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BASTERIA, 59: 65-83, 1995

Philinidae dredged by the CANCAP expeditions (Gastropoda, Opisthobranchia)

CANCAP-Project Contribution No. 110

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Frankenslag 176, 2582 HZ The Hague, The Netherlands

During the CANCAP expeditions, fourteen species of Philinidae have been dredged around the Azores, Madeira, the Canary Islands, the Cape Verde Islands, and off Morocco and Mauritania. A survey is given of some common and less well-known species. Five new species are described: *Philine alternans, P. araneosa, P. calva, P. condensa* and *P. gelida*. A short note on the occurrence of *P. intricata* in the Pliocene has been added.

Key words: Mollusca, Gastropoda, Opisthobranchia, Philinidae, taxonomy, East Atlantic.

INTRODUCTION

Among the opisthobranch gastropods, dredged by the NNM-CANCAP expeditions (1976-1988), the family of the Philinidae is well represented in species, though not in specimens. Although it is no problem to classify the shells into various species, naming these is often difficult. The literature on marine molluscs of Mauritania and the Cape Verde Islands is very limited. There are some important publications from the 19th century, strangely enough only a few from much more recent years with data on (East) Atlantic Philinidae: Jeffreys (1867), G.O. Sars (1878), Vayssière (1885), Watson (1886), Pilsbry (1895-1896), Lemche (1948), Bouchet (1975), and Thompson (1976, 1988). An obstacle is the lack of good, detailed figures (even in the recent publications). Even though the microsculpture on the shells is a major character, the accompanying descriptions are often (very) incomplete, and the main point of arguments is sometimes (Bouchet, 1975; Thompson, 1976, 1988) restricted to differences in radulae and other anatomical features. Undoubtedly this is scientifically essential, but it is not very useful for the identification of empty shells.

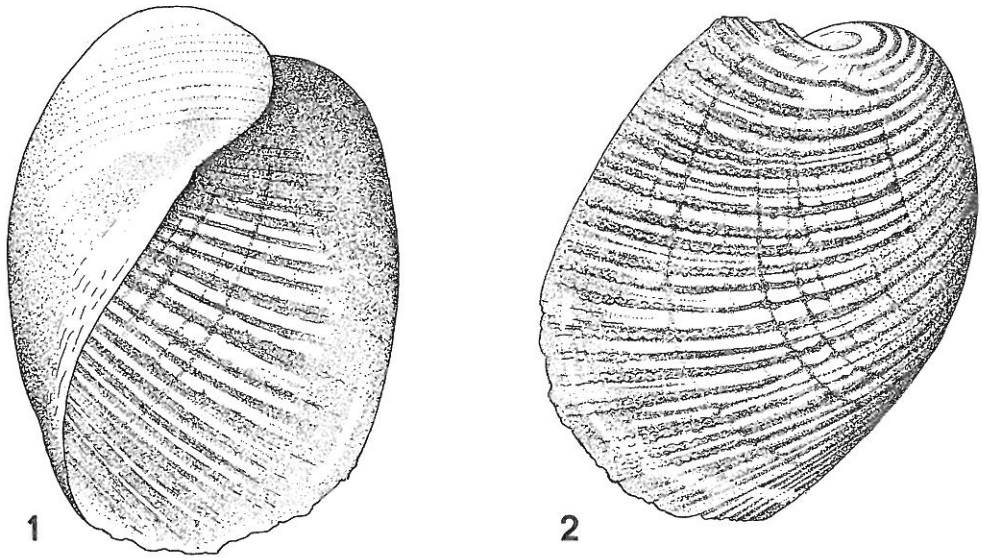
Following Bouchet (1975), I have used the generic name *Philine* without (sub)genera as e.g. *Johania, Hermania, Laona, Ossiania*, and *Philinorbis*. For some species even the taxon Philinidae is at least doubtful.

Abbreviations: NNM = Nationaal Natuurhistorisch Museum, Leiden; LH = collection J. van der Linden, The Hague. Samples mentioned without any indications are from NNM.

SYSTEMATIC PART

Philine alternans spec. nov.
(figs.1, 2)

Type material. — Holotype: (NNM 57018), Mauritania, off Banc d'Arguin, 20°28′N, 17°17′W, depth 38 m (MAU 1988 Sta. 115); length 1.4 mm (no paratypes).



Figs. 1-2. *Philine alternans* spec. nov., holotype (NNM 57018), CANCAP Sta. MAU. 115, Mauritania, off Banc d'Arguin. Length 1.4 mm.

Description. — The shell has an oval shape, somewhat flattened on the top and the basis. The spire is not very large and rather loosely coiled, a little tilted on the top only. Inside the aperture, the protoconch is just visible. On the outer side the top of the spire is very flat, with an indistinct suture. The aperture is expansive and slightly convex. Seen from the top of the shell, the outer lip lies on the same level as the spire. Seen from the ventral side, the upper edge of the aperture is about level with the spire. The outer lip is nearly straight and gradually changes into the rounded basis. The inner side of the aperture is almost straight from the basis to the uppermost part of the spire. There is no umbilical groove.

The microsculpture and -pattern are very peculiar: first of all, there is a pattern of spirally arranged white bands and lines, closely together and irregularly ordered, fading away before the edge of the aperture and interrupted only by the major growth-lines. The broader colour-zones often split up into two lines. The more or less narrow (depending on the width of the colour-streaks) transparent zones between the white bands, consist of catenoid spirals of irregular ovals, which run, contrary to the white pattern, to the margin of the aperture.

Distribution. — Only known from the type locality.

Derivatio nominis. — *Alternare* (Latin), alternate with (colour-lines and chain spirals).

Discussion. — The single specimen is very fresh; it still contains remains of the animal. Therefore, the white zones are not the result of age and/or wear. Moreover, old empty shells of Philinidae change from transparent into opaque white from the top and the basis, leaving a broad transparent zone in the middle. Because of the unique character of the combination of white streaks and catenoid lines, it is not possible to confuse *P. alternans* with any other species.

Philine angulata Jeffreys, 1867

References. — Jeffreys, 1867: 451; 1869: pl. XCVI fig. 3; Pilsbry, 1895: 17-18, pl. 3 figs. 41-42; Lemche, 1948: 67, fig. 75; Thompson, 1976: 131-132, fig. 67; 1988: 56-57, fig. 19; Van der Linden, 1994: 43, figs. 8, 13-14.

P. angulata has been figured for the first time by SEM photographs by Van der Linden (1994), who gives some details on diagnostic characters. Thompson (1976, 1988) gives only an incomplete description, with some drawings; he records a range from Norway, around the British Isles, south to the Mediterranean Sea, and NE. America. The following records imply extension of the known range: CANCAP Sta. 4.041 from the Canary Islands, S. of Lanzarote, depth 120 m/1 (NNM) and CANCAP Sta. 3.172, off Mauritania, depth 34 m/1 (NNM).

Philine aperta (L., 1767)

P. quadripartita (Ascanius, 1772); *P. quadriloba* (Müller, 1776); *P. schroeteri* (Philippi, 1844); *P. capensis* (Martens, 1879).

