

The genus *Cryptopecten* Dall, Bartsch & Rehder, 1938, in the Indo-Pacific (Mollusca; Bivalvia; Pectinidae)

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A comparative study of the various type specimens of species of the genus *Cryptopecten* Dall, Bartsch & Rehder, 1938, as well as additional material makes a provisional revision of the recent species of the genus in the Indo-Pacific possible. Based on this material five species are recognized, viz, *Cryptopecten bernardi* (Philippi, 1851), *C. nux* (Reeve, 1853), *C. vesiculosus* (Dunker, 1877), *C. guendolena* (Melvill, 1888), and *C. bullatus* (Dautzenberg & Bavay, 1912). A lectotype is designated for *C. nux* (Reeve, 1853), and a type-locality for *C. bernardi* (Philippi, 1851).

Key words: Bivalvia, Pectinidae, *Cryptopecten*, taxonomy, Indo-Pacific.

The molluscs procured by the tangle net activities in the vicinity of Cebu revealed many species of Pectinidae that are new for the Philippines, or even represented new species (Wagner, 1988; Dijkstra, 1988, 1989). Some species among this material cause many problems with identification such as the species of *Cryptopecten*, because, except for *C. vesiculosus* (Dunker, 1877), all species of this genus are quite rare and relevant data are very scarce and incomplete. A separate genus for this group of shells was only established in 1938 by Dall, Bartsch & Rehder (1938: 93), and then one species was mentioned by name only. Although Dall, Bartsch & Rehder remark that more Indo-Pacific species belong to *Cryptopecten*, it never became clear which taxa described previously belong to it. Very often the species of the genus *Gloripallium* Iredale, 1939, are considered in recent literature as *Cryptopecten* species, but Waller (1972: 241) pointed out that these two genera are clearly distinct.

In a previous paper I reported two *Cryptopecten* species from the tangle net material (Wagner, 1988: 37), but the name of one of the species, *C. bernardi*, is erroneous. I then considered *C. nux* (Reeve, 1853) to be a junior synonym of *C. bernardi*, in accordance with the general opinion and because at that time I had not yet examined the type material of these taxa. The presence of a third species, that I initially could not identify, among this material was the reason for me to search in the literature for species that have "tripartite" ribs or that have (hollow) vesicles on the ribs. The type material of the majority of the species with this peculiar microsculpture was received on loan and examined, resulting in the recognition of five recent species in the Indo-Pacific. The type specimen of *C. vesiculosus* was not examined. Of *C. nux* the figured syntype was examined only, so it seems appropriate to designate this specimen as lectotype, as I do not know whether the (now) paralectotypes comprise one species only.

The method of calculating the relative ratio's by dividing the height and width of the shell by its depth proved to be a useful character to discriminate between closely allied species. Other diagnostic characters are the presence or absence of riblets on the

lunulae (the area between the auricles and the disc of the valve), number of ribs, top angle, top protruding beyond the hinge-line, hinge dentition, and general colour pattern. A short description, remarks and figures are given for each species.

Abbreviations used in the text and figures are: AMS = Australian Museum, Sydney (Australia); AVP = collection A. D. P. van Peursen, Apeldoorn (The Netherlands); BMNH = British Museum (Natural History), London (England); HPW = collection H. P. Wagner, Leiden (The Netherlands); MP = Muséum National d'Histoire Naturelle, Paris (France); NM = Natal Museum, Pietermaritzburg (South Africa); NMW = National Museum of Wales, Cardiff (Wales); PVP = collection P. L. van Pel, Egmond aan Zee (The Netherlands); RMNH = Rijksmuseum van Natuurlijke Historie, Leiden (The Netherlands); SAM = South African Museum, Cape Town (South Africa); USNM = National Museum of Natural History (Smithsonian Institution), Washington D.C. (U.S.A.); WJHO = collection W. J. H. Onverwagt, Egmond aan Zee (The Netherlands); ZMA = Zoölogisch Museum, Amsterdam (The Netherlands); d. = depth (diameter measured of the valves together); drv. = depth of the right valve only; h. = height (measured from the apex straight down to the ventral edge of the valve); lv. = left valve; rv. = right valve; sp. = complete specimen(s); w. = width (measured from the anterior edge to the posterior edge of the valve parallel to the hinge-line).

Cryptopecten Dall, Bartsch & Rehder, 1938

Cryptopecten Dall, Bartsch & Rehder, 1938: 93 [type species: *Cryptopecten alli* Dall, Bartsch & Rehder, 1938 (= *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912)].

Corymbichlamys Iredale, 1939: 362 [type species: *Chlamys corymbiatus* Hedley, 1909 (= *Cryptopecten nux* Reeve, 1853)].

Original diagnosis.—Shell of medium size, orbicular, laterally compressed, moderately thin; wings (= auricles) subequal, byssal sinus conspicuous, with a few short lamellar denticles on the lower border. Sculpture consists of radiating ribs which are very regularly lamellose, the laminations extending ventrally where they are met by the next lamellation with which they fuse. They thus enclose a series of hollow chambers.

