, ventral limb confluent with the pallial line for two thirds of its length.

Valves whitish to irregularly pale rose or lilac, with slightly darker brownish-pink rays, isolated purple dots and spots and frequently the typical, pale purple, concentric zigzag lines, forming a tented pattern, which is more or less developed and which can be absent. Just before the umbos on the antero-dorsal slope, a short, narrow, oblique, light orange ray, not always visible. Periostacum light greenish brown to dark brown, very thin or missing on the earlier parts of the valves, thicker on the marginal part of valves of adults, with wrinkles close to the margins. Interior whitish, colour of the outside showing through.

*Selected measurements with length/width ratio*

58.5 × 33.0 mm	Banié, Gabon	1.8 : 1
56.4 × 32.1 mm	Banié	1.8 : 1
54.4 × 30.5 mm	Guinea (10°27' N/15°44' W)	1.8 : 1
53.7 × 29.6 mm	Guinea (10°27' N/15°37,5' W)	1.8 : 1
53.2 × 31.1 mm	Banié	1.7 : 1
52.7 × 30.1 mm	Guinea (10°12' N/13°06' W)	1.8 : 1
52.6 × 30.0 mm	Guinea (10°17' N/15°43,5' W)	1.8 : 1
51.9 × 28.2 mm	Banié	1.8 : 1
51.3 × 29.2 mm	Guinea (10°12' N/13°06' W)	1.8 : 1
50.6 × 28.0 mm	Guinea (10°12' N/13°06' W)	1.8 : 1
49.5 × 28.2 mm	Guinea (10°30' N/15°43,5' W)	1.8 : 1
48.6 × 28.1 mm	Guinea (10°30' N/15°43,5' W)	1.7 : 1
48.0 × 27.0 mm	Guinea (10°30' N/15°43,5' W)	1.8 : 1
47.2 × 27.2 mm	Guinea (10°27' N/15°22,5' W)	1.7 : 1
46.8 × 26.9 mm	Lumley, Sierra Leone	1.7 : 1
46.7 × 26.3 mm	Guinea (10°27' N/15°37,5' W)	1.8 : 1
44.6 × 26.0 mm	Guinea (10°27' N/15°43,5' W)	1.7 : 1
43.9 × 23.7 mm	Guinea (9°50' N/14°14' W)	1.9 : 1
40.0 × 23.5 mm	Guinea (10°27' N/15°01' W)	1.7 : 1
39.8 × 22.3 mm	Guinea (9°52' N/14°02' W)	1.8 : 1
36.4 × 20.2 mm	Guinea (9°06' N/13°56' W)	1.8 : 1
33.5 × 19.0 mm	Guinea (9°42' N/14°59,5' W)	1.8 : 1

DISTRIBUTION : Guinea (Compony Bancs) southward to Gabon (Port Gentil).

MATERIAL EXAMINED : **Guinea** : continental shelf between the Compony Bancs and the border to Sierra Leone, numerous sh. and v. from 20 stations of the SEDIGUI campaign, 10-40 m, dredged and trawled R/V "André Nizéry", leg. VON COSEL, IV.-V. and IX.XI.1988, MNHN; 9°23' N/15°07' W, 34 m, 1 v., "Atlantide" Sta. 45, MNHN. **Sierra Leone** : off Lumley, 1 v., leg. LONGHURST (West African Fisheries Research Institute), 9.XI.1954, MNHN. **Gabon** : Ile Banié, North of Cap Esterias, on sand banc, 3-7 m, numerous sh. and v., leg. BERNARD, IV.1983 and IV.1987; Port Gentil, 1 spm., 1 v., both MNHN.

BIOTOPE : Mixed and coarse sand, also with gravel or shell debris, from about 3 to 50 m, most common between 10 and 25 m.

#### REMARKS

*G. castrensis* is a strictly tropical species which does not penetrate into the regions with seasonal upwellings north- and southward of the tropical zone. It differs from *G. depressa* in being higher, more oval and thinner, and in having the conspicuous tent-markings. It lacks the faint, radial striae on the early part of the postero-dorsal slope; the beaks are placed more forward. Juvenile and half-grown specimens are quite thin-shelled and fragile.

There is a sibling species in the tropical Indo-Pacific, *G. oriens* (Deshayes, 1855) which is known from East Africa to New Caledonia. This species has minor but constant differences to *G. castrensis* in adult specimens: the shell is somewhat stronger, the external pattern is less showing through or not at all, the interior is generally more yellowish; the posterior hinge-plate is stronger and slightly convex towards the interior, whereas in *G. castrensis* it is straight or somewhat concave. Without doubt the two species originated from a common ancestor. WILLAN (*in litt.*, 12.II.1986) provisionally considers *G. oriens* a subspecies of *G. castrensis*, which is separated from the West African subspecies by the cold waters of southern Africa. However, MATSUKUMA (1989: 107) separates them on species level. In the forthcoming revision of Indo-Pacific Psammobiidae by WILLAN this question will be treated in detail. Also *G. oriens* is an entirely tropical species which is not reported from the Indian Ocean coast of South Africa (KILBURN & RIPPEY, 1982).

#### ***Gari costulata* (Turton, 1822)**

*Psammobia costulata* Turton, 1822: 87, pl. 6, fig. 8.

*Psammobia discors* Philippi, 1836: 23, pl. 3, fig. 8.

TYPE MATERIAL: Two syntypes of *Psammobia costulata* in Jeffreys collection, USNM 178601 (figured by WARÉN (1980): pl. 9, fig. 1-4, actual specimen not examined). Holotype of *Psammobia discors* in ZMB, Berlin.

TYPE LOCALITY: Dredged in Torbay and the Channel (British).

#### DESCRIPTION

Shell small, up to 25 mm (TEBBLE, 1966), solid, very weakly inequivalve, variable in shape, inequilateral to nearly equilateral, elongate-oval, length-width ratio 1.9-2.2: 1. Valves moderately inflated, left valve slightly more convex than right valve. Valves only very slightly gaping posteriorly. Anterior and posterior ends rounded, posterior margin slightly undulate, reflecting the radial ribs running from the umbos to the posterior end. Ventral margin gently convex. Beaks on the vertical midline or somewhat behind it.

Exterior with fine, concentric ridges and 9-13 quite prominent, radial ribs on the postero-dorsal part, delimited by a line from the umbo to the postero-ventral corner.

Hinge plate narrow, two bifid cardinals in the right valve, one bifid anterior and one thread-like posterior cardinal in the left valve. Pallial sinus broad and rounded, extending beyond the level of the beaks, its ventral limb confluent with the pallial line for two thirds of its length.

Colour of valves very variable, from uniform white to rose, pinkish, reddish, orange or violet, mottled with pale brownish, or with radial rays of the same colour. Umbonal region mostly whitish or yellowish, often delimited by a vertical, reddish to violet zone anteriorly only or both anteriorly and posteriorly. Periostracum thin and mostly peeling off. External colours visible on interior in the same intensity.

*Selected measurements with length/width ratio*

23.5 × 11.3 mm	Azores (39°32' N/31°14' W)	2.1 : 1
23.4 × 11.7 mm	Azores (S. Jorge)	2.0 : 1
21.1 × 10.5 mm	Azores (39°32' N/31°14' W)	2.0 : 1
20.7 × 10.0 mm	Azores (38°30' N/27°14,5' W)	2.1 : 1
20.3 × 10.5 mm	Celtic Sea (48°39,4' N/5°54,9' W)	1.9 : 1
20.0 × 9.7 mm	Azores (37°51' N/25°41' W)	2.1 : 1
19.8 × 9.7 mm	Azores (38°13' N/26°36' W)	2.0 : 1
19.0 × 9.1 mm	Naples, Italy	2.1 : 1
18.4 × 9.0 mm	Azores (38°39' N/27°14,5' W)	2.0 : 1
18.0 × 8.4 mm	Dakar, Sénégal	2.1 : 1
17.5 × 8.6 mm	Ceuta North, Strait of Gibraltar	2.0 : 1
16.6 × 8.0 mm	Ceuta South	2.1 : 1
16.4 × 8.0 mm	Belle-Ile, Atlantic France	2.1 : 1
16.3 × 7.8 mm	Belle-Ile	2.1 : 1
15.1 × 7.2 mm	Gorée, Sénégal	2.1 : 1
14.2 × 6.8 mm	Alger, Algeria	2.1 : 1
14.2 × 6.7 mm	Guinea (9°06' N/14°29' W)	2.1 : 1
14.0 × 6.6 mm	Guinea (9°30' N/15°26,6' W)	2.1 : 1
13.8 × 6.8 mm	Guinea (9°30' N/15°26,6' W)	2.0 : 1
13.4 × 6.2 mm	Guinea (9°35' N/15°36' W)	2.2 : 1
13.3 × 6.5 mm	Guinea (9°06' N/14°38' W)	2.0 : 1
13.2 × 6.5 mm	Guinea (9°19' N/14°56,5' W)	2.0 : 1
13.0 × 6.2 mm	Guinea (9°24' N/14°51' W)	2.1 : 1
12.9 × 6.2 mm	Guinea (9°19' N/14°56,5' W)	2.1 : 1
12.3 × 6.2 mm	Guinea (9°18,5' N/14°54' W)	2.0 : 1
12.1 × 5.7 mm	Praia Amelia, Angola	2.1 : 1

**DISTRIBUTION :** Faroes (shells only, HØPNER PETERSEN, 1968); Shetlands; west coast of the British Isles, but not in the North Sea; Atlantic coast to Guinea; southern Angola (Moçâmedes); Azores, Madeira, Canary Islands and Cape Verde Islands; Mediterranean. Also in South Africa from False Bay to Natal (BARNARD, 1964).