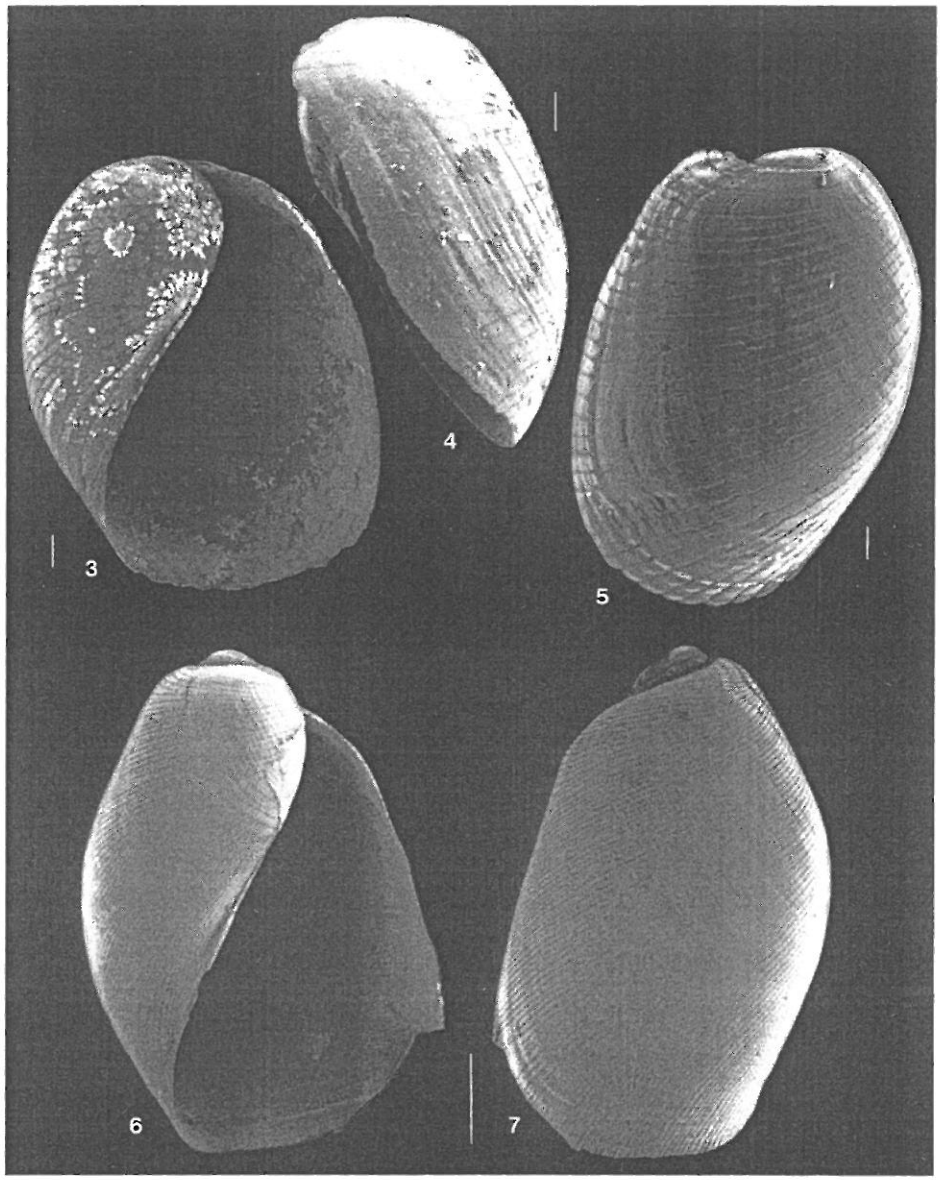
References. — Jeffreys, 1867: 457-460; 1869: pl. XCVI fig. 8; Vayssière, 1885: 33-34, pl. 1 figs. 18-21; Pilsbry, 1895-1896: 10-12, pl. 3 figs. 47-56, pl. 9 figs. 1-7; Lemche, 1948: 90-91: Thompson, 1976: 132-134, figs. 68-69; Rolan Mosquera, 1983: 284-285; Van der Linden, 1994: 47, figs. 15-16.

A very common species with a large, even Pacific, distribution; in the East Atlantic it occurs from Norway to the Cape (South Africa). Ten samples of empty shells have been dredged from the Madeira Archipelago, the Canary Islands, the Cape Verde Islands and off Mauritania, at depths of between 20 and 108 m. Apart from these empty shells, several dozens of living animals were dredged off Mauritania, Sta. MAU 021, depth 37 m. Although the shells of these animals resemble those of *P. aperta* from northern latitudes, there are some significant differences in the anatomy of the animals (cf. Marcus & Marcus, 1966). A more detailed survey about this matter is in preparation.

Philine araneosa spec. nov.
(figs. 3-5, 14)

Type material. — Holotype: (NNM 57019), Cape Verde Islands, W. of Boa Vista, 16°10′N, 23°00′W, depth 60 m (CANCAP 1986 Sta. 7.079); length 1.55 mm. Paratypes: all other material mentioned below (NNM 57020, figured; 57028-57037).

Description (after 31 shells from 12 localities). — The shell is minute (length 0.8-1.8 mm) and has an oval shape, somewhat cylindrical by the straight and almost vertical outer lip (shell in ventral view, top on the upper side). In side view the margin of the outer lip is sinuous due to a depression in the middle. The last half whorl, the aperture, is rather convex, bowl-shaped, especially because the margin of the outer lip (seen from the top of the shell) is projected above the level of the spire. The upper edge of the aperture is in line with the top of the spire, or a little below it. The basis and the inner side of the aperture are gently rounded (the last one not sinuous). The spire has about 1.5 whorls, near the top somewhat swollen. The top of the spire is remarkably flat and



Figs. 3-7. *Philine* spec. 3-5, *P. araneosa* spec. nov.; 3-4, holotype (NNM 57019), CANCAP Sta. 7.079, Cape Verde Islands, W. of Boa Vista; 5, paratype (NNM 57020), CANCAP Sta. 6.101, Cape Verde Islands, SW. of Santa Lucia. Scales 0.1 mm. 6-7, *P. calva* spec. nov., holotype (NNM 57021), CANCAP Sta. 5.136, Azores, N. of Faial. Scale 0.5 mm.

the suture is very indistinct. At 30× magnification the microsculpture consists of many uninterrupted, incised spiral lines, more or less irregular like spun threads and standing away from each other. They are crossed by numerous close-set and sinuous growth-lines, often more prominent near the edge of the aperture. Colour: transparent and glossy; old, empty shells are opaque white, often with a transparent zone in the middle.

Material examined. — Cape Verde Islands, SE. of Boa Vista, 15°57′N, 22°44′W, depth 50 m, CANCAP Sta. 6.059/3 (NNM); 15°53′N, 23°00′W, depth 53 m, CANCAP Sta. 6.066/2 (NNM); S. of Branco, 16°38′N, 24°41′W, depth 35 m, CANCAP Sta. 7.141/5 (NNM); 16°38′N, 24°41′W, depth 56 m, CANCAP Sta. 7.142/1 (NNM); SW. of Razo, 16°36′N, 24°37′W, depth 400-430 m, CANCAP Sta. 6.093/2 (NNM); W. of Sal, 16°45′N, 23°01′W, depth 262-280 m, CANCAP Sta. 7.101/1 (NNM); SW. of Santa Lucia, 16°45′N, 24°46′W, depth 20 m, CANCAP Sta. 6.101/8 (NNM) /2 (LH); S. of São Nicolau, 16°33′N, 24°16′W, depth 405 m, CANCAP Sta. 7.129/1 (NNM); 16°34′N, 24°22′W, depth 49 m, CANCAP Sta. 6.083/2 (NNM); NW. of São Vincente, 16°54′N, 25°01′W, depth 30 m, CANCAP Sta. 6.160/1 (NNM); 16°54′N, 25°02′W, depth 50 m, CANCAP Sta. 6.175/2 (NNM).

Distribution. — As yet only known from the Cape Verde Islands, from 20 to 430 m deep.

Derivation nominis. — *Araneosus* (Latin), like a spiderweb.

