

Pectinoidea (Bivalvia, Propeamussiidae & Pectinidae) collected during the Dutch CANCEP and MAURITANIA expeditions in the south-eastern region of the North Atlantic Ocean

CANCEP-Project contribution No. 127

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Twenty-seven species of the Pectinoidea (6 Propeamussiidae and 21 Pectinidae), collected during several expeditions in the southeastern region of the North Atlantic Ocean, are listed, with notes on geographical and bathymetrical distributions, nomenclature and systematics. One of these is a new record for the tropical eastern Atlantic Ocean (Pectinidae: *Pseudohinmites* sp. cf. *adamsi*) and one a new species (Propeamussiidae: *Cyclopecten capeverdensis* spec. nov.). The following taxa are synonymized: *Karnekampia* Wagner, 1988 (= *Pseudamussium* Mörch, 1853), *Propeamussium centobi* Schein, 1989 [= *Propeamussium lucidum* (Jeffreys, in Thomson, 1873)], *Pecten* (*Cyclopecten*) *commutabilis* Fenaux, 1944 [= *Similipecten similis* (Laskey, 1811)]. New combinations are *Pseudamussium alicei* (Dautzenberg & H. Fischer, 1897), *Bractechlamys corallinoides* (d'Orbigny, in Webb & Berthelot, 1839), *Talochlamys abscondita* (P. Fischer, in Locard, 1898) and *Talochlamys pusio* (Linnaeus, 1758).

Key words: Bivalvia, Propeamussiidae, Pectinidae, taxonomy, eastern Atlantic Ocean, Madeira Archipelago, Azores, Selvagens Archipelago, Canary Islands, Cape Verde Islands, Senegal, Mauritania.

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## INTRODUCTION

This paper aims at a review of the Recent pectinoid material collected by the oceanographic survey vessels "Onversaagd" and "Tydeman" during the CANCAP-expeditions to the Canary and the Cape-Verdian archipelagoes, under the leadership of Dr. J. van der Land. In the years 1976-1978, 1980-1982 and 1986 the CANCAP I-VII expeditions have investigated the zoology, botany and paleontology of the Azores, Madeira Archipelago, Selvagens Archipelago, Canary Islands, Mauritania, Cape Verde Islands

and Senegal. For more details, i.e. the objectives, the institutes involved, methods, equipment, and data on the sampling stations, see Van der Land (1987); for the Dutch Mauritania I and II expeditions, see also Van Aartsen et al. (1998).

Recent pectinoid bivalves were obtained from deep water by taking grab samples, dredging and trawling, and from shallow water by snorkeling and scuba-diving. The material of the species here described is deposited in the National Museum of Natural History, Leiden, The Netherlands. Specimens from the following collections have been used for comparison: BMNH, HD, KBIN, MNHN, NMW, SMNH, ZMA, ZMUC (for acronyms, see below). Duplicate voucher specimens are in the collection of the first author.

Fossil pectinoid material of the *CANCAP* V expedition and Recent pectinoid material of the *CANCAP* I-VII expeditions was studied by de Boer (1988).

In general, the taxonomy and conchological terms are after Waller (1978, 1984, 1986, 1991, 1993) and Waller & Marinovich (1992).

Acronyms for collections: BMNH, Natural History Museum, London; HD, Henk H. Dijkstra collection, Sneek; KBIN, Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels; MHNG, Muséum d'Histoire Naturelle, Geneva; MNHN, Muséum National d'Histoire Naturelle, Paris; MOM, Musée Océanographique, Monaco; MSNP, Museo di Storia Naturale e del Territorio, Calci; LSL, Linnean Society of London, London; NHMW, Naturhistorisches Museum Wien, Vienna; NM, Natal Museum, Pietermaritzburg; NMS, Natur-Museum Senckenberg, Frankfurt am Main; NMW, National Museum of Wales, Cardiff; PMNH, Peabody Museum of Natural History, New Haven; RMNH, Nationaal Natuurhistorisch Museum, Leiden; RSM, Royal Scottish Museum, Edinburgh; RUG, Rijksuniversiteit Groningen, Groningen; SAM, South African Museum, Cape Town; SMNH, Swedish Museum of Natural History, Stockholm; USNM, United States National Museum of Natural History, Washington D.C.; UUZM, University of Uppsala, Zoological Museum, Uppsala; ZMA, Zoölogisch Museum, Amsterdam; ZMUC, Zoologisch Museum, Copenhagen.

Abbreviations used in the descriptions: D, depth (convexity); H, height (dorsal-ventral); lv, left valve(s); rv, right valve(s); spm, articulated specimen; v, valve(s); W, width (anterior-posterior).

Material preserved in ethanol 70% is indicated by /a after the stationnumber in the listings of examined material.

## SYSTEMATIC PART

Superfamily Pectinoidea Wilkes, 1810 (emend., Waller, 1978)

Family Propeamussiidae Abbott, 1954

Genus *Propeamussium* de Gregorio, 1884

*Propeamussium* de Gregorio, 1884: 119 (as a subgenus of *Pecten*). Type species (by original designation): *Pecten (Propeamussium) ceciliae* de Gregorio, 1884; Miocene, Terrebianche, Sicily, Italy.

Diagnosis. — Shell equivalve, fragile, usually small, mostly transparent, laterally compressed, gaping along lateral margins. Left valve smooth or sculptured with fine radial and/or commarginal riblets or striae. Right valve with commarginal lines or lirae. Auricles nearly equal to equal. Byssal notch moderately prominent. No ctenolium.

Internal riblets commencing in early growth stage and extending to submarginal area.

Distribution. — Jurassic to Recent, worldwide, at bathyal to abyssal depths.

Remarks. — See Dijkstra (1995: 12).

*Propeamussium lucidum* (Jeffreys, in Thomson, 1873) (figs 1-4, 39, 40)

*Pleuronectia lucida* Jeffreys, in Thomson, 1873: 464, fig. 78a. Syntypes: USNM 62336, 62346, 62348, and BMNH 77.11.28.8, 85.11.5.156, 85.11.5.590. Type localities: "Valorous" stn 11 and 12, "Porcupine" (1869) stn 3, 39, and 41, "Porcupine" (1870) stn 16. For additional data, see Warén (1980).

*Amussium lucidum* var. *striata* [sic] Jeffreys, 1879: 562.

*Propeamussium editae* de Gregorio, 1898: 38 (unnecessary replacement name for *Pleuronectia lucida* Jeffreys in Thompson, not *Pecten lucidus* Goldfuss, 1836).

*Propeamussium lucidum*; Morton & Thurston, 1989: 471-496, figs 1-18; Rolan Mosquera et al., 1990: 90, fig.; Smriglio & Mariottini, 1990: 6, 12, 13, pl. 2 figs 7a-e; Sabelli et al., 1990: 82, 289; 1992: 463; Smith & Heppell, 1991: 63; Gómez Rodríguez & Pérez Sánchez, 1997: 165, fig. (pro parte).

*Amussium hypomeces* Dautzenberg & Fischer, 1897a: 195, pl. 5 figs 11-12; 1897b: 24; 1906: 71. Syntypes: MOM 28 0059, MOM 28 0060, MOM 28 0061, MOM 28 0062, MOM 28 0063, MOM 28 0066, MOM 28 0070, MNHN (not registered), KBIN (Dautzenberg collection: I.G. 10591), and NMW Z.1955.158.02237. Type localities: Azores, "Hirondelle" (1888) stn 34, 47, 69, and 80, "Princesse-Alice" (1895) stn 46, 95, and 109, "Princesse-Alice" (1896) stn 74. For additional data, see Dautzenberg & Fischer (1897a: 140-141).

*Propeamussium (Parvamussium) lucidum*; de Boer, 1988: 186.

*Propeamussium (Parvamussium) hypomeces*; de Boer, 1988: 186.

*Parvamussium lucidum*; Schein, 1989: 88.

*Propeamussium centobi* Schein, 1989: 93, pl. 8 figs 1-6. Syn. nov. Holotype: MNHN (not registered); north of Bay of Biscay, BIOGAS VI, stn CP 10, 47°29.6'N, 09°04.5'W, 2878 m.

*Propeamussium hypomeces*; Smriglio & Mariottini, 1990: 12, 13, pl. 2 fig. 5a-e.

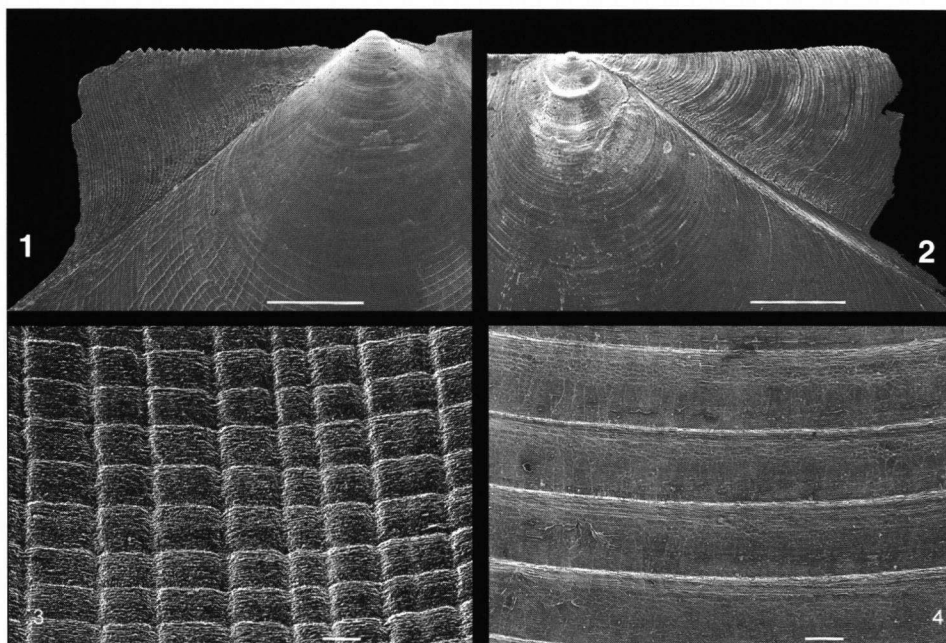
Material examined. — Madeira: 1.044. Canary Islands: 4.054; 4.062; 4.064; 4.086. Azores: 5.024; 5.171; 5.182; 5.183. Cape Verde Islands: 6.065.

Distribution. — Temperate to tropical eastern Atlantic (53°N – 15°N). Bathymetric range from c. 785 m (present data) to 4255 m (Locard, 1898). Living bathyally to abyssal depths on soft bottom sediments. Depth range of present material c. 785-1890 m.

Description. — Shell up to c. 14 mm in height, fragile, oval, semitransparent, inequivalve, nearly equilateral. Prodissoconch distinct and c. 200-230 m in height (Morton & Thurston, 1989: 476). Left valve almost smooth (typical), sometimes irregularly sculptured with weak radial and/or commarginal striae or lirae. Right valve sculptured with regularly arranged commarginal lirae or lamellae. Auricles slightly unequal in size, anterior somewhat larger than posterior, dorsal margin spinous or denticulated. Internally usually with 9 radial ribs (typical), rarely 8 or 10 with a few rudimentary interstitial riblets, and 2 auricular riblets. Byssal notch small, no ctenolium.

Remarks. — *P. lucidum* varies in sculpture on the left valves. Very weak radial striae, sometimes with few radial lirae, are visible near the anterior and posterior margins. Sometimes fine, closely spaced, commarginal lamellae are developed near the ventral margin. A weak reticulated sculpture is produced when both (radial and commarginal striae) are present. Observed specimens from the boreal eastern Atlantic are almost smooth, whereas specimens from the tropical eastern Atlantic are more weakly sculptured (BMNH, MNHN, MOM, NNM).

The conchological characters of *A. hypomeces* and *P. centobi* are identical to those of the



Figs 1-4. *Propeamussium lucidum*, sta. 6.065: Cape Verde Islands, E of Boa Vista, 15°58'N 22°33'W, depth 950-1040 m, 13.vi.1982. 1, lv, antero-dorsal part; 2, rv, antero-dorsal part; 3, lv, detail reticulate sculpture on central part of disc; 4, rv, detail commarginal sculpture on central part of disc. Lv = c. 11 x 11 mm (broken), rv = 9.5 x 8.9 mm.

present species. They are similar in size (up to c. 14 mm in height), in shape (subcircular), internal ribs (8-10) and texture. Typical *P. lucidum* is almost smooth with some weak commarginal lamellae on the left valve. Typical *A. hypomeces* have a more reticulated sculpture on the central part of the disc and commarginal lamellae near the ventral margin. Typical *P. centobi* have a more radial sculpture. However, all kinds of intermediate sculpture variations are observed within *P. lucidum* including that of *A. hypomeces* and *P. centobi*. Therefore we consider *A. hypomeces* and *P. centobi* as junior synonyms of the present species.

*P. lucidum* differs from *Parvamussium propinquum* (Smith, 1885) in having a more oval shape, a small byssal notch, and less internal riblets (usually 9 with 2 auricular ones); the latter species is more orbicular oblong in shape, has a well-developed byssal notch, and more internal riblets with several rudimentary interstitial ones (13-18), which are commencing in a later growth stage than of the present species.

In conchological characters, *A. hypomeces* and *P. centobi* are similar to *P. lucidum* and fall within the ecomorphological variation range of the present species.

Previous records of *P. lucidum* from the tropical western Atlantic are referred to *Propeamussium pourtalesianum* (Dall, 1886).

For more information on functional morphology of *P. lucidum* see Morton & Thurston (1989).

Genus *Parvamussium* Sacco, 1897

*Parvamussium* Sacco, 1897a: 102 (as a subgenus of *Amussium* Herrmannsen, 1846 [invalid emendation of *Amustum* Röding, 1798]); no diagnosis given. Type species (by original designation): *Pecten* (*Pleuronectes*) *duodecimlamellatus* Bronn, 1832. Upper Miocene, Tabbiano, northern Italy.

*Parvamussium*; Sacco, 1897b: 48 (diagnosis).

Diagnosis. — Shell up to c. 20 mm in height, fragile, inequivalve, orbicular to oblique, laterally compressed, lateral gape absent. Left valve usually strongly sculptured with radial and/or commarginal riblets or striae. Right valve with commarginal lamellae. Auricles unequal. Byssal notch well-developed. No ctenolium. Internal riblets commence in late growth stage and extend to submarginal or marginal area.

Distribution. — Cretaceous to Recent. Worldwide; sublittoral to abyssal depths.

Remarks. — See Dijkstra (1995: 25).

*Parvamussium fenestratum* (Forbes, 1844) (figs 5-10, 11, 12)

*Pecten fenestratus* Forbes, 1844: 146, 192. Syntypes: RSM 1976.5.31902-3. Type locality not designated (see Smaldon, Heppell & Watt, 1976: 51).

*Pecten concentricus* Forbes, 1844: 146, 192. Syntype: RSM 1976.5.31901. Type locality not designated (see Smaldon, Heppell & Watt, 1976: 51).

*Pecten inaequisculptus* Tiberi, [1855]: 12, pl. 1 figs 19-22. Type material not seen. Type locality: 'golfo napoletano' and 'mar di Sardegna'.

*Pecten philippii* Acton, 1855: 3, fig. 1a (not Michelotti, 1839, not Récluz, 1853). Type material not seen. Type locality not designated.

*Pecten actoni* von Martens, 1856: 195, pl. 3 figs 1-3 (nom. nov. for *P. philippii* Acton).

*Pecten gallimus* de Gregorio, 1885: 191. Type material not seen. Type locality: 'Altavilla', Italy (Pliocene).

*Amussium fenestratum* var. *depressa* [sic] Locard, 1898: 406. Type material not seen. Type locality not designated.

*Propeamussium* (*Parvamussium*) *fenestratum*; de Boer, 1988: 186.

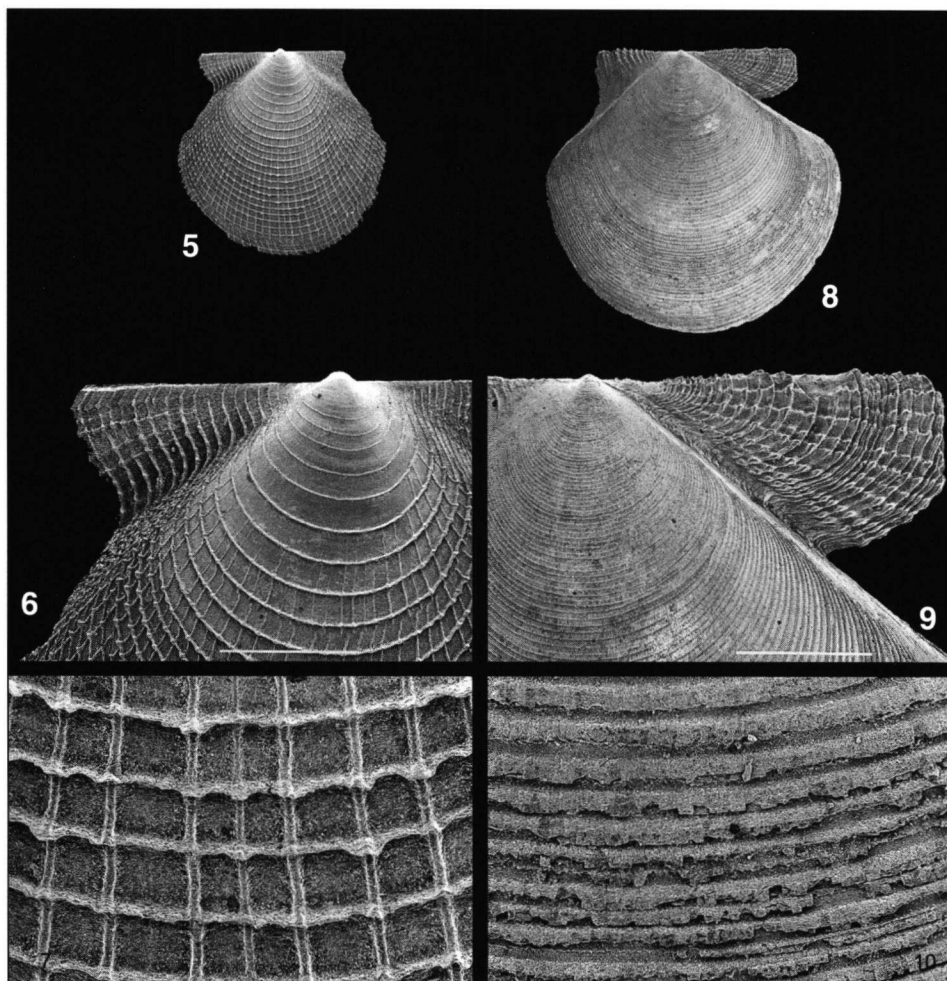
*Propeamussium fenestratum*; Smriglio & Mariottini, 1990: 1, 2, 4, 5, 6, pl. 1 fig. 4a-e; Cossignani, Cossignani, di Nisio & Passamonti, 1992: 32, fig. 283; Poppe & Goto, 1993: 70, pl. 10 fig. 5a-b; Zenetos, 1996: 76, map 21; Gómez Rodríguez & Pérez Sánchez, 1997: 164, fig.; Ardovini & Cossignani, 1999: 90, fig.

*Parvamussium fenestratum*; Schein, 1989: 87.

Material examined. — Madeira: 1.017; 1.020; 1.021; 1.026; 1.057; 1.071; 1.085; 1.086; 1.121; 1.146; 1.D47; 3.007; 3.025; 3.059; 3.062; 3.068. Canary Islands: 2.003; 2.010; 2.012; 2.013; 2.023; 2.065; 2.073; 2.074; 2.075; 2.084; 2.096; 2.103; 2.120; 4.044; 4.048; 4.049; 4.069; 4.075; 4.077; 4.080; 4.101; 4.103; 4.112; 4.116; 4.117; 4.139; 4.145; 4.157; 4.159. Azores: 5.011; 5.020; 5.058; 5.074; 5.121; 5.126; 5.131; 5.132; 5.135; 5.146; 5.148; 5.150. Cape Verde Islands: 6.011; 6.012; 6.019; 6.020; 6.044; 6.078; 6.081; 6.090; 6.093; 6.116; 6.122.

Distribution. — Temperate to tropical eastern Atlantic (50°N-14°N), bathymetric range from 99 m (present data) to 1193 m (Schein, 1989: 87). Depth range of present material 99-1085 m. One sample from Madeira (1.D47) was collected by scuba-diving at 0-20 m. Shells of *P. fenestratum* from this depth are probably transported and distributed by an upwelling current.

Description. — Shell up to c. 7 mm in height, fragile, semitransparent, subcircular, inequivalve, nearly equilateral. Auricles unequal in size. Prodissoconch c. 180-200 m.



Figs 5-10. *Parvamussium fenestratum*. Figs 5-7, sta. 6.044: Cape Verde Islands, W of Fogo, 14°55'N 24°32'W, depth 450 m, 9.vi.1982; 5, lv (4.8 x 4.6 mm), exterior; 6, lv, antero-dorsal part; 7, lv, detail reticulate sculpture on central part of disc. Figs 8-10, sta. 4.080: Canary Islands, SE of Lanzarote, 28°55'N 13°33'W, depth 200-220 m, 21.v.1980; 8, rv (6.5 x 6.5 mm), exterior; 9, rv, antero-dorsal part; 10, rv, detail commarginal sculpture on central part of disc.

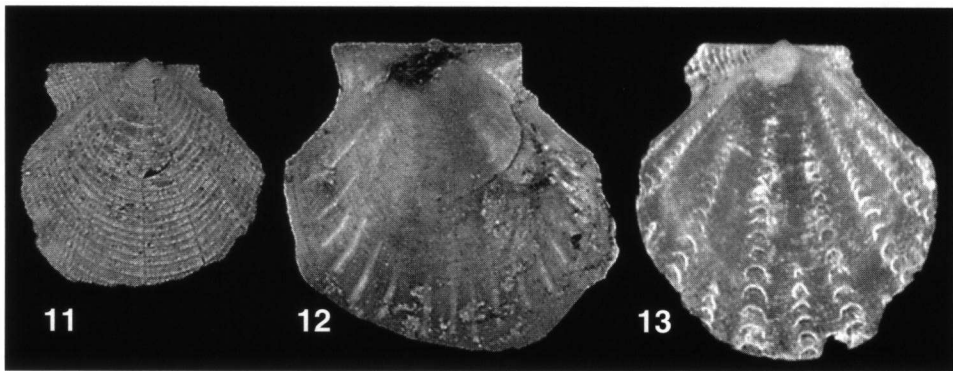
Left valve sculptured with irregularly spaced, radial lirae and prominent overrunning commarginal lamellae. Auricles more weakly sculptured and somewhat reticulated. Right valve with closely spaced, regularly arranged commarginal lamellae or lirae; marginal apron pressed to the left valve. Auricles weakly sculptured with radial and commarginal striae. Hinge line straight; dorsal margin weakly denticulated. Internally 14-20 radial ribs, commencing in late growth stage and extending to semiventral margin. Byssal notch well developed; no ctenolium. Left valve creamy and maculated with white

and brown dots, sometimes more monochrome milky white. Right valve less maculated and more opaque.

Remarks. — The sculpture of the left valve and the internal ribs (length and number) are rather variable in the present species. Sometimes the reticulated sculpture of the left valve is absent on the central part of the disc. Juvenile specimens are lacking the internal ribs.

Previous records of *P. fenestratum* from the tropical western Atlantic are *Parvamussium thalassinum* (Dall, 1886). Records of *P. lucidum* from Capraia Islands (Terreni, 1980; 1981) are probably weak sculptured specimens of *P. fenestratum*. Conchological characters of *Cyclopecten brundisiensis* Smriglio & Mariottini, 1990 from off Brindisi (S Adriatic Sea) are somewhat similar to those of juvenile *P. fenestratum*.

The present species is placed by previous authors in different genera of Pectinidae, but *P. fenestratum* is in all aspects a propeamussiid. Morphological characters of *P. fenestratum* (unequal auricles, byssal notch well developed, internal ribs commence in late ontogeny, no ctenolium) justify placement in *Parvamussium*.



Figs 11-13. Syntypes. Figs 11-12. *Pecten fenestratus* Forbes, 1844: 2 lv: RSM 1976.5.31902-3, (4.7 x 4.9 and 5.4 x 5.6 mm), exterior and interior. 13, *Pecten hoskynsi* Forbes, 1844, lv: RSM 1976.5.31904 (5.6 x 5.2 mm), exterior with vesicular sculpture.

#### *Parvamussium propinquum* (Smith, 1885) (figs 14-20)

*Amussium propinquum* Smith, 1885: 314, pl. 23 figs 7, 7a-b. Holotype: BMNH 1887.2.9.3325; "Challenger" stn 78, off the Azores, 37°26'N, 25°13'W, 1000 fms (= 1829 m), volcanic mud.

*Amussium sublucidum* Dautzenberg & Fischer, 1897a: 193, pl. 5 figs 9-10. Syntypes: MOM 28 0088, MOM 28 0090-93, MNHN (not registered), KBIN (Dautzenberg collection, I.G. 10591). Type localities: Azores, "Hirondelle" (1888) stn 39, 69, "Princesse-Alice" (1895) stn 46, 68, and 71, "Princesse-Alice" (1896) stn 74. For additional data, see Dautzenberg & Fischer (1897a: 140-141).