**MATERIAL EXAMINED :** **Great Britain :** "England" (no precise locality) 1 sh., coll. LOCARD, MNHN. **Atlantic France :** Celtic Sea, 49°09,1' N/08°55,1' W, 147 m, 1 v.; 48°39,4' N/05°54' W, 112 m, 1 v.; 48°38,7' N/09°31,7' W, 177 m, 1 v., all dredged R/V "Thalassa", leg. VON COSEL & LOZOUET, XII.1983, MNHN; Belle-Ile, Morbihan, 2 sh.; Ile de Ré, Charente-Maritime, 3 v., both coll. LOCARD, MNHN. **Spain :** Strait of Gibraltar, Ceuta, Playa Benitez, 15-25 m, 8 v.; Ceuta, Ensenada de la Almadraba, 20-36 m, several v., leg. BOUCHET, GOFAS & VON COSEL, V.1986, MNHN. **Atlantic Morocco :** Ibero-Moroccan Gulf, 35°47' N/06°04' W, 332 m, 1 v.; 35°45' N/06°05' W, 144 m, 5 v., both dredged R/V "Cryos", BALGIM-Expedition, leg. BOUCHET & WARÉN, 11.VI.1984, MNHN; Cape Bojador, 25°11,9' N/15°48,24' W, 85-90 m, several v.; 24°58,3' N/15°32,6' W, 50-53 m, 2 v., both dredged R/V "Meteor", cruise 36, 21 and 22.II.1975, both SMF. **Mediterranean Morocco :** Alboran Sea, 35°26' N/04°17' W, 195 m, 1 v.; 35°25' N/04°19' W, 145 m, 5 v.; 35°26' N/04°19' W, 170 m, 2 v., all dredged R/V "Cryos", BALGIM-Expedition, leg. BOUCHET & WARÉN, 15.6.1984, MNHN. **Algeria :** Alger, 6 v., MNHN. **Italy :** Palermo, 1 sh., 1 v., coll. JOUSSEAUME; Naples, 3 sh., 2 v., coll. SCACCHI and PETIT, all MNHN. **Mediterranean France :** St. Raphaël, Var, 1 sh., coll. LOCARD, MNHN. **Azores :** Baia de Horta,



Faial, 20 m, 1 spm., 2 v., R/V "Hirondelle"- Sta 193, 1888; Santa Cruz, Flores, 40 m, 4 v., R/V. "Hirondelle"- Sta. 218, 4.VIII.1888, both MNHN; 26 lots with numerous spm., sh. and v. from Sao Miguel, Terceira, Canal de Faial and Flores, between 6 and 150 m, empty shells and valves washed down on the steep slope to 1675 m, all dredged R/V "Jean Charcot", BIAÇORES-Expedition, leg. MÉTIVIER, X.1971, MNHN. **Canary Islands** : South of Lanzarote, 5 lots with in total 10 v., between 28°51' and 28°48' N and 13°47' and 13°41' W, 20-47 m, all taken by bottom grab, R/V "Tydeman", CANCAP 4-Expedition, 14-16.V.1980, RMNH. **Cape Verde Islands** : SSW of Sta. Luzia, 16°43' N/24°47' W, 204 m, foram sand with shell gravel, 5 v.; West of Fogo, 14°55' N/24°31' W, 38-55 m, coarse volcanic sand with shell gravel, 1 v., both R/V "Tydeman", CANCAP 6-Expedition, 16. and 9.VI.1982, RMNH. **Sénégal** : Dakar region (no precise locality), 129-150 m, 2 v., dredged R/V "Gérard Tréca", leg. MARCHE-MARCHAD, 24.I.1958; South of Gorée, 30-40 m, 1 v., leg. MARCHE-MARCHAD; between Dakar and Saloum, 50 m, 1 juv. spm., leg. LEUNG TACK, 1983, all MNHN. **Guinea** : Continental shelf between Cap Verga and the border to Sierra Leone, 9°24,9' N/14°54' W, 38 m, 1 spm., SEDIGUI, sta. 193, 17.V.1988; 9°18' N/15°09' W, 50 m, 1 spm., SEDIGUI, Sta. 131, 16.V.1988; numerous sh. and v. from 84 stations of the SEDIGUI campaign, 30-63 m, most samples between 40 and 55 m, bottom grab, R/V "André Nizéry", leg. VON COSEL, V.1988, all MNHN. **Angola** : Off Ambrizete, 7°07' S/12°21' E, 80 m, 1 v., leg. GOFAS, 1983; Praia Amelia, Moçâmedes, 60-80 m, dredged, leg. GOFAS, 1984-86, both MNHN.

**BIOTOPE** : Mixed sand, coarse sand and gravel, from 5 to about 150 m, most common between 35 and 60 m.

#### REMARKS

This species is characterized by its particular, elongate-oval outline and the radial ribs on the postero-dorsal surface, which distinguish it from all other Eastern Atlantic *Gari*. Tropical West African specimens are smaller than specimens from temperate European seas.

*G. costulata* may be absent from the greater part of tropical West Africa : it is not yet recorded from Sierra Leone to Angola north of Ambrizete. In fact, almost the entire African range presently recorded, except the extreme south of Guinea, lies within the influence of permanent or seasonal upwelling. The distribution pattern in West Africa coincides with that of *G. jousseaumeana*, whereas the discontinuity for *G. depressa* is larger and includes also the northern upwelling zone.

#### *Gari tellinella* (Lamarck, 1818)

*Psammobia tellinella* Lamarck, 1818 : 515.

**TYPE MATERIAL** : In coll. VALENCIENNES, not localized in MNHN.

**TYPE LOCALITY** : Manche, near Cherbourg.

#### DESCRIPTION

Shell small, up to 29 mm (northern specimens to 35 mm, MADSEN, 1949) long, solid, nearly equivalve to slightly inequivalve, nearly equilateral, elongate-oval, length-width ratio 1.7-2.0 : 1. Valves moderately inflated, not gaping. Anterior and posterior end rounded. Beaks on the vertical midline or very slightly before it.

Exterior with fine growth lines and few, clear growth stages, overlain by very fine, somewhat irregular, radial threads, which are only visible under a lens (ca.  $\times$  20), and which are most pronounced postero-dorsally and ventrally and on the rest of the shell often obsolete.

Hinge with two cardinals in the right valve, of which the posterior one is bifid, the anterior one only very slightly or not bifid. Left valve with a bifid anterior and a thread-like posterior cardinal. Anterior end of pallial sinus more or less rounded, extending to the level of the beaks, its ventral limb confluent with the ventral pallial line for slightly more than a half of its length.

Colour of valves white, cream, yellowish or rose, often uniform, but also with the earlier parts more strongly suffused with orange, reddish or violet. Central umbonal area often lighter coloured, sometimes reddish rays anteriorly and posteriorly or only anteriorly. Periostracum very thin and mostly lost. Interior whitish to rose or yellowish.

*Selected measurements with length/width ratio*

29.1 × 15.1 mm	Roscoff, Atlantic France	1.9 : 1
29.0 × 16.8 mm	Scarborough, England	1.7 : 1
28.7 × 14.7 mm	Scarborough	2.0 : 1
26.5 × 13.7 mm	Brest, Atlantic France	1.9 : 1
25.9 × 13.7 mm	Roscoff	1.9 : 1
25.7 × 13.6 mm	Le Croisic, Atlantic France	1.9 : 1
25.0 × 13.0 mm	Roscoff	1.9 : 1
23.3 × 12.8 mm	Concarneau, Atlantic France	1.8 : 1
22.6 × 12.3 mm	Celtic Sea (48°44,9' N/5°10,5' W)	1.8 : 1
21.4 × 10.5 mm	Ile d'Oléron, Atlantic France	2.0 : 1
20.5 × 10.8 mm	Celtic Sea (48°39,1' N/5°28,1' W)	2.0 : 1
20.0 × 10.3 mm	Celtic Sea (48°39,7' N/5°47,2' W)	1.9 : 1
15.7 × 8.0 mm	St. Raphaël, Mediterranean France	2.0 : 1
15.5 × 8.0 mm	Atlantic Morocco (35°47' N/6°04' W)	1.9 : 1
11.0 × 5.6 mm	Alboran Sea (35°26' N/4°19' W)	2.0 : 1

**DISTRIBUTION** : Norway (70° N, HØISÆTER, 1986); S- and W-Iceland (MADSEN, 1949); Faroes; British Isles; Atlantic coast to N-Morocco; Mediterranean. Not in the eastern North Sea.