Discussion. — Most certainly, *P. punctata* (J. Adams, 1800), which has not been found in the area investigated, is the closest related species: the shells have the same length, the same convexity of the spire and aperture and about the same profile. Nevertheless, the microsculpture is different: *P. araneosa* has uninterrupted spiral lines and *P. punctata* has spirally arranged rows of separate dots or rings (Van der Linden, 1994). There are only few species with the same spiral sculpture as shown by *P. araneosa*. *P. amabilis* Verrill, 1880 (pp. 398-399) from the West Atlantic is a large (length 15 mm) species; the shell was not figured by Verrill (1880) or Pilsbry (1895-1896), but a drawing was given by Abbott (1974, no. 3967). It is quite clear that *P. amabilis* is completely different, with a less conspicuous and more loosely coiled spire and with the upper edge of the aperture somewhat projecting above the top of the spire. *P. azorica* Bouchet, 1975, has about the same characters but different from *P. araneosa* (and *P. amabilis*), *P. azorica* has a callus, bordering on the sinuous spire, and a more ample aperture. *P. infundibulum* Dall, 1889, is a large (length 12 mm) species too; like *P. amabilis*, it has a loosely coiled and inconspicuous spire. This species is figured by Rios (1975, no. 693); it seems to be very closely related to *P. amabilis*. Finally, *P. finmarchica* M. Sars, 1870, *P. pruinosa* (Clark, 1827) and *P. monterosatoi* Dautzenberg, 1891 (non *P. monterosati* Vayssière, 1885) have very close-set and (especially the first two species) much coarser and raised spiral lines.

Philine calva spec. nov.
(figs. 6, 7, 15)

Type material. — Holotype: (NNM 57021), Azores, N. of Faial, 38°38′N, 28°38′W, depth 95 m, CANCAP 1981 Sta. 5.136; length 3.1 mm. Paratypes: all other material mentioned below (NNM 57022-57024, 57038-57054).

Description (after 28 shells from 21 localities). — The shell is small (length 1.3-3.1 mm) and has an ovoid-cylindrical shape, outer lip and basis more or less straight in small specimens, the largest shell has a roundish basis and the outer lip is curved a little obliquely to the right. The top side and the outer side of the spire are more roundish.

The spire has about 1.5 whorls, its top, somewhat protruding, is smooth, semi-transparent and glossy. There is a narrow but conspicuous suture. The upper part of the spire is situated remarkably beyond the upper edge of the aperture. Because the upper part of the spire is neither swollen nor tilted, its border is straight. It is covered with a thin callus. The teleoconch has about 1.2 whorls. The last half whorl, the aperture, is convex and not very wide. The microsculpture consists of numerous very close-set spirals of minuscule irregular rings and dots, generally touching each other, sometimes a little separated. The minute pattern could be observed on a transparent (zone of the) shell only.

Material examined. — Azores, E. of Formigas, 37°16'N, 24°44'W, depth 240-245 m, CANCAP Sta. 5.020/2 (NNM); N. of São Jorge, 38°39'N, 27°54'W, depth 400 m, CANCAP Sta. 5.122/1 (NNM), /1 (LH); S. of São Miguel, 37°41'N, 25°31'W, depth 220-290 m, CANCAP Sta. 5.011/1 (NNM); 37°41'N, 25°25'W, depth 225 m, CANCAP Sta. 5.074 /2 (NNM); 37°41'N, 25°24'W, depth 196 m, CANCAP Sta. 5.075/1 (NNM). Canary Islands, S. of Fuerteventura, 28°02'N, 14°29'W, depth 125 m, CANCAP Sta. 2.011/1 (NNM); 28°02'N, 14°28'W, depth 170 m, CANCAP Sta. 2.012/1 (NNM); 28°03'N, 14°30'W, depth 225 m, CANCAP Sta. 2.013/1 (NNM); 28°01'N, 14°21'W, depth 96 m, CANCAP Sta. 2.073/1 (NNM); S. of Lanzarote, 28°48'N, 13°46'W, depth 120 m, CANCAP Sta. 4.041/1 (NNM); S. of Lanzarote, 28°48'N, 13°46'W, depth 150 m, CANCAP Sta. 4.044/1 (NNM); SE. of Lanzarote, 28°55'N, 13°33'W, depth 160 m, CANCAP Sta. 4.075/2 (NNM); SW. of Palma, 28°40'N, 17°59'W, depth 400 m, CANCAP Sta. 4.159/1 (NNM). Cape Verde Islands, W. of Boa Vista, 15°56'N, 23°04'W, depth 90 m, CANCAP Sta. 6.073/1 (NNM); W. of Fogo, 14°55'N, 24°31'W, depth 60 m, CANCAP Sta. 6.041/1 (NNM); S. of São Nicolau, 16°33'N, 24°16'W, depth 405 m, CANCAP Sta. 7.007/1 (NNM); 16°33'N, 24°16'W, depth 405 m, CANCAP Sta. 7.129/1 (NNM); S. of São Tiago, 14°53'N, 23°30'W, depth 328 m, CANCAP Sta. 6.011/3 (NNM); 14°53'N, 23°30'W, depth 380 m, CANCAP Sta. 6.017/2 (NNM); 14°53'N, 23°30'W, depth 150 m, CANCAP Sta. 6.015/2 (NNM).

Distribution. — *P. calva* has been dredged around the Azores, the Canary Islands and the Cape Verde Islands at depths of 60-405 m.

Derivatio nominis. — *Calvus* (Latin), bald-headed.

Discussion. — There are two specimens, one from the Azores (CANCAP Sta. 5.074), the other from the Cape Verde Islands (CANCAP Sta. 6.041), with a different type of 'sculpture'. An axially oriented design resembling marbled paper is superimposed on the usual structure of catenoid spiral lines. *P. punctata* (J. Adams, 1800) has about the same pattern, but the spirals are more widely separate, the rings are more irregular and distant. Furthermore, the top of the spire is not protruding like in *P. calva*. The spire of *P. calva* is approximately straight, whereas in *P. punctata* it is curved. The outline of the shell is ovoid-cylindrical in *P. calva* and more roundish-oval in *P. punctata*. The much larger *P. lima* (Brown, 1827) has about the same general outline with a protruding top of the spire, but here the top is much more slender and acute. The sculpture of *P. lima* is much coarser, consisting of spirals with very irregular, separated or just touching rings, which have a diameter at least four times larger than those of *P. calva*. The most obvious difference between *P. araneosa* and *P. calva* is the microsculpture. The former species has incised lines, rather far from each other, whereas the latter has very close-set chains of minuscule rings. Beyond this, *P. araneosa* has no protruding top and has more rounded edges, especially on the basis, which is about straight in *P. calva*. *P. gelida* has, apart from the frosted surface, a somewhat pear-shaped profile and a flat top, *P. approximans*

Dautzenberg & Fischer, 1896, is completely different in shape (almost circular) and has a deeply umbilicated top of the spire. *P. azorica* is much larger (length 7.5 mm) and has a rhomboidal profile; the columella is sinuous (*P. calva* has an almost straight columella) and there is a microsculpture of spiral lines only. *P. monilifera* Bouchet, 1975, is also much larger (length 9.5 mm) and has a roundish shape with a slightly umbilicated top; the spire is sinuous and the upper edge of the aperture protrudes above the spire. *P. complanata* Watson, 1897, has about the same outline, but has growth-lines only, no spirals. *P. lucida* Dall, 1927, has a more depressed aperture, with its upper edge rising above the spire. Differences with *P. condensa* are shown below.

Philine condensa spec. nov.
(figs. 8, 9, 16)

Type material. — Holotype: (NNM 57025), Canary Islands, SW. of Hierro, 27°41′N, 18°10′W, depth 330-430 m (CANCAP 1977 Sta. 2.126); length 2.0 mm. Paratypes: all other material mentioned below (NNM 57026, figured; 57055-57061).