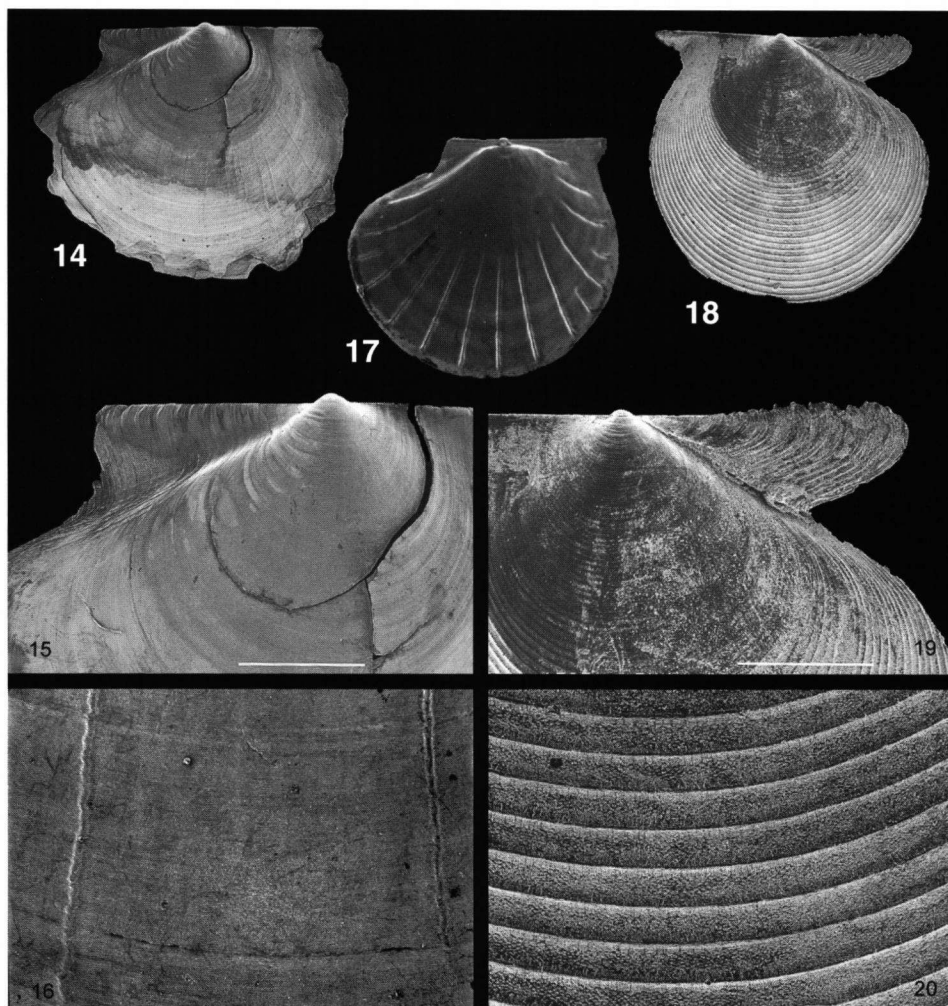
*Propeamussium* (*Parvamussium*) *propinquum*; de Boer, 1988: 186.

*Parvamussium propinquum*; Schein, 1989: 89, 90.

*Propeamussium sublucidum*; Smriglio & Mariottini, 1990: 12, 13, pl. 2 fig. 6a-e.

Material examined. — Canary Islands: CANCAP-II 2.078, 28°01'N 14°26'W, 790 m.





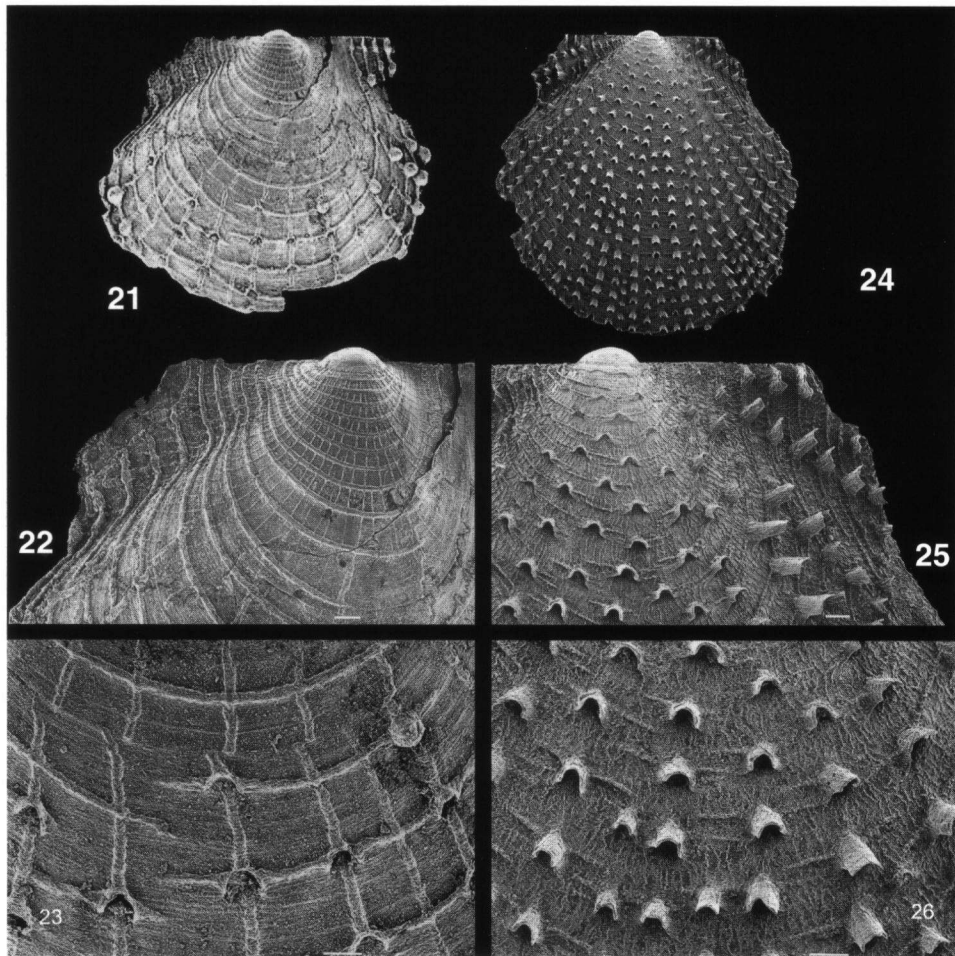
Figs 14-20. *Parvamussium propinquum*, sta. 2.087: Canary Islands, SE of Gran Canaria, 27°42'N 15°02'W, depth 2300 m, 31.viii.1977. 14, lv (4.6 x 5.3 mm), exterior; 15, lv, antero-dorsal part; 16, lv, detail central part of disc; 17, rv (4.4 x 4.8 mm), interior; 18, rv (4.0 x 4.4 mm), exterior; 19, rv, antero-dorsal part; 20, rv, detail commarginal sculpture on central part of disc.

**Distribution.** — Subtropical eastern Atlantic (c. 40°N–20°N); bathymetric range from 790 m (present data) to 4060 m (Locard, 1898). Present material dead in 790 m.

**Description.** — Shell up to c. 7 mm in height, fragile, transparent, semi-orbicular, slightly oblique, inequivalve, nearly equilateral. Auricles subequal; umbonal angle c. 125°. Prodissoconch c. 200  $\mu$ m. Left valve smooth with fine closely spaced, commarginal lamellae near the margin. Right valve sculptured with regularly arranged commarginal

lirae. Auricles small; hinge line rather long and straight and very weakly sculptured with closely spaced lamellae. Internally short and small radial riblets (usually 12, sometimes with several rudimentary interstitial ones), commencing near the central part and extending to the submarginal area. Byssal notch well developed; no ctenolium.

Remarks. — So far not recorded from the boreal and tropical western Atlantic and the Mediterranean Sea. For comparison of conchological characters with *P. lucidum* see above. *P. propinquum* is a representative of *Parvamussium* (unequal auricles, byssal notch well developed, internal riblets commence in late growth stage).



Figs 21-26. *Cyclopecten hoskynsi*. Figs 21-23, sta. 4.006: Canary Islands, S of Lanzarote, 28°50'N 13°50'W, depth 30 m, 14.v.1980. 21, lv (2.2 x 2.4 mm), exterior; 22, lv, antero-dorsal part; 23, lv, detail reticular sculpture with broken vesicles on intersections of central part of disc. Figs 24-26, sta. 6.011: Cape Verde Islands, S of São Tiago, 14°53'N 23°30'W, depth 328 m, 5.vi.1981; 24, rv (3.5 x 3.2 mm), exterior; 25, rv, antero-dorsal part; 26, rv, detail lamellar sculpture on central part of disc.

Genus *Cyclopecten* Verrill, 1897

*Cyclopecten* Verrill, 1897: 70. Type species (designated by Sykes et al., 1898): *Pecten pustulosus* Verrill, 1873; Recent, near St. George's Bank, Gulf of Maine, U.S.A., 274 m.

**Diagnosis.** — Shell equivalve, fragile, small, usually orbicular, laterally compressed. Prodissoconch flat curved. Left valve usually sculptured with radial and/or commarginal riblets or striae. Right valve with commarginal lamellae. Auricles unequal; byssal notch narrow to well-developed. No ctenolium. Usually no internal riblets.

**Distribution.** — Miocene to Recent. Worldwide; sublittoral to abyssal depths.

**Remarks.** — See Dijkstra (1995: 41).

*Cyclopecten hoskynsi* (Forbes, 1844) (figs 13, 21-26)

*Pecten hoskynsi* Forbes, 1844: 192. Syntype: RSM 1976.5.31904; off Piscopi (= Tilos), Sporades, Greece, 200 fathoms (= 366 m) (see Smaldon et al., 1976: 51).

*Pecten hoskynsi* var. *verrucosa* [sic] Locard, 1888: 150. Type material not seen. Type locality not designated.

*Parvamussium hoskynsi*; S.M. Smith & Heppell, 1991: 86.

*Cyclopecten hoskynsi*; Lucas, 1979: 16, 17, 18, figs; Piani, 1980: 186; Cecalupo & Giusti, 1986: 293, 295, 296, 297, figs 8-8a; Schein, 1989: 86; Rolan Mosquera et al., 1990: 89, fig.; Sabelli et al., 1990: 291; Smriglio & Mariottini, 1990: 4, 5, pl. 2 fig. 3a-e; Poppe & Goto, 1993: 71; Zenetos, 1996: 78, map 23; Ardoyni & Cossignani, 1999: 89, fig.

*Cyclopecten (Cyclopecten) hoskynsi*; de Boer, 1988: 186.

Material examined. — Cape Verde Islands: 6.011.

**Distribution.** — Boreal to tropical eastern Atlantic (c. 60° N–14° N); bathymetric range from 82–2064 m (Locard, 1898). The present material is from 328 m.

**Description.** — Shell up to c. 10 mm in height, fragile, semitransparent, sub-orbicular, compressed, slightly inequivalve, nearly equilateral. Auricles unequal. Prodissoconch c. 180 μm high. Left valve sculptured with primary and secondary longitudinal arranged rounded vesicles or lamellae (usually damaged), sometimes sculpture very weak or nearly absent, and commarginal lamellae near ventral margin (sometimes also absent). Right valve with closely spaced commarginal lamellae. Auricles rather small, anterior more prominent sculptured with small vesicles or lamellae. Internally sometimes with rudimentary riblets commencing in late ontogeny and extending towards the submarginal area. Byssal notch small; no ctenolium.

**Remarks.** — *Cyclopecten imbrifer* (Lovén, 1846) from the Arctic and boreal western Atlantic is a closely related species, which is larger (up to c. 25 mm high), with a weaker sculpture consisting of numerous irregularly spaced radial vesicles, or more rarely with commarginal lamellae, without vesicles [= *C. imbrifer* var. *lamellosus* (Posselt & Jensen, 1898)]. *Cyclopecten pustulosus* (Verrill, 1873) from the northwestern Atlantic is closest related to *C. hoskynsi*, although larger (up to c. 25 mm high) with more prominent vesicular sculpture. Verrill & Bush (1898) mentioned *Cyclopecten subimbrifer*, which is a new name for *C. hoskynsi* (Verrill, 1882, non Forbes), from the northwestern Atlantic, which is more similar to *C. imbrifer*. Jensen (1912: 25) treated both as ecomorphical forms of *C. imbrifer*, and showed that sculpture is extremely variable. He also enumerated *C. imbrifer* var. *major* (Leche, 1878) and *C. imbrifer* var. *minor* (Jensen, 1912: 25) from SW Iceland. Both are forms of *C. imbrifer*. No internal ribs are observed (SMNH, ZMUC) in *C. imbrifer*.

Philippi (1844: 61) described two fossil species, viz. *Pecten antiquatus* (a right valve) and *Pecten fimbriatus* (a left valve) from Sicily, of which the conchological characters (small arranged commarginal lamellae without pustulations on the left valve) are more identical to *C. imbrifer* than to *C. hoskynsi*.

Some authors placed the present species in *Parvamussium*, based on the presence of the internal costae. However, these are rudimental and not constantly present.

*Cyclopecten capeverdensis* spec. nov. (figs 27-32)

Type material. — Holotype RMNH 92568, 13 paratypes RMNH 92569, HD.

Type locality. — CANCAP-VII: 7.038; Cape Verde Islands, SE of Chima; 14°57'N 24°38'W; depth 410-460 m, yellow-grey calcareous sand and shell gravel with some basaltic pebbles; van Veen grab; 24.viii.1986.

Material examined. — Canary Islands: 4.159. Cape Verde Islands: 6.006; 6.010; 6.017; 6.093; 6.149; 7.003; 7.004; 7.037; 7.038; 7.039; 7.049; 7.100; 7.129; 7.177.

Distribution. — So far only known from the Canary Islands and the Cape Verde Islands, 28°40'N–14°53'N, 25°06'W–17°59'W, 100-610 m.

Description. — Shell up to c. 7 mm in height, fragile, opaque to semi-transparent, interior nacreous, semi-orbicular, somewhat higher than wide, inequivalve, equilateral. Left valve somewhat reticulated. Right valve commarginally sculptured. Auricles inequal. Prodissoconch c. 150  $\mu$ m. Left valve covered with delicate commarginal lamellae, more widely spaced near umbonal area. Irregularly arranged radial riblets, somewhat more prominent on the postero-marginal area, commence at 1.5 mm of the umbonal top and extend to the ventral margin. Anterior auricle more prominently sculptured with commarginal lamellae than posterior auricle. Right valve with closely spaced, regularly arranged commarginal lamellae, very weak in early ontogeny and more prominent in late ontogeny, and somewhat spiny on the postero-marginal area. Anterior auricle strongly developed with commarginal lamellae, which extend to antero-dorsal margin in a scaly sculpture, and some radial riblets, more prominent near the suture. Posterior auricle weakly sculptured with fine, closely spaced commarginal lirae. Hinge line straight. No internal riblets, except a small posterior auricular lira. Resilifer triangular. Cardinal crura strongly irregularly striated. Byssal notch small; no ctenolium.

Measurements holotype: H 6.9 mm, W 6.7 mm, D 1.1 mm.

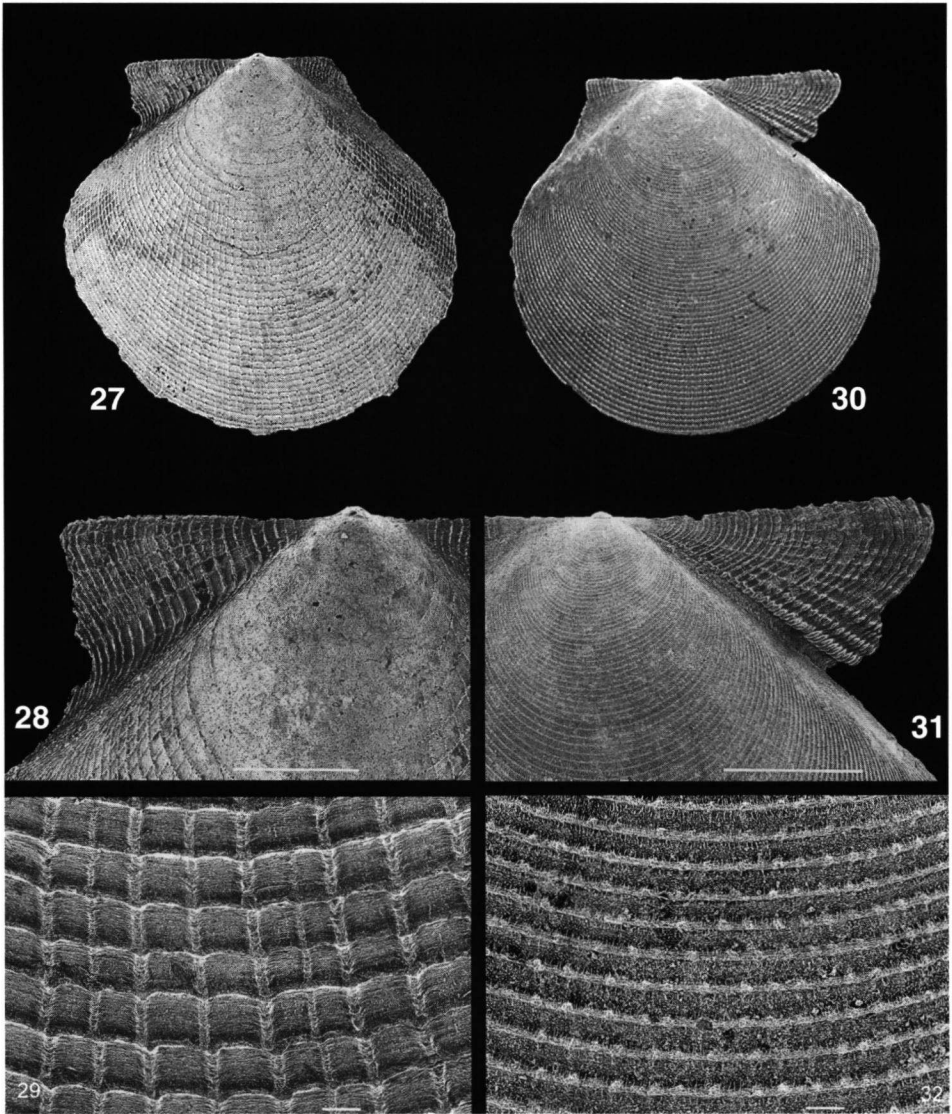
Discussion. — *Cyclopecten simplex* Verrill, 1897, from the tropical western Atlantic and *Cyclopecten ambiannulatus* Schein, 1989 from the boreal and temperate eastern Atlantic are most closely related to *C. capeverdensis*. *C. simplex* has a weaker and more delicate sculpture on the left valve, sometimes rather smooth or only covered with minute irregularly spaced radial riblets. The cardinal crura is slightly broader. *C. cancellatus* is only sculptured with commarginal lamellae on the left valve and lacks auricular lirae.

Etymology. — The present species is named after the Cape Verde Islands.

Genus *Similipecten* Winckworth, 1932

*Similipecten* Winckworth, 1932: 241, 250 (as a subgenus of *Chlamys*). Type species (by original designation): *Pecten similis* Laskey, 1811. Recent, Firth of Forth, Scotland, U.K.

Diagnosis. — Shell inequivalve, subequilateral, small, fragile, semi-orbicular, laterally compressed, translucent to vitreous. Left and right valve usually unsculptured. Auricles



Figs 27-32. *Cyclopecten capeverdensis* spec. nov., sta. 7.038: Cape Verde Islands, SE of Cima, 14°57'N 24°38'W, depth 410-460 m, 24.viii.1986. Figs 27-29, holotype RMNH 31183. 27, lv (6.9 x 6.7 mm), exterior; 28, lv, antero-dorsal part; 29, lv, detail reticular sculpture on central part of disc. Figs 30-32, paratype RMNH 31239. 30, rv (5.4 x 5.3 mm), exterior; 31, rv, antero-dorsal part; 32, rv, detail commarginal sculpture on central part of disc.

unequal; anterior auricle slightly curved and sculptured. Byssal notch well-developed. No ctenolium. No internal riblets.

Distribution. — Miocene to Recent. Worldwide; littoral to abyssal depths.

Remarks. — *Similipecten* was formerly allotted to Pectinidae genera, viz. *Pseudamussium* Mörch, 1853, by H. & A. Adams (1858: 553) and Verrill (1897: 81), to *Palliohum* Monterosato, 1884, by Sacco (1897: 45) or to *Camptonectes* Agassiz in Meek, 1864, by von Teppner (1922: 140). Hertlein (1969: N354) treated *Similipecten* as a synonym of *Delectopecten* Stewart, 1930, together with *Arctinula* Thiele, 1934 and *Catillopecten* Iredale, 1939, and placed these genera in the *Eburneopecten*-group. Vaught (1989: 119) also synonymized *Similipecten* with *Delectopecten*, but treated *Arctinula* and *Catillopecten* as synonyms of *Cyclopecten*. Now *Similipecten* is attributed to Propeamussiidae (Waller, 1984: 213; Dijkstra, 1991: 23), or to Propeamussiinae (Schein, 1989: 95).

The morphological characters of *Arctinula* and *Similipecten* are identical (shell very fragile and subcircular, laterally compressed, translucent to opaque, usually smooth, no internal ribs, byssal notch moderately developed, and ctenolium absent).

### *Similipecten similis* (Laskey, 1811) (figs 33-38)

*Pecten similis* Laskey, 1811: 387, pl. 8 fig. 8. Type material not seen; Firth of Forth, Scotland.

*Ostrea tumida* Turton, 1819: 132. Type material not seen; Torbay, England.

*Pecten pullus* Cantraine, 1835: 24 [396]. Type material not seen. Type locality not designated.

*Pecten (Cyclopecten) commutabilis* Fenaux, 1944: 1, pl. 1 figs 3-6. Syn. nov. Type material not seen; Golfe de Saint-Raphaël, Mediterranean Sea.

*Similipecten similis*; Lucas, 1979: 3, figs; Schein, 1989: 96, pl. 9 figs 1-8; Smith & Heppell, 1991: 63; Poppe & Goto, 1993: 71 (pro parte); de Bruyne et al., 1994: 73; Jensen & Knudsen, 1995: 39; Rolán & Ryall, 1999: 74.

*Hyalopecten similis*; Terreni, 1981: 70; Cecalupo & Giusti, 1986: 295; Rolan Mosquera et al., 1990: 88; Sabelli et al., 1990: 291; Zenetos, 1996: 79, map 24; Ardovini & Cossignani, 1999: 90, fig.

*Cyclopecten (Cyclopecten) similis*; de Boer, 1988: 186.

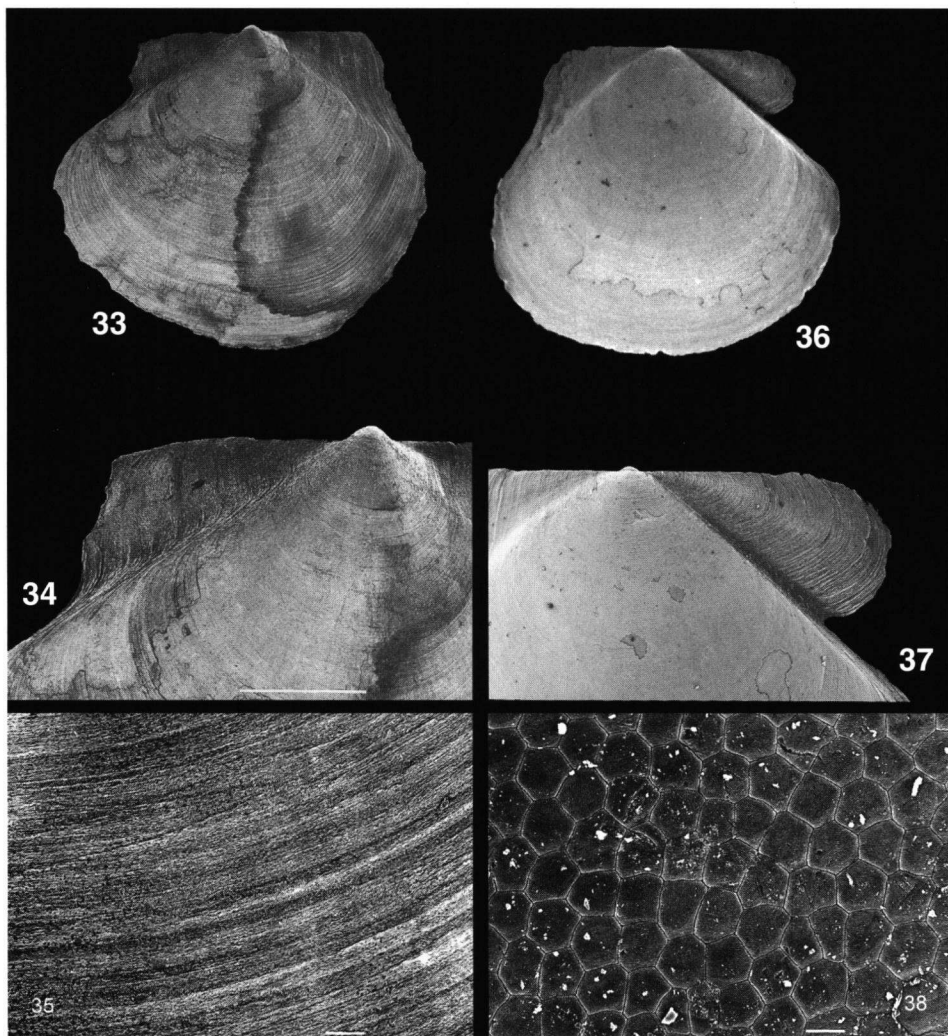
*Cyclopecten (Similipecten) similis*; Rombouts, 1991: 30, 51, 81

Material examined. — Madeira: 1.017; 1.019; 1.020; 1.021; 1.025; 1.026; 1.029; 1.040; 1.057; 1.067; 1.081; 1.084; 1.085; 1.086; 1.121; 1.123; 1.146; 1.147. Canary Islands: 2.003; 2.011; 2.012; 2.013; 2.021; 2.022; 2.023; 2.030; 2.033; 2.035; 2.043; 2.048; 2.049; 2.058; 2.065; 2.066; 2.073; 2.074; 2.075; 2.083; 2.084; 2.085; 2.087. Madeira: 3.002; 3.007; 3.008; 3.009; 3.016; 3.025; 3.059. Selvagens: 3.062; 3.065; 3.068; 3.080; 3.081; 3.083; 3.088. W Sahara: 3.108. Mauritania: 3.123; 3.133; 3.135; 3.154; 3.194. Canary Islands: 4.014; 4.038; 4.040; 4.041; 4.044; 4.048; 4.049; 4.068; 4.069; 4.070; 4.075; 4.080; 4.088; 4.089; 4.090; 4.091; 4.092; 4.101. Selvagens: 4.103; 4.104. Canary Islands: 4.116; 4.117; 4.137; 4.138; 4.139; 4.143; 4.144; 4.145; 4.148; 4.156; 4.157; 4.158; 4.159. Mauritania: M.031; M.034; M.087; M.099; M.140.