**MATERIAL EXAMINED** : Norway : (no precise locality), 1 sh., coll. PETIT, 1872, MNHN. **Great Britain** : Scarborough, 4 sh., coll. PETIT, 1872, MNHN; Channel Islands : Jersey, 1 v., coll. STAADT, 1969, MNHN; Guernsey, 4 v., SMF. **Atlantic France** : Réville, near St. Vaast, 1 sh.; St. Malo, 3 sh., coll. ROUSSEAU, 1839; Morlaix, 8 sh., coll. JOUSSEAUME, 1917; Roscoff, 9 sh.; Brest, 2 sh., coll. LOCARD, 1892, all MNHN; Celtic Sea; on seven stations between 49°32,9' and 48°33,2' N and 05°09,1' and 05°47,2' W, 98-114 m, 10 v., dredged R/V "Thalassa", leg. VON COSEL, XII.1983, MNHN; Concarneau, 1 sh., coll. LOCARD, 1892; Les Glénans Islands, several juv. spm. and sh.; Belle-Ile, 2 sh., coll. LOCARD; La Turballe, 1 sh., coll. LOCARD, 1892; Le Croisic, four lots with several sh. and v., coll. LOCARD, H. FISCHER, etc.; Noirmoutier, several sh. and v., old coll. MNHN; La Rochelle, 1 sh., coll. PETIT, 1872; île d'Oléron, 2 sh., coll. LOCARD, 1892, all MNHN. **Atlantic and Mediterranean Morocco** : Ibero-Moroccan Gulf : 35°47' N/06°04' W, 332 m, 1 v.; Alboran Sea : 35°26' N/04°19' W, 170 m 1 v., both dredged R/V "Cryos" BALGIM-expedition, leg. BOUCHET & WARÉN, 11. and 15.VI.1984, MNHN. **Mediterranean France** : St. Raphaël, 1 v., coll. LOCARD, 1892, MNHN.

**BIOTOPE** : Coarse sand, sand with shells and shell debris, gravel and stones (TEBBLE, 1966), from a few metres to about 100 m.

**REMARKS**

This species is the only eastern Atlantic *Gari* which does not reach the tropical zone of West Africa. It is closest to *G. costulata* and differs from it by the lack of the prominent postero-dorsal sculpture, the more median beaks and the more regular elongate-oval outline.

**Gari gofasi n. sp.**

TYPE MATERIAL : Holotype in MNHN, Punta de Mussulo, Prov. Luanda, Angola, on beach, a complete fresh sh., leg. GOFAS, 1983. Paratypes : same locality, 2 sh., 2 v., MNHN, 1 sh., SMF, 1 sh. Natal Museum, 1 sh. ZMC.

TYPE LOCALITY : Punta de Mussulo, Prov. Luanda, northern Angola.

DESCRIPTION

Shell very small for the genus, up to 15 mm, solid, nearly equivalve, inequilateral, elongate-oval, length-width ratio 2.3-2.5 : 1. Beaks well behind the vertical midline. Valves moderately compressed, slightly gaping anteriorly and posteriorly. Antero-dorsal margin straight, anterior margin well rounded. Posterior margin in its postero-dorsal part gently rounded, postero-ventrally forming a rounded corner. Ventral margin anteriorly evenly convex, in the middle and posteriorly nearly straight.

Exterior smooth, with very fine, irregular growth lines, on the postero-dorsal part a few shallow, irregular waves, somewhat similar to juvenile *Gari intermedia*. Posterior angle running from the beaks to the postero-ventral corner smooth and rounded.

Hinge plate very narrow, right valve with two cardinals, the anterior one slightly bifid, left valve with a vertical, bifid anterior and a subhorizontal, thin, short and blade-like posterior cardinal. Pallial sinus very deep, reaching nearly to the first third of the valve, broadening towards anterior, with a broad and rounded end, the ventral limb confluent with the ventral pallial line.

Colour of valves variable : whitish to pale yellowish, occasionally with orange hue or some orange in front of the beaks, or pale violet to violet with two lighter rays running from the beaks to the ventral margin. Beaks often white, zones anterior or posterior of the beaks often more intensively coloured. Periostracum very thin, nearly colourless and translucent or very light greyish brown, mostly on the ventral part of the valves. External colours showing through on the interior.

*Selected measurements with length/width ratio*

14.7 × 6.5 mm	Pta. de Mussulo, Angola (paratype)	2.3 : 1
13.7 × 5.9 mm	Pta. de Mussulo (paratype)	2.3 : 1
12.2 × 5.1 mm	Pta. de Mussulo (paratype)	2.4 : 1
11.7 × 5.1 mm	Guinea (9°48' N/15°15' W)	2.3 : 1
11.4 × 4.8 mm	Pta. de Mussulo (paratype)	2.4 : 1
11.3 × 5.0 mm	Pta. de Mussulo (holotype)	2.3 : 1
11.2 × 4.8 mm	Guinea (9°30' N/14°59,5' W)	2.3 : 1
11.0 × 4.8 mm	Guinea (9°03' N/14°20' W)	2.3 : 1
11.0 × 4.7 mm	Guinea (9°54' N/14°58' W)	2.3 : 1
9.8 × 4.0 mm	Guinea (9°24' N/14°58' W)	2.5 : 1
9.7 × 4.2 mm	Pta. de Mussulo (paratype SMF)	2.3 : 1
9.1 × 3.9 mm	Pta. de Mussulo (paratype Natal M.)	2.3 : 1
8.7 × 3.7 mm	Pta. de Mussulo (associated spm.)	2.4 : 1
7.3 × 3.1 mm	Pta. de Mussulo (paratype ZMC)	2.4 : 1

DISTRIBUTION : Guinea (Cap Verga), 10°33' N to northern Angola (Luanda).

MATERIAL EXAMINED : The type material. **Guinea** : SW of Cap Verga, 10°07,5' N/15°13' W, sand, 15 m, 1 v., dredged R/V "André Nizéry", leg. VON COSEL, 3.X.1988; 9°54' N/14°58' W, 37 m, 2 v.; W of Dubreka, 9°48' N/15°15' W, sand, 23 m, 1 v.; W of Conakry, 9°30' N/14°59,5' W, sand, 37 m, 1 v.; 9°30' N/15°18' W, 41 m, 1 v.; 9°24' N/15°00' W, sand, 37 m, 1 v.; 9°24' N/14°58' W, sand, 40 m, 1 v.; border between Guinea and Sierra Leone, 9°03' N/14°20' W, sand, 41 m, 1 v., all taken by bottom grab, R/V "André Nizéry", SEDIGUI campaign, V.1988, leg. VON COSEL, all MNHN. **Angola** : Ilha de Luanda, mud, 120 m, 1 v., dredged, leg. GOFAS, 1985, MNHN.

BIOTOPE : Clean sandy bottom. In Angola, most probably also in shallow water, judging from the fresh shells in the beachdrift. In Guinea found only offshore on the vast shelf between 15 and 40 m, on mixed and coarse sand. As only a few valves were taken (one fresh with periostracum), the species seems to be rare.

DERIVATIO NOMINIS : The species is named after my colleague S. GOFAS who first noted its existence and donated the type material.

#### REMARKS

*G. gofasi* is characterized by its small size and the very long anterior part. Two Western Pacific species of similar outline are *Gari gracilentia* (E. A. Smith, 1884) from Northern Australia and *G. rasilis* (Melvill & Standen, 1899), also from Northern Australia.

Although *G. gofasi* is so far only recorded from Guinea and northern Angola, the existence of a distribution discontinuity between the two regions is uncertain. *Gari gofasi* is so rare, that an occurrence between the two localities is not unlikely although it has not yet been discovered. The other species discussed here with disjunct distributions occur further north and further south, where they inhabit regions with influences of upwelling. *G. gofasi*, in contrast, seems to be restricted to tropical conditions and was not found north of Cap Verga and not south of Luanda.

### **Heterodonax parvus** Dunker, 1853

*Heterodonax parvus* Dunker, 1853 : 52-53, pl. 9, fig. 22-24.

TYPE MATERIAL : Most probably in ZMB Berlin (not examined).

TYPE LOCALITY : Loanda (Luanda), Angola.