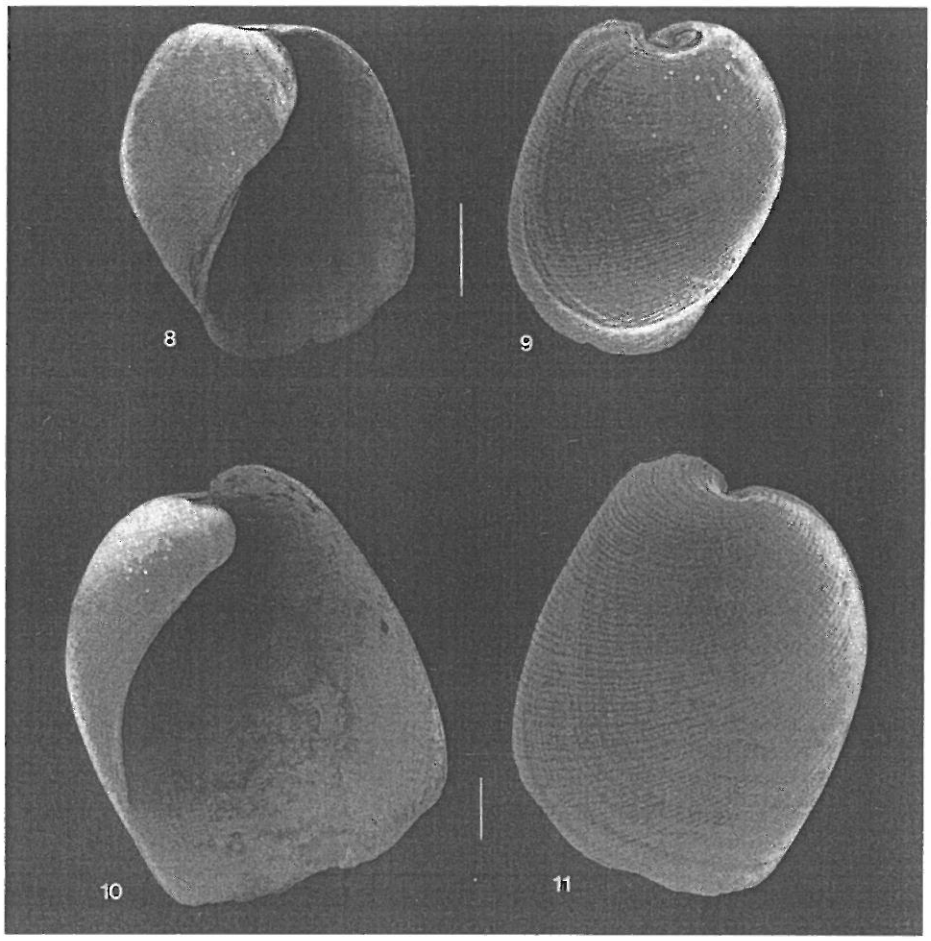
Description (after 16 shells from 9 localities). — The shell is roundish-oval and small (length 0.7-3.0 mm). There is a broad spire, which is swollen and tilted on the upper part. The top is flat, with a clear suture. The demarcation between the protoconch and the teleoconch (about 1.2 whorls) is distinct. As a result of the expansive spire and the convexity of the last half whorl, the aperture is rather narrow. The upper edge is situated below the top of the spire; the outer lip and the basis are slightly rounded. There are no peculiarities on the spire-side of the aperture, neither a folded inner-lip, nor a callus or an umbilical groove. Because of the swollen and tilted upper part of the spire, the border is sinuous. The microsculpture consists of numerous very close-set (the successive spirals almost touching each other) and chain-like spirals of regular and connected microscopic rings.

Material examined. — Canary Islands, SW. of Hierro, 27°41′N, 18°09′W, depth 340-480 m, CANCAP Sta. 2.114/2 (NNM); S. of Lanzarote, 28°48′N, 13°46′W, depth 313 m, CANCAP Sta. 4.049/1 (NNM); S. of Palma, 28°26′N, 17°51′W, depth 503 m, CANCAP Sta. 4.117/1 (NNM), /1 (LH). Azores, E. of Formigas, 37°16′N, 24°44′W, depth 240-245 m, CANCAP Sta. 5.020/1 (NNM); S. of Santa Maria, 36°55′N, 25°07′W, depth 620 m, CANCAP Sta. 5.051/2 (NNM); N. of São Jorge, 38°32′N, 28°35′W, depth 400 m, CANCAP Sta. 5.122/2 (NNM); S. of São Miguel, 37°39′N, 25°32′W, depth 480 m, CANCAP Sta. 5.012/3 (NNM), /1 (LH); 37°42′N, 25°27′W, depth 110 m, CANCAP Sta. 5.054/1 (NNM).

Distribution. — Around the Canary Islands and the Azores, at depths of 110-620 m.

Derivatio nominis. — *Condensus* (Latin), crowded together (i.e. the spirals)

Discussion. — *P. condensa* somewhat resembles *P. quadrata*, but the latter species has a more dilated aperture, a narrower spire (especially the upper part is less swollen) bordered with a callus, which *P. condensa* never has. Furthermore, the sculpture of *P. quadrata* is much coarser, with rather raised spiral bands. The surface of *P. condensa* is 'smooth'. The aperture of *P. monterosati* Vayssière, 1885, is even more dilated than that of *P. quadrata*. The basis of the shell is much more squarish than the basis of *P. condensa* and even the whole profile of *P. monterosati* is more or less squarish, whereas the profile of *P. condensa* is more oval. Finally, the upper part of the spire of *P. condensa* is much more swollen. *P. calva* has another profile, i.e. oblong-oval (more cylindrical), versus roundish-



Figs. 8-11. *Philine* spec. 8-9, *P. condensa* spec. nov., paratype (NNM 57026), CANCAP Sta. 4.049, Canary Islands, S. of Lanzarote; 10-11, *P.* cf. *monilifera*, CANCAP Sta. 5.071, Azores, S. of São Miguel. Scales 0.5 mm.

oval. The spire is much narrower, less swollen and tilted on the upper part, whereas the top of the spire is a little protruding and flat in *P. condensa*.

The Miocene species *P. intermedia* Von Koenen, 1882 (non Knipowitsch, 1901, i.e. a junior syn. of *P. finmarchica* M. Sars, 1858), of which I have compared some specimens from Winterswijk-Miste, the Netherlands (NNM), has the same outline and the same convexity of the last half whorl, but the spire is less expansive and the microsculpture is somewhat different: the successive spirals are more distant and not chain-like. They consist of rows of separate and depressed dots or circles, which give the shell more or less the same coarse surface as in *P. quadrata*.

It is not inconceivable that *P. condensa* proves to be the same species as the (until now) obscure *P. striatula* Monterosato, 1874. Further investigation of the Monterosato collection in Rome might clarify the matter. *P. striatula* (mentioned several times in the

literature, without any description) has been described very poorly, but validly by Monterosato (1874: 281): resembles the preceding species (i.e. *P. punctata*) in size, but differs in the spire, the sculpture and the more dilated aperture (also compare Pilsbry, 1895-1896). Additional information was only given by Sykes (1905), who published two drawings, illustrating the shell and a detail of the sculpture. It is possible that these pictures correspond to those of *P. condensa*. Furthermore, *P. condensa* resembles *P. punctata* not only in size but in profile too. Indeed, the spire differs, being more swollen and tilted in *P. condensa*; the top of the spire is more protruding in *P. punctata*. The difference in sculpture is clear: *P. punctata* has separate spiral lines of isolated rings and dots and *P. condensa* has very close-set catenoid spirals. The aperture of *P. condensa* is somewhat more dilated. According to Warén (1980), *P. striatula* is a dubious species for which he refers to Sykes (1905).

Philine gelida spec. nov.
(figs. 12, 13)

Type material. — Holotype: (NMM 57027), off Mauritania, 19°04'N, 16°24'W, depth 18 m (MAU, 1988 Sta. 043); length 1.3 mm (no paratypes).