Distribution. — Arctic to tropical eastern Atlantic (70°N – 15°N), bathymetric range from c. 36-2134 m (Schein, 1989). Depth range of present material 28-1150 m.

Description. — Shell up to c. 7 mm in height, compressed, fragile, transparent or vitreous, sub-orbicular, slightly inequivalve, inequilateral. Auricles inequal. Prodissoconch c. 180-200 m.

Left and right valves smooth, sometimes weakly sculptured with fine commarginal striae. Right valve sometimes slightly more convex than left one. Anterior auricles weakly sculptured with fine closely spaced, commarginal lamellae; posterior nearly smooth. Hinge line straight, except near the antero-dorsal margin (somewhat curved). No internal riblets, except 2 small auricular ones (sometimes nearly absent). Byssal notch small;



Figs 33-38. *Similipecten similis*. Figs 33-35, sta. SE.8151: Norway, Hjelte Fjord, off Herdla, 60°36'N 4°55'E, depth 30-50 m, 4.ix.1981; 33, lv (5.7 x 6.3 mm), exterior; 34, lv, antero-dorsal part; 35, lv, detail commarginal micro-sculpture on postero-ventral part of disc. Figs 36-38, sta. MAU.140: Mauritania, off Cap Blanc, 20°40'N 17°31'W, depth 73 m, 21.vi.1988; 36, rv (5.0 x 5.5 mm), exterior; 37, rv, antero-dorsal part; 38, rv, detail irregular hexagonal micro-structure of outer prismatic layer on on central part of disc.

no ctenolium. Very variable in colour or uniform milky white.

Remarks. — Fenaux (1944: 1) described a new propeamussiid from the Mediterranean Sea, which in all conchological features is similar to the present species. Recently Schein (1989: 96) placed several references of *Similipecten greenlandicus* (non Sowerby) in the synonymy of *S. similis*. Juvenile specimens of *S. greenlandicus* could be easily mixed with the present species. The former species has a more compressed right valve, a more straight hinge line, no auricular riblets and a less conspicuous colouration (usually milky white).

*S. similis* was often placed by previous authors in different genera of Pectinidae, viz. *Pecten*, *Pseudamussium*, *Amussium*, *Chlamys*, *Palliohum* or *Hyalopecten*. However, the present species is a representative species of Propeamussiidae and is currently placed in *Similipecten* (Waller, 1984: 213; Schein, 1989: 65).

Family Pectinidae Wilkes, 1810  
Genus *Pseudohinnites* Dijkstra, 1989

*Pseudohinnites* Dijkstra, 1989: 29. Type species (by original designation): *Pseudohinnites levii* Dijkstra, 1989. Recent, SE of New Caledonia, 965 m.

Diagnosis. — Shell inequivalve, fragile, medium-sized, very irregular, with a "*Hinnites*"-like appearance. Auricles unequal. Left valve convex. Right valve flat. Exterior of left valve with irregular radial costae and commarginal lamellae. Right valve smooth, with irregular commarginal waves or irregular depressions, giving a deformed appearance. Byssal notch with ctenolium.

Distribution. — Recent. Western tropical Atlantic and Indo-West Pacific; bathyal to abyssal depths.

Remarks. — For morphology and assignment of *P. levii* see Dijkstra & Knudsen (1997).

*Pseudohinnites* spec. cf. *adamsi* (Dall, 1886)

*Hinnites adamsi* Dall, 1886: 223, pl. 5 fig. 6; Abbott, 1974: 445; Dijkstra & Knudsen, 1997: 14. Holotype (lv): USNM 333632. Type locality: "Blake" stn 227, West Indies, off St. Vincent, 13°10'10"N 61°18'15"W, 573 fathoms (= 1048 m).

*Pseudohinnites adamsi*, Dijkstra, 1989: 32.

Material examined. — Canary Islands: 4.133.

Distribution. — So far only known from St. Vincent and the Virgin Islands (West Indies) at a depth range of 550-1048 m. The present juvenile specimen is the only record of the tropical eastern Atlantic.

Description. — Shell up to c. 30 mm in height, deformed, somewhat higher than wide, thin, semi-transparent, inequivalve. Left valve convex. Right valve nearly flat. Auricles nearly equal. Left valve sculptured with fine concentric lamellae in early growth stage, and irregularly placed primary and secondary radial costae. Sculpture continued on the auricles; no interruption between the shell disc and the auricles. Anterior auricle slightly longer than posterior one. Internal surface reproducing the external irregular radial sculpture. Right valve nearly flat, smooth with growth lines and irregular depressions. Hinge line straight. Byssal notch small; inactive and active ctenolium. Colour milky white, interior semi-nacreous.



Remarks. — The juvenile specimen from the Canary Islands very well resembles *P. adamsi* in morphological characters.

Dall (1886: 223) placed *P. adamsi* in 'Hinnites'. However, Dijkstra (1989: 29) treated it as a representative of *Pseudohinnites*.

### Genus *Hyalopecten* Verrill, 1897

*Hyalopecten* Verrill, 1897: 63, 71, pl. 18 fig. 5. Type species (by original designation): *Hyalopecten undatus* Verrill, 1897 (= *Pecten undatus* Verrill & S. Smith in Verrill, 1885); Recent, 37°38'40"N 73°16'30"W, off Virginia, W. Atlantic, 2603 m.

Diagnosis. — Shell inequivalve, compressed, hyaline. Valves with commarginal undulations or corrugations and sculptured. With fine radial lirae on one or both valves. Auricles unequal. Byssal notch well-developed; ctenuolium present.

Distribution. — Miocene to Recent. Worldwide, bathyal to hadal depths.

Remarks. — Grau (1959: 55) and Knudsen (1970: 97) treated *Hyalopecten* as a subgenus of *Cyclopecten*. The latter genus is now placed in Propeamussiidae and the former in Pectinidae, both are extant genera. Coan, Scott & Bernard (2000: 228) treated *Hyalopecten* as a junior synonym of *Cyclopecten* Seguenza, 1877, following Palazzi & Villari (1996: 270). However, *Cyclopecten* has antimarginal microsculpture. Representative species of *Hyalopecten* always lack this particular microsculpture. Moreover, *Hyalopecten* has pointed posterior auricles, but in *Cyclopecten* these are merged with the shell disc (see Coan et al., 2000: 227).

### *Hyalopecten pudicus* (E.A. Smith, 1885) (fig. 41)

*Pecten fragilis* Jeffreys, 1876: 424; 1879: 361, pl. 45 fig. 1 (non Defrance, 1825). Syntypes: USNM 62426, USNM 62427, USNM 62429, BMNH 1877.11.28.7, BMNH 1885.11.5.94. Type localities: "Valorous" stn 8, 11, and 15, "Porcupine" (1869) stn 23a. For additional data see Warén (1980).

*Pecten pudicus* E.A. Smith, 1885: 302, pl. 21 figs 8-8b. Holotype: BMNH 87.2.9.3280; "Challenger" stn 146, 46°46'S, 45°31'E, E of Marion Island, 1375 fathoms (= 2515 m).

*Pecten undatus* Verrill & Smith, in Verrill, 1885: 444, pl. 44 fig. 21 (non Defrance, 1825: 257). Holotype: USNM 44827; "Albatross" stn 2229, 37°38'40"N, 73°16'30"W, 1423 fms (= 2603 m).

*Hyalopecten dilectus* Verrill & Bush in Verrill, 1898: 80. Holotype: USNM 52539; "Albatross" stn 2570, off Martha's Vineyard, 1813 fms (= 3316 m).

*Pecten biscayensis* Locard, 1888: 144 (pro parte); 1898: 400 (pro parte). (nom. nov. for *Pecten fragilis* Jeffreys, 1876)

*Hyalopecten undatus*, Schein, 1989: 78, pl. 3 figs 1-9.

*Cyclopecten (Hyalopecten) undatus*, Knudsen, 1970: 101, text-fig. 63B, pl. 14 figs 1-2; Rombouts, 1991: 80.

*Hyalopecten undatus*, Schein, 1989: 78, pl. 3 figs 1-9, text-fig. 9 (references, distribution, remarks).

*Cyclopecten (Hyalopecten) pudicus*, Rombouts, 1991: 80.

Material examined. — Cape Verde Islands: 6.018; 6.018/a; 6.092.

Distribution. — Northern Atlantic to Antarctic (c. 65°N – 70°S), bathyal to abyssal depths (400-5100 m) (Pelseneer, 1903: 26; Schein, 1989: 79, 80). Depth range of present material 3000-4025 m, living at 3825-4025 m.

Description. — Shell up to c. 30 mm in height, fragile, semi-transparent, oblique, higher than wide, subequivalve, inequilateral. Auricles subequal. Prodissoconch c. 180-200  $\mu$ m

(Schein, 1989: 79). Both valves regularly, commarginally undulated and sculptured with numerous fine, closely spaced, radial lirae, somewhat coarser on the left valve. Left valve slightly more convex than right valve. Auricles small, anterior separated, posterior not separated from the disc, and covered with a reticulated sculpture. Hinge line straight. Byssal fasciole broad; byssal notch deep; weak inactive and active ctenolium.

Remarks. — The present species is closely related to *Hyalopecten frigidus* (Jensen, 1904, 1912) from the Arctic and boreal Atlantic (Bouchet & Warén, 1979: 216). *H. frigidus* is more depressed, has somewhat broader undulations and the radial lirae are weaker and almost absent on the right valve than of *H. pudicus*. The reticulated sculpture on the auricles of *H. pudicus* is lacking in *H. frigidus*.

*Hyalopecten neoceanicus* (Dall, 1908) from the Galapagos Islands differs from the present species in having weaker undulations, and reticulated sculpture on both valves. *Hyalopecten profundicola* Okutani, 1962, from the northwestern Pacific differs from *H. pudicus* in having a more orbicular shape without undulated valves and a prominent sculpture of commarginal lamellae with fine interstitial lirae. *Hyalopecten hadalis* Knudsen, 1970, from the Kermadec Trench (S Pacific Ocean) differs from *H. pudicus* in having smaller undulations and finer radial lirae on both valves.

#### Genus *Delectopecten* Stewart, 1930

*Delectopecten* Stewart, 1930: 37, 118 (as a subgenus of *Palliolium*). Type species (by original designation): *Pecten (Pseudamussium) vancouverensis* Whiteaves, 1893; Recent, Forward Inlet, Quatsino Sound, Vancouver Island, Canada, 18-37 m.

Diagnosis. — Shell inequivalve, fragile, small, nearly orbicular. Valves nearly equally convex, sculptured with commarginal rows of scales or vesicles, spinose radial ridges and/or delicate antimarginal striae. Byssal notch well-developed; ctenolium present.

Distribution. — Early Cretaceous to Recent. Worldwide, sublittoral to abyssal depths.

Remarks. — See Dijkstra (1995: 50).

#### *Delectopecten vitreus* (Gmelin, 1791) (figs 42-44)

*Ostrea vitrea* Gmelin, 1791: 3328 (ex Chemnitz, 1784: 335, pl. 67 fig. 637a); Dillwyn, 1817: 263. Syntypes: ZMUC BIV-54, ZMUC BIV-55; "Oceano septentrionali" (= N. Atlantic Ocean).

*Chlamys papyracea* Röding, 1798: 164. Type material not seen. Type locality not designated.

*Pecten gemmellari filii* Biondi, 1859: 118, pl. 1 fig. 4. Type material not seen. Type locality 'Sicilia, Aci-Trezza'.

*Pecten abyssorum* Lovén, in G.O. Sars, 1878: 2, fig. 6a-c. Type material not seen; Lofoten (300 fms [= 549 m]), Sognefjord (650 fms [= 1189 m]), Christianifjord [Oslofjord] (230 fms [= 421 m]), attached to pieces of decaying sea weed [transl. Warén].

*Pseudamussium gelatinosum* Mabile & Rochebrune, 1889: H-126. Type material not seen; "Baie Orange" (Orange Bay, Beagle Channel, Tierra del Fuego).

*Pecten chaperi* Dautzenberg & H. Fischer, 1897: 190, pl. 5 figs 5-8. Syntypes: MOM 28 148-9; Azores, "Princesse-Alice" (1895) stn 77, 38°31'N, 29°9'30"W, 845 m; "Princesse-Alice" (1896) stn 90, 39°11'N, 32°44'30"W, 1600 m.

*Cyclopecten (Delectopecten) vitreus*, Grau, 1959: 47, pl. 18 fig.; de Boer, 1988: 186.

*Delectopecten vitreus*, Rolan Mosquera et al., 1990: 94, fig.; Sabelli et al., 1990: 291; S.M. Smith & Heppell, 1991: 62; Wagner, [1991]: 13, text-fig. 5; Barash & Danin, 1992: 254, fig. 272; Poppe & Goto, 1993: 65, pl. 9 fig. 7; Jensen & Knudsen, 1995: 39; Zenetos, 1996: 78, map 23; Ardovalini & Cossignani, 1999: 90, fig; Rolán & Ryall, 1999: 74.

Material examined. — Western Sahara: 3.107/a; 3.108/a. Canary Islands: 4.054/a; 4.055/a. Azores: 5.090/a; 5.101. Mauritania: M.040.

Distribution. — Atlantic Ocean, from the Arctic to the Antarctic, 70 m (present record) to 4255 m (Locard, 1898). Depth range of present material 70-1338 m, living at 1000-1338 m.

Description. — Shell up to c. 20 mm in height, fragile, transparent, suborbicular, inequivalve, subequilateral. Auricles nearly equal. Prodissoconch I 70-80  $\mu$ m; prodissoconch II 275-385  $\mu$ m (Schein, 1989: 76). Both valves near equiconvex and covered with microscopic antimarginal striae (*Camptonectes*-like sculpture) and commarginal rows of small vesicles (sometimes nearly absent). When commarginal scales are damaged, minute commarginal ridges are visible. Posterior auricles similarly sculptured as shell disc. Anterior auricle of right valve with 3-5 radial riblets covered with commarginal lamellae. Hinge line straight. Byssal notch well developed. Inactive and active ctenolium present.

Remarks. — The present species is very variable in sculpture (nearly smooth or sculptured with commarginally arranged prominent vesicles, scales or lamellae) and convexity (moderate to strong).

*Pecten abyssorum* from Norway, *Pecten chaperi* from the Azores and *Pseudamussium gelatinosum* from southern Argentina are intraspecific variants of the present species. *Delectopecten alcocki* (E.A. Smith, 1904) from the Indo-Pacific differs from *D. vitreus* by lacking the antimarginal microsculpture, but other shell characters are similar to those of *D. vitreus*. Some authors (E.A. Smith, 1885: 303; Grau, 1959: 50; Clarke Jr., 1962: 60) treated *D. vitreus* as a cosmopolitan species. *D. vitreus* reported by Dautzenberg & Bavay (1912: 27) from the Banda Sea, Indonesia, is similar to *Delectopecten musorstomi* Poutiers, 1981. The latter species is much smaller (up to c. 6 mm high) than *D. vitreus*, and has more prominent antimarginal microsculpture and c. 20 spinous radial riblets on both valves and 3-5 on the anterior auricle of the left valve. These radial riblets are absent on *D. vitreus*.

Subfamily Pallioluminae Korobkov, in Eberzin, 1960 [?] (Palliolinae; emend. by Waller & Marincovich, 1992)  
Tribe Palliolini Waller, 1993

Genus *Palliolium* Monterosato, 1884

*Palliolium* Monterosato, 1884: 5 (as a section of *Pecten*). Type species (subsequent designation by Crosse, 1885: 140): *Pecten incomparabilis* Risso, 1826; Recent, Mediterranean Sea.

Diagnosis. — Non-cemented orbicular chlamydoid Palliolini with prominent antimarginal microsculpture. Antimarginal macrosculpture nearly absent. No shagreen microsculpture or commarginal macrosculpture. Foliated calcite (uniformly oriented laths) outside of pallial line. Byssal notch and sinus shallow throughout ontogeny. A weak ctenolium with closely spaced teeth; small auricular crura.

Distribution. — Upper Eocene to Recent (Hertlein, in Moore, 1969: N354). Boreal Atlantic (Waller, 1991: 35) and southwestern Pacific; littorally to bathyal depths.

Remarks. — For phylogeny and stratigraphy, see Waller (1991: 35; 1993: 198), Waller & Marincovich (1992: 219) and Beu (1995: 19).

*Palliolium incomparabile* (Risso, 1826)

*Pecten incomparabilis* Risso, 1826: 302, pl. 11 fig. 154. No types traced in MNHN (Héros personal communication); off Nice, France, Mediterranean Sea.

*Pecten vitreus* Risso, 1826: 303, fig. 156. No types traced in MNHN (Héros, pers. comm.).

*Pecten testae* Bivona, in Philippi, 1836: 11, pl. 5 fig. 17. Type material not seen; Panormi, Trapani (Sicily).

*Pecten furtivus* Lovén, 1846: 31. Syntype: SMNH 2001, Bergen, Norway

*Pecten forestii* Martin, in Gay, 1858: 209. Type material not seen; near "Ile de Gien", (France, Mediterranean Sea), 70-80 fms (= 128-146 m).

*Palliolium incomparabile*, Sabelli et al., 1990: 291; Wagner, [1991]: 7, pl. 2 fig. 3, text-fig. 2; Barash & Danin, 1992: 254, fig. 271; Poppe & Goto, 1993: 66, pl. 9 fig. 11; Zenetos, 1996: 81, map 25; M.C. Consolado Macedo et al., 1999: 392, figs; Ardovini & Cossignani, 1999: 90, fig; Rolán & Ryall, 1999: 74

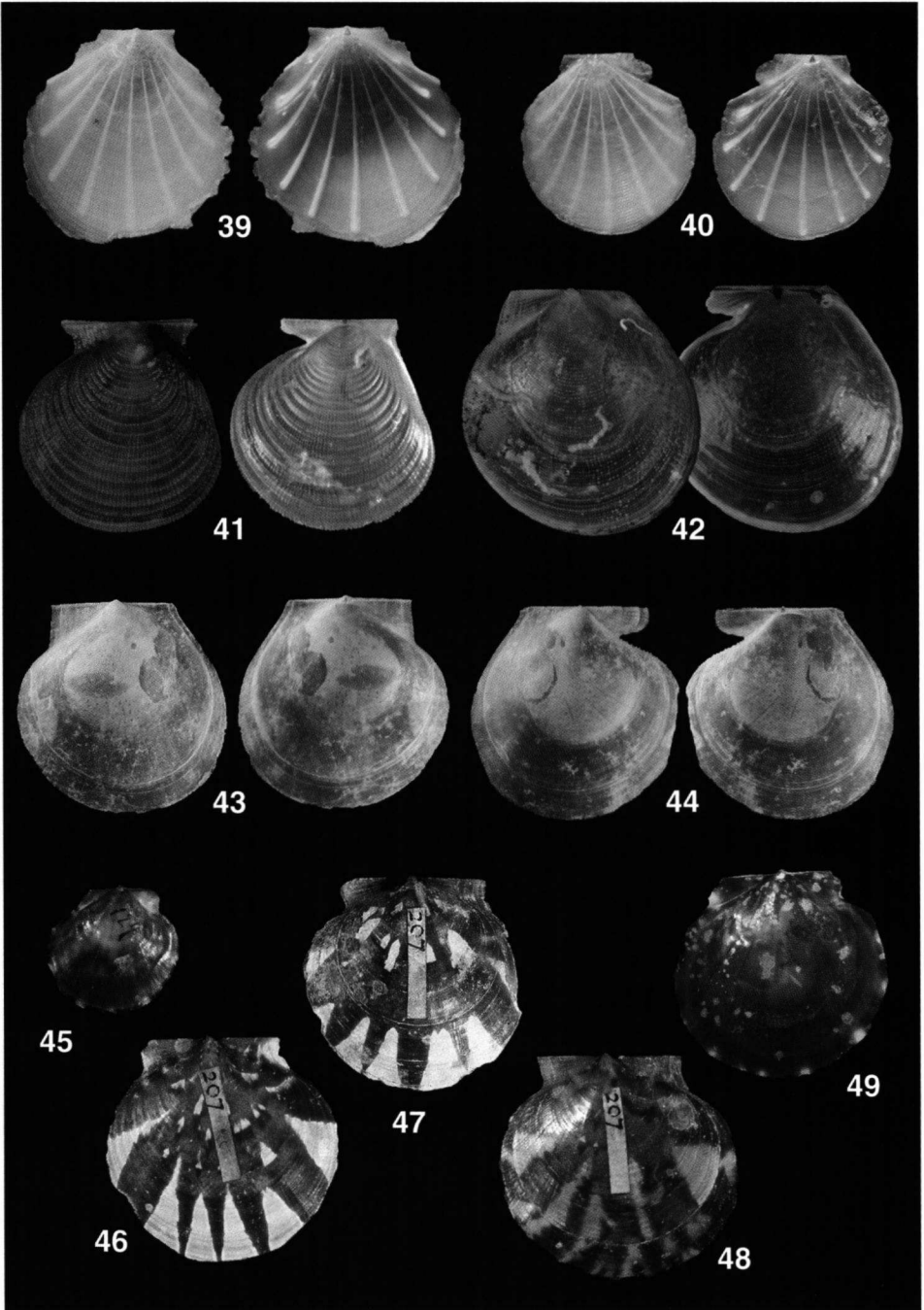
*Pseudamussium (Pseudamussium) incomparabile*, de Boer, 1988: 187, fig. 107.

Material examined. — Azores: 5.008; 5.009; 5.010; 5.011; 5.019; 5.020; 5.035; 5.048; 5.050; 5.054; 5.055; 5.058; 5.059; 5.064; 5.068; 5.077; 5.078; 5.079; 5.080; 5.081; 5.082; 5.083; 5.084; 5.092; 5.093; 5.094; 5.106; 5.109; 5.111; 5.112; 5.114; 5.119; 5.120; 5.121; 5.125; 5.126; 5.128; 5.129; 5.130; 5.131; 5.132; 5.133; 5.134; 5.135; 5.138; 5.139; 5.141; 5.142; 5.144; 5.145; 5.146; 5.147; 5.148; 5.150; 5.171; 5.176; 5.187. Madeira Archipelago: 1.021. Morocco: 1.147. Selvagens Archipelago: 3.081. Canary Islands: 2.012; 2.064/a; 2.066. Cape Verde Islands: 6.105; 6.107; 6.147; 7.042; 7.101; 7.142. Mauritania: M.032; M.033; M.034.

Distribution. — From the boreal NE. Atlantic to the tropical E. Atlantic, including the Mediterranean Sea, living littorally to abyssal depths, byssally attached to rocks or amongst algae or rubble on muddy or sandy bottoms. Depth range of present material 54-300 m, living at 77 m.

Description. — Shell up to c. 18 mm in height, usually smaller, depressed, fragile, semi-transparent, polychrome, slightly orbicular, somewhat equivalve and equilateral. Right valve more convex than left valve. Auricles strongly unequal in size; umbonal angle c. 95°. Both valves sculptured with microscopic antimarginal striae, intersected by minute commarginal growth lines and with delicate scaly radial riblets, more prominent near ventral margin. Anterior auricles with radial and commarginal sculpture, posterior auricles with radial sculpture. Hinge line straight. Byssal notch rather narrow, byssal fasciole weak. Active ctenolium with 3-5 teeth. Resilifer elongate and triangular. Left valve somewhat more brightly coloured than right one.