#### DESCRIPTION

Shell small, up to 13 mm long, quite thick and solid, somewhat variable in shape, inequilateral, equivalve, oval, length/width ratio 1.4-1.7 : 1. Valves moderately compressed, not gaping. Anterior margin rather narrowly rounded, posterior margin broadly rounded-truncate. Ventral margin in general on the anterior part more convex than posteriorly. Beaks in adult specimens about 0.8-1.0 mm behind the vertical midline. Exterior smooth, with faint, irregular growth lines. Posterior angle broad and rounded.

Hinge plate narrow, right valve with two cardinals, of which the posterior one is bifid. Left valve with a broad, bifid, vertical anterior cardinal and a narrow but strong, oblique, posterior cardinal. Ligament on a projecting nymph as in *Gari*. Pallial sinus broad and

rounded-truncated at the end, extending slightly less than two-thirds of shell length, its ventral limb confluent with the pallial line for only a bit more than one-third of its length.

Background colour of valves whitish with few radial rays, streaks or spots of pale to deep violet, occasionally valves uniform violet. Periostracum thin, pale straw-coloured, translucent and glossy, in adult specimens remaining only on the marginal part. Inside whitish to yellowish, with irregular deep violet rays, spots, streaks or zones.

*Selected measurements with length/width ratio*

13.3 × 8.9 mm	Punta de Mussulo, Angola	1.5 : 1
13.3 × 8.7 mm	Pta. de Mussulo	1.5 : 1
13.0 × 8.8 mm	Pta. de Mussulo	1.5 : 1
12.0 × 8.8 mm	Lagune Ebrié, Côte d'Ivoire	1.4 : 1
11.7 × 8.0 mm	Pta. de Mussulo	1.5 : 1
11.5 × 8.2 mm	Pta. de Mussulo	1.4 : 1
11.2 × 7.4 mm	Pta. de Mussulo	1.5 : 1
11.0 × 7.4 mm	Pta. de Mussulo	1.5 : 1
10.8 × 7.6 mm	Pta. de Mussulo	1.4 : 1
10.4 × 7.6 mm	Corimba, Angola	1.4 : 1
10.3 × 7.4 mm	Pta. de Mussulo	1.4 : 1
10.2 × 7.0 mm	Lagune Ebrié	1.5 : 1
10.0 × 6.6 mm	Pta. de Mussulo	1.5 : 1
9.8 × 5.8 mm	Pta. de Mussulo	1.7 : 1
9.1 × 6.0 mm	Pta. de Mussulo	1.5 : 1

**DISTRIBUTION :** Known only from a short coastal strip in the northern part of Angola around Luanda, also from Lagune Ebrié, Côte d'Ivoire.

**MATERIAL EXAMINED :** Côte d'Ivoire : Lagune Ebrié, near Abidjan, 2 spm. (no more information), leg. G. S. ZABI, 12.I.1972, MNHN. N-Angola : Baía de Corimba, Luanda, 10-20 m, 1 spm.; Praia Etambar, Luanda, infralittoral, 1 juv. sh.; Punta de Mussulo, Luanda, beach drift, several sh. and v., all leg. GOFAS, 1982-85, MNHN.

**BIOTOPE :** Sandy bottom, occasionally with rocky areas, from shallow water to about 10-20 m.

**REMARKS**

This is the only eastern Atlantic *Heterodonax*, it is close to the other three biological species of the genus : *Heterodonax bimaculatus* (Linné, 1758) from Bermuda, southern Florida and the Caribbean Sea, *H. pacificus* (Conrad, 1837) from Southern California to Colombia and *H. ludwigi* (Krauss, 1848) from Mozambique to southern Natal. Both tropical American species are shorter and higher than the West African species. *H. ludwigi* is considerably larger, slightly shorter, and the beaks are more median.

The restricted range of *H. parvus* in Angola, in contrast to the much broader distribution ranges of the two American species, could only be explained by special hydrographic conditions in the Luanda area within the transition zone between the tropical north and the influence of the cold Benguela Current from the south. Unlike some other Psammobiidae present in Angola and not in the entirely tropical part of W-Africa, *Heterodonax parvus* has an isolated population in Côte d'Ivoire, but not further northward in the northern zone with seasonal upwelling (Sénégal, Mauritania). It is not known as a Tertiary fossil.

Apart from a somewhat smaller and slightly more upwards pointing pallial sinus and a thinner shell, the two studied specimens from Côte d'Ivoire show no substantial differences to the Angolan population. I prefer leaving them for the moment under *H. parvus*. If more specimens can be studied, a separation of the population from Côte d'Ivoire as a geographic subspecies might be possible.

***Sanguinolaria africana* n. sp.**

*Sanguinolaria sanguinolenta* auct. (non Gmelin, 1791) : NICKLÈS, 1950 : 215, fig. 415; MARCHE-MAR-CHAD, 1958 : 54.

*Sanguinolaria vitrea* : NICKLÈS, 1952 : 152 (non DESHAYES, 1854).

TYPE MATERIAL : Holotype in MNHN, Morton Bay, Victoria/Limbe, Cameroon, on beach, an empty shell, leg. VON COSEL, 1.4.XII.1985. Paratypes : same locality, 1 sh. with one v. slightly broken, MNHN.

TYPE LOCALITY : Victoria/Limbe, Cameroon.

DESCRIPTION

Shell medium-sized, up to 68 mm long, thin and rather fragile to quite solid (depending on the populations), somewhat variable in shape, oval to elongate-oval, equivalve, slightly inequilateral, length/width ratio 1.5-1.7 : 1. Valves rather inflated, weakly gaping posteriorly. Anterior margin broadly rounded, with a small sinuosity at the anterior end, posterior part tapering, posterior margin attenuated and narrowly rounded. Ventral margin markedly convex, often with a weak, broad sinuosity postero-ventrally. Beaks before the vertical midline.

Exterior smooth, with irregular, concentric growth lines and some coarser growth stages. Anterior fourth of the valves with faint, broad, radial striae, more pronounced marginally. Slight, broad, radial depression on the posterior half.

Hinge plate narrow, with two cardinals in the right valve, the posterior one often bifid. Left valve with strong, often bifid anterior cardinal and a thin, oblique posterior cardinal; no laterals. Pallial sinus large, very deep and broadening anteriorly, the ventral limb confluent with the pallial along its whole length.

Colour of valves whitish to cream or orange-whitish, occasionally with pale salmon orange on the umbonal area which very rarely extends more ventrally. Interior white, sometimes with orange-salmon hue, especially on the margins. Periostracum thin, very pale yellowish grey to nearly colourless, persistent only on the marginal part of the valves.

*Selected measurements and length/width ratio*

68.1 × — (broken) M'Bour, Sénégal.	
64.6 × 39.2 mm M'Bour	1.6 : 1
62.0 × 38.7 mm M'Bour	1.6 : 1
61.4 × 37.9 mm M'Bour	1.6 : 1
60.6 × 36.7 mm M'Bour	1.7 : 1
57.9 × 36.2 mm M'Bour	1.6 : 1
57.2 × 34.5 mm Pointe-Noire, Congo	1.7 : 1
57.1 × 33.5 mm Kafountine, Sénégal	1.7 : 1
56.9 × 34.4 mm M'Bour	1.7 : 1

56.4 × 35.8 mm	M'Bour	1.6 : 1
55.7 × 33.4 mm	M'Bour	1.7 : 1
54.9 × 35.4 mm	Victoria/Limbe, Cameroon (Paratype)	1.6 : 1
53.4 × 33.7 mm	M'Bour	1.6 : 1
51.7 × 32.4 mm	Pointe-Noire	1.6 : 1
51.6 × 33.7 mm	Pointe-Noire	1.5 : 1
50.0 × 28.8 mm	Victoria/Limbe (Holotype)	1.7 : 1
49.2 × 30.3 mm	Pointe-Noire	1.6 : 1
48.4 × 29.3 mm	Pointe-Noire	1.7 : 1
46.0 × 31.4 mm	Pointe-Noire	1.5 : 1
44.1 × 26.6 mm	Pointe-Noire	1.7 : 1
43.8 × 27.3 mm	Pointe-Noire	1.6 : 1
38.5 × 24.2 mm	Pointe-Noire	1.6 : 1
31.2 × 19.7 mm	Pointe-Noire	1.6 : 1
29.1 × 17.9 mm	Pointe-Noire	1.6 : 1

DISTRIBUTION : Sénégal (Petite Côte : M'Bour) to the Congo (Pointe-Noire).

MATERIAL EXAMINED : The type material. **Sénégal** : M'Bour, on the beach between tide-marks, numerous v. ; Casamance : Abene — Kafountine — towards Presqu'île aux Oiseaux, beach, several v., all leg. VON COSEL, III.1988, MNHN. **Cameroon** : Victoria/Limbe, beach, few v., leg. VON COSEL, 4.1969, MNHN ex author's coll. **R.P. Congo** : Pointe-Noire, Plage Mondaine, beach drift, few sh. and several fresh v., some broken; beach at ORSTOM, 1 broken sh., both leg. VON COSEL, XII.1985, MNHN.