Description. — The shell is minute, somewhat pear-shaped, getting narrower near the basis. The spire is rather loosely coiled; the protoconch is partly visible from inside the aperture. The top of the spire is very flat, with an indistinct suture. The aperture is convex, bowl-shaped, the upper edge is about in line with the top of the spire. The outer lip and the basis are gently rounded and the inner margin is slightly sinuous. The surface of the shell has a remarkably frosted appearance. The microsculpture consists of, at first sight (and even at 30 × magnification), spiral lines. In fact these are series of micro-pits and rings, touching each other or sometimes just separated. Between some spirals additional minute dotted lines may be seen. All these spirals are crossed by straight, prosocline growth-lines. The remaining surface has an etched appearance, like frozen water.

Distribution. — Only known from the type locality.

Derivatio nominis. — *Gelidus* (Latin), frozen.

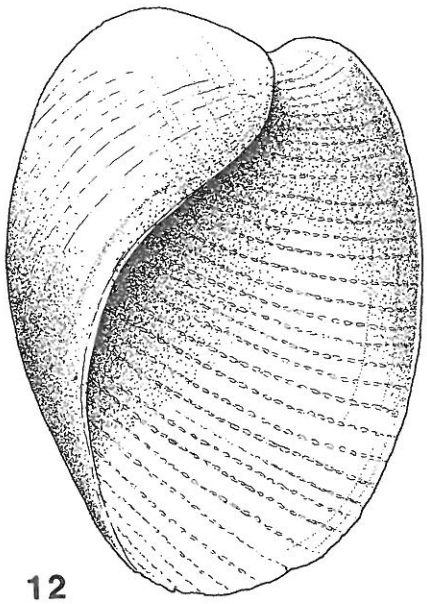
Discussion. — *P. gelida* differs from most other small Philinidae with more or less chained spirals by its peculiar surface and its piriform shape. Only *P. talismani* Sykes, 1905 (nom. nov. for *P. striatula* Locard, 1897, non Monterosato, 1874) is pear-shaped as well, but has a much more conspicuous spire and suture. The spiral lines are much more separated from each other.

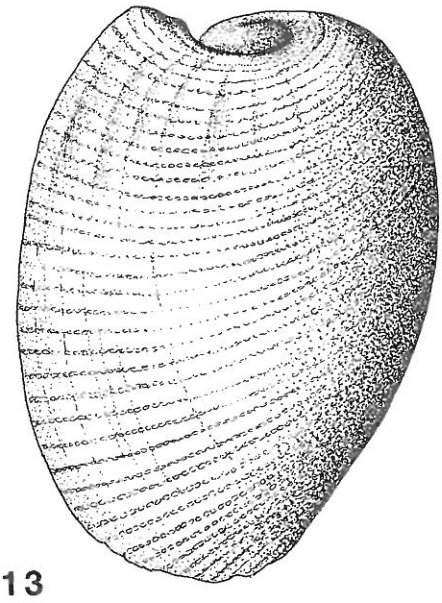
Philine intricata Monterosato, 1884

References. — Monterosato, 1884: 147; Sykes, 1905: fig.; Gaglini, 1991: 12, figs.; Van der Linden, 1994: 41-48, figs. 1-6.

P. intricata has been discussed and figured in detail by Van der Linden (1994). CANCAP samples have been dredged around the Canary Islands and the Cape Verde Islands at a depth of 85-420 m. One sample from the Azores was taken at a depth of 620 m.

Note. — Recently I could establish the occurrence of this species in the Pliocene based on a sample of Philinidae in the NNM. The sample consists of three specimens of





Figs. 12-13. *Philine gelida* spec. nov., holotype (NNM 57027), CANCAP Sta. MAU.043, off Mauritania. Length 1.3 mm. It was not possible to reproduce the minute secundary sculpture.

P. intricata from Belgium, Antwerp, construction pit for B1-B2 canal, 21-21.80 m, Pliocene, Scaldisian, Lillo Formation, Luchtbal Sands Member, leg. D. van der Mark, 1964: RGM 393.519.

Philine cf. *monilifera* Bouchet, 1975
(figs. 10, 11, 17)

References. — Bouchet, 1975: 354-356, fig. 18, pl. 4 d-e.

Description. — The shell is rectangular, its length 3.4 mm. Because the spire is loosely coiled and open, the two whorls of the protoconch are visible from inside the aperture. The beginning of the teleoconch is clearly demarcated. The teleoconch has one whorl only. The top of the spire is somewhat depressed. The aperture is wide, more because the spire is narrow, than by its extent; on the contrary, it is rather convex. The outer lip is slightly rounded and the basis (in our material not completely intact) seems about straight. The upper edge is a little protruding beyond the spire; the inner lip is somewhat distinct and borders a very vague furrow. There is a chain-like and very close-set spiral sculpture of irregular rings and ovals. Near the basis of the shell, these rings or ovals become increasingly more elongated and finally merge. As a result of this, the catenoid spirals almost change into meandering lines. All the spirals are crossed by many, clear growth-lines, placed close together.

One sample, two shells (one fragment): Azores, S. of São Miguel, 37°49′N, 25°25′W, depth 220 m, CANCAP Sta. 5.071 (NNM).

Discussion. — Unfortunately, the figures published by Bouchet (1975) are not very detailed and his description is short, but evidently our species is similar in many characters. Nevertheless, *P. monilifera* is much larger (length 9.5 mm) and the shell has a more roundish profile (perhaps because the specimen is much larger?). There are, however, few if any alternatives. *P. monterosati* is about as long as broad and not rectangular; it has a much larger and flatter aperture, whereas the upper part of the spire is covered with a callus like that in *P. quadrata*. *P. approximans* is more roundish in profile, and the spire is more conspicuous, reaching nearly the basis of the shell. The top of the spire is deeply and narrowly umbilicated. *P. amabilis*, *P. azorica* and *P. infundibulum* all have a spiral sculpture of lines and no catenoid spirals.

Philine quadrata (S. Wood, 1839)
(figs. 18, 22, 23)

P. scutulum Lovén, 1846; *P. formosa* Stimpson, 1850.

References. — Jeffreys, 1867: 452-453; 1869: pl. XCVI fig. 4; G.O. Sars, 1878: 299-300, pl. 18 figs. 9a-d; Pilsbry, 1895-1896: 19-20, pl. 5 figs. 17-19; Sykes, 1905: 325; Abbott, 1974: no. 3962; Thompson, 1976: 139-140, figs. 74a-f.

Description. — The shell has a roundish profile on the spire-side, the outer lip and the basis are more or less straight. The upper edge of the aperture is at the same level as the top of the spire (small specimens), or somewhat below it in more full-grown specimens. Length up to 7 mm. The last whorl is rather convex; on the dorsal side there is often a transversal dent at about one third of the length from the top, which ends as a small contraction of the outer lip (see e.g. Sars, 1878: fig. 9a). There is a conspicuous callus on the parietal lip. The sculpture consists of many somewhat raised spiral bands of different width. Between these, there are depressed, chain-like spirals of rings and pits, either just touching each other or just not. These spirals irregularly alternate with some incised, punctate lines.

Distribution. — From the Arctic and both sides of the North Atlantic; along the East Atlantic south to the Mediterranean Sea (Biondi & di Paco, 1981), the Azores and even to St. Helena (Sykes, 1905; Thompson, 1976), at depths of 20-2500 m.

One sample (a single shell) from Morocco, W. of Cape Yubi, 28°00'N, 13°22'W, depth 540-580 m (CANCAP Sta. 2.036).