Figs 39-49. *Propeamussium*, *Hyalopecten*, *Delectopecten* and *Lissochlamis* species. Figs 39-40, *Propeamussium lucidum*, sta. 6.065: Cape Verde Islands, E of Boa Vista, 15°58'N 22°33'W, depth 950-1040 m, 13.vi.1982; 39, lv (11.0 x 10.5 mm), exterior and interior; 40, rv (10.2 x 9.9 mm), exterior and interior. 41, *Hyalopecten pudicus*, sta. 6.018: Cape Verde Islands, S of São Tiago, 14°31'N 23°33'W, depth 3825-4025 m, 5.vi.1982, 1 spm (14.1 x 13.4 mm), lv, exterior and rv, interior. Figs 42-44, *Delectopecten vitreus*; 42, sta. 5.090: Azores, S of Pico, 38°09'N 28°31'W, depth 1320-1350 m, 2.vi.1981, 1 spm (23.3 x 22.1 mm), lv, exterior and rv, interior; 43-44, syntypes of *Ostrea vitrea*, ZMUC BIV-54; 43, lv (14.6 x 14.6 mm), exterior and interior; 44, rv (14.0 x 14.6 mm), exterior and interior. Figs 45-49, *Lissochlamis exotica*, probable syntypes of *Ostrea exotica* from ZMUC (ex.coll. Mus. Moltk.); 45, lv (19.5 x 19.8 mm), interior; 46, lv (31.8 x 32.4 mm), exterior; 47, lv (29.7 x 30.3 mm), exterior; 48, lv (32.3 x 33.8 mm), exterior; 49, lv (28.4 x 28.5 mm), interior.



Remarks. — Some authors (Nordsieck, 1969: 43; Tebble, 1976: 62; Lucas, 1979: 16) treated *P. testae* and *P. furtivum* as distinct species or subspecies of *P. incomparabile*, mainly based on the presence of radial sculpture on the disc, which is usually absent in *P. incomparabile*. However, this sculpture is often missing and very variable when present, also in the observed material (MNHN, NNM, SMNH, ZMA, ZMUC) from the eastern Atlantic. The material from the Azores usually has a radial sculpture.

### Genus *Lissochlamis* Sacco, 1897

*Lissochlamis* Sacco, 1897a: 102 (as a subgenus of *Chlamys*). Type species (by original designation): *Pecten excisus* Bronn, 1832; Lower Pliocene, Val d'Andona, near Asti, Italy.

Diagnosis. — Non-cemented orbicular Palliolini with prominent antimarginal microsculpture. Radial macrosculpture nearly absent. No shagreen microsculpture or comarginal macrosculpture. Byssal notch deep throughout ontogeny; byssal fasciole deeplying. Ctenolium well developed.

Distribution. — Upper Miocene to Recent; western Europe (fossil) and tropical eastern Atlantic (Recent); littorally to sublittorally.

Remarks. — Hertlein (1969: N354) treated *Lissochlamis* Sacco, 1897, *Delectopecten* Stewart, 1930, *Hyalopecten* Verrill, 1897, and *Parvochlamys* Sacco, 1904, as subgenera of *Palliohum*, placed in the *Eburneopecten*-group. All but one of these so-called subgenera of *Palliohum* can be treated as distinct genera, placed in other suprageneric taxa. Waller & Marinovich (1992: 219) considered *Palliohum* a genus of the subfamily Palliolinae.

### *Lissochlamis exotica* (Dillwyn, 1817) (figs 45-48)

*Ostrea exotica* Dillwyn, 1817: 259 [ex Chemnitz, 1795: 262, pl. 207 figs 2037, 2038; invalid publication]. Probable syntypes in ZMUC (Schjøtte, pers. comm.); "im rothen Meer" (erroneous locality).

*Pecten dispar* Lamarck, 1819: 173, no. 40; Dijkstra, 1994: 486, figs 93-94 (lectotype designation: MHNG 1088/64/2). Type locality unknown.

*Pecten pseudamysium* G.B. Sowerby 2nd, 1842: 56, pl. 19 figs 211-212, pl. 20 fig. 243 (ex Klein, 1753: 134, pl. 9 fig. 31; invalid publication). Syntypes: BMNH (not registered); Gambia.

*Pecten orbicularis* G.B. Sowerby 2nd, 1842: 57, pl. 20 figs 231-232 (non J. Sowerby, 1817). Syntypes: BMNH (not registered); "Co. of Africa" (west coast of Africa).

*Pecten loveni* Dunker, 1853: 44, pl. 9 fig. 31. Syntype: ISZHU (not registered); type locality unknown.

*Lissochlamis exotica*; Waller, 1984: 207, fig. 2e-f.

*Lissopecten exoticus*; Rolán & Ryall, 1999: 75.

Material examined. — Mauritania: M.084.

Distribution. — Tropical eastern Atlantic, from Mauritania southwards to Angola. Living littorally on soft sediments (sand, mud) in colonies. Present specimen dead in 19 m.

Description. — Shell up to c. 40 mm in height, thin, compressed, orbicular, nearly equi-valve and equilateral. Left valve slightly more convex than right valve. Auricles subequal in size and small; umbonal angle c. 110°. Both valves smooth or sculptured with delicate radial riblets laterally, weaker or nearly absent on right valve. Antimarginal microsculpture only laterally present. Auricles with fine radial riblets (4-8) or nearly smooth and

nearly continuous with disc, except anterior auricle of right valve. Hinge straight. Byssal notch deep; byssal fasciole deep-lying. Active ctenolium well developed with knobby teeth. Colour variable, left valve brownish with maculations or uniform coloured, right valve paler or whitish.

Remarks. — The present species is often referred to as *Ostrea hybrida* Gmelin, 1791 (see Grau, 1959: 58). However, Gmelin's references to Lister (1687) and Klein (1753) most probably refers to *Ostrea exotica* Dillwyn, 1817, whereas the reference to Chemnitz (1784) points to *Pecten septemradiatus* Müller, 1776, as does Gmelin's diagnosis and reported locality.

### Genus *Pseudamussium* Mörch, 1853

*Pseudamussium* Mörch, 1853: 59. Type species (Opinion 714, ICZN): *Pecten septemradiatus* Müller, 1776; Recent, E. Atlantic.

*Karnekampia* Wagner, 1988: 41, fig. 1. Type species (by original designation): *Pecten bruei* Payraudeau, 1826; Recent, Golfe de Sagone, Golfe d'Ajaccio, Golfe de Valinco, Golfe de Porto-Vecchio, Corsica, France.

Diagnosis. — Shell convex, medium-sized, orbicular, inequilateral. Valves ornamented with plicate costae, sculptured with fine to fairly prominent radial ridges and/or radial striae. Antimarginal microsculpture. Auricles unequal, sculptured with fine riblets. Byssal notch shallow; ctenolium present.

Distribution. — Miocene to Recent. Eastern Atlantic; littoral to bathyal depths.

Remarks. — Previous taxonomists attributed *Pseudamussium* to different authors, viz. Klein (1753: 134) (pre-Linnaean), Herrmannsen (1847: 340) [neither a diagnosis, nor an indication; no type species designation], Mörch (1853: 59) (invalid publication; no type species designation), and H. & A. Adams (1858: 553) (type species based on *Pseudamussium* Lister, Klein and Chemnitz; Lister and Klein pre-Linnaean, Chemnitz' figures erroneous).

North (1951: 231) discussed the confusion of the classifications of *Pseudamussium*. Grau (1959: 57) followed North's opinion, and described in detail the status of *Pseudamussium*. In 1964 the ICZN validated under its Plenary Powers (Opinion 714) *Pseudamussium* Mörch, 1853, with *Pecten septemradiatus* Müller, 1776, as type species.

*Pseudamussium* and *Karnekampia* are similar in shape (both are subcircular to oblong and slightly equilateral), have compressed valves with primary radial plicae or costae and delicate radial ridges and/or striae, and an antimarginal microsculpture. The auricles are unequal in size, and the byssal notch is shallow. Therefore, *Karnekampia* is placed in the synonymy of *Pseudamussium* (see also Dijkstra & Kilburn, 2001). Wagner (1988: 42) compared *Karnekampia* only with *Chlamys* s.s. and *Manupecten*, both currently placed in Chlamydinæ (see Waller, 1993), and overlooked *Pseudamussium*, a genus of Pectininae (see also Waller, 1993).

Waller (1991: 35) placed *Pseudamussium* in the *Palliolium*-group, now classified as Palliolini by Waller (1993: 198) in Pectininae.

### *Pseudamussium peslutrae* (Linnaeus, 1771) (fig. 50)

*Ostrea peslutrae* Linnaeus, 1771: 547; Dodge, 1952: 196; Dance, 1967: 22; Dijkstra, 1999: 427, fig. 7E-F (lectotype designation; synonymy). Type locality: off Largs, Ayrshire, Scotland.

*Pecten septemradiatus* Müller, 1776: 248. Type material not seen (not in ZMUC); Denmark.

*Ostrea hybridum* Gmelin, 1791: 3318. Type material not seen; Norway.

*Pecten aspersus* Lamarck, 1819: 167. Holotype: MHNG 1088/28; Type locality unknown (see Dijkstra, 1994: 476).

*Pecten nebulosus* Brown, 1835: 9. Type material not seen; Largs, mouth of the Clyde, Scotland.

*Pecten jamesoni* J. Smith, 1839: 106, pl. 2 fig. 1. Type material not seen; Hebrides.

*Pseudamussium septemradiatum*; Sabelli et al., 1990: 290; Rombouts, 1991: 57, pl. 20 fig. 9; Wagner, [1991]: 14, pl. 3 fig. 1, text-fig. 6; Poppe & Goto, 1993: 70, pl. 10 fig. 7; Jensen & Knudsen, 1995: 39; Zenetos, 1996: 77, map 22; M.C. Consolado Macedo et al., 1999: 393, figs.

*Pseudamussium (Pseudamussium) septemradiatum*; Gómez Rodríguez & Pérez Sánchez, 1997: 170, figs.

Material examined. — Mauritania: 3.120; 3.121; 3.140; 3.154; M.033; M.034; M.131; M.132/a; M.144.

Distribution. — Eastern Atlantic from Norway to Morocco, into the western Mediterranean Sea, living littorally to bathyal depths on soft sediments (mud, muddy sand, sand). Depth range of present material 114-325 m, living at 305-325 m.

Description. — Shell up to c. 65 mm in height, rather thin, translucent or opaque, compressed. Right valve slightly more convex than left one, almost orbicular, inequivalve, inequilateral. Auricles somewhat unequal in size; umbonal angle c. 95°. Both valves with 5-10, usually regularly arranged, radial plicae, on right valve broader than on left valve. Secondary radial scaly riblets, sometimes lacking, and microscopic radial striae on and between primary ribs. Microsculpture of commarginal lamellae in early growth stage. Hinge line straight, byssal notch and ctenolium weak. Colour brownish, creamy mottled, unusually white or purplish, right valve paler; interior glossy white.

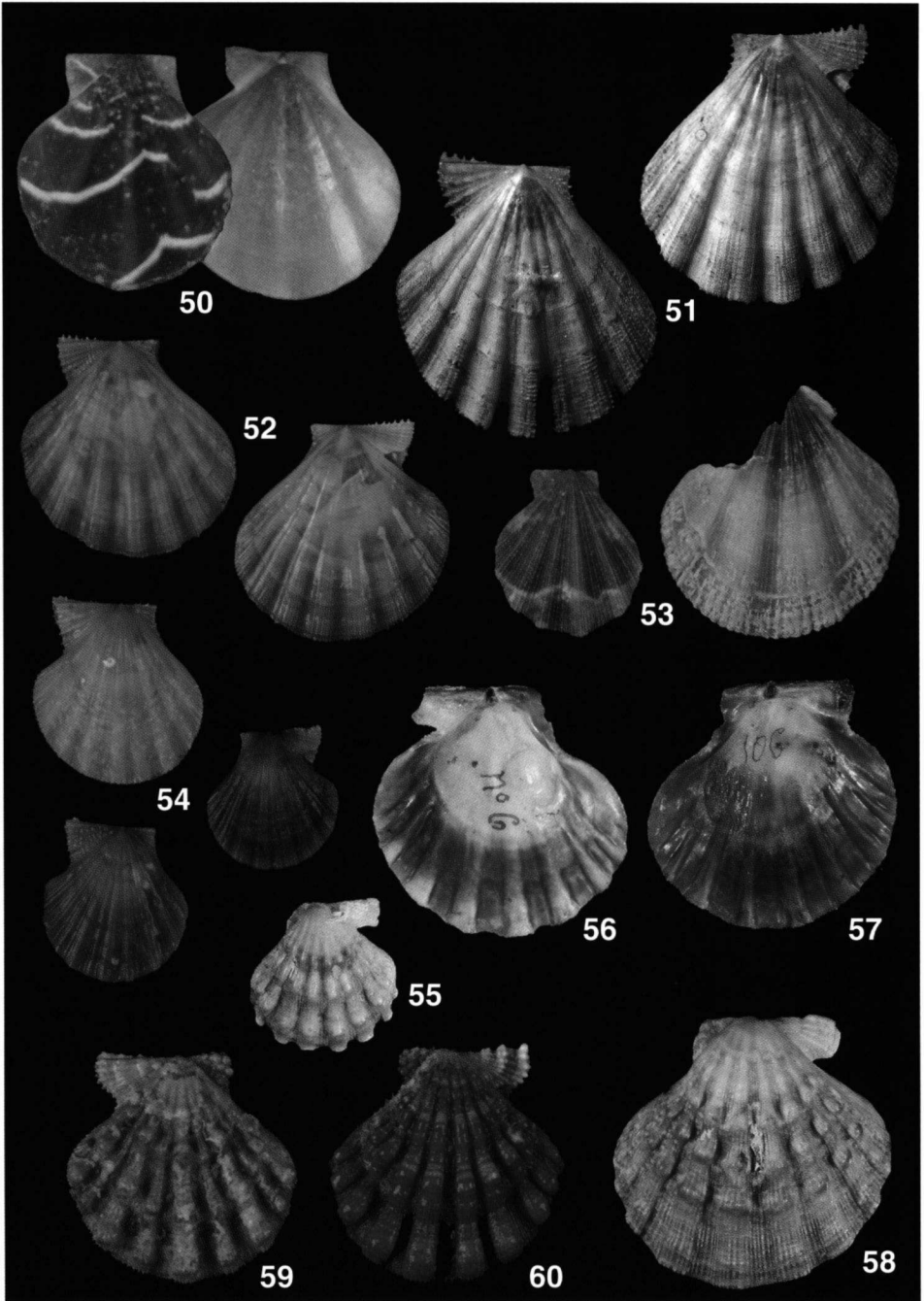
Remarks. — The present species is rather variable in shape, macro- and microsculpture. Material from the boreal region is usually larger (up to c. 65 mm high) and more prominently sculptured than from the southern region. The radial lirae are strongly variable.

*Pseudamussium alicei* (Dautzenberg & H. Fischer, 1897) **comb. nov.** (figs 51-52)

*Chlamys alicei* Dautzenberg & H. Fischer, 1897a: 22; 1897b: 188, pl. 5 figs 3-4. Syntypes: MOM 280136-8, KBIN (Dautzenberg collection; not registered), MNHN (not registered); type locality: "Hirondelle" (1888) stn 234 (70), Azores, 39°01'40"N, 30°15'40"W, 454 m; Poppe & Goto, 1993: 71.

Figs 50-60. *Pseudamussium* and *Bractechlamys* species. 50, *Pseudamussium peshutrael*, sta. 3.121: off Mauritania, 20°22'N 17°40'W, depth 210 m, 28.x.1978, lv (23.2 x 20.9 mm), exterior and sta. 3.154: off Mauritania, 19°21'N 16°56'W, depth 200 m, 31.x.1978, rv (23.1 x 21.3 mm), interior. Figs 51-52, *Pseudamussium alicei*; 51, syntype of *Chlamys alicei*, MOM 2801326-8, 1 spm, lv and rv, both exterior; 52, sta. 5.187: Azores, E of Flores, 39°27'N 31°05'W, depth 500-550 m, among fossil corals, 12.vi.1981, 1 spm (23.2 x 22.9 mm), lv and rv, both exterior; 53, *Pseudamussium clavatum*, sta. 5.121: Azores, N of São Jorge, 38°39'N 27°54'W, depth 250 m, 4.vi.1981, lv (13.3 x 11.8 mm), exterior, rv (broken, 20.3 x 19.2 mm), exterior; 54, *Pseudamussium sulcatum*, sta. 3.151: off Mauritania, 19°20'N 16°54'W, depth 280-320 m, 31.x.1978, 3 spms, lv (18.5 x 17.2 mm), exterior, lv (16.3 x 14.9 mm), exterior, rv (14.3 x 13.4 mm), exterior. Figs 55-60, *Bractechlamys corallinoides*. Figs 55-58, syntypes of *Pecten corallinoides*; 55, rv (21.7 x 21.3 mm), exterior; 56, rv (33.8 x 33.8 mm), interior; 57, lv (33.4 x 33.7 mm), interior; 58, rv (39.8 x 40.4 mm), exterior; 59, sta. 6.176: Cape Verde Islands, NW of São Vicente, 16°54'N 25°02'W, depth 54-62 m, 22.vi.1982, lv of spm (26.1 x 25.8 mm), exterior; 60, sta. 6.109: Cape Verde Islands, S of Santa Luzia, 16°44'N 24°46'W, depth 55-80 m, 16.vi.1982, rv of spm (26.7 x 26.7 mm), exterior.





*Chlamys (Chlamys) alicei*; de Boer, 1988: 188.

*Karnekampia alicei*; Wagner, 1988: 41; [1991]: 20, text-fig. 10.

Material examined. — Azores: 5.187/a; 5.187.

Distribution. — Temperate to tropical eastern Atlantic (40°N - 15°N), from the Azores southwards to the Cape Verde Islands; 355 m (Locard, 1989: 375) to 1229 m (Dautzenberg, 1927: 255). Present material living at 525 m.

Description. — Shell up to c. 30 mm in height, thin, higher than wide, valves convex and plicate, subequivalve and subequilateral. Auricles unequal. Left valve ornamented with 7-9 radial plicae, sometimes irregularly spaced. Ribs composed of coalesced hollow sections and delicate radial riblets, interstices with secondary radial riblets. In an early growth stage there is an antimarginal microsculpture, whereas the preradial stage has a fine, reticulate sculpture. Anterior auricle, much larger than the posterior, covered with 4-5 radial ribs and commarginal lamellae, more prominent to the disc flank; sculpture of posterior auricle weaker. Right valve with 8-10 more weak radial plicae, sometimes bifurcate, with hollow sections. Interstices with secondary radial riblets. Hinge line straight, with scales on the antero-dorsal margin. Byssal notch moderately deep, byssal fasciole broad. Active ctenolium well developed with 3-5 teeth. Colour monochrome whitish, cream, orange or yellowish.

Remarks. — The present species is very close to *Pseudamussium gilchristi* (G.B. Sowerby 3rd, 1904), known from the continental shelf of Namibia and South Africa (see Dijkstra & Kilburn, 2001). Both species are similar in shape and texture. More material of intermediate areas should be studied to see whether both taxa are partly sympatric.

#### *Pseudamussium clavatum* (Poli, 1795) (fig. 53)

*Ostrea clavata* Poli, 1795: 160, pl. 28 fig. 17. Type material not seen; Sicily (see Waller, 1993: 213).

*Ostrea inflexa* Poli, 1795: 160, pl. 28 figs 4-5. Type material not seen; Sicily (see also Waller, 1993: 213).

*Pecten dumastii* Payraudeau, 1826: 75, pl. 2 figs 6-7. Syntypes: MNHN (not registered); Corsica at Ajaccio, Santa-Giulia, and Algaïola.

*Peplum clavatum*; Lucas, 1979: 10 (figs), 11, 13 (figs); Wagner, [1991]: 16, fig. 7; Barash & Danin, 1992: 251.

*Pseudamussium (Peplum) clavatum*; de Boer, 1988: 187; Sabelli et al., 1990: 83, 290; Rombouts, 1991: 57, pl. 20 fig. 10.

*Pseudamussium clavatum*; Poppe & Goto, 1993: 70, pl. 10 fig. 6a-b; Zenetos, 1996: 77, map 22; M.C. Consolado Macedo et al., 1999: 392, figs; Ardovalini & Cossignani, 1999: 91, 2 figs.

Material examined. — Azores: 5.011; 5.070; 5.121.

Distribution. — Mediterranean Sea and adjacent region of the eastern Atlantic, rarely northwards to the Hebrides and southwards to the Cape Verde Islands. Living littorally to bathyal depths on soft sediments (mud or muddy sand). Present material dead in 240-255 m.

Description. — Shell up to c. 35 mm in height, usually smaller, rather solid, inflexed or pyxoid, higher than wide, inequivalve, inequilateral. Right valve slightly more convex than left one. Auricles unequal; umbonal angle c. 85°-90°. Left valve almost flat with 3 prominent radial lirae; smaller and weaker radial lirae laterally. Secondary imbricate radial sculpture (or absent) and radial microsculpture on disc. Commarginal micro-

sculpture in early growth stage. On anterior and posterior margins antimarginal microsculpture. Interspaces wider than lirae. Right valve with 2 prominent and 2 weaker radial lirae. Interspaces smaller than lirae. Sculpture similar to that on left valve. Auricles small, with antimarginal microsculpture and delicate squamous radial riblets. In early growth stage also commarginal sculpture on the anterior auricle of left valve. Hinge line straight. Byssal notch rudimentary. Active ctenolium very weak with 2-3 teeth. Left valve usually reddish, sometimes creamy (rarely white or whitish), with white or cream markings and delicate spots. Right valve paler.

Remarks. — This species is rather polymorphic, with compressed to strongly pyxoid valves. The macro- and microsculpture is variable.

*Pseudamussium sulcatum* (Müller, 1776) (fig. 54)

*Pecten sulcatus* Müller, 1776: 248. Type material not seen (not in ZMUC); type locality unknown.

*Ostrea arata* Gmelin, 1791: 3327. Type material not seen; "Oceano septentrionali" (NE Atlantic).

*Pecten bruei* Payraudeau, 1826: 78, figs 10-14. Syntypes: MNHN (not registered); "Les golfes de Sagone, d'Ajaccio, de Valinco, de Porto-Vecchio" (Corsica).

*Pecten idaeus* Reeve, 1853: species 153, pl. 33 fig. 153. Holotype: BMNH 19990407; type locality unknown.

*Chlamys bruei*; Poppe & Goto, 1993: 60, pl. 7 fig. 4a, b; Zenetos, 1996: 83; M.C. Consolado Macedo et al., 1999: 393, figs.

*Chlamys (Chlamys) sulcata*; Tebble, 1976: 59, pl. 6 fig. f.

*Karnekampia bruei*; Wagner, 1988: 41, 43 fig. 1; [1991]: 18, pl. 3 fig. 2, text-fig. 8.

*Karnekampia sulcata*; Wagner, 1988: 41, 43 fig. 2; [1991]: 19, pl. 3 fig. 4, text-fig. 9.

*Chlamys (Karnekampia) bruei*; Sabelli et al., 1990: 292; Gómez Rodríguez & Pérez Sánchez, 1997: 175, figs.

*Chlamys (Chlamys) bruei*; Rombouts, 1991: 9, pl. 23 fig. 5.

*Pseudamussium sulcatum*; Waller, 1991: 18, 35.

Material examined. — Mauritania: 3.151; M.035; M.040; M.040/a. Cape Verde Islands: 6.093.

Distribution. — NE. Atlantic to tropical SE. Atlantic, from N. Norway and Iceland, southwards to the Macaronesian Archipelago and into the Mediterranean Sea. Living sublittorally to bathyal depths, byssally attached to rocks or amongst gravel and/or rubble on soft sediments. Depth range of present material 200-500 m, living at 500 m.

Description. — Shell up to c. 30 mm in height, thin, compressed, strongly polymorphic, orbicular, slightly higher than wide, inequivalve. Left valve somewhat more convex than right valve, rather equilateral. Auricles unequal; umbonal angle c. 90°. Left valve sculptured with 15-40 irregularly arranged, primary costae, somewhat hollow or more solid, with tubercles, spines or lamellae. Interstitial secondary radial riblets commence near central part of disc and increase towards the ventral margin. Primary and secondary ribs sometimes nearly equal in strength and closely spaced. Right valve with more clustered radial ribs to more equally spaced. Interstitial commarginal lamellae in radial stage. Antimarginal microsculpture laterally and on auricles, absent on anterior auricle of right valve. Auricles with 3-6 radial riblets and commarginal riblets in early growth stage on anterior auricle of left valve. Hinge line straight. Byssal notch moderately deep, byssal fasciole broad. Active ctenolium well developed with 4-6 teeth. Colour variable, usually uniform whitish, creamy orange or deep-red with commarginal bands.

Remarks. — Some authors consider *P. sulcatum* and *P. bruei* distinct species (Nordsieck, 1969; Wagner, [1991]), but both are strongly variable in sculpture and intergrade.

## Tribe Decatopectinini Waller, 1986

Genus *Bractechlamys* Iredale, 1939

*Bractechlamys* Iredale, 1939: 366. Type species (by original designation): *Bractechlamys evecta* Iredale, 1939; Recent, N. Queensland.

Diagnosis. — Solid Decatopectinini, suborbicular to oblong, about equally convex, with radial sculpture (costate and liriate, commonly nodose ribs, and interspaces); commarginal microsculpture throughout ontogeny. Auricles unequal to subequal. Byssal notch moderately deep; ctenolium weak to well-developed.

Distribution. — Recent (Hayami, 1989). Subtropical and tropical eastern Atlantic, tropical Indo-Pacific; littoral to sublittoral depths.

Remarks. — Hertlein (1969: N360) treated *Bractechlamys* as a junior synonym of *Semipallium* Jousseaume [sic], 1928, in the "Decatopecten-group". Currently *Bractechlamys* is considered a distinct genus in the Decatopectinini (Waller, 1986: 41).