BIOTOPE : Sandy bottom, most probably in fine and mixed sand, in shallow water, in semi-sheltered bays, only found locally.

#### REMARKS

This species has hitherto erroneously been cited as *Sanguinolaria sanguinolenta* (Gmelin, 1791), a Caribbean species which is slightly higher (length/width ratio 1,54 : 1, n = 14, versus 1,63 : n = 22, for *S. africana*), generally smaller (30-55 mm long, exceptionally up to 62 mm) and has a vivid pink colouration on the umbonal part and in many specimens on the whole inside except a white marginal rim. The Panamic-Pacific cognate species *S. tellinoides* A. Adams, 1850, is pink to deep red. *S. vitrea* Deshayes, 1854 is thinner, smaller and entirely white. It was described from an unknown locality and erroneously cited by ANGAS (1865 : 646) as coming from Australia ("Port Lincoln, Spencer's Gulf and Tasmania"). However, in the later Australian literature this species has not been mentioned again, and it is probable that ANGAS, localities are erroneous. Two lots in MNHN have the locality "Veracruz", and *S. vitrea* seems well to be a white variety of *S. sanguinolenta*.

#### Acknowledgements

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*Abbreviations used in the text*

- BM(NH) : British Museum (Natural History), London, UK.  
ICZN : International Commission on Zoological Nomenclature.  
MNHN : Muséum national d'Histoire naturelle, Paris, France.  
Natal Museum : Natal Museum, Pietermaritzburg, South Africa.  
RMNH : Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.  
sh. : shell, shells (both valves, empty).  
SMF : Naturmuseum und Forschungsinstitut Senckenberg, Frankfurt/M., W-Germany.  
spm. : specimen, specimens (live taken).  
sta. : station.  
USNM : United States National Museum, Smithsonian Institution, Washington, D.C., USA.  
v. : valve, valves.  
ZMB : Zoologisches Museum der Humboldt-Universität Berlin, Berlin, GDR.  
ZMC : Universitets Zoologisk Museum, Copenhagen, Denmark.

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PLATE I

1. Interior view of the right valve of each species with adductor scars, pallial lines and cruciform muscle impressions. (Scales = 10 mm.)

- A — *Gari fervensis* (Gmelin, 1791) : off Sangarea Bay, Guinea, 9°42' N/14°14' W, 21 m.
- B — *Gari jousseaumeana* Bertin, 1880 : Casamance, 12°43' N/17°21' W, 34 m.
- C — *Gari pseudoweinkauffi* n. sp. : W of Conakry, Guinea, 9°24' N/14°21' W, 40 m.
- D — *Gari intermedia* (Deshayes, 1855) : M'Bour, Sénégal, plage, leg. PIN.
- E — *Gari depressa* (Pennant, 1777) : Lobito Bay, Angola, beach, leg. mission GRUVEL.
- F — *Gari castrensis* (Spengler, 1794) : Ile Banié, Gabon, leg. BERNARD.
- G — *Gari tellinella* (Lamarck, 1818) : Roscoff, France, old coll. MNHN.
- H — *Gari costulata* (Turton, 1822) : W of Conakry, Guinea, 9°24' N/15°54' W, 38 m.
- I — *Gari gofasi* n. sp. : Pta. de Mussulo, Angola, beach, leg. GOFAS (cruciform muscle impression not seen).
- J — *Heterodonax parvus* Dunker, 1853 : Pta. de Mussulo, Angola, beach, leg. GOFAS.
- K — *Sanguinolaria africana* n. sp. : Plage Mondaine, Pointe-Noire, Congo, beach.

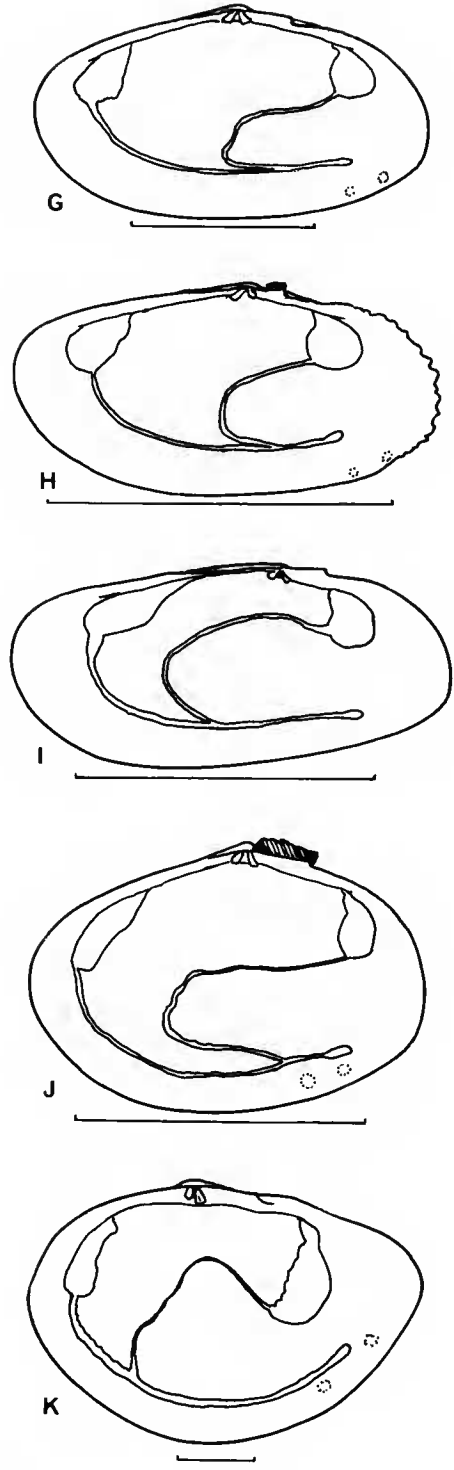
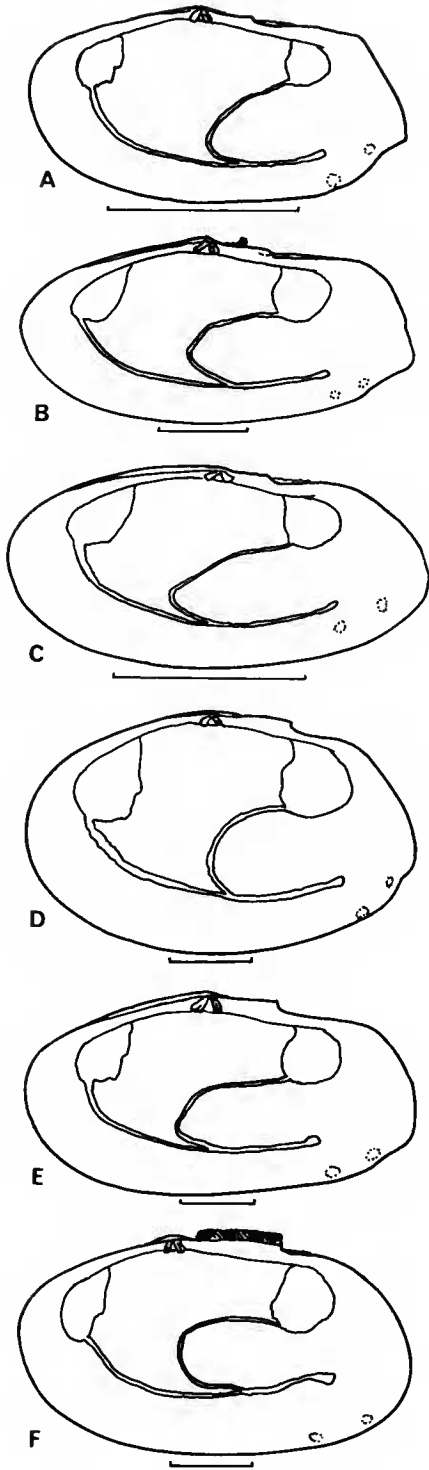


PLATE I



PLATE II

- 2 — *Gari fervensis* (Gmelin, 1791) : off Sangarea Bay, Guinea, 9°12' N/14°14' W, 21 m, interior and exterior of both valves.
- 3 — *Gari fervensis* (Gmelin, 1791) : off Ilha de Luanda, Angola, 40-60 m, leg. GOFAS, exterior of left valve.
- 4 — *Gari fervensis* (Gmelin, 1791) : same locality, exterior of right valve.
- 5 — *Gari fervensis* (Gmelin, 1791) : Laredo, Santander, on beach, leg. GOFAS, interior and exterior of both valves.
- 6 — *Gari jousseameana* Bertin, 1880 : off Rio Pongo, Guinea, 9°54' N/16°01,5' W, 39 m, exterior of both valves.
- 7 — *Gari jousseameana* Bertin, 1880 : off Nouadhibou, Mauritania, 20°20' N/16°22' W, 10 m, leg. MARCHE-MARCHAD, exterior and interior of right valve.