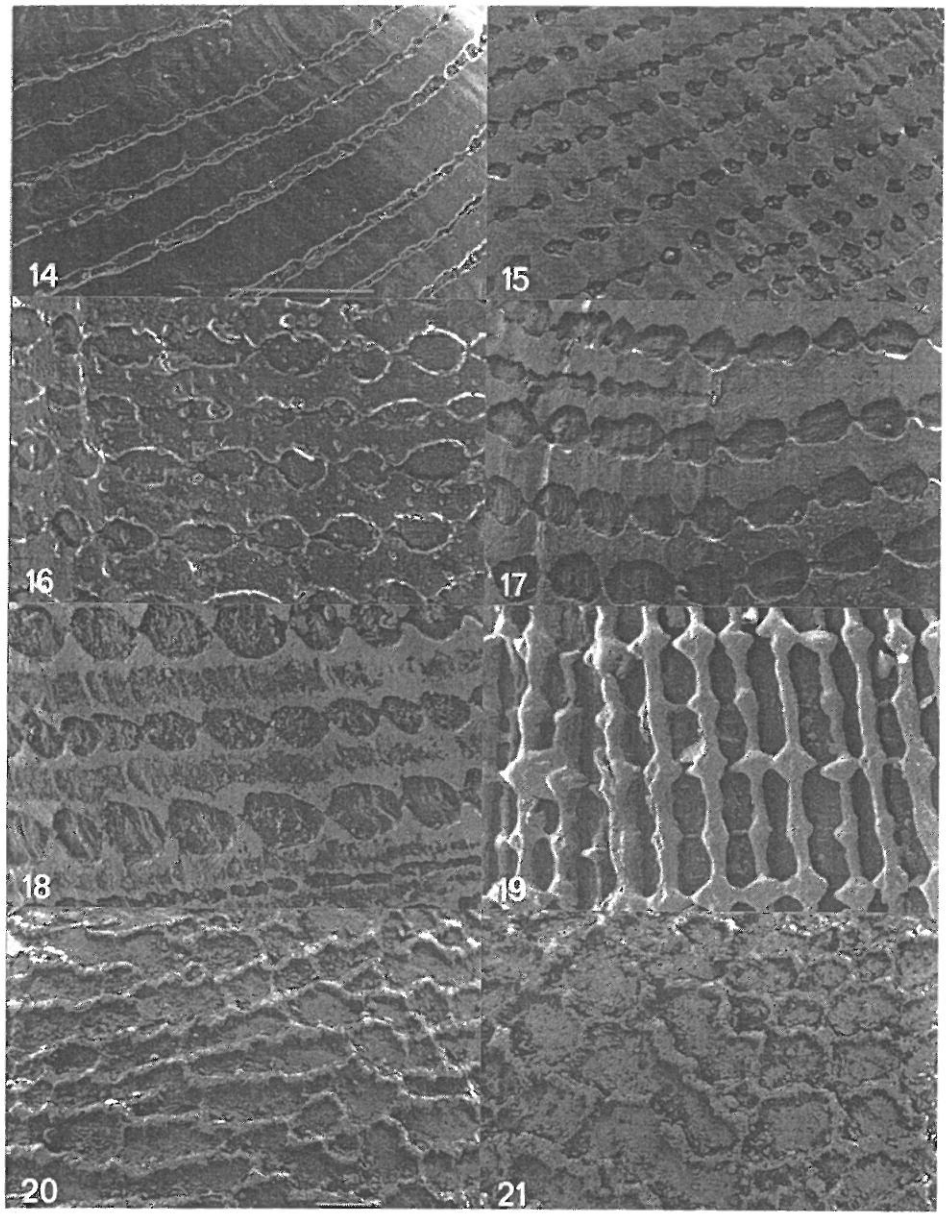
Discussion. — Even though *P. quadrata* is not a littoral species, the shell is rather common, especially at northern latitudes. The specimens from the Trondheimfjord, Norway (collection LH), have a somewhat coarser sculpture than the single shell from Morocco.

Philine retifera (Forbes, 1844)
(figs. 19, 24, 25)

P. vestita (Philippi, 1844).

References. — Philippi, 1844: 95; Pilsbry, 1895-1896: 27-28, pl. 4 figs. 66-68; Nordsieck, 1972: 19, no. 3.00, pl. 3 fig. 1; d'Angelo & Garguillo, 1978: 158, fig.; Piani & Turolla, 1980: 1-3, figs.

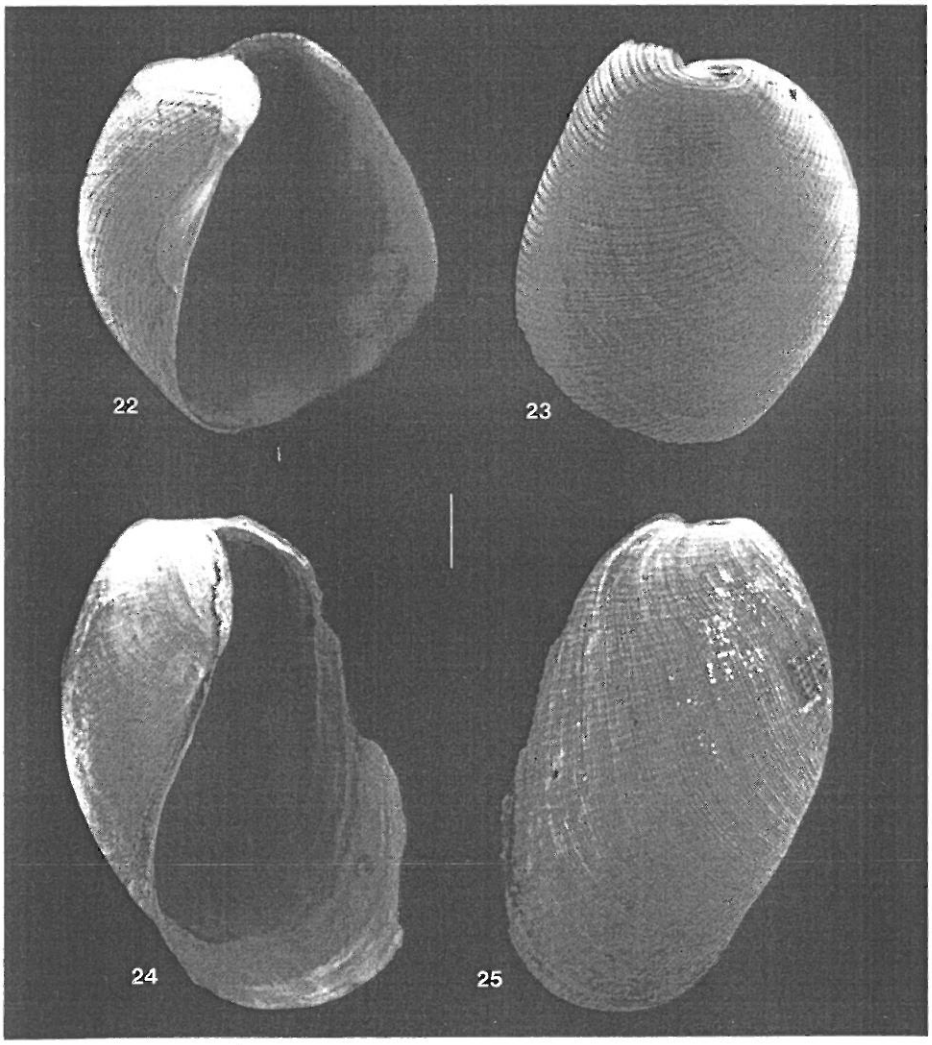
Description. — The shell is elongate oval; the margins are rounded, except for the outer lip which is straight. Length 3-4 mm. The spire is slightly sinuous and umbilicated



Figs. 14-21. *Philine* spec., dorsal surface sculpture. 14, *P. araneosa* spec. nov. (shell, see figs. 3-4); 15, *P. calva* spec. nov. (shell, see figs. 6-7); 16. *P. condensa* spec. nov. (shell, see figs. 8-9); 17, *P.* cf. *monilifera* (shell, see figs. 10-11); 18, *P. quadrata* (shell, see figs. 22-23); 19, *P. retifera*, CANCAP Sta. MAU.045, off Mauritania (only the outer layer of the sculpture is shown); 20, *P. rugulosa* (shell, see figs. 27-28); 21, *P. rugulosa* (shell, see fig. 26). Scales 0.1 mm.

at the top. The aperture is rather narrow (as compared to other Philinidae) and convex, its upper edge lies on the same level as the top of the spire, or somewhat below it. The microsculpture of fresh shells is very remarkable, fragile and delicate, lying on the surface like a three-dimensional piece of gauze. Older shells have only a reticulated pattern of close-set undulating axial lines and minor spiral lines.