*Bractechlamys corallinoides* (d'Orbigny, in Webb & Berthelot, 1839) comb. nov.  
(figs 55-60)

*Pecten corallinoides* d'Orbigny, in Webb & Berthelot, 1839: 102, pl. 7b figs 20-22. Syntypes: BMNH 1854.9.28.162/1-3; off Santa Cruz de Tenerife, Tenerife, Canary Islands [on label "Santa Cruz"].

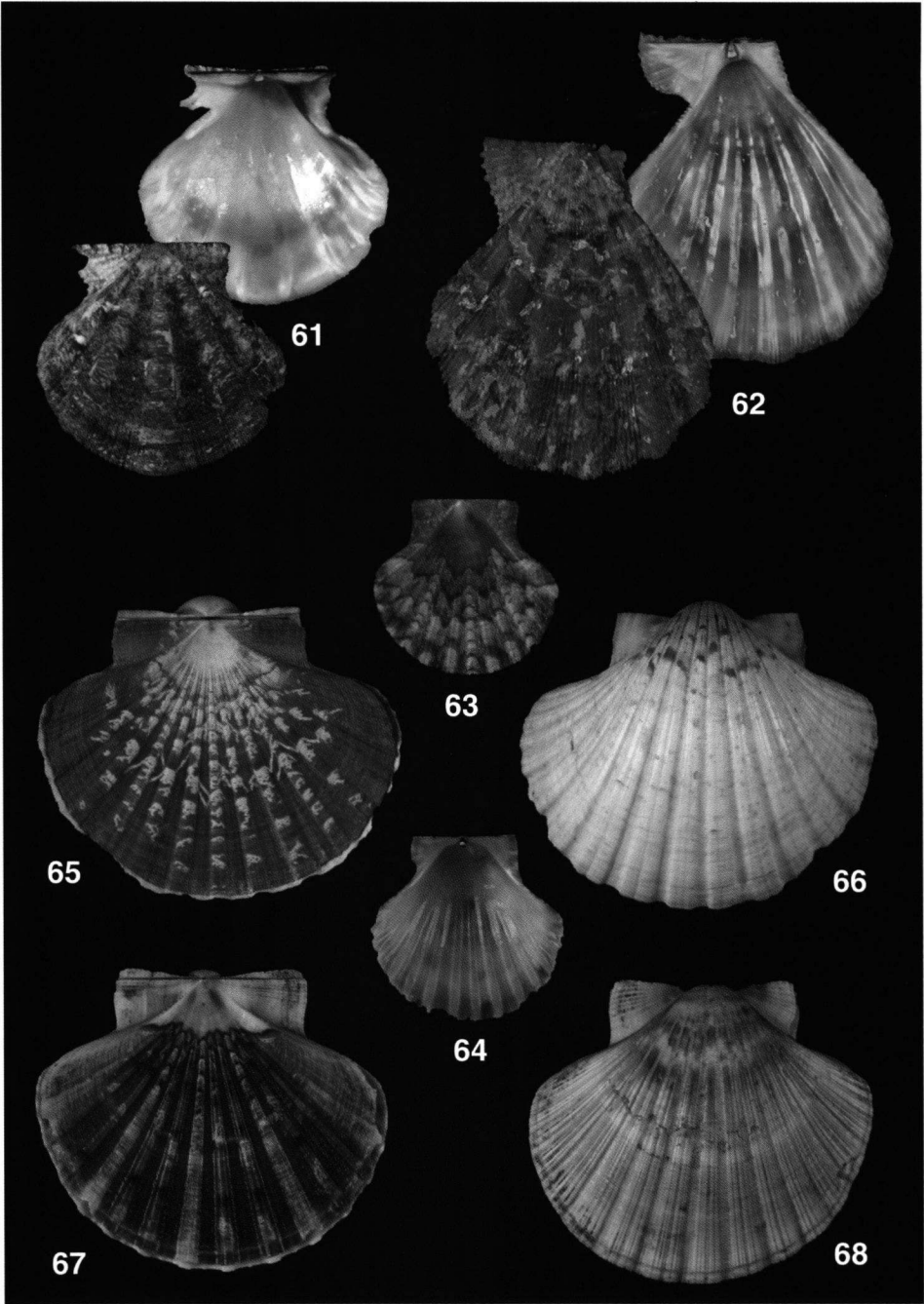
*Nodipecten corallinoides*, J.T. Smith, 1991: 91, pl. 7 figs 3-4; Wagner, [1991]: 23, fig. 12; Poppe & Goto, 1993 66, pl. 9 fig. 10; M.C. Consolado Macedo et al., 1999: 391, figs.

*Nodipecten (Nodipecten) corallinoides*; de Boer, 1988: 189, figs 112, 113.

*Chlamys (Nodipecten) corallinoides*; Gómez Rodríguez & Pérez Sánchez, 1997: 177, figs.

Material examined. — Azores: 5.006; 5.007; 5.008; 5.053; 5.054; 5.055; 5.058; 5.064; 5.068; 5.077; 5.078; 5.079; 5.084; 5.088; 5.091; 5.092; 5.095; 5.100; 5.101; 5.105; 5.108; 5.112; 5.113; 5.114; 5.118; 5.119; 5.124; 5.125; 5.133; 5.134; 5.136; 5.144; 5.145; 5.162; 5.D05; AZO.011; AZO.25b. Madeira: 1.029; 1.040; 1.067; 1.081; 1.D48; 1.D82; 3.002; 3.007; 3.009; 3.056; 3.D04. Morocco: 1.121. Canary Islands: 2.003; 2.010; 2.012; 2.013; 2.022; 2.024; 2.030; 2.033; 2.035; 2.043; 2.049; 2.050/a; 2.050; 2.073; 2.075; 2.D07/a; 2.D08; 2.D10; ?2.K14b; 4.002; 4.009; 4.010; 4.015; 4.016; 4.017; 4.018; 4.023; 4.024; 4.038; 4.039; 4.044; 4.048; 4.049; 4.068; 4.070; 4.139; 4.D09; 4.K01; 4.K11. Selvagens Archipelago: 3.063; 3.064; 3.065; 3.066; 3.080; 3.081; 3.084; 4.103. Cape Verde Islands: 6.001; 6.004; 6.005; 6.006; 6.007; 6.008; 6.015; 6.040; 6.044; 6.056; 6.058; 6.059; 6.060; 6.062; 6.063; 6.064; 6.066; 6.071; 6.073; 6.077; 6.078; 6.082; 6.083; 6.084; 6.092; 6.101; 6.103; 6.105; 6.107; 6.108; 6.109/a; 6.109; 6.110; 6.110/a; 6.111; 6.114; 6.128; 6.130; 6.131/a; 6.131; 6.136; 6.137; 6.141; 6.146; 6.147; 6.156; 6.159; 6.160; 6.161; 6.162; 6.169; 6.171; 6.174; 6.175; 6.176/a; 6.V02/a; 7.023; 7.031; 7.032; 7.033; 7.036; 7.036/a;

Figs 61-68. *Flexopecten*, *Manupecten* and *Pecten* species. 61, *Flexopecten flexuosus*, sta. 1.D117: S coast of Madeira, W of Funchal harbour, 32°38'N 16°56'W, diving to 20 m, 20.iii.1976, 1 spm (23.7 x 24.7 mm), lv, exterior, rv, interior; 62, *Manupecten pesfelis*, sta. 4.D03: Canary Islands, SE coast of Lanzarote, Arrecife, 28°57'N 13°33'W, depth to 15 m, 21.v.1980, 1 spm (46.6 x 39.4 mm), lv, exterior and rv, interior. Figs 63-66, *Pecten keppelianus*; 63-64, sta. 7.166: Cape Verde Islands, NE of São Vicente, Baía das Gatas, 16°53'N 24°53'W, depth 50 m, 6.ix.1986, 1 young spm (21.8 x 22.2 mm); 63, lv, exterior; 64, rv, interior; 65-66, Cape Verde Islands, coll. J. Mulder (RMNH), 1 spm (66.1 x 77.0 mm); 65, lv, exterior; 66, rv, exterior. Figs 67-68, *Pecten jacobaeus*, sta. 3.058: SE of Madeira, 32°42'N 16°44'W, depth about 100 m, 20.x.1978, 1 spm (68.7 x 78.6 mm); 67, lv, exterior; 68, rv, exterior.



7.042; 7.043; 7.067; 7.075; 7.079; 7.085; 7.086; 7.088; 7.090; 7.091; 7.093; 7.101; 7.102; 7.105; 7.106; 7.110; 7.141; 7.141/a; 7.142; 7.143; 7.145; 7.155; 7.156; 7.159; 7.161; 7.166; 7.166/a.

Distribution. — Subtropical to tropical eastern Atlantic from the Azores southwards to the Cape Verde Islands. Living littorally to sublittoral depths amongst coral rubble on sandy bottoms. Depth range of present material 0-480 m, living at 10-90 m.

Description. — Shell up to c. 50 mm in height, usually smaller, solid, orbicular, usually commarginally undulated, slightly equivalve and equilateral. Right valve somewhat more convex than left one. Auricles very unequal in size; umbonal angle c. 95°. Left valve ornamented with 8-9 primary, radial, nodose lirae. The nodose sculpture is usually very strongly developed, rarely weak or even lacking. Secondary sculpture consists of delicate, closely spaced, radial riblets throughout ontogeny and intercostal commarginal microsculpture. Anterior auricle with 6-8 radial riblets and prominent intercostal commarginal lamellae; posterior with 2-3 radial riblets near disc and 2 radial, heavily nodose ribs near dorsal margin. Right valve similarly sculptured as left valve, although with 7-8 broader primary lirae. Anterior auricle with 5-6 radial riblets. Prominent squamose sculpture on dorsal margin. Posterior auricle with 2 radial riblets near disc and 2 heavily nodose ribs near dorsal margin. Hinge line straight. Byssal notch moderately deep, byssal fasciole rather broad. Active ctenolium with 4-6 teeth. Colour left valve usually deep reddish or creamy, stained and dotted, right valve paler.

Remarks. — Reeve (1852: species 26) supplied the present species with a wrong locality 'Zanzibar', subsequently followed by other authors. The Indo-West Pacific species is *Bractechlamys nodulifera* (G.B. Sowerby 2nd, 1842) and mainly differs from *B. corallinoides* in having a more closely spaced commarginal microsculpture, less prominent sculptured auricles and a different colour pattern.

Nordsieck (1969: 54) and Rombouts (1991: 45) placed the present species in *Lyropecten*.

### Genus *Flexopecten* Sacco, 1897

*Flexopecten* Sacco, 1897b: 38, 73, pl. 12 figs 24-26 (as a subgenus of *Chlamys*). Type species (by original designation): *Ostrea flexuosa* Poli, 1795; Recent, off Sicily, Italy.

Diagnosis. — Byssate and free 'swimming' Decatopectinini, having closely spaced commarginal lamellae, antimarginal microsculpture in early growth stage and radial plicae (rarely absent), orbicular. Right valve usually more convex than left one. Auricles nearly equal. Byssal notch moderately deep. With delicate ctenolium.

Distribution. — Miocene to Recent. Mediterranean Sea and adjacent eastern Atlantic, and western S Atlantic; littoral to sublittoral depths.

Remarks. — Hertlein (1969: N357) treated *Flexopecten* as a subgenus of *Chlamys* Röding, 1798, placed in the *Chlamys*-group. Waller (1986: 40) raised *Flexopecten* to the genus level and placed it in the tribe Decatopectinini.

### *Flexopecten flexuosus* (Poli, 1795) (fig. 61)

*Ostrea flexuosa* Poli, 1795: 160, pl. 28 fig. 11. Type material not seen; Sicily (see Waller, 1993: 213).

*Pecten isabella* Lamarck, 1819: 109. Lectotype: MHNG 1088/48/1, designated by Dijkstra (1994: 482); "Golfe de Tarente" [Mediterranean Sea].

*Pecten plicatulus* Risso, 1826: 296. Lectotype: MNHN (not registered), designated by Arnaud (1977: 129); "Environs de Nice et des Alpes maritimes" (Mediterranean Sea).

*Flexopecten flexuosus*, Lucas, 1980: 3, figs; de Boer, 1988: 189, fig. 111; Rombouts, 1991: 40, pl. 25 figs 5, 7a; Wagner, [1991]: 35, pl. 5 figs 6-7, text-fig. 19; Barash & Danin, 1992: 253, fig. 270.

*Chlamys flexuosa*, Poppe & Goto, 1993: 61, pl. 8 fig. 1a-f; Zenetos, 1996: 83, map 26; M.C. Consolado Macedo et al., 1999: 394, figs.

*Chlamys (Flexopecten) flexuosa*; Sabelli et al., 1990: 292; Gómez Rodríguez & Pérez Sánchez, 1997: 173, figs.

Material examined. — Azores: 5.006; 5.007; 5.008; 5.048; 5.053; 5.054; 5.056; 5.064; 5.068; 5.077; 5.092; 5.108; 5.112; 5.113; 5.114; 5.119; 5.124; 5.125; 5.145; 5.183. Madeira: 1.040; 1.067; 1.D117; 1.D82; 3.002; 3.007; 3.008; 3.009; 3.016; 3.041. Selvagens Archipelago: 3.064; 3.081; 3.083. Canary Islands: 2.003; 2.012; 2.013; 2.022; 2.024; 2.030; 2.031; 2.033; 2.035; 2.043; 2.065; 2.073; 2.074; 2.075; 4.002; 4.010; 4.016; 4.024; 4.067; 4.140.

Distribution. — Central and western region of the Mediterranean Sea and adjacent area of the eastern Atlantic from Portugal southwards to the Cape Verde Islands. Living sublittorally to bathyal depths amongst seaweed and rubble on sandy or muddy sand bottoms. Present material dead in 20-2450 m.

Description. — Shell up to c. 45 mm in height, usually smaller, thin to solid, polymorphic, semi-orbicular, inequivalve, slightly equilateral. Right valve somewhat more convex than left one. Auricles unequal; umbonal angle c. 85°-95°. Valves compressed to strongly pyxoid. Left valve sculptured with 3-5 primary radial plicae and secondary interstitial radial riblets (also absent) near ventral margin. Right valve with 5-6 plicae, sometimes weakly bipartite. Valves rarely smooth. Microsculpture of closely spaced commarginal lamellae throughout ontogeny. Anterior auricle larger in size than posterior, and sculptured with delicate 4-7 radial riblets, or smooth. Anterior auricle of right valve without microsculpture. Hinge line straight. Byssal fasciole narrow, byssal notch relatively deep. Active ctenolium with 4-5 teeth on suture. Colour strongly variable, valves monochrome or polychrome.

Remarks. — Juveniles of the present species can be easily confused with juveniles of *Flexopecten glaber* (Linnaeus, 1758) or *Flexopecten hyalinus* (Poli, 1795).

Many variations of form and colour are enumerated by Locard (1888: 108).

#### Tribe Pectinini Wilkes, 1810

#### Genus *Pecten* Müller, 1776

*Pecten* Müller, 1776: 248. Type species (subsequent designation by Schmidt, 1818): *Ostrea maxima* Linnaeus, 1758; Recent, eastern Atlantic.

Diagnosis. — Byssally attached (early ontogeny), non-attached (late ontogeny) Pectinini. Left valve flat or concave. Right valve strongly convex. Auricles equal or nearly equal in size. Preradial stage of left valve generally smooth or rarely delicately pitted. Macrosculpture of regularly arranged radial lirae or plicae with secondary sculpture of radial riblets or grooves, microsculpture of commarginal lamellae. Auricular crura with intermediate tooth.

Distribution. — Upper Eocene to Recent. Eastern Atlantic and Indo-Pacific, littorally to sublittorally.

Remarks. — For phylogeny and distribution of Pectinini, see Waller in Shumway (1991: 36) and Waller (1993: 199).

*Pecten jacobaeus* (Linnaeus, 1758) (figs 67-68)

*Ostrea jacobaea* Linnaeus, 1758: 696, no. 155; Dijkstra, 1999: 392, fig. 8B (type data). Lectotype: UUZM (not registered), designated by Dijkstra (1999: 393, fig. 8B); "M. Mediterraneo" (Mediterranean Sea).

*Pecten jacobaeus*; Rombouts, 1991: 51, pl. 19 figs 1, 1a; Wagner, [1991]: 46, pl. 7 figs 1-2, text-fig. 25; Barash & Danin, 1992: 249, fig. 266; Poppe & Goto, 1993: 67, pl. 10 figs 2a-b; Gómez Rodríguez & Pérez Sánchez, 1997: 160, fig.; M.C. Consolado Macedo et al., 1999: 390, figs; Rolán & Ryall, 1999: 74.

*Pecten (Pecten) jacobaeus*; de Boer, 1988: 190, figs 114-115; Zenetos, 1996: 74, map 20.

Material examined. — Madeira: 1.025; 1.040; 1.108; 1.D117; 3.002; 3.016; 3.058/a; 3.060; 3.066. Canary Islands: 2.012; 2.021; 2.022; 2.048; 2.067; 2.075; 2.081; 2.084; 4.013; 4.071; 4.133; 4.138; 4.148. Azores: 5.007; 5.008; 5.048; 5.053; 5.054; 5.058; 5.064; 5.068; 5.077; 5.078; 5.079; 5.082; 5.083; 5.084; 5.092; 5.098; 5.100; 5.105; 5.106; 5.112; 5.119; 5.124; 5.126; 5.128; 5.131; 5.132; 5.133; 5.134; 5.135; 5.141; 5.144; 5.145; 5.148; 5.153; 5.159; 5.162; 5.166; 5.173; 5.176; 5.187; 5.190.

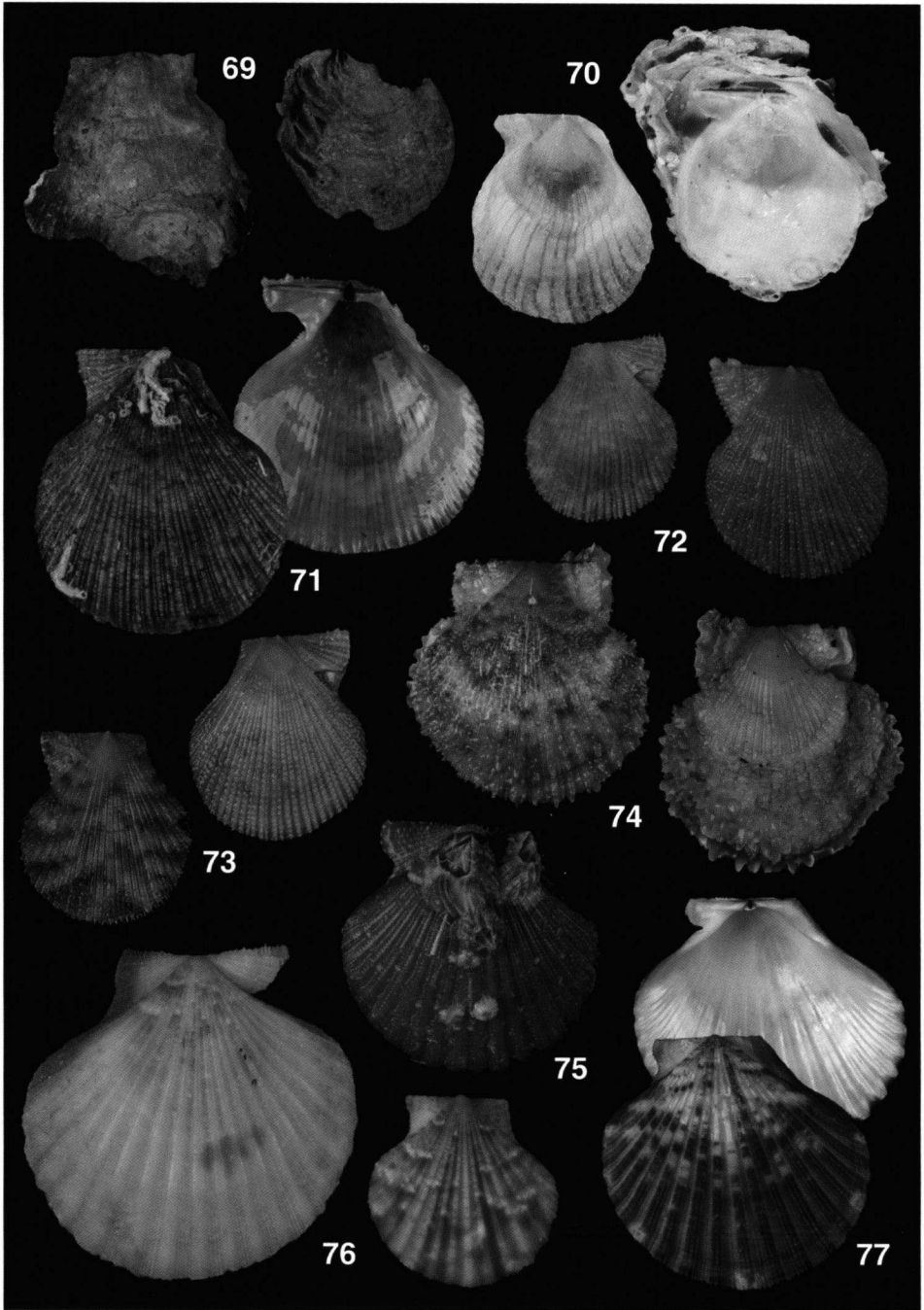
Distribution. — Mediterranean Sea and adjacent region of the Atlantic, from the Iberian coast, the Azores, Madeira, the Canary Islands, and along the coast of Morocco. Living littorally to bathyal depths on soft sediments (sand, mud). Depth range of present material 20-2465 m, living at 100 m.

Description. — Shell up to c. 150 mm in height, solid, suborbicular, wider than high, inequivalve, nearly equilateral. Left valve slightly concave (juveniles), flat (adult). Right valve convex. Auricles subequal in size; umbonal angle c. 105°. Both valves sculptured with 14-17, regularly arranged, prominent radial costae, high rounded on left valve, more angular on right valve. Secondary radial riblets (2-6) on primary ribs of right valve. Closely spaced commarginal lamellae in interstices, weak on ribs. Hinge line straight. Byssal notch very weak. Active ctenolium absent. Colour very variable, uniform or mottled, right valve paler or whitish.

Remarks. — Present material from the northern Macaronesian archipelago and examined material from the Iberian coast (HD) is atypical (right valve with more rounded radial ribs).

Figs 69-77. *Talochlamys* and *Aequipecten* species. Figs 69-70, *Talochlamys abscondita*; 69, sta. 6.088: Cape Verde Islands, SW of São Nicolau, 16°34'N 24°23'W, depth 460-540 m, 14.vi.1982, lv (58.5 x 56.6 mm), exterior, rv (47.4 x 42.2 mm), exterior (both 'sub'fossil); 70, syntype of *Hinnites absconditus*, MNHN, not catalogued, 1 spm, lv, exterior (31.0 x 27.0 mm) and rv, interior, in substrate; 71-72, *Talochlamys multistriata*; 71, sta. 6.D09: Cape Verde Islands, SW coast of Santo Antão, W of Monte Trigo, 16°59'N 25°20'W, depth to 20 m, 7.vi.1982, 1 spm (25.1 x 22.4 mm), lv, exterior and rv, interior; 72, sta. 2.029: Canary Islands, S of Fuerteventura, Punta de Gran Tarajal, 28°12'N 13°53'W, depth 70 m, 27.viii.1977, rv of spm (12.4 x 10.6 mm), exterior and lv of spm (14.7 x 12.6 mm), exterior; 73-74, *Talochlamys pusio*; 73, sta. 5.D10: Azores, E coast of Flores, S of Santa Cruz, 39°26'N 31°09'W, depth to 15 m, 9.vi.1981, lv of spm (10.5 x 9.3 mm), exterior and rv of spm (11.1 x 9.7 mm), exterior; 74, sta. 5.K10: Azores, N coast of Sao Jorge, Faja da Caldeira, 38°38'N 27°56'W, shore collecting, 13.vi.1981, 1 spm (27.1 x 24.7 mm), lv, exterior and rv, exterior; 75, *Aequipecten flabellum*, sta. 3.125: off Mauritania, 19°00'N 16°24'W, depth 21 m, 29.x.1978, 1 spm (30.6 x 31.7 mm), lv, exterior; 76, *Aequipecten opercularis*, sta. MAU.130: Mauritania, off Banc d'Arguin, 20°25'N 17°40'W, depth 95-100 m, 20.vi.1988, rv (37.2 x 37.4 mm), exterior and lv (21.6 x 21.3 mm), exterior; 77, *Aequipecten commutatus*, sta. MAU.094: Mauritania, off Banc d'Arguin, 19°32'N 17°01'W, depth 110 m, 15.vi.1988, 1 spm (29.8 x 31.3 mm), lv, exterior and rv, interior.





*Pecten keppelianus* G.B. Sowerby 3rd, 1905 (figs 63-66)

*Pecten keppelianus* G.B. Sowerby 3rd, 1905: 279. Holotype: BMNH 1905.10.23.50; "Ascension Island (?)". See also Sowerby 3rd (1905: 279); Bernard, 1984: 112, pl. 62 fig. 229; Gofas et al., [1986]: 110, fig. 46b-c; Rolán & Ryall, 1999: 74.

*Pecten* (*Pecten*) *keppelianus*; de Boer, 1988: 190.