Scales = 10 mm.

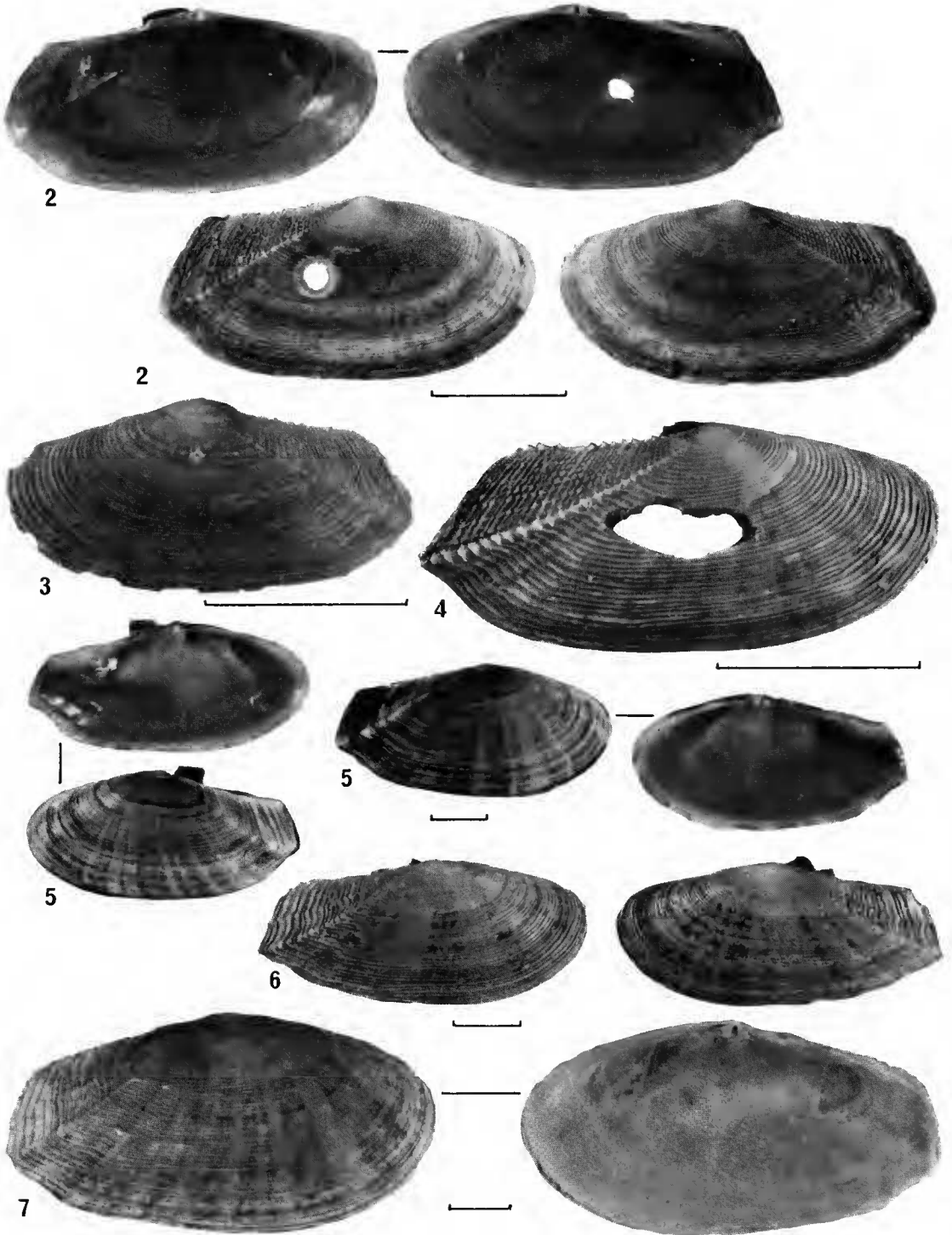
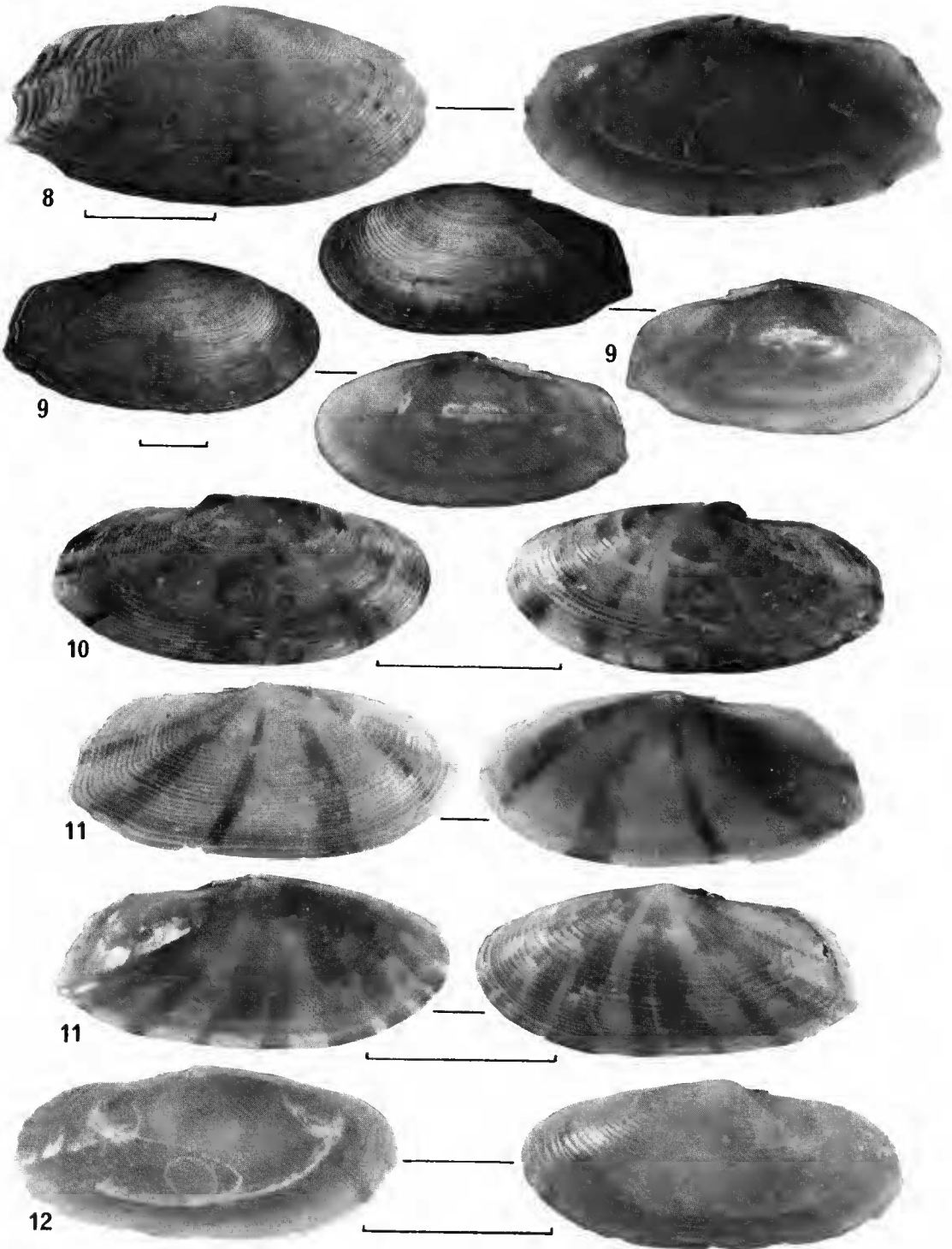


PLATE II

PLATE III

- 8 — *Gari jousseaumeana* Bertin, 1880 : off Lucira, Moçâmedes, Angola, 40 m, leg. GOFAS, exterior and interior of right valve.
- 9 — *Gari jousseaumeana* Bertin, 1880 : Holotype MNHN, no locality, exterior and interior of both valves.
- 10 — *Gari pseudoweinkauffi* n. sp. : Holotype MNHN, West of Dubreka Estuary, Guinea, 9°42' N/15°31,7' W, 35 m, exterior of both valves.
- 11 — *Gari pseudoweinkauffi* n. sp. : Paratype MNHN, West of Conakry, Guinea, 9°30' N/15°00,4' W, 37 m, exterior and interior of both valves.
- 12 — *Gari pseudoweinkauffi* n. sp. : West of Dubreka Estuary, Guinea, 9°42' N/15°30' W, 35 m, exterior and interior of left valve.

Scales = 10 mm.