Two samples (two shells) off Mauritania: MAU Sta. 0.30 and Sta. 0.45, depth 36 m and 22 m.



Figs. 22-25. *Philine* spec. 22-23, *P. quadrata*, CANCAP Sta. 2.036 Morocco, W. of Cape Yubi; 24-25, *P. retifera* CANCAP Sta. MAU.030, off Mauritania. Scales 0.5 mm.

Discussion. — This is a rare species, which has scarcely been discussed in the literature. It is only known from the Mediterranean Sea. Nevertheless, the two investigated shells from Mauritania are identical to a Mediterranean shell (NNM). Although the type-material of both *P. retifera* and *P. vestita* is probably lost, the description by (especially) Philippi (1844: 95) is beyond all doubt: ".... reticulum album calcareum irregulare velut spongia parasitica ....". Other authors also mention this peculiar sculpture, like Monterosato (1884: 147): ".... ricoperte di uno strato pumiceo reticulato .... fa suppore che la conchiglia non sia interno ....", or d'Angelo & Gargiullo (1978: 158): ".... ricoperta da una membrana che forma un reticolo simile a un nido di api." Confusion with other species is out of question. One of the seemingly related species, *P. pruinosa*, has been studied by many authors, but none has described the remarkable three-dimensional sculpture, either on full-grown shells, or on juveniles, or on very fresh shells taken from preserved animals. Besides, *P. pruinosa* has a completely different profile, being more roundish. Infortunately, *P. retifera* has been investigated insufficiently (the animal is unknown) and might even belong to another family.

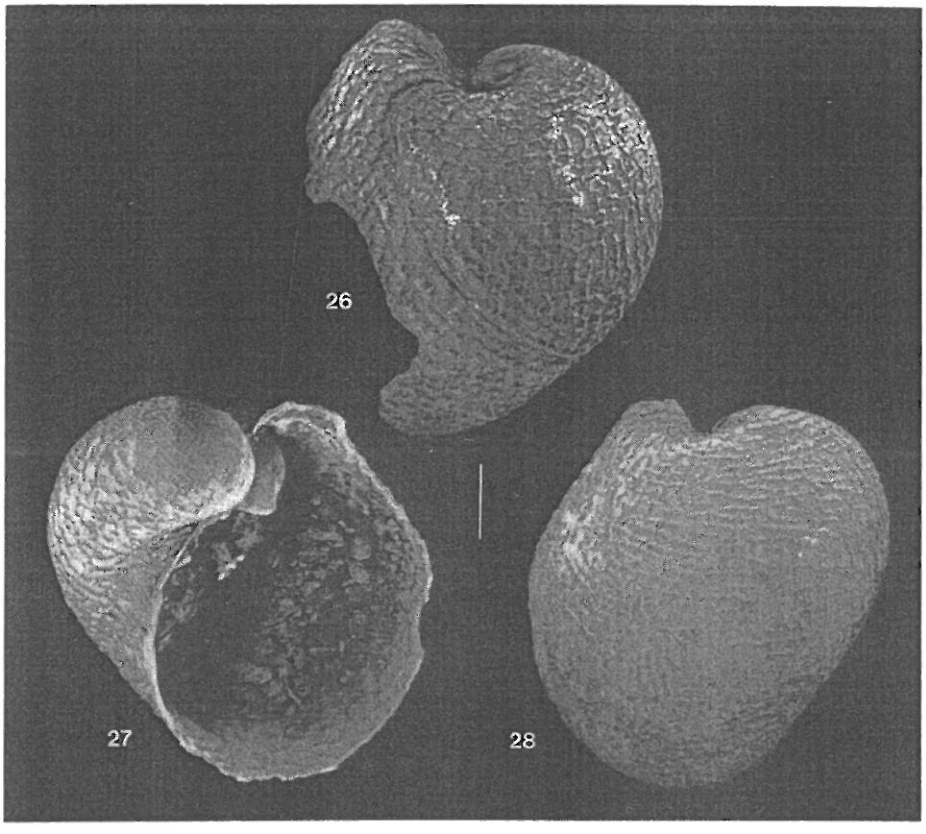
Philine rugulosa Dautzenberg & Fischer, 1896
(figs. 20-21, 26-28)

References. — Dautzenberg & Fischer, 1896: 406, pl. XV figs. 6-7.

Description. — The shell has a roundish-oval shape. Length c. 3 mm. Its colour is yellow-white; it is not transparent and the surface is dull. There are about two whorls and the depressed top of the spire has a clear suture. The aperture is rather wide and remarkably convex, increased by the outer lip, which rises high above the spire. The upper edge of the aperture protrudes beyond the top of the spire too. The inner lip everts a little over the marked umbilical groove. The sculpture of the shell is very conspicuous and lies upon the surface of the shell, as e.g. in *P. pruinosa*. In fact, there are axial and spiral ridges, forming irregular squares, but these are so spidery and wriggly, interrupted and staggered, that it is impossible to discern any pattern at all. The comparison with a labyrinth is obvious.

Two samples (two shells): Cape Verde Islands, S. of São Tiago, 14°53′N, 23°30′W, depth 380 m, CANCAP Sta. 6.017, and 14°54′N, 23°38′W, depth 450-600 m, CANCAP Sta. 7.014.

Discussion. — *P. rugulosa* and *P. pruinosa* have about the same dirty-white colour and both are opaque and dull. They have more or less the same coarse sculpture. Apart from this, there are many differences: *P. pruinosa* has mainly pronounced axial ridges on which there are raised irregular chains of dots. This gives the axials a scaly appearance; they are crossed by minor, extremely close-set spiral lines. There are never conspicuous empty squares between the axials, as *P. rugulosa* has. The shape of *P. pruinosa* is more elongated, the diameter is about 70% of the length instead of 85-90% in *P. rugulosa*. Furthermore, the upper edge of the aperture and the outer lip are on the same level as the spire is, and not projected above it as in *P. rugulosa*. *P. finmarchica* has a more or less embossed sculpture too. However, this raised sculpture consists of close-set and pronounced axial growth-lines crossed by extremely crowded spiral lines. *P. rugulosa* is



Figs. 26-28. *Philine rugulosa*. 26, CANCAP Sta. 7.014, Cape Verde Islands, S. of São Tiago; 27-28, CANCAP Sta. 6.017, Cape Verde Islands, S. of São Tiago. Scale 0.5 mm.

extremely rare and was only known from the holotype, dredged near the Azores, at a depth of 1167 m. The classification with the Philinidae is questionable.

Philine scabra (Müller, 1776)

P. pectinata (Dillwyn, 1817); *P. loveni* Malm, 1855.

References. —Jeffreys, 1867: 447-449; 1869: pl. XCVI fig. 1; G.O. Sars, 1878: 294, pl. 18 figs. 13a-c; Pilsbry, 1895-1896: 12-13, pl. 5 figs. 1-3; Bouchet, 1975; 34-35, fig. 15; Thompson, 1976: 140, figs. 75a-k; Rolan Mosquera, 1983: 287-288, figs.; Van der Linden, 1994: 47, figs. 10, 19-20.