Material examined. — Mauritania: 3.113; 3.131; 3.132; 3.162; 3.172; 3.187; 3.191; M.016; M.020/a; M.021/a; M.049/a; M.049; M.069; M.070/a; M.071/a; M.072; M.080; M.101; M.113; M.114/a; M.114; M.115; M.116; M.117; M.122/a; M.122; M.124/a; M.124; M.125; M.126; M.127; M.130; M.137; M.138; M.139. Cape Verde Islands: 6.007; 6.059; 6.060; 6.062; 6.064/a; 6.065; 6.071; 6.073; 6.088; 6.092; 6.097; 6.103; 6.107; 6.109/a; 6.109; 6.110; 6.111; 6.137; 6.160; 6.164; 7.033; 7.042; 7.079; 7.110; 7.166/a.

Distribution. — Tropical eastern Atlantic, from Cape Verde Islands, Mauritania southwards to Angola. Living littorally to sublittoral depths on soft sediments (sand, mud). Depth range of present material 12-1200 m, living at 12-80 m.

Description. — Shell up to c. 80 mm in height, solid, orbicular (juvenile), suborbicular (adult), wider than high, inequivalve, nearly equilateral. Left valve slightly concave. Right valve strongly convex. Auricles subequal in size; umbonal angle c. 105°. Both valves sculptured with 10-12, regularly arranged, primary prominent radial costae, laterally weak, small and highly rounded to angular on left valve, broad low angular on right valve. Primary ribs with 1-3 delicate grooves. Interstitial secondary radial riblets commence on central part of left valve and increase to ventral margin. Microsculpture of commarginal lamellae between ribs (widely spaced) and on auricles (closely spaced). Hinge line straight. Byssal notch very weak. Active ctenolium absent. Colour left valve orange to deep red with creamy maculations near umbo and on primary ribs, right valve paler to whitish.

Remarks. — The present species is close to *P. jacobaeus*, but smaller (up to c. 80 mm high) and differs in having more angulated radial ribs with interstitial secondary riblets on the left valve (highly rounded of *P. jacobaeus* with very weak interstitial secondary riblets) and a more convex right valve with weaker angulated radial ribs. Present fossil specimens of *P. jacobaeus* from the Azores are of exceptionally large dimension (over 200 mm wide).

Subfamily Chlamydinæ von Teppner, 1922

Tribe Chlamydini von Teppner, 1922

Genus *Manupecten* Monterosato, 1889

*Manupecten* Monterosato, 1889: 21 (as a subgenus of *Chlamys*). Type species (subsequent designation by Sacco, 1897): *Ostrea pesfelis* Linnaeus, 1758.

Diagnosis. — Byssate Chlamydini, elongate, primary radial liræ and secondary radial riblets, prominent shagreened microsculpture throughout ontogeny, posterior auricles with tubercles.

Distribution. — Miocene to Recent. Mediterranean Sea and adjacent region of the eastern Atlantic; living littorally to sublittoral depths.

Remarks. — *Manupecten* is closely allied to the Indo-West Pacific *Semipallium* Jousseau, in Lamy, 1928, but differs in having a more prominent shagreen microsculpture (more delicate in *Semipallium*) and tubercles on the posterior auricles (absent in *Semipallium*).

*Manupecten pefelis* (Linnaeus, 1758) (fig. 62)

*Ostrea pefelis* Linnaeus, 1758: 697, no. 165. Lectotype: LSL (not registered), designated by Dijkstra (1999: 409, fig. 3C-F); "O. Africano" (incorrect locality). New, restricted type locality: Mediterranean Sea (see Dijkstra, 1999: 410)

*Ostrea elongata* Born, 1778: 86; 1780: 103, pl. 6 fig. 2. Syntype: NHMW (not registered), locality unknown.

*Ostrea corallina* Poli, 1795: 164, pl. 28, fig. 16. Type material not seen; Sicily (see Waller, 1993: 212).

*Pecten bornii* Payraudeau, 1826: 76. Syntype: MNHN (not registered); "Le golfe d'Ajaccio et les bouches de Bonifacio", Corsica.

*Manupecten pefelis*; Lucas, 1979: 15, figs; Barash & Danin, 1992: 252, fig. 269; Poppe & Goto, 1993: 66, pl. 9 fig. 9a-b; Rolán & Ryall, 1999: 75.

*Chlamys pefelis*; M.C. Consolado Macedo et al., 1999: 395, 2 textfigs.

*Chlamys (Chlamys) pefelis*; de Boer, 1988: 188, fig. 109.

*Manupecten (Manupecten) pefelis*; Wagner, [1991]: 21, pl. 3 fig. 3, text-fig. 11.

*Chlamys (Manupecten) pefelis*; Zenetos, 1996: 84, map 26.

Material examined. — Madeira: 1.029; 1.072; 1.108; 1.D39; 1.D58; 1.K14. Canary Islands: 2.D05; 2.D08; 2.K14b; 3.D05; 4.044; 4.071; 4.093; 4.139; 4.D01; 4.D03; 4.D04; 4.D09. Selvagens Archipelago: 3.D06; 3.D08. Cape Verde Islands: 6.004; 6.008; 6.040; 6.088; 7.026; 7.030; 7.080.

Distribution. — Mediterranean Sea and adjacent region of eastern Atlantic from Portugal southwards to the Cape Verde Islands. Living littorally to bathyal depths amongst coral rubble or gravel on sandy bottoms. Present material dead in 0-540 m.

Description. — Shell up to c. 75 mm in height, usually smaller, elongate, thin, not transparent, compressed, inequivalve, inequilateral, sometimes slightly oblique. Right valve slightly more convex than left one. Auricles strongly unequal in size; umbonal angle c. 75°. Both valves sculptured with 6-7 prominent, regularly arranged, radial plicae, and secondary radial riblets on and between plicae. Shagreen (reticulated) microsculpture throughout. Anterior auricles with 10-12 radial riblets, on posterior fewer (4-5), with vesicles near dorsal margin. Hinge line declined posteriorly. Byssal notch moderately deep. Active ctenolium with 4-6 teeth. Colour variable, creamy, reddish, orange, yellowish, uniform in colour or maculated, right valve paler.

Remarks. — Our material from the Canary Islands is atypical and mainly differs from the type material in having flat radial lirae or nearly a smooth surface (typical: high rounded radial lirae).

Tümtürk (1989: 16) differentiated three morphs of *M. pefelis*: Ligurian morph (regularly arranged, prominent radial lirae: typical), Aegean morph (irregularly arranged radial lirae) and the Canarian morph (see above).

*Mimachlamys* Iredale, 1929: 162. Type species (by original designation): *Pecten asperrimus* Lamarck, 1819; Recent, southern Australia.

**Diagnosis.** — Non-cemented, byssally attached Mimachlamyidini. Shell convex with regularly arranged, primary radial ribs, flanked with secondary riblets; granulated microsculpture in preradial stage, divaricate or antimarginal intercostal microsculpture. Auricles unequal; byssal notch relatively, byssal fasciole rather broad; ctenolium well developed.

**Distribution.** — Eocene to Recent (Waller, 1991: 32). Southwestern, southern, and southeastern Australia, living littorally to sublittoral depths.

**Remarks.** — Hertlein (1969: N355) treated *Mimachlamys* as a synonym of *Chlamys* Röding, 1798. Waller (1991: 31; 1993: 200) established the morphological differences between *Chlamys* and *Mimachlamys*, and placed the latter genus in the Mimachlamyidini.

### *Mimachlamys varia* (Linnaeus, 1758)

*Ostrea varia* Linnaeus, 1758: 698, no. 168. Lectotype: LSL (not registered), designated by Dijkstra (1999: 416, fig. 5A-D); "O. australiore" (incorrect locality). Locality mentioned by Dijkstra (1999: 416): Brittany, France.

*Pecten monotis* Da Costa, 1778: Type material not seen; England.

*Ostrea muricata*, *Ostrea aculeata*, *Ostrea subrufa*, *Ostrea ochroleuca*, *Ostrea mustelina*, *Ostrea flammea*, *Ostrea versicolor*, all of Gmelin, 1791: Type material not seen. Type localities unknown.

*Chlamys varia*; Lucas, 1979: 4, figs; Barash & Danin, 1992: 250, fig. 267; Poppe & Goto, 1993: 64, pl. 9 fig. 6a-c, text-fig. 16; Jensen & Knudsen, 1995: 39; Zenetos, 1996: 82, map 26; M.C. Consolado Macedo et al., 1999: 396, figs; Rolán & Ryall, 1999: 74.

*Chlamys (Chlamys) varia*; Rombouts, 1991: 20, pl. 8 figs 1, 1a, 1b; Gómez Rodríguez & Pérez Sánchez, 1997: 172, illustr.

*Mimachlamys varia*; Waller in Shumway, 1991: 31, pl.3 figs 14-16.

**Material examined.** — Selvagens Archipelago: 3.064. Mauritania: M.125.

**Distribution.** — Boreal to tropical eastern Atlantic from Norway southwards to the Cape Verde Islands, and into the Mediterranean Sea. Living littorally to sublittoral depths, byssally attached to rocks or amongst rubble on soft sediments (mud, muddy sand or sand). Present material dead in 47-90 m.

**Description.** — Shell up to c. 100 mm in height, usually much smaller, solid, elongate, valves nearly equally convex, equivalve, equilateral, auricles very unequal in size, umbonal angle c. 80°. Both valves with 26-36 regularly arranged, high rounded, spinous radial ribs, microsculpture of commarginal lamellae in early growth stage and antimarginal striae, both in interstices. Hinge line straight, somewhat declined on posterior side, byssal notch deep, active ctenolium well developed. Colour very variable, white, creamy, yellow, orange, red, brown, purplish or violet, uniform or mottled.

**Remarks.** — The present species is sparingly distributed throughout the Macaronesian Archipelago and offshore western Africa.

*M. varia* was generally placed in *Chlamys*, but recently Waller (1991; 1993) treated the present species as a representative of *Mimachlamys*.

### Genus *Talochlamys* Iredale, 1929

*Talochlamys* Iredale, 1929: 164 (as a subgenus of *Mimachlamys*). Type species (by original designation): *Chlamys famigator* Iredale, 1925 [= *Pecten pulleineanus* Tate, 1887]; Living, New South Wales, 91-127 m.

Diagnosis. — Byssally attached and cemented Mimachlamyidini. Shell convex with irregularly arranged, primary radial ribs, flanked with irregularly commenced secondary riblets; granulated microsculpture in preradial stage, intercostal commarginal sculpture usually in early radial stage and antimarginal microsculpture throughout, more prominent laterally, auricles unequal, byssal notch relatively, byssal fasciole rather broad, ctenolium well developed.

Distribution. — Oligocene to Recent (Beu, 1995). Indo-West Pacific and eastern Atlantic. Living littorally to bathyal depths.

Remarks. — For more information on *Talochlamys* and representative species see Beu (1995: 17).

*Talochlamys abscondita* (P. Fischer, in Locard, 1898) **comb. nov.**  
(figs 69-70)

*Hinnites* ? *absconditus* P. Fischer, in Locard, 1898: 408, pl. 18 figs 9-11. Syntypes: MNHN (not registered); "Talisman" 1883 stn 103, Cape Verde Islands, Santo Antao Island, 225 m (S. Gofas, in litt.).

*Hinnites* ? *absconditus* var. *submutica* [sic] P. Fischer, in Locard, 1898: 409.

*Hinnites absconditus*; Lucas, 1980: 6, fig.; Gofas et al., [1986]: 110, fig. 46a; Rolán & Ryall, 1999: 75.

*Chlamys* (f. acc. *Hinnites*) *abscondita*; Adam, 1960: 1-10, pl. 1 figs 1-4, pl. 2 fig. 1.

"*Hinnites*" *absconditus*; de Boer, 1988: 190, figs 67, 68.

Material examined. — Cape Verde Islands: 6.088; 6.097.

Distribution. — Tropical eastern Atlantic from the Cape Verde Islands southwards to Namibia (see Waller, 1993: 203). Living sublittorally to bathyal depths, usually cemented to hard substrates. Present material (?subfossil) dead in 460-1200 m.

Description. — Shell up to c. 50 mm in height, thin, elongate, inequivalve. Valves about equally convex, inequilateral. Juvenile *Talochlamys*-stage to c. 30 mm high; adult growth stage distorted. Right valve cemented to hard substrate. Auricles unequal in size, distorted laterally; umbonal angle c. 85°. Both valves in juvenile *Talochlamys*-stage sculptured with numerous (40-60), irregularly arranged, closely spaced, weak and prominent squamose radial ribs. Interstitial antimarginal microsculpture. Adult distorted stage with prominent lamellae on ribs of left valve, and strongly irregularly developed commarginal lamellae on right valve. Auricles with 8-10 radial riblets and antimarginal microsculpture (not on anterior auricle of right valve), commarginal sculpture on anterior auricle of left valve in early growth stage. Hinge line straight. Byssal notch in juvenile stage rather deep, in adult stage distorted with lamellae. Active ctenolium in juvenile stage, absent in adult stage. Left valve creamy with small red or brown maculations, right valve yellowish.

Remarks. — The present species is not known living from the northern Macaronesian Archipelago.

Locard (1898: 374, 393, 409) reported different depths and localities for the typelocality, which is station 103, viz. 225 m (La Praja), 275 m (La Praja), and 150 m (Santiago).

Previously authors placed the present species in *Hinnites*, but the juvenile stage ('free-living' or byssally attached) has morphological characters similar to those of *Talochlamys*. The adult stage (cemented) has no macro- or microsculpture, but only deformed devel-

oped shell material.

Waller (1993: 203) synonymized the present species with a similar Pliocene species from Italy: "*Hinnites*" *ercolanianus* Cocconi, 1873. We have not examined enough fossil material to be able to follow Waller's opinion.

*Talochlamys multistriata* (Poli, 1795) (figs 71-72)

*Ostrea multistriata* Poli, 1795: 164, pl. 28 fig. 14. Lectotype: the shell figured by Poli (1795: pl. 28 fig. 14), designated by Waller (1993: 213); Sicily, Italy.

*Pecten tinctus* Reeve 1853: species 106, pl. 26 fig. 106. Lectotype: BMNH 1981247/1, designated by Waller (1993: 213); locality unknown.

*Pecten effulgens* Reeve 1853: species 156, pl. 33 fig. 156. Lectotype: BMNH 1993039/1, designated by Waller (1993: 213); locality unknown.

*Pecten textilis* Reeve 1853: species 174, pl. 35 fig. 174. Lectotype: BMNH 1993040/1, designated by Waller (1993: 213); locality unknown.

*Chlamys multistriata*; Lucas, 1979: 10, figs; Barash & Danin, 1992: 250, fig. 268; Zenetos, 1996: 81, map 25; M.C. Consolado Macedo et al., 1999: 395, figs.

*Chlamys (Chlamys) multistriata*; de Boer, 1988: 187, fig. 108; Wagner, [1991]: 29, text-fig. 16.

*Crassadoma multistriata*; Waller, 1993: 212, figs 5a, 5d, 5g, 6c-j (synonymy, data on type series); Rolán & Ryall, 1999: 75.

*Talochlamys multistriata*; Dijkstra & Kilburn, 2001: 300, figs 38-39.

Material examined. — Morocco: 1.126. Madeira Archipelago: 1.017; 1.020; 1.021; 1.025; 1.026; 1.D27; 1.029; 1.040; 1.057; 1.072; 1.081; 1.D82; 1.D82/a; 1.084; 1.086; 1.D109; 1.D117; 1.K14; 3.007; 3.008; 3.016; 3.025; 3.038; 3.059; 3.060/a; 3.K02/a. Selvagens Archipelago: 3.062; 3.080; 3.081; 3.083; 3.099. Canary Islands: 2.003; 2.010; 2.012; 2.013; 2.021; 2.022; 2.029/a; 2.030; 2.033; 2.034; 2.035; 2.043; 2.048; 2.049/a; 2.064; 2.065; 2.073; 2.075; 2.085; 2.K11; 4.002; 4.005; 4.009; 4.018; 4.024; 4.034; 4.036; 4.038; 4.041; 4.067; 4.070; 4.071/a; 4.091; 4.115; 4.139; 4.K06/a. Azores: 5.100; 5.138; 5.D04/a; 5.D05/a. Cape Verde Islands: 6.001; 6.003; 6.004; 6.005; 6.006; 6.007; 6.008; 6.009; 6.010; 6.011; 6.013; 6.015; 6.016; 6.017; 6.019; 6.020; 6.024; 6.025; 6.026; 6.031; 6.038/a; 6.040; 6.041; 6.043; 6.044; 6.047; 6.051; 6.052; 6.054; 6.056; 6.059; 6.062; 6.064; 6.066; 6.078; 6.082; 6.083; 6.084; 6.085; 6.093; 6.101; 6.103; 6.105; 6.107; 6.109; 6.111; 6.114; 6.115; 6.116; 6.122; 6.128; 6.130; 6.132; 6.141; 6.143; 6.145; 6.147; 6.149; 6.156; 6.158; 6.159; 6.160; 6.161; 6.162; 6.164; 6.171; 6.172; 6.175; 6.D03/a; 6.D09/a; 7.003; 7.005; 7.007; 7.014; 7.023; 7.028; 7.030; 7.031; 7.032; 7.036/a; 7.037; 7.038; 7.042; 7.043; 7.048; 7.049; 7.050; 7.059/a; 7.064; 7.067; 7.068; 7.071; 7.075; 7.079; 7.080; 7.088; 7.093; 7.095; 7.097; 7.100; 7.101; 7.102; 7.105; 7.106; 7.109; 7.110; 7.115; 7.116; 7.119; 7.120; 7.121; 7.128; 7.129; 7.135; 7.141; 7.142; 7.143; 7.146; 7.155; 7.159; 7.160; 7.161; 7.166; 7.D06/a. Mauritania: 3.156; 3.172; 3.180/a; 3.182/a; 3.194; M.030; M.032; M.043; M.078; M.079; M.084; M.085; M.086; M.097; M.098; M.099; M.113; M.115; M.122; M.140.

Distribution. — From France (Brittany) southwards into the Mediterranean Sea, Macaronesian Archipelago and St. Helena, southwards to South Africa. Living littorally to bathyal depths, byssally attached to rocks or amongst coral rubble. Depth range of present material 0-930 m, living at 0-100 m.

Description. — Shell up to c. 35 mm in height, usually 15-20 mm, elongate, inequilateral. Right valve slightly more convex than left one. Auricles very unequal; umbonal angle c. 85°. Both valves sculptured with numerous (50-80) irregularly arranged, closely spaced, squamous or spinous radial costae. Antimarginal intercostal striated microsculpture throughout ontogeny, more prominent in broader interstices near ventral margin; com-marginal intercostal lamellae restricted in early radial growth stages to central part of

disc, more prominent on RV. Anterior auricle of LV with 7-15 spinous radial riblets; on posterior 5-7 fine spinose radial riblets. Anterior auricle of RV with 4-7 scabrous radial ribs; on posterior finer and more spinose. Hinge line straight, somewhat sloping near postero-dorsal margin. Byssal fasciole broad; byssal notch rather deep. Active ctenolium with 5-8 prominent teeth on suture. Resilium triangularly elongate. Colour very variable, orange, purple, white, brown or yellow with pale maculations or zones.

Remarks. — The present species has an extensive distribution. The reported records of southern Mozambique (see Waller, 1993: 214) could belong to *Laevichlamys deliciosa* (Iredale, 1939) (see Dijkstra & Kilburn, 2001). In the literature, *T. multistriata* and *T. pusio* are often mixed up (see also Waller, 1993: 214). Recently Waller (1993: 214) considered both as distinct species of *Crassadoma*. In our opinion, however, morphological characters of both species are more similar to those of *Talochlamys*: similar intercostal commarginal lamellae in early ontogeny and antimarginal microsculpture throughout. *Crassadoma* has prominent intercostal commarginal lamellae throughout and lacks antimarginal microsculpture in non-cemented stage).

*Talochlamys pusio* (Linnaeus, 1758) comb. nov. (figs 73-74)

*Ostrea pusio* Linnaeus, 1758: 698, no. 169; Dijkstra, 1999: 417, fig. 4c-f. Lectotype: LSL (not registered), designated by Waller (1993: 215); "O. australiore". Waller (1993: 215) designated a new locality: northeastern Atlantic. For more details on the types see also Dijkstra (1999: 417-419).

*Hinnites (Hinnites) distortus*, Wagner, [1991]: 32, text-fig. 17.

*Hinnites distortus*, Lucas, 1980: 4, figs; Poppe & Goto, 1993: 65, pl. 9 fig. 8a-b.

*Chlamys (Chlamys) distorta*; de Boer, 1988: 187, figs 60-63.

*Chlamys (Hinnites) pusio*; Rombouts, 1991: 25, pl. 9 fig. 5.

*Crassadoma pusio*; Waller, 1993: 215, figs 5b, 5e, 5h, 6k, 6l (synonymy, data on type series).

*Chlamys (Hinnites) distorta*; Gómez Rodríguez & Pérez Sánchez, 1997: 174, illustr.

*Chlamys distorta*; M.C. Consolado Macedo et al., 1999: 393, figs.

Material examined. — Madeira Archipelago: 1.017; 1.026; 1.029; 1.040; 1.057; 1.072; 1.081; 1.D82; 1.D82/a; 1.084; 1.086; 1.D109; 1.D117; 1.K14; 3.007; 3.008; 3.016; 3.025; 3.038; 3.059. Selvagens Archipelago: 3.062; 3.080; 3.081. Canary Islands: 2.003; 2.010; 2.012; 2.013; 2.021; 2.022; 2.029/a; 2.030; 2.033; 2.034; 2.035; 2.048; 2.049/a; 2.064; 2.065; 2.066; 2.073; 2.075; 2.085; 2.K11; 4.015; 4.016; 4.044; 4.049; 4.068; 4.088; 4.089; 4.091; 4.092; 4.093; 4.103; 4.133; 4.139; 4.D01. Azores: 5.006; 5.007; 5.008; 5.009; 5.010; 5.011; 5.020; 5.026; 5.035; 5.037; 5.038; 5.040; 5.047; 5.048; 5.051; 5.053; 5.054; 5.056; 5.058; 5.064; 5.068; 5.077; 5.078; 5.079; 5.080; 5.081; 5.082; 5.083; 5.084; 5.086; 5.088; 5.091; 5.092; 5.093; 5.094; 5.095; 5.096; 5.098; 5.100; 5.101; 5.102; 5.105; 5.106; 5.107; 5.108; 5.109; 5.111; 5.112; 5.113; 5.114; 5.116; 5.117/a; 5.118; 5.119; 5.121; 5.124; 5.125; 5.126; 5.128; 5.129; 5.130; 5.131; 5.132; 5.133; 5.134; 5.135; 5.136; 5.138; 5.139; 5.140; 5.141; 5.143; 5.144; 5.145; 5.146; 5.150; 5.158; 5.159; 5.160; 5.162; 5.164; 5.173; 5.176; 5.187; 5.190; 5.D04; 5.D05/a; 5.D10/a; 5.K01; 5.K02; 5.K10/a; AZO.004; AZO.011; AZO.013; AZO.016; AZO.020; AZO.020/a; AZO.24a; AZO.37a.

Distribution. — Boreal to tropical eastern Atlantic from Norway southwards to Ivory Coast (see Waller, 1993: 216), common throughout the British Isles, Channel Islands and Azores, rarely in the western Mediterranean Sea and southern Macaronesian Archipelago. Living littorally to bathyal depths, usually cemented to hard substrates.

Depth range of present material 0-900 m, living at 0-45 m.

Description. — Shell up to c. 60 mm in height, solid, juvenile valves slightly equally convex, adult valves distorted, right valve usually cemented to hard substrates, inequivalve, inequilateral, auricles unequal in size, umbonal angle c. 80°. Both valves with 60-

80 irregularly arranged, closely spaced, spinous radial riblets, microsculpture of com-marginal lamellae in early growth stage and antimarginal striae, both in interstices. Hinge line straight, somewhat declined on posterior side, byssal notch rather deep, active tenorium present. Colour variable, creamy, yellowish, orange or brown, usually mottled.

Remarks. — Juveniles from the Canary Islands of *T. pusio* and *T. multistriata* are hard to distinguish and often confused.

#### Tribe Aequiptectinini Nordsieck, 1969

##### Genus *Aequiptecten* Fischer, 1886

*Aequiptecten* Fischer, 1886: 944 (as a section of *Chlamys*). Type species (by monotypy): *Ostrea opercularis* Linnaeus, 1758; Recent, Brittany, France.

*Aequiptecten* (*Perapecten*) Wagner, 1985: 84. Type species (by original designation): *Pecten commutatus* Monterosato, 1875 [= nom. nov. for *Pecten philippii* Récluz, 1853 (non *Pecten philippii* Michelotti, 1839)]; Recent, NE. Atlantic and Mediterranean Sea.

*Lindapecten* Petuch, 1995: 40. Type species (by original designation): *Pecten muscosus* Wood, 1828; (sub)tropical W. Atlantic.

Diagnosis. — Byssally attached Aequiptectinini; shell convex with regularly arranged, radial costae, equilateral; pitted preradial microsculpture, prominent intercostal com-marginal sculpture showing in later growth stage a concave curve on the rib flanks (Waller, in Shumway, 1991: pl. 4 fig. 9), antimarginal microsculpture weak or almost lacking; byssal notch shallow.

Distribution. — Cretaceous to Recent (Hertlein, 1969: N355). Temperate and tropical western and eastern Atlantic. Living from littorally to bathyal depths.

Remarks. — Hertlein (1969: N355) treated *Aequiptecten* as a subgenus of *Chlamys*, placed in the *Chlamys*-group. Waller (1991: 32) placed *Aequiptecten*, as a distinct genus, in the *Aequiptecten*-group, currently defined by Waller (1993) in the tribe Aequiptectinini in Chlamydiae.