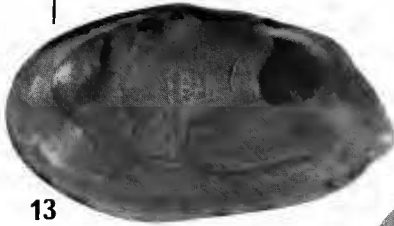
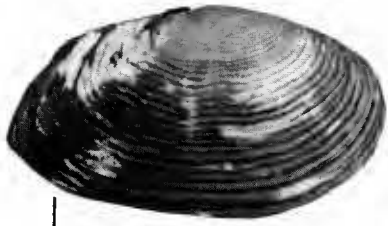
*PLATE III*

PLATE IV

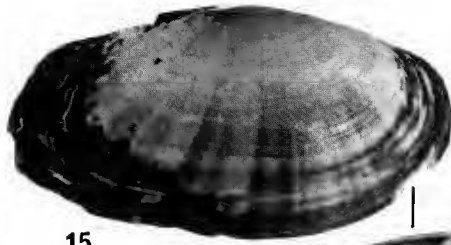
- 13 — *Gari intermedia* (Deshayes, 1855) : Las Palmas, Gran Canaria, Canary Islands, from fisherman, MNHN ex coll. VON COSEL, exterior and interior of both valves.
- 14 — *Gari intermedia* (Deshayes, 1855) : Sénégal (no précise locality), old coll. MNHN, exterior of left valve.
- 15 — *Gari depressa* (Pennant, 1777) : Futungo, Luanda, Angola, on beach, leg. GOFAS, exterior and interior of right valve.
- 16 — *Gari depressa* (Pennant, 1777) : Santa Maria, Benguela, Angola, 1-2 m, leg. GOFAS, exterior and interior of both valves.
- 17 — *Gari depressa* (Pennant, 1777) : Quiberon, Morbihan, France, Plage de Conguel, low tide, exterior and interior of both valves.

Scales = 10 mm.

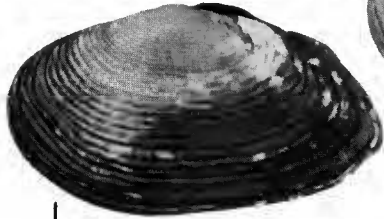
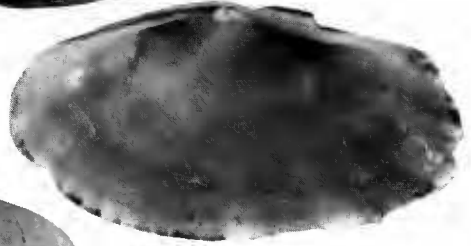




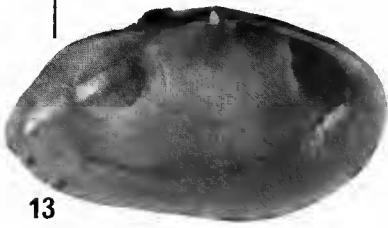
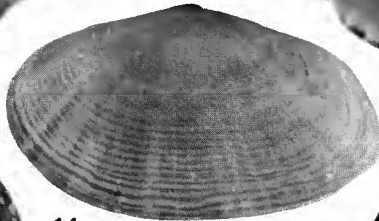
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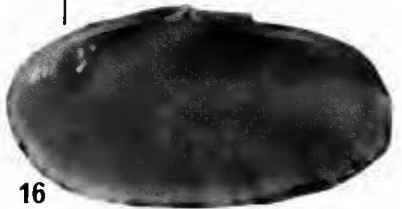
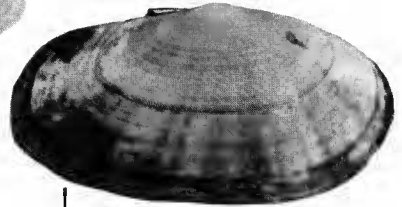
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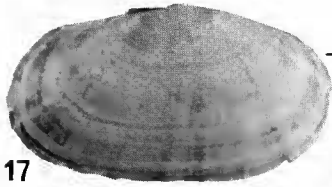
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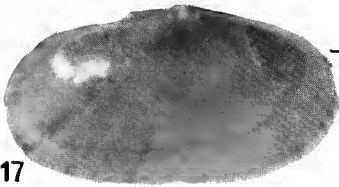
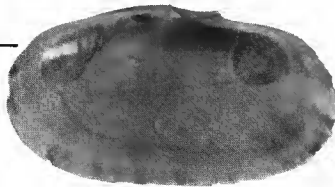
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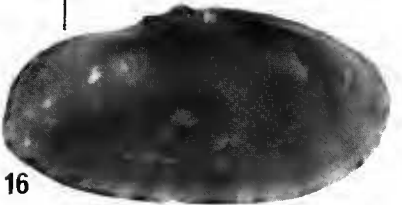
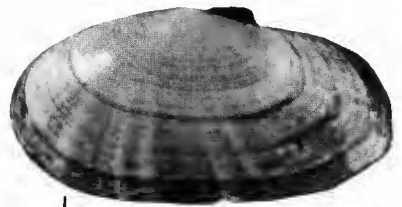
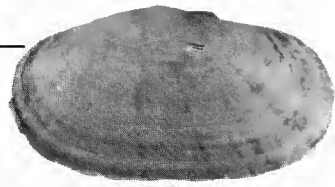
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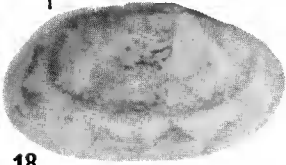
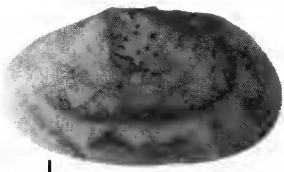
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PLATE IV

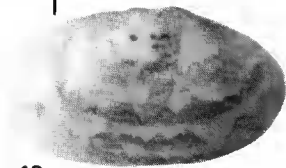
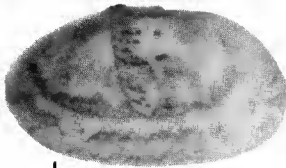
PLATE V

- 18 — *Gari castrensis* (Spengler, 1794) : Holotype ZMC, exterior and interior of both valves.  
19 — *Gari castrensis* (Spengler, 1794) : Ile Banié, Gabon, leg. BERNARD, interior and exterior of both valves (periostracum removed).  
20 — *Gari castrensis* (Spengler, 1794) : same locality, exterior of right valve.  
21 — *Gari tellinella* (Lamarck, 1819) : Roscoff, France, old coll. MNHN, exterior and interior of both valves.

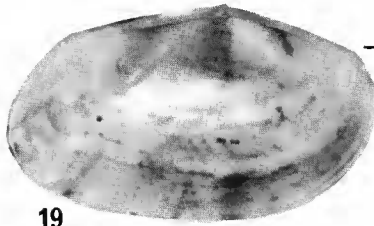
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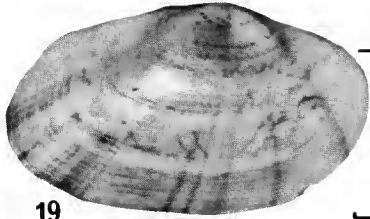
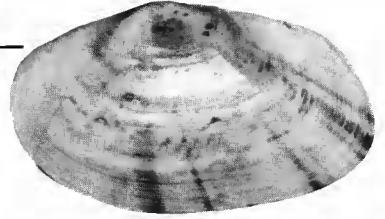
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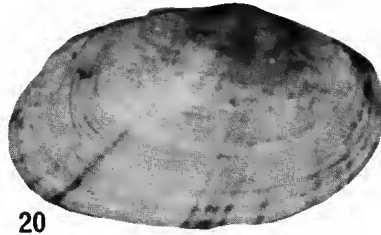
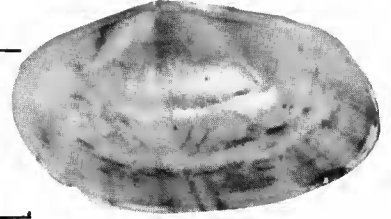
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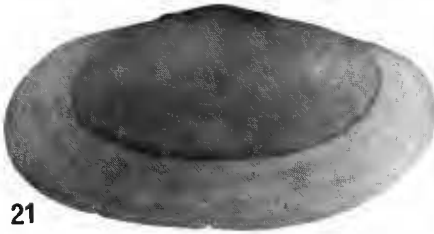
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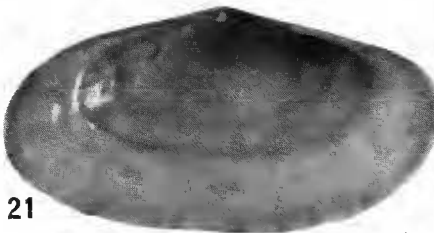
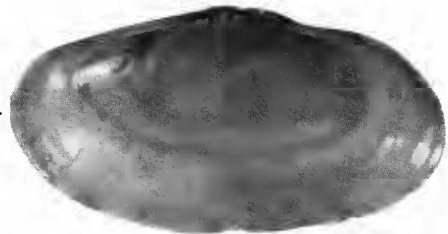
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21



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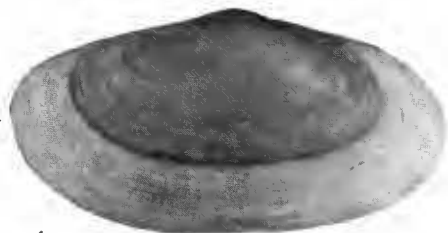


PLATE VI

- 22 — *Gari costulata* (Turton, 1822) : West of Conakry, Guinea, 9°24' N/14°54' W, 38 m, exterior of both valves, interior of right valve.  
23 — *Gari gofasi* n. sp. : holotype MNHN, Pta. de Mussulo, Luanda, Angola, on beach, leg. GOFAS, exterior and interior of both valves.  
24 — *Gari gofasi* n. sp. : West of Rio Pongo, Guinea, 10°00' N/15°46' W, 28 m, exterior and interior of left valve.