Shells of this species are certainly not common in shell-grit washed ashore, because the animals live in rather deep waters (even at 1500 m depth according to Thompson, 1976). *P. scabra* has a rather large distribution, from Iceland and Norway, south to the equator (Gulf of Guinea) and the Mediterranean Sea. It is not surprising that *P. scabra*

has been dredged by the CANCAP expeditions around the Canary Islands and off Mauritania. It was found at depths of 42-300 m in nine samples (14 shells).

'Philine' cf. *ventricosa* (Jeffreys, 1865)
(figs. 29, 30)

P. ventrosa (Jeffreys, 1867); *P. velutinoides* G.O. Sars, 1878.

References. — Jeffreys, 1867: 425-426; 1869: pl. XCIV fig. 5; G.O. Sars, 1878: 302, pl. 26 figs. 10a-c; Pilsbry, 1895-1896, vol. XVI: 21, pl. 5 figs. 26-28; Lemche, 1948: 64 and 97; 1967: 207-214.

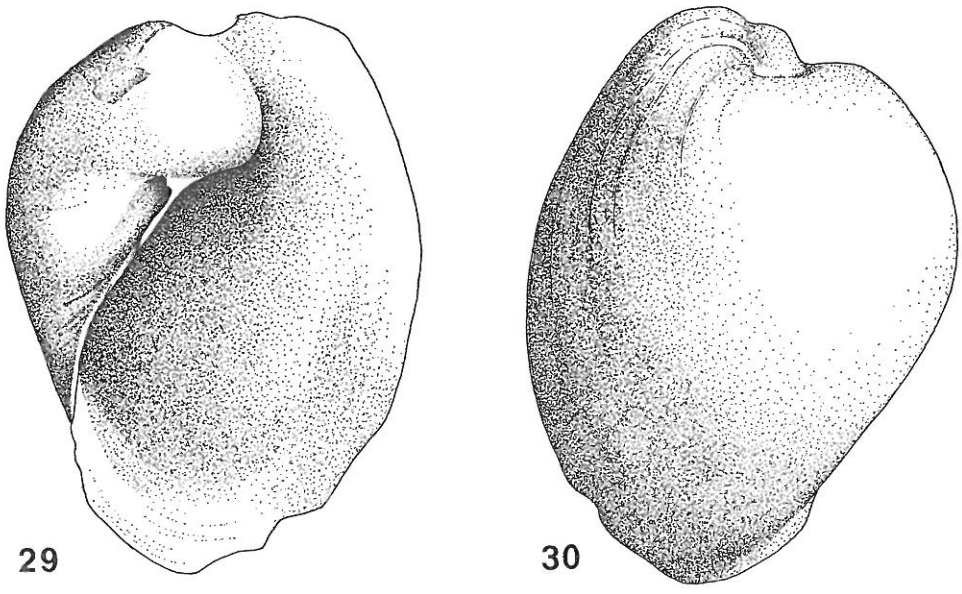
The identification of a single juvenile shell with a damaged outer lip, is not without doubt.

Description. — The shell is globose and somewhat triangular. Length 1.6 mm. On the upper half the spire is swollen and tilted, its top is about flat and deeply umbilicated. The large aperture is convex and ear-shaped, the upper edge is clearly projected above the top of the spire. The outer lip is semicircular; although the margin is damaged, the edge is on the same level as the spire. Therefore, we can assume that an intact outer lip will be projected above the spire too. On the basis the aperture is narrowed (distinctly visible on the dorsal side of the shell) and somewhat acute. The inner lip is folded over the spire, forming a channelled furrow. The globose upper part of the spire is largely covered with a thin callus. The shell is more or less transparent, not vitreous but like frosted glass. There is no microsculpture, except for the very fine and close-set growth-lines.

One sample, one shell: Cape Verde Islands, SW. of São Tiago, 14°54'N, 23°38'W, depth 420 m, CANCAP Sta. 7.007 (NNM).

Discussion. — The nomenclatorial history of this species is complicated. First Jeffreys (1858: 47, pl. II fig. 8) has named it *Amphisphyra globosa*. After several years he noticed that this name had been preoccupied by *A. globosa* Lovén, 1846, so he renamed the species in 1865 *A. ventricosa*. Probably Jeffreys had forgotten this when he redescribed the species in question in 1867 (p. 425) in detail, giving the unnecessary replacement name *Utriculus ventrosus*. G.O. Sars (1878) has described *P. velutinoides*, but he was obviously in doubt about his new taxon, because he writes: "= *Utriculus ventrosus*, Jeffr.?". Lemche (1948) has found that the two species are similar indeed. Later on, Lemche (1967) has examined the animal of '*P*'. *ventricosa* and he concluded that the species does not belong to the Philinidae because of many deviating anatomical characters (e.g. the lack of gizzard plates) and he has placed the species in a new genus *Rhinodiaphana*, family Diaphanidae. Since I have no certainty about the classification of the described specimen and I do not possess the soft parts of the animal, I have indicated the species as '*Philine*' cf. *ventricosa*.

The description of *P. velutinoides* by G.O. Sars, 1878 (later on repeated by Pilsbry, 1895-1896) gives the same characters as above, exept for the surface of the shell, which is: "extremely pellucid, hyaline..." and "...very smooth, shining...". Lemche (1967: 208) mentioned the colour of the shell as light brownish, while Jeffreys (1867) has written: "colour whitish, with a faint tinge of reddish-brown near the outer lip". The description of G.O. Sars (1878) gives no information about any colour. The CANCAP-specimen is dirty white. Unfortunately, there are still two more species with about the same features: *P. infortunata* Pilsbry, 1895, a new name for *P. vitrea* G.O. Sars, 1878, non Gould, 1841



Figs. 29-30. '*Philine*' cf. *ventricosa*, CANCAP Sta. 7.007, Cape Verde Islands, S. of São Tiago. Length 1.6 mm.

(*P. vitrea* M. Sars, 1870 nom. nud.!), but this species is "rotundato-ovata" and not somewhat triangular and the aperture is "amplissima et patula" (G.O. Sars), i.e. very large and wide, and not convex, ear-shaped. *P. membranacea* Sykes, 1905 (Monterosato, 1880 nom. nud.) was recently described by Gaglini (1991), who gives two photographs. This species looks very similar too, although the aperture is not narrowed and somewhat pointed on the basis, but "regolarmente incurvato verso il basso".

ACKNOWLEDGEMENTS

First of all I am grateful to Prof. Dr. E. Gittenberger and to Mr. A.W. Janssen, curators of the Nationaal Natuurhistorisch Museum (NNM), who have given me the opportunity to investigate the valuable and often very rare material. I also thank Mr. J. Goud (NNM) who, apart from being generally helpful, has also made the SEM photographs with professional care, and Mr. R. Vroom (NNM) for assisting me when I had to use reference material from the collection. Furthermore, I thank Mr. R. Moolenbeek (Zoölogisch Museum Amsterdam), who has helped me with some literature and has given me permission to study the collection. I am grateful to Dr. T. Schiøtte from the Zoologisk Museum, Copenhagen, Danmark, who has lent me generously many samples of Philindae. The study of this valuable material has helped me greatly; furthermore, he referred me (indirectly) to the publication of Lemche (1967). I thank my friends Messrs. A.J. Bos, M. Mellema and H.P.M.G. Menkhorst for their assistance and support, and especially Mr. J.C.A. Eikenboom for making some difficult drawings. Finally I thank Dr.

J.J. van Aartsen for correspondence concerning his problems with *P. retifera* and *P. pruinosa*.

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