Dijkstra & Kilburn (2001) consider *Perapecten* a junior synonym of the present genus, based on similar macro- and microsculpture and identical auricular crura. Petuch (1995) differentiated *Lindapecten* from *Aequiptecten*, based on longer erect spines on the radial costae of *Lindapecten*, but other characters of both genera are similar (see also Dijkstra & Kilburn, 2001).

#### *Aequiptecten opercularis* (Linnaeus, 1758) (fig. 76)

*Ostrea opercularis* Linnaeus, 1758: 698, no. 171; Dijkstra, 1999: 421, figs 7A-D. Lectotype LSL (not registered), designated by Dijkstra (1999: 423, fig. 7A-D), 3 paralectotypes (LSL 2, UUZM 1); "O. meridionali". Locality mentioned by Dijkstra (1999: 422): Brittany, France. See also Dijkstra (1999: 422) for a complete synonymy.

*Chlamys* (*Aequiptecten*) *opercularis*; Dautzenberg, 1889: 75; Tebble, 1976: 60, pl. 5 figs b, d; de Boer, 1988: 189.

*Aequiptecten opercularis*; Lucas, 1979: 14, text-figs; Rombouts, 1991: 2, pl. 1 figs 2, 2a, 2b; Wagner, [1991]: 40, pl. 6 figs 1-5, text-fig. 22; Barash & Danin, 1992: 251; Jensen & Knudsen, 1995: 39; Zenetos, 1996: 75, map 21; M.C. Consolado Macedo et al., 1999: 391, figs.

*Chlamys opercularis*; Poppe & Goto, 1993: 63, pl. 9 fig. 4a-d.

*Aequiptecten* (*Aequiptecten*) *opercularis*; Gómez Rodríguez & Pérez Sánchez, 1997: 162, illustr.



Material examined. — Madeira: 1.025; 1.126. Canary Islands: 2.010; 2.012. Mauritania: 3.194; M.031; M.034; M.130; M.140.

Distribution. — Boreal to tropical eastern Atlantic from Iceland, Norway, southwards to Cape Verde Islands, also into the Mediterranean Sea. Living littorally to bathyal depths, byssally attached to rocks in juvenile stage, 'free-swimming' in adult stage in populations on soft sediments (mud, muddy sand). Rare in the Macaronesian Archipelago. Present material dead in 70-170 m.

Description. — Shell up to c. 100 mm in height, depressed, suborbicular, somewhat wider than high, inequivalve, inequilateral, slightly posteriorly oblique. Left valve more convex than right one. Auricles unequal in size; umbonal angle c. 105°. Both valves sculptured with 18-25, regularly arranged, radial, squamose costae; secondary radial, scaly ribs and commarginal lamellae on and between primary ribs, more prominent on left valve. Hinge line straight; byssal notch moderately small and deep. Active ctenolium well developed. Colour extremely variable, white, creamy, yellowish, orange, reddish, pinkish, purplish, brown or greyish, uniformly coloured or maculated.

*Aequipecten commutatus* (Monterosato, 1875) (fig. 77)

*Pecten philippii* Récluz, 1853: 52, pl.2 fig. 15

*Pecten commutatus* Monterosato, 1875: 6 [nom. nov. for *Pecten philippii* Récluz, non Michelotti]. Holotype and paratype: MNHN (Bouchet & Héros, personal communication; see also Fischer-Piette, 1950: 14); Sicily, *Argopecten solidulus*; Monterosato, 1889: 20 [non Reeve, 1853].

*Aequipecten (Argopecten) commutatus*; Lucas, 1979: 17, 18, fig.; Zenetos, 1996: 76, map 21.

*Aequipecten (Perapecten) commutatus*; Wagner, 1985: 84; Gómez Rodríguez & Pérez Sánchez, 1997: 163, illustr.

*Argopecten commutatus*; Rombouts, 1991: 6, pl. 3 fig. 2.

*Perapecten commutatus*; Wagner, [1991]: 43, pl. 3 fig. 5, text-fig. 23.

*Chlamys commutata*; Poppe & Goto, 1993: 60, pl. 7 figs 5a-b.

*Aequipecten commutatus*; M.C. Consolado Macedo et al., 1999: 391, figs; Rolán & Ryall, 1999: 75.

Material examined. — Azores: 5.007; 5.008; 5.009; 5.010; 5.011; 5.017; 5.019; 5.020; 5.035; 5.037; 5.047; 5.048; 5.053; 5.054; 5.055; 5.056; 5.058; 5.059; 5.064; 5.068; 5.077; 5.078; 5.079; 5.080; 5.081; 5.082; 5.083; 5.084; 5.086; 5.088; 5.092; 5.093; 5.094; 5.100; 5.101; 5.102; 5.106; 5.108; 5.109; 5.111; 5.112; 5.113; 5.114; 5.118; 5.119; 5.120; 5.121; 5.124; 5.125; 5.128; 5.129; 5.130; 5.131; 5.132; 5.133; 5.134; 5.135; 5.136; 5.139; 5.140; 5.141; 5.144; 5.145; 5.146; 5.147; 5.148; 5.150; 5.164; 5.176; 5.187; 5.D10/a. Madeira: 1.017; 1.018; 1.020; 1.021; 1.025; 1.026; 1.029; 1.040; 1.057; 1.059; 1.071; 1.081; 1.084; 1.085; 1.086; 3.002; 3.003; 3.007; 3.008; Sta. 3.009; 3.038; 3.058; 3.059; 3.060. Selvagens Archipelago: 3.062; 3.063; 3.064; 3.065; 3.066; 3.068; 3.070; 3.080; 3.081; 3.083; 3.099. Morocco: 1.121; 1.126; 1.147. Canary Islands: 2.003; 2.012; 2.013; 2.022; 2.029; 2.033; 2.034; 2.035; 2.035/a; 2.043; 2.048; 2.049/a; 2.050; 2.064; 2.073; 2.074; 2.075; 2.084; 2.103; 2.120; 4.010; 4.014; 4.016; 4.024; 4.038; 4.044; 4.048; 4.049; 4.067; 4.068; 4.071; 4.074; 4.075; 4.090; 4.091/a; 4.092; 4.093; 4.103; 4.137; 4.138; 4.138/a; 4.139; 4.140; 4.141; 4.145; 4.148; 4.148/a; 4.152/a. Mauritania: 3.116; 3.133; 3.135; 3.154; 3.156; 3.172; 3.194; M.032; M.033; M.059; M.078; M.080/a; M.082; M.094; M.094/a; M.098; M.098/a; M.111; M.113; M.114; M.115; M.117; M.121; M.122; M.124/a; M.125; M.130; M.130/a; M.139; M.140; M.142. Cape Verde Islands: 6.008; 6.015; 6.024; 6.059; 6.061; 6.062; 6.062/a; 6.065; 6.066; 6.070; 6.071; 6.073; 6.076; 6.076/a; 6.077; 6.078; 6.080; 6.084; 6.090/a; 6.092; 6.093; 6.103; 6.105; 6.109; 6.110; 6.111; 6.114; 6.130; 6.131; 6.132; 6.134; 6.137; 6.137/a; 6.145; 6.145/a; 6.146; 6.146/a; 6.147; 6.148; 6.148/a; 6.149; 6.164; 6.165; 6.165/a; 6.166; 6.166/a; 6.174; 6.174/a; 6.176; 7.004; 7.007; 7.028; 7.030; 7.031; 7.032; 7.037; 7.042; 7.048; 7.058; 7.079; 7.080; 7.097; 7.100; 7.101; 7.102; 7.105; 7.106; 7.107; 7.110; 7.115; 7.116; 7.119; 7.120; 7.122; 7.128; 7.142; 7.143; 7.146; 7.155; 7.156; 7.160; 7.160/a; 7.161; 7.178/a.

Distribution. — Mediterranean Sea and adjacent region of the Atlantic, west to the Azores and south to Senegal. Living sublittorally to bathyal depths on sandy, corallinous or rocky bottoms. Depth range of present material 0-2465 m, living at 15-300 m.

Description. — Shell up to c. 40 mm in height, usually smaller, solid, orbicular, somewhat wider than high, inequivalve, inequilateral, slightly posteriorly oblique. Left valve more convex than right valve. Auricles unequal in size; umbonal angle c. 105°. Both valves sculptured with 16-18 regularly arranged, radial ribs with fine grooves near ventral margin and hollow sections or when damaged with remnants of commarginal lamellae on sides. Hinge line straight. Byssal notch obsolete. Active ctenolium weak. Colour variable, white, creamy, yellowish, orange, pinkish, purple or brown, usually maculated or uniformly coloured.

Remarks. — The St Helena-morph, *Pecten atlanticus* E.A. Smith, 1890, slightly differs from the type material in having a more oblique shape, less orbicular (higher than wide) and less radial ribs (14-16).

*Aequipecten flabellum* (Gmelin, 1791) (fig. 75)

*Ostrea flabellum* Gmelin, 1791: 3321 [ex Regenfuss, 1758: pl. 9 fig. 33]. Type material not seen; "Guinea (Regenfuss, 1758: pl. 9 fig. 33).

*Aequipecten (Perapecten) flabellum*; Wagner, 1985: 84.

*Argopecten flabellum*; Bernard, 1984: 112, pl. 56 fig. 228; Rombouts, 1991: 6, pl. 3 figs 5, 5a.

*Aequipecten flabellum*; Moolenbeek & Pieters, 1997: 60, 66, 127, 139, pl. 1 fig. 11, pl. 2 figs 16, 17, pl. 9 fig. 33, pl. 11 fig. 51; Rolán & Ryall, 1999: 75.

Material examined. — Mauritania: 3.110; 3.111; 3.111/a; 3.124; 3.124/a; 3.125; 3.125/a; 3.129; 3.171; 3.172; 3.172/a; 3.173; 3.180/a; 3.182/a; 3.186; 3.187/a; M.011; M.013; M.014; M.015; M.017; M.018; M.029; M.030; M.043; M.044; M.045; M.045/a; M.046; M.047; M.047/a; M.048; M.049; M.050; M.052; M.054; M.064; M.065; M.077; M.078; M.084; M.097; Sta. M.099; M.106; M.108; M.109; M.110; M.111; M.112; M.113; M.114; M.115; M.116; M.117; M.119; M.121; M.122; M.124; M.125.

Distribution. — Tropical eastern Atlantic from Spanish Sahara southwards to Angola. Living littorally to sublittoral depths on soft sediments (sand, muddy sand). Depth range of present material 12-47 m, living at 12-30 m.

Description. — Shell up to c. 60 mm in height, solid, orbicular, equivalve, right valve slightly more convex than left valve, inequilateral, auricles unequal in size, umbonal angle c. 110°-115°. Both valves sculptured with 18-22 regularly arranged, primary radial ribs, secondary radial spinose riblets commencing on central part of disc and increasing to the ventral margin and interstitial commarginal lamellae. Anterior auricles with 5-7 prominent radial riblets, on posterior auricles weaker and numerous. Hinge line straight. Byssal notch moderately deep. Active ctenolium well developed with 4-6 teeth. Colour extremely variable, creamy, yellowish, orange, reddish, pinkish, brown or greyish, uniformly coloured or usually maculated near umbo.

Remarks. — The present species is not recorded from the northern Macaronesian Archipelago. Nicklès (1955: 134) only reported it from the Cape Verde Islands.

#### ACKNOWLEDGEMENTS

We are most grateful to Jaap de Boer (RUG) for his contribution to this project.

species	Azores	Madeira	Morocco	Western Sahara	Selvagens	Canary Islands	Mauritania	Cape Verde Is.	total	depth range (m)	live collected at (m)
PROPEAMUSSIIDAE											
<i>Propeamussium lucidum</i>	4	1				4		1	10	785-2145	950-1040
<i>Parvamussium fenestratum</i>	12	16				29		11	68	99-1085	
<i>Parvamussium propinquum</i>						1			1		
<i>Cyclopecten hoskynsi</i>								1	1		
<i>Cyclopecten capeverdensis</i>						1		14	15	100-610	
<i>Similipecten similis</i>		25		1	9	53	10		98	28-1150	
PECTINIDAE											
<i>Pseudohinnites cf. adamsi</i>						1			1	c. 850	
<i>Hyalopecten pudicus</i>								3	3	3000-4025	3825-4025
<i>Delectopecten vitreus</i>	2			2		2	1		7	70-1338	1000-1338
<i>Palliolium incomparabile</i>	57	1	1		1	3	3	6	72	54-300	
<i>Lissochlamis exotica</i>							1		1		
<i>Pseudamussium peslutrae</i>								9	9	114-325	305-325
<i>Pseudamussium alicei</i>	1								1		
<i>Pseudamussium clavatum</i>	3								3	240-255	
<i>Pseudamussium sulcatum</i>							4	1	5	200-500	
<i>Bractechlamys corallinoides</i>	37	11	1		8	38		85	180	0-480	10-90
<i>Flexopecten flexuosus</i>	20	10			3	20			53	20-2450	
<i>Pecten jacobaeus</i>	41	9				13			63	20-2465	100
<i>Pecten keppelianus</i>							31	24	55	12-1200	12-80
<i>Manupecten pesfelis</i>		6			2	12		7	27	0-540	
<i>Mimachlamys varia</i>					1		1		2	47-90	
<i>Talochlamys abscondita</i>								2	2	460-1200	
<i>Talochlamys multistriata</i>	4	25	1		5	36	20	124	215	0-930	0-100
<i>Talochlamys pusio</i>	99	19			3	34			155	0-900	0-45
<i>Aequipecten opercularis</i>		2				2		5	9	70-170	
<i>Aequipecten commutatus</i>	71	24	3		11	45	28	74	256	0-2465	15-300
<i>Aequipecten flabellum</i>							52		52	12-47	12-30
number of stations	246	200	54	3	54	362	89	428	1436		
number of samples	351	149	6	3	43	294	160	358	1364		
number of specimen	12	12	4	2	9	16	11	14	27		

Table 1. Indication of the geographical and bathymetrical distribution of the Propeamussiidae and Pectinidae species sampled by the CANCAP expeditions. Numbers of samples are given for the separate archipelgo's. The total number of stations per archipelago consists of all these of the different collection methods used, excluding gill-nets and fish-traps.

For information on type material and literature, and discussions on taxonomy and nomenclature we are much indebted to Prof. Dr Edmund Gittenberger (NNM), Drs Philippe Bouchet, Rudo von Cosel, and Mrs Virginie Héros (MNHN), Drs Thierry Backeljau (KBIN), Ronald Janssen (NMF), Alan R. Kabat, Thomas R. Waller and Mrs Ray Germon (USNM), Mr Eric A. Lazo-Wasem (PMNH), Messrs Robert Moolenbeek and Bram van der Bijl (ZMA), Dr Jørgen Knudsen and Mr Tom Schiøtte (ZMUC), Dr Graham Oliver, Mrs Alison Trew and Mrs Harriet Wood (NMW), Dr Anders Warén (SMNH), Mr Paul Cooper, Mrs Kathie Way and Mrs Joan Pickering (BMNH), Drs C. Carpine, M. Wurtz and Mrs Michèle Bruni (MOM). Acknowledgements are due to the curators in charge for kindly submitting pectinoid material for study. Thanks are also due to Mr Y. Berard (MOM) for preparing slides.

## REFERENCES

- AARTSEN, J.J. VAN, E. GITTENBERGER & J. GOUD, 1998. Pyramidellidae (Mollusca, Gastropoda, Heterobranchia) collected during the Dutch CANCAP and MAURITANIA expeditions in the south-eastern part of the North Atlantic Ocean (part 1). – Zoologische Verhandlungen 321: 1-57.
- ABBOTT, R.T., 1954. American seashells: i-xiv, 1-541. New York.
- ABBOTT, R.T., 1974 [2nd ed.]. American seashells: 1-663. New York.
- ACTON, G., 1855. Ricerche conchiologiche: 1-4. Napoli.
- ADAM, W., 1960. A propos de *Chlamys* (f. acc. *Hinnites*) *abscondita* (P. Fischer, 1898) de la côte occidentale de l'Afrique. – Bulletin de l'Institut Royal des Sciences Naturelles de Belgique 36(20): 1-10.
- ADAMS, H., & A. ADAMS, 1854-1858. The genera of recent Mollusca, arranged according to their organization, 2: 1-661. London.
- ARDOVINI, R., & T. COSSIGNANI, 1999. Atlante delle conchiglie di profondità del Mediterraneo: 1-111. Ancona.
- ARNAUD, P.M., 1977. Révision des taxa malacologiques méditerranéens introduits par Antoine Risso. – Annales du Musée d'Histoire Naturelle de Nice 5: 101-150.
- BELLOC, G., 1962. Catalogue des types de Pélécy-podes du Musée océanographique de Monaco. – Bulletin de l'Institut océanographique, Monaco, 1246: 1-8.
- BARASH, A., & Z. DANIN, 1992. Annotated list of Mediterranean molluscs of Israel and Sinai. – Fauna Palaestina. Mollusca I: i-iii, 1-405. Jerusalem.
- BERNARD, P.A., 1984. Coquillages du Gabon. Shells of Gabon: 1-140. Libreville.
- BEU, A.G., 1995. Pliocene limestones and their scallops. – Institute of Geological & Nuclear Sciences, Monograph 10: i-iv, 1-243.
- BIONDI, S., 1859. Memoria su alcune specie malacologiche Siciliane. – Atti dell'Accademia Gioenia di Scienze Naturali di Catania (2)14: 113-123.
- BOER, J.H. DE, 1988. Paleobiogeography of Middle Atlantic Neogene to Recent Pectinidae: 1-266. [Doctoraalscriptie RU, Groningen; Intern report CANCAP-archive no. 47, RMNH (now NNM), Leiden].
- BOSS, K.J., 1982. Mollusca - Bivalvia: Pteriomorpha. In: Synopsis and classification of the living organisms 1: 945-1166. New York.
- BOUCHET, P., M. NICKLES & J.C. ROSSO, 1982. Bibliographie malacologique ouest-Africaine: 1-40. Lisboa.
- BOUCHET, P., & A. WARÉN, 1979. The abyssal molluscan fauna of the Norwegian Sea and its relation to other faunas. – Sarsia 64: 211-243.
- BRONN, H.G., 1832. Ergebnisse meiner naturhistorisch-ökonomischen Reisen. Zweyter Teil: Skizzen und Ausarbeitungen über Italien nach einem zweiten Besuche im Jahre 1827: i-xviii, 1-686. Heidelberg.

- BRUYNE, R.H. DE, R.A. BANK, J.P.H.M. ADEMA & F.A. PERK, 1994. Nederlandse naamlijst van de weekdieren (Mollusca) van Nederland en België: 1-149. Oegstgeest.
- CANTRAINE, F.J., 1835. Opuscules de zoologie et d'anatomie comparée. — Bulletin de l'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique 2: 380-401.
- CECALUPO, A., & F. GIUSTI, 1986. Rinvenimenti malacologici a sud ovest dell'Isola di Capraia (LI). — Bollettino Malacologico 22: 293-298.
- CHEMNITZ, J.H., 1784. Neues systematisches Conchylien-Cabinet 7: 1-356, pls 37-69. Nürnberg.
- CHEMNITZ, J.H., 1795. Ibid. 11: 1-310, pls 174-213. Nürnberg.
- CLARCKE, A.H. Jr, 1962. Annotated list and bibliography of the abyssal marine molluscs of the world. — Bulletin National Museum of Canada 181: 1-114.
- COAN, E.V., P. VALENTICH SCOTT & F.R. BERNARD, 2000. Bivalve seashells of western North America. Marine bivalve mollusks from Arctic Alaska to Baja California, i-viii, 1-764. Santa Barbara.
- COCCONI, G., 1873. Enumerazione sistematica dei Molluschi miocenici e pliocenici delle provincie di Parma e di Piacenza. — Memorie Reale Accademia della Scienze. Istituto di Bologna (3) 3: 1-372.
- CONRAD, T.A., 1863. Descriptions of new genera, sub-genera, and speciers of Tertiary and Recent shells. — Proceedings of the Academy of Natural Sciences of Philadelphia (2) 6: 284-291.
- CONSOLADO MACEDO, M.C., M.I. CONSOLADO MACEDO & J.P. BORGES, 1999. Conchas marinhas de Portugal. Seashells of Portugal: 1-516. Lisboa, São Paulo.
- COSSIGNANI, T., V. COSSIGNANI, A. DI NISIO & M. PASSAMONTI, 1992. Atlante delle conchiglie del medio Adriatico. Atlas of shells from Central Adriatic Sea: 1-40, figs 1-417. Ancona.
- CROSSE, J.C.H., 1885. [Review of Monterosato's 'Nomenclature generica e specifica di alcune conchiglie Mediterranee, 1884']. — Journal de Conchyliologie 33: 139-142.
- DALL, W.H., 1886. Reports on the results of dredging [...] in the Gulf of Mexico by the U.S. Coast Guard Survey Steamer "Blake" [...] XXIX. Report on the Mollusca. Part 1: Brachiopoda and Pelecypoda. — Bulletin of the Museum of Comparative Zoology 12(6): 206-223.
- DALL, W.H., 1898. Contributions to the Tertiary fauna of Florida [...], Part 4. I. Prionodesmacea, II. Teleodesmacea. — Transactions of the Wagner Free Institute of Science of Philadelphia 3(4): i-viii, 571-947.
- DALL, W.H., 1908. The Mollusca and the Brachiopoda. Reports "Albatross" 1891; 1904-1905. — Bulletin of the Museum of Comparative Zoology 43(6): 203-487.
- DANCE, S.P., 1967. Report on the Linnaean shell collection. — Proceedings of the Linnean Society of London 178 (1): 1-24.
- DAUTZENBERG, P., 1889. Révision des mollusques marins des Açores. — Résultats des Campagnes scientifiques accomplies par le Prince Albert I, Monaco 1: 1-112.
- DAUTZENBERG, P., 1927. Mollusques provenant des campagnes scientifiques du Prince Albert Ier de Monaco dans l'Océan Atlantique et dans le Golfe de Gascogne. — Résultats des Campagnes scientifiques accomplies sur son yacht par Albert Ier, Prince souverain de Monaco 72: 1-400.
- DAUTZENBERG, P., & A. BAVAY, 1912. Les lamellibranches de l'Expédition du Siboga. Partie Systematique I: Pectinidés. — Monographie Siboga-Expeditie 53b: 1-41. Leiden.
- DAUTZENBERG, P., & H. FISCHER, 1897a. Campagnes scientifiques de S.A. le Prince Albert Ier de Monaco, dragages effectués par l' "Hirondelle" et par la "Princesse-Alice" (1888-1896). — Mémoires de la Société Zoologique de France 10: 139-234.
- DAUTZENBERG, P., & H. FISCHER, 1897b. Campagnes scientifiques de S.A. le Prince Albert Ier de Monaco. Diagnoses d'espèces nouvelles de Pélécy-podes. — Bulletin de la Société Zoologique de France 22: 22-31.
- DEFRANCE, M.J.L., 1825. Peigne. In: F. CUVIER, ed., Dictionnaire des Sciences Naturelles [...] 38: 234-267. Paris, Strasbourg.
- DIJKSTRA, H.H., 1989. *Pseudohinnites levii* gen. et spec. nov. (Mollusca, Bivalvia: Pectinidae) from New Caledonia. — Basteria 53: 29-33.