Scales = 10 mm.

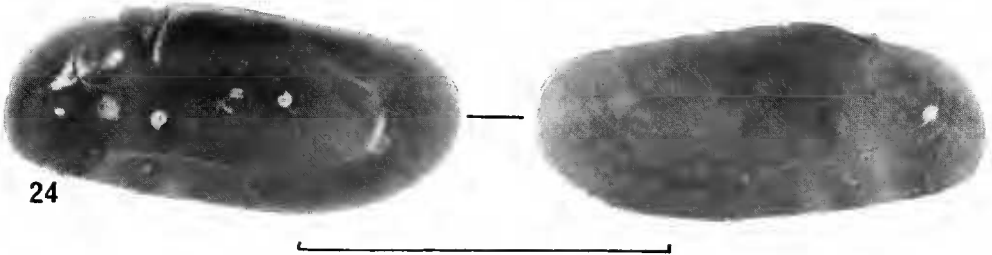
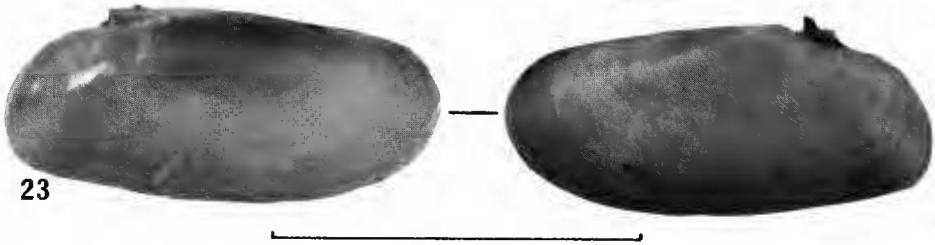
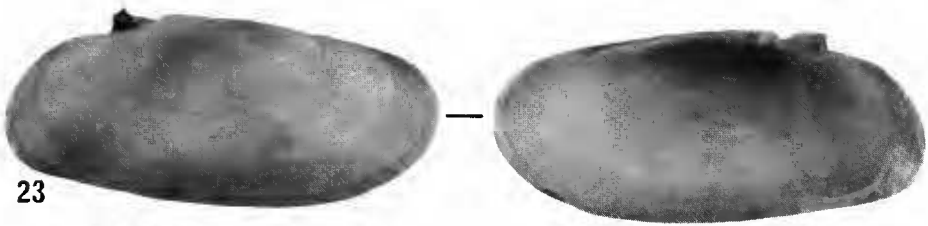
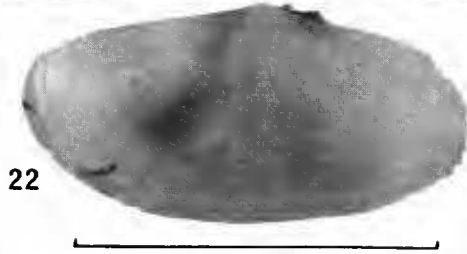
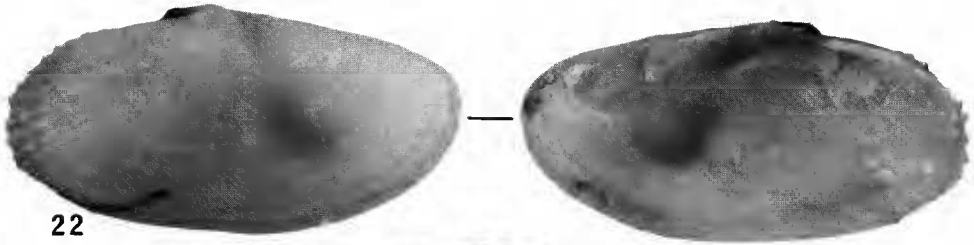
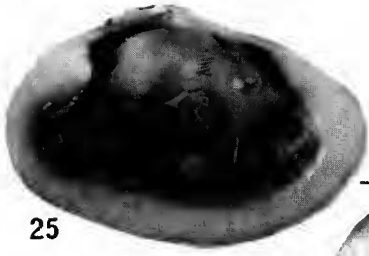


PLATE VI

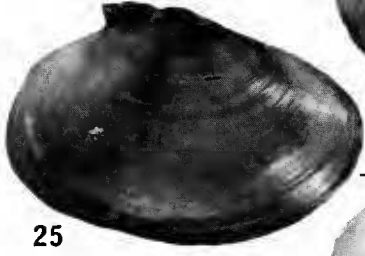
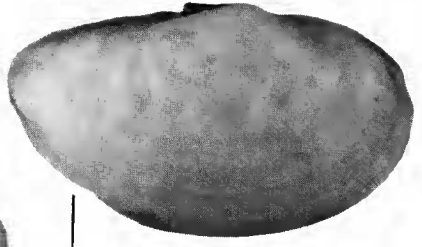
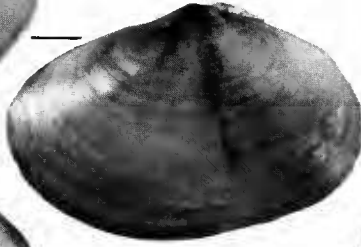
PLATE VII

- 25 — *Heterodonax parvus* Dunker, 1853 : Pta. de Mussulo, Luanda, Angola, on beach, leg. GOFAS, exterior and interior of both valves.  
26 — *Sanguinolaria africana* n. sp. : holotype MNHN, Morton Bay, Victoria/Limbe, Cameroon, on beach, exterior and interior of both valves.  
27 — *Sanguinolaria africana* n. sp. : M'Bour, Sénégal, on beach, exterior and interior of right valve.  
28 — *Sanguinolaria sanguinolenta* (Gmelin, 1791) : Martinique, old coll. MNHN, exterior of left valve, interior of right valve.

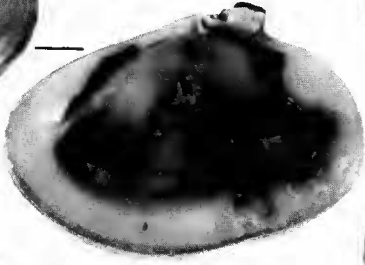
Scales = 10 mm.



25



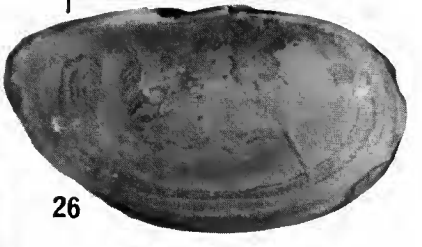
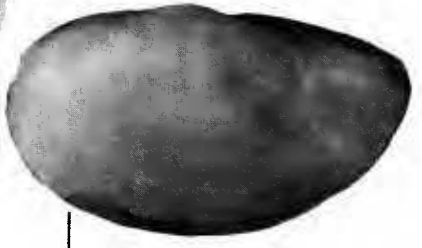
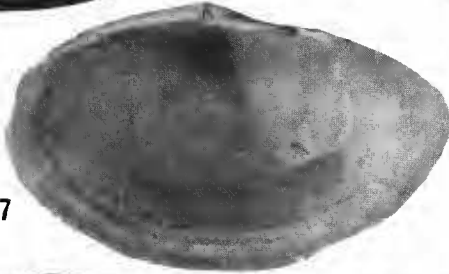
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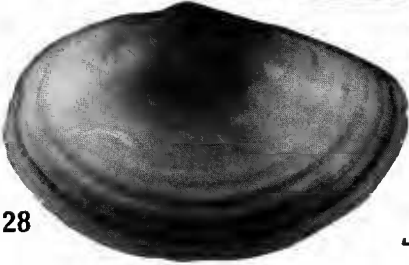
26



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PLATE VII