Distribution.—From South Africa east to the Hawaiian Islands, and the Caribbean region with adjacent area.

Cryptopecten vesiculosus (Dunker, 1877) figs. 1-2

Pecten vesiculosus Dunker, 1877: 72.

Pecten hyssinodes Melvill, 1888: 280, pl. 2 fig. 8.

Cryptopecten vesiculosus; Hayami, 1982: 233.

Material examined.—JAPAN: collection Hegt, ZMA/1 sp.; 1870, leg. Schut, ZMA/1 sp.; bought from Sowerby & Fulton, 1908, RMNH/1 sp.; East coast, 1963, collection C. A. van der Peijl, RMNH/ 2 sp.; Kii, leg. H. Dabbert, collection J. Mulder, RMNH/ 2 sp.; Mikawa, Aichi Prefecture, trawled, at 10-20 fathoms, January 1982, WJHO 901-049/ 4 sp.; Mikawa Bay, Aichi Prefecture, 1984, HPW 497b/ 1 sp.; Astuma Bay, Aichi Prefecture, at 20 fathoms, 1971, HPW 497a/ 2 sp.; Minabe, Wakayama Prefecture, at 10-20 fathoms, 1979, HPW 497/ 1 sp.; LOCALITY UNKNOWN: Melvill-Tomlin collection, NMW 1955.158.07/ 1 sp. (holotype of *Pecten hyssinodes* Melvill, 1888).

Description.—Shell solid, oblong, somewhat wider than long, max. h. 29.9 mm, w. 30.6 mm, d. 15.5 mm. Valves inaequilateral, right valve up to 1.6 times more convex than left one; lunulae smooth; left valve with 16-17 equally pronounced ribs; right valve with 16-17 ribs, also equally pronounced. Microsculpture as described for the genus, with the sole exception in this species that the central wall connecting the two alternating rows of vesicles is rather thick, this in contrast to the other species discussed. Anterior auricles 1.5-1.6 times as large as the posterior ones; anterior auricle of left valve with 5-6 ribs, of right valve with 6; posterior auricle of left valve with 5-6 ribs, of right valve with 6-7. Byssal notch broad and short, 3-5 teeth observed. Resilium small and triangular. Top angle 95°-99°. Colour pattern of the shell generally consisting of brown, reddish or violet with white or cream V-shaped markings.

Remarks.—This species is much more solid than any of its congeners, and often has between 16 and 22 mm from the apex a strong growth line, which results in larger specimens in so-called box-shaped forms. This phenomenon was not encountered in the other species discussed.

Distribution.—In contrast to the other taxa this species seems to be restricted to central and southwest Japan and adjacent seas.

Cryptopecten bernardi (Philippi, 1851)
figs. 3-5

Pecten bernardi Philippi, 1851: 90.

Pecten hastingsii Melvill, 1888: 279, pl. 2 fig. 7.

Cryptopecten nux (part); Hayami, 1982: 233 (not Reeve, 1853).

Material examined.—JAPAN: leg. Hastings Dent, Melvill-Tomlin collection, NMW 1955.158.06/ 1 sp. (holotype of *Pecten hastingsii* Melvill, 1888); MARQUESAS: bought from Sowerby & Fulton, 1912, RMNH/ 1 sp. LOCALITY UNKNOWN: leg. Julius Reisner, BMNH 1923.7.13.7/ 1 sp. (holotype of *Pecten bernardi* Philippi, 1851).

Description.—Shell solid, triangular, wider than long (also when overhanging top is included), max. h. 20.2 mm (excl. overhanging part of the top 19.6 mm), w. 20.6 mm, d. 13.6 mm. Valves inaequilateral, right valve up to 1.37 times more convex than left one; left valve with 17 equally pronounced ribs; right valve with 17-18 ribs, also equally pronounced; lunulae with several finely squamate riblets. Microsculpture as described for the genus. Anterior auricles 1.4-1.6 times as large as the posterior ones; anterior auricle of the left valve with 6-7 ribs, of the right valve with 4; posterior auricle of the left valve with 6-7 ribs, of the right valve with 6. Byssal notch with 3-4 teeth. Resilium small and triangular, a large tooth present on the hinge. Top distinctly passing the hinge-line. Top angle 90°-95°. Colour pattern of the shell basically white with fine reddish-brown and pure white V-shaped markings. Internally the valves are brownish.

Remarks.—This species is often confused with the preceeding one, *C. nux*. Philippi described his species from an unknown locality. The type-locality that was originally given by Reeve for *P. nux* as "Port Anna Maria, Nukuhiva, Marquesas Islands", an area where Philippi's species can be found and not *C. nux*, is questionable, because for the specimen that he erroneously identified as *Pecten coruscans* Hinds, 1844, Reeve

quoted the type-locality of Hinds' type. Later, Reeve discovered the mix-up of species, renamed the shell *P. nux*, but did not give the correct locality or a note that the one given might be wrong. Therefore it is not surprising that *C. bernardi* and *C. nux* were considered conspecific.