- DIJKSTRA, H.H., 1991. A contribution to the knowledge of the pectinacean Mollusca (Bivalvia: Propeamussiidae, Entoliidae, Pectinidae) from the Indonesian Archipelago. — Zoologische Verhandlungen, Leiden 271: 1-57.
- DIJKSTRA, H.H., 1994. Type specimens of Recent species of Pectinidae described by Lamarck (1819), preserved in the Muséum d'Histoire Naturelle of Geneva and the Muséum National d'Histoire Naturelle of Paris (with 30 plates). — Revue suisse de Zoologie 101(2): 465-532.
- DIJKSTRA, H.H., 1995. Bathyal Pectinoidea (Bivalvia: Propeamussiidae, Entoliidae, Pectinidae) from New Caledonia and adjacent areas. In: P. BOUCHET, ed., Résultats des Campagnes MUSORSTOM 14. — Mémoires du Muséum national d'Histoire naturelle 167: 9-73.
- DIJKSTRA, H.H., 1998. Notes on taxonomy and nomenclature of Pectinoidea (Mollusca: Bivalvia: Propeamussiidae, Pectinidae) 3. Nomina nova. — Basteria 62: 245-261.
- DIJKSTRA, H.H., 1999. Type specimens of Pectinidae (Mollusca: Bivalvia) described by Linnaeus (1758-1771). — Zoological Journal of the Linnean Society 125: 383-443.
- DIJKSTRA, H.H., & GOFAS, S., in prep. Bathyal Pectinoidea (Bivalvia: Propeamussiidae, Pectinidae) from the Lusitanian seamounts (northeastern Atlantic).
- DIJKSTRA, H.H., & R.N. KILBURN, 2001. The family Pectinidae in South Africa and Mozambique (Mollusca: Bivalvia: Pectinoidea). — African Invertebrates 42: 263-321.
- DIJKSTRA, H.H., & J. KNUDSEN, 1997. The morphology and assignment of *Pseudohinnites levii* Dijkstra, 1989 (Bivalvia: Pectinoidea). — Basteria 61(1-3): 1-15.
- DIJKSTRA, H.H., & J. KNUDSEN, 1998. Some Pectinoidea (Mollusca: Bivalvia: Propeamussiidae, Pectinidae) of the Red Sea. — Molluscan Research 19(2): 43-104.
- DILLWYN, L.W., 1817. A descriptive catalogue of Recent shells, arranged according to the Linnaean method; with particular attention to the synonymy 1: 1-580. London.
- DODGE, H., 1952. A historical review of the mollusks of Linnaeus. Part 1: The classes Loricata and Pelecypoda. — Bulletin of the American Museum of Natural History 100: 1-264.
- DUNKER, W., 1853. Index molluscorum quae in itinere ad Guineam inferiorem collegit Georgius Tams [...]. In: Novitates Conchologicae, Abbildungen und Beschreibungen neuer Conchylien, Suppl. 2: i-iv, 1-74. Cassel [Kassel].
- EBERZIN, A.G., 1960. Mollyuski: Pantsirnye, Dvustvorchatye, Lopatonogie [Mollusca: Polyplacophora, Bivalvia, Scaphopoda]. In: Y.A. ORLOV (ed.), Osnovy Paleontologii: 1-300. Moscow.
- FENAU, A., 1944. Description d'un nouveau *Pecten* de la Méditerranée. — Bulletin de l'Institut Océanographique de Monaco (862): 2-3.
- FERNANDES, F., & E. ROLAN, 1991. Bibliografía malacologica de la costa occidental de Africa. — Reseñas malacológicas 4: 1-64.
- FISCHER, P., 1886. Manuel de conchyliologie et de paléontologie conchyliologique. Histoire naturelle des Mollusques vivants et fossils 10: 897-1008. Paris.
- FISCHER-PIETTE, E., 1950. Liste des types décrits dans le Journal de Conchyliologie et conservés dans la collection de ce journal. — Journal de Conchyliologie 90: 8-23.
- FORBES, E., 1844. Report on the Mollusca and Radiata of the Aegean Sea, and on their distribution, considered as bearing on geology. In: Aegean Invertebrata (Report), 1843: 130-193. London.
- GAY, L., 1858. Catalogue des mollusques du Département du Var - Classe des Conchifères. — Bulletin de la Société des Sciences, Belles-Lettres et Arts du Département du Var 25-26: 133-216.
- GMELIN, J.F., 1791. Caroli Linnaei systema naturae per regna tria naturae [...] Editio Decima Tertia, Aucta, Reformata, Vermes Testacea, Vol. 1, pt. 6: 3021-3910. Lipsiae [Leipzig].
- GOFAS, S., J. PINTO AFONSO & M. BRANDÃO, [1986]. Conchas e moluscos de Angola. Coquillages et Mollusques d'Angola: 1-139. Luanda.
- GÓMEZ RODRÍGUEZ, R., & J.M. PÉREZ SÁNCHEZ, 1997. Moluscos bivalvos de Canarias: 1-425. Las Palmas de Gran Canaria.

- GRAU, G., 1959. Pectinidae of the eastern Pacific. In: Alan Hancock Foundation, Pacific Expeditions 23: 1-308. Los Angeles.
- GREGORIO, A. DE, 1884. Nota intorno ad alcune nuove conchiglie mioceniche di Sicilia. — *Naturalista Siciliano* 3: 119-120.
- GREGORIO, A. DE, [1885]. Studi su talune conchiglie mediterranee viventi e fossili con una rivista del genera *Vulsella*. — *Bollettino Società Malacologica Italiana* 1884 10: 36-288.
- GREGORIO, A. DE, 1898. Etudes sur le genre *Amussium*. — *Annales de Géologie et de Paléontologie* 23: 1-70.
- HAYAMI, I., 1989. Outlook on the Post-Paleozoic historical biogeography of pectinids in the western Pacific region. In: H. OHBA, I. HAYAMI & K. MOCHIZUKI, eds, Current aspects of biogeography in West Pacific and East Asian regions. — *Nature and Culture* 1: 3-25. Tokyo.
- HEMMEN, J., & K. GROH, 1989. *Bibliographia Atlantica. Eine malakozoologische Bibliographie der gemäßigten mittelatlantischen Inseln: 1-74*. Wiesbaden.
- HERRMANNSEN, A.N., 1846-1852. Indices generum malacozoorum primordia [...] 1: i-xxvii, 1-232 [1846]; 233-637 [1847]; 2: xxix-xlii, 1-352 [1847], 353-492 [1848], 493-717 [1849]; Suppl.: 1-140 [1852]. Cassellis [Kassel].
- HERTLEIN, L.G., 1969. Family Pectinidae Rafinesque, 1815. In: R.C. MOORE, ed., *Treatise on invertebrate paleontology, Part N, Mollusca 6, Bivalvia 1*: 348-373. Kansas.
- ICZN 1964. Opinion 714: Mörch, 1852-53, *Catalogus Conchyliorum* : validated under plenary powers with the designation of a type-species for *Pseudamussium* Mörch, 1853 (Pelecypoda). — *Bulletin of Zoological Nomenclature* 21: 355-356.
- ICZN, 1999 (4th ed.). *International code of zoological nomenclature*: i-xxix, 1-306. London.
- IREDALE, T., 1925. Mollusca from the continental shelf of eastern Australia. — *Records of the Australian Museum* 14: 243-270.
- IREDALE, T., 1929. Mollusca from the continental shelf of eastern Australia. No. 2. — *Record of the Australian Museum* 17: 157-189.
- IREDALE, T., 1939. Mollusca. Part 1. In: *British Museum (Natural History) Great Barrier Reef Expedition 1928-29, Scientific Reports* 5(6): 209-425. London.
- JEFFREYS, J.G., 1876. New and peculiar Mollusca of the *Pecten*, *Mytilus* and *Arca* families procured in the Valorous Expedition. — *Annals and Magazine of Natural History* (4) 18 (107): 424-436.
- JEFFREYS, J.G., 1879. On the Mollusca procured during the "Lightning" and "Procupine" expeditions 1868-70. (II). — *Proceedings of the Zoological Society of London* 1879: 553-588.
- JENSEN, A.S., 1904. *Pecten frigidus*, nomen Pectini profundorum maris polaris incolae novum datum. — *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn* 1904: 305-311.
- JENSEN, A.S., 1912. *Lamellibranchiata, Part I*. In: *The Danish-Ingolf Expedition* 2(5): 1-119. Copenhagen.
- JENSEN, K.R. & J. KNUDSEN, 1995. Annotated checklist of Recent marine molluscs of Danish waters: 1-73. Copenhagen.
- KLEIN, J.T., 1753. Tentamen methodi ostracologicae sive dispositio naturalis cochlidum et concharum [...]: i-viii, 1-177, i-xxxv, 1-44, 1-16, i-ii. *Lugduni Batavorum* [Leiden].
- KNUDSEN, J., 1970. The systematics and biology of abyssal and hadal Bivalvia. — *Galathea Report* 11: 1-241.
- LAMARCK, J.B.P.A. DE MONET DE, 1819. *Histoire naturelle des animaux sans vertèbres*, Vol. 6 (1): i-vi, 1-252. Paris.
- LAMY, E., 1928. Les peignes de la Mer Rouge (d'après les matériaux recueillis par le Dr. Jousseume). — *Bulletin du Muséum National d'Histoire Naturelle*, Paris 34: 166-172, 219-220.
- LAND, J. VAN DER, 1987. Report on the CANCAP-Project for marine biological research in the Canarian-Cape Verdean region of the North Atlantic Ocean (1976-1986). Part I. List of stations. — *Zoologische Verhandelingen*, Leiden 243: 1-94.

- LASKEY, J., 1811. Account of North British Testacea. — Memoirs of the Wernerian Natural History Society 1: 370-417.
- LECHE, W., 1878. Öfversigt öfver de af Svenska expeditionerna till Novaja Semlja och Jenissej 1875 och 1876 Insamlade. Hafs-Mollusker. — Kungliga Svenska Vetenskapsakademiens Handlingar 16(2): 1-86.
- LINNAEUS, C., 1758. Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis [...] I, Editio decima, reformata: 1-824, i-iii. Holmiae [Stockholm].
- LINNAEUS, C., 1771. Mantissa Plantarum altera Generum editionis VI. & Specierum editionis II. [...]. Regni animalis appendix. Vermes testacea: 544-552. Holmiae [Stockholm].
- LISTER, M., 1685-1692. Historiae sive synopsis methodicae conchyliorum [...]. — Londini [London].
- LOCARD, A., 1888. Contribution à la fauna malacologique Française. Part XI. Monographie des espèces appartenant au genre *Pecten*. — Annales de la Société Linnéenne de Lyon (N.S.) 34: 133-287.
- LOCARD, A., 1898. Expéditions scientifiques du "Travailleur" et du "Talisman", 1880-1883. Mollusques testacés 2: 1-515. Paris.
- LOVÉN, S., 1846. Index molluscorum. Litora Scandinaviae occidentalia habitantium. Faunae Prodromum: 1-50. Holmiae [Stockholm].
- LUCAS, M., 1979-80. The Pectinoidea from the European coasts. — La Conchiglia 11(118-129)-12(130-137).
- MABILLE, J., & A.T. DE ROCHEBRUNE, 1889. Mollusques. In: Mission Scientifique du Cap Horn 1882-1883 6 (2): 1-143. Paris.
- MARSHALL, B.A., 1991. Dates of publication and supraspecific taxa of Bellardi and Sacco's (1873-1904) "I molluschi dei terreni terziarii del Piemonte e della Liguria" and Sacco's (1890) "Catalogo paleontologico del bacino terziario del Piemonte". — The Nautilus 105: 104-115.
- MARTENS, E. VON, 1856. Conchyliologische Untersuchungen von Wilhelm Acton. — Malakozoologische Blätter 3: 194-197.
- MEEK, F.B., 1864. Checklist of the invertebrate fossils of North America: Cretaceous and Jurassic. — Smithsonian Miscellaneous Collections 177: 1-40.
- MICHELOTTI, G., 1839. Brevi cenni di alcuni resti delle classi Brachiopodi, ed Acefali, trovati fossili in Italia. — Annali della Scienze del Regno Lombardo-Veneto 9: 119-138, 157-174.
- MOOLENBEEK, R.G., & F.F.J.M. PIETERS, 1997. F.M. Regenfuss' exquisite shells (1758, vol. I) revisited: 1-193 + PhotoCD + floppy-disc. Amsterdam.
- MONTEROSATO, T.A. DI, 1875. Nuova rivista delle conchiglie Mediterranee. — Atti Accademia Palermitana di Scienze, Lettere ed Arti, Palermo (N.S.) 5: 1-50.
- MONTEROSATO, T.A. DI, 1884. Nomenclature generica e specifica di alcune conchiglie Mediterranee: 1-152. Palermo.
- MONTEROSATO, T.A. DI, 1889. Coquilles marines marocaines. — Journal de Conchyliologie 37: 20-40, 112-121.
- MÖRCH, O.A.L., 1853. Catalogus conchyliorum quae reliquit D. Alphonso d' Aguirra & Gadea, comes de Yoldi: 1-74. Hafniae [Copenhagen].
- MORTON, B., & M.H. THURSTON, 1989. The functional morphology of *Propeamussium lucidum* (Bivalvia: Pectinacea), a deep-sea predatory scallop. — Journal of Zoology, London 218: 471-496.
- MÜLLER, O.F., 1776. Zoologiae Danicae prodromus, seu animalium Daniae et Norvegiae indigenarum, characteres, nomina, et synonyma imprimis popularium: i-xxxii, 1-281. Havniae [Copenhagen].
- NICKLÈS, M., 1955. Scaphopodes et lamellibranches récoltés dans l'ouest-africain. In: A.F. BRUUN (ed.), Atlantide-Report 3. Scientific results of the Danish expedition to the coasts of tropical West Africa 1945-1946: 93-237. Copenhagen, London.
- NORDSIECK, F., 1969. Die europäischen Meeresmuscheln (Bivalvia): 1-256. Stuttgart.
- NORTH, F.K., 1951. On the type of *Pseudamussium* and other notes on pectinid nomenclature. — Journal of Paleontology 25: 231-236.



- OKUTANI, T., 1962. Report on the archibenthal and abyssal lamellibranchiate Mollusca mainly collected from Sagami Bay and adjacent waters by the R.V. Soyo-Maru during the years 1955-1960. — Bulletin of the Tokai Regional Fisheries Research Laboratory (32): 1-40.
- ORBIGNY, A. D', 1839. Mollusques, échinodermes, foraminifères et polypiers, recueillis aux Iles Canaries par MM. Webb et S. Berthelot: 1-152. In: P.B. WEBB & S. BERTHELOT (1836-1844), Histoire naturelle des Iles Canaries 2(2). Zoologie: Mollusques. Paris.
- PALAZZI, S., & A. VILLARI, 1996. Malacofaune batiali Plio-Pleistocénique del Messinese. 2: Capo Milazzo. — Naturalista Siciliano (4) 20 (3-4): 237-279.
- PAYRAUDEAU, B.C., 1826. Catalogue descriptif et méthodique des annélides et des mollusques de l'île de Corse: 1-218. Paris.
- PELSENEER, P., 1903. Résultats du voyage du S.Y. Belgica [...]. Zoologie. Mollusques (amphineures, gastropodes, et lamellibranches): 1-85. Anvers [Antwerp].
- PHILIPPI, R.A., 1836-44. Enumeratio Molluscorum Siciliae cum viventium tum in tellure tertiaria fossilium, quae in itinere suo observavit 1: i-xiv, 1-267. Berolini [Berlin]; 2: 1-303. Halis Saxonomum [Halle].
- PIANI, P., 1980. Catalogo dei molluschi conchiferi viventi nel Mediterraneo. — Bollettino Malacologico 16: 113-224.
- POLI, J.X., 1795. Testacea utriusque Siciliae eorumque historia et anatomie 2: 75-264, i-lxxvi. Parmae [Parma].
- POPPE, G.T., & Y. GOTO, 1993. European seashells 2: 1-221. Wiesbaden.
- POSSELT, H.J., & A.S. JENSEN, 1898. Grønlands brachiopoder og bløddyr. — Meddelelser om Grønland 23: i-xix, 1-298.
- POUTIERS, J.M., 1981. Mollusques: bivalves. In: Resultats des campagnes Musorstom I. Philippines (18-28 Mars 1976). — Mémoires d'ORSTOM (91): 325-356. Paris.
- RÉCLUZ, C.A., 1853. Description de coquilles nouvelles. — Journal de Conchyliologie 4: 152-156.
- REEVE, L.A., 1852-1853. Monograph of the genus *Pecten*. In: Conchologica Iconica: or, illustrations of the shells of molluscous animals 8: [unnumbered pages], pls 1-12 + text [1852], pls 13-35 + text + index [1853]. London.
- REGENFUSZ, F.M., 1758. Auserlesene Schnecken, Muscheln und andere Schaalthiere. Choix de coquillages et de crustacées: 1-12, figs 1-64. Hafniae [Copenhagen].
- RISSO, A., 1826. Histoire naturelle des principales productions de l'Europe Méridionale et particulièrement de celles des environs de Nice et des Alpes maritimes 4: i-iv, 1-439. Paris.
- RÖDING, P.F., 1798. Museum Boltenianum [...] Pars secunda, continens conchyliia sive testacea univalvia, bivalvia et multivalvia: i-viii, 1-199. Hamburgi [Hamburg].
- ROLAN MOSQUERA, E., J. OTERO SCHMITT & E. ROLAN ALVAREZ, 1990. Moluscos de la Ria de Vigo II: 1-276. Santiago de Compostela.
- ROLAN [MOSQUERA], E. & P. RYALL, 1999. Checklist of the Angolan marine molluscs. — Reseñas Malacológicas 10: 1-132.
- ROMBOUITS, A., 1991. Guidebook to *Pecten* shells: Recent Pectinidae and Propeamussiidae of the world: i xiii, 1-157. Oegstgeest.
- SABELLI, B., R. GIANNUZZI-SAVELLI & D. BEDULLI, 1990-1992. Catalogo annotato dei molluschi marini del Mediterraneo. Annotated check-list of Mediterranean marine mollusks 1 [1990]: i-xiv, 1-348; 2 [1992]: 349-498; 3 [1992]: 501-781. Bologna.
- SACCO, F., 1897a. I molluschi dei terreni terziarii del Piemonte e della Liguria, Part 24. — Bollettino dei Musei di Zoologia ed Anatomia Comparata della R. Università di Torino 12(298): 101-102.
- SACCO, F., 1897b. I molluschi dei terreni terziarii del Piemonte e della Liguria, Part 24 (Pectinidae): 1-116. Torino.
- SACCO, F., 1904. I molluschi dei terreni terziarii del Piemonte e della Liguria, Part 30. Aggiunte e correzioni: 140-146. Torino.
- SARS, G.O., 1878. Mollusca regionis Arcticae Norvegiae 16: 1-466. Christiania.

- SCHEIN, E., 1989. Pectinidae (Mollusca, Bivalvia) bathyaux et abyssaux des campagnes Biogas (Golfe de Gascogne). Systématique et biogéographie. — Annales de l'Institut Océanographique 65: 59-125.
- SCHMIDT, F.C., 1818. Versuch über die beste Einrichtung zur Aufstellung, Behandlung und Aufbewahrung der verschiedenen Naturkörper und Gegenstände der Kunst, vorzüglich der Conchylien-Sammlungen, nebst kurzer Beurtheilung der conchylogischen Systeme und Schriften: 1-252. Gotha.
- SEGUENZA, G., 1877. Studii stratigrafici sulla formazione pliocenica dell'Italia Meridionale 4. — Bollettino della R. Comitato Geologico d'Italia 8(9-10): 359-367.
- SMALDON, G., D. HEPPELL & K.R. WATT, 1976. Type specimens of Invertebrates (excluding insects) held at the Royal Scottish Museum, Edinburgh. — Royal Scottish Museum Information Series, Natural History 4: 1-118. Edinburgh.
- SMITH, E.A., 1885. Report on the Lamellibranchiata collected by H.M.S. "Challenger" during the years 1873-1876. In: Report on the scientific results of the voyage of the H.M.S. "Challenger" during the years 1873-1876. Zoology 13(35): 1-341. Edinburgh.
- SMITH, E.A., 1890. Report on the marine molluscan fauna of the island of St. Helena. — Proceedings of the Zoological Society of London 1890 (18): 247-317.
- SMITH, E.A., 1904. Natural history from H.M. Indian marine survey steamer "Investigator", commander T.H. Heming, R.N. - Series III, No. 1. On Mollusca from the Bay of Bengal and the Arabian Sea. — Annals and Magazine of Natural History 13: 453-473; 14: 1-14.
- SMITH, J.T., 1991. Cenozoic giant pectinids from California and the Tertiary Caribbean Province: *Lyropecten*, *Macrochlamis*, *Vertipecten*, and *Nodipecten*-species. — United States Geological Survey Professional Paper (1391): i-v, 1-155.
- SMITH, S.M., & D. HEPPELL, 1991. Checklist of British marine Mollusca. — National Museums of Scotland Interior Series 11: 1-114. [Is de titel correct Jeroen]
- SMRIGLIO, C., & P. MARIOTTINI, 1990. Descrizione di una nuova specie di Pectinidae (Rafinesque, 1815) per il Mar Mediterraneo: *Cyclopecten brundisiensis* n. sp. e considerazioni su alcune specie appartenenti ai generi *Cyclopecten* (Verrill, 1897) e *Propeamusium* de Gregorio, 1884. — Bollettino Malacologico 26(1-4): 1-18.
- SOWERBY, G.B. 2nd, 1842. Monograph of the genera *Pecten* and *Hinnites*. In: Thesaurus Conchyliorum, or figures and descriptions of Recent shells 1 (2): 45-82, pls 12-20. London.
- SOWERBY, G.B. 3rd, 1904. Mollusca of South Africa (Pelecypoda). — Marine Investigations in South Africa 4: 1-19.
- SOWERBY, G.B. 3rd, 1905. Descriptions of seven new species of marine Mollusca from the collection of the late admiral Keppel. — Proceedings of the Malacological Society of London 6: 279-282.
- SOWERBY, J., 1817. The mineral conchology of Great Britain; or animals or shells which have been preserved at various times and depths in the earth 2 (27-32): 117-194. London.
- STEWART, R.B., 1930. Gabb's California Cretaceous and Tertiary type lamellibranchs. — Publications of the Academy of Natural Sciences of Philadelphia 3: 1-314.
- TATE, R., 1887. Descriptions of some new species of South Australian marine and freshwater Mollusca. — Transactions of the Royal Society of South Australia 9: 62-75.
- TEBBLE, N., 1976 [2nd ed.]. British bivalves seashells: 1-212. London.
- TEPPNER, W. VON, 1922. Lamellibranchiata Tertiaria. Pars 15. "Anisomyaria" II. In: C. DIENER (ed.), Fossilium Catalogus I: Animalia: 67-296. Berlin.
- TERRENI, G., 1980. Molluschi poco conosciuti dell' Arcipelago Toscano: 2. Bivalvi. — Bollettino Malacologico 16: 301-304.
- TERRENI, G., 1981. Molluschi conchiferi del mare antistante la costa Toscana: 1-106. Livorno.
- THIELE, J.D., 1935. Handbuch der systematischen Weichtierkunde. Band 2: 779-1154. Jena.
- THOMSON, C.W., 1873. The depths of the sea: 1-527. London.
- TIBERI, N., 1855. Descrizione di alcuni nuovi testacei viventi nel Mediterraneo lettere: 1-16. Napoli [Napels].

- TÜMTÜRK, I., 1989. *Chlamys pefelis* (L., 1758), nell' Egeo. — *La Conchiglia* 21(242): 16.
- TURTON, W., 1819. A conchological dictionary of the British Islands: 1-272, pls 1-28. London.
- VAUGHT, K.C., 1989. A classification of the living Mollusca: 1-143. Melbourne, USA.
- VERRILL, A.E., 1873. Results of recent dredging expeditions on the coast of New England. — *Americal Journal of Science* (3) 5: 1-16.
- VERRILL, A.E., 1882. Catalogue of marine Mollusca added to the fauna of New England during the past ten years. — *Transactions of the Connecticut Academy of Arts and Sciences* 5: 447-587.
- VERRILL, A.E., 1885. Third catalogue of Mollusca, recently added to the fauna of the New England coast and the adjacent parts of the Atlantic. — *Transactions of the Connecticut Academy of Arts and Sciences* 6: 395-452.
- VERRILL, A.E., 1897. A study of the family Pectinidae with a revision of the genera and subgenera. — *Transactions of the Connecticut Academy of Arts and Sciences* 10: 41-95.
- VERRILL, A.E., & K.J. BUSH, 1898. Revision of the deep-water Mollusca of the Atlantic coast of North America, with descriptions of new genera and species. Part I, Bivalvia. — *Proceedings of the United States National Museum* 20(1139): 775-901.
- WAGNER, H.P., 1985. Notes on type material of the family Pectinidae (Mollusca: Bivalvia). 3. On the identity of *Pecten solidulus* Reeve, 1853, and *Pecten commutatus* Monterosato, 1875. — *Basteria* 49(4-6): 81-84.
- WAGNER, H.P., 1988. The status of four scallop species (Mollusca; Bivalvia; Pectinidae), with description of a new genus. — *Basteria* 52: 41-44.
- WAGNER, H.P., [1991]. Review of the European Pectinidae. Overzicht van de Europese Pectinidae (Mollusca: Bivalvia). — *Vita Marina* 41: 1-48.
- WALLER, T.R., 1978. Morphology, morphoclines and a new classification of Pteriomorphia (Mollusca: Bivalvia). — *Philosophical Transactions of the Royal Society of London (B)* 284: 345-365.
- WALLER, T.R., 1984. The ctenolium of scallop shells: functional morphology and evolution of a key family-level character in the Pectinacea (Mollusca, Bivalvia). — *Malacologia* 25: 203-219.
- WALLER, T.R., 1986. A new genus and species of scallop (Bivalvia: Pectinidae) from off Somalia, and the definition of a new tribe Decatopectinini. — *Nautilus* 100: 39-46.
- WALLER, T.R., 1991. Evolutionary relationships among commercial scallops (Mollusca: Bivalvia: Pectinidae). In: S.E. SHUMWAY, ed., *Scallops: Biology, ecology and aquaculture*: 1-73. Amsterdam, etc.
- WALLER, T.R., 1993. The evolution of "Chlamys" (Mollusca: Bivalvia: Pectinidae) in the tropical western Atlantic and eastern Pacific. — *American Malacological Bulletin* 10: 195-249.
- WALLER, T.R., & L. MARINCOVICH JR., 1992. New species of *Camptochlamys* and *Chlamys* (Mollusca: Bivalvia: Pectinidae) from near the Cretaceous/Tertiary boundary at Ocean Point, North Slope, Alaska. — *Journal of Paleontology* 66: 215-227.
- WARÉN, A., 1980. Marine Mollusca described by John Gwyn Jeffreys, with the location of the type material. — *Special Publications of the Conchological Society of Great Britain and Ireland* 1: 1-60.
- WHITEAVES, J.F., 1893. Notes on some marine Invertebrata from the coast of British Columbia. — *Ottawa Naturalist* 7: 133-137.
- WILKES, J., 1810. Conchology. In: *Encyclopaedia Londinensis; or, Universal Dictionary of Arts, Sciences, and Literature*: 14-41. London.
- WINCKWORTH, R., 1932. The British marine Mollusca. — *Journal of Conchology* 19: 211-252.
- ZENETOS, A., 1996. Fauna Graeciae VII. The marine Bivalvia (Mollusca) of Greece: 1-319. Athens.