The specimen that Melvill in 1888 named *P. hastingsii* also has a questionable type-locality; since he described all species mentioned in this paper simultaneously, it is not surprising that its type-locality could have been mixed up with that of *C. hyssinodes*.

According to Dijkstra (personal communication) typical *C. bernardi* is mainly known from the French Polynesian area.

This species can be distinguished from *C. nux* by the much smaller top angle, which gives the shell its triangular shape, the very globose left and right valves, the large hinge, tooth on each valve, the presence of fine riblets on the lunulae (absent in *C. nux*), and its distinctly larger size.

Type-locality.—The type-locality cannot be established since the provenance of the holotype is unknown.

Distribution.—This species can be found in the central Pacific.

Cryptopecten nux (Reeve, 1853)
figs. 6-9, 17-18

Pecten coruscans; Reeve, 1853: species 143, pl. 32 fig. 143 (not Hinds, 1844).

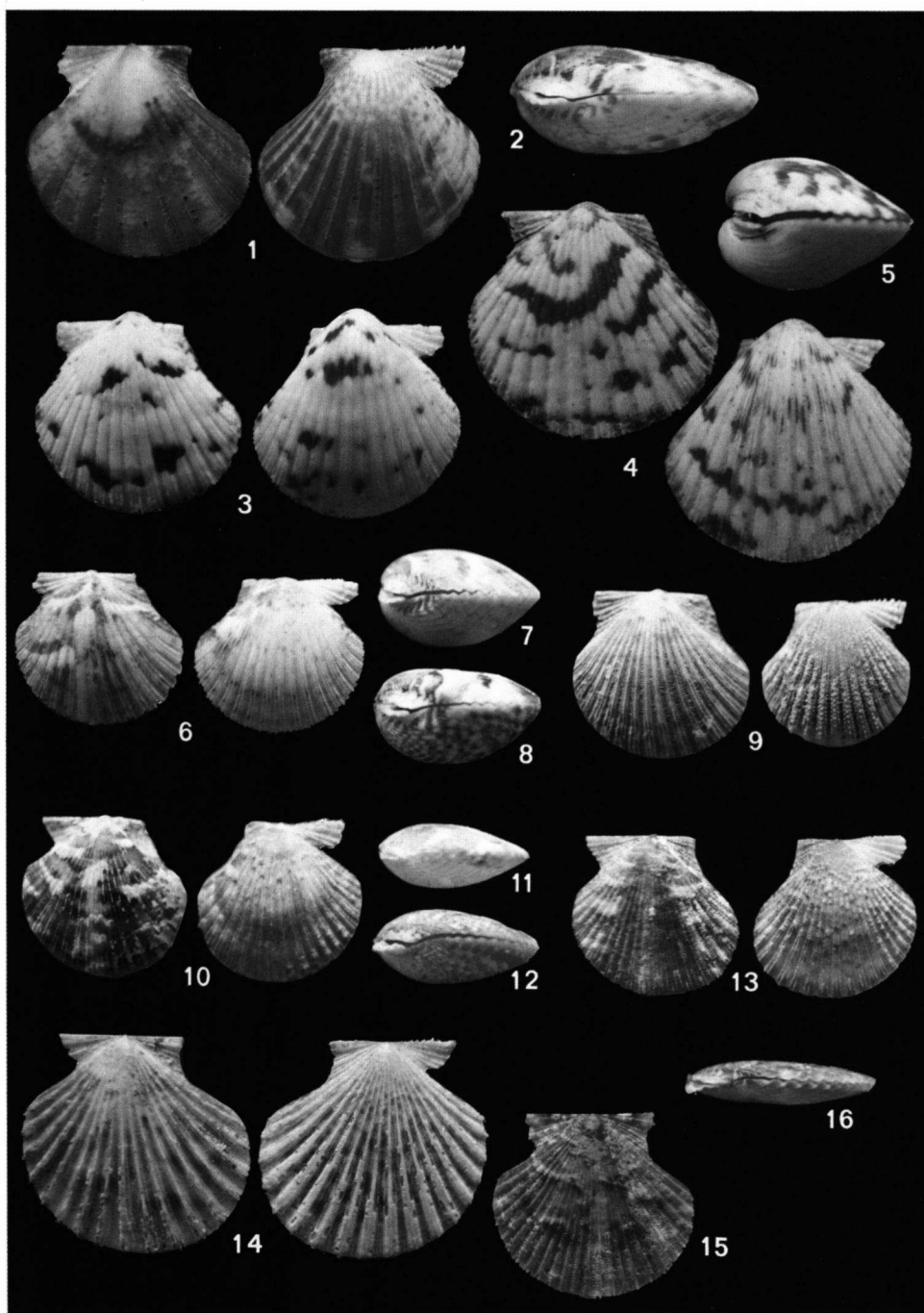
Pecten nux Reeve, 1853: note under species 149.

Chlamys corymbiatus Hedley, 1909: 423, pl. 36 figs. 1-4.

Pecten (Aequipecten) vesiculosus; Dautzenberg & Bavay, 1912: 22 (not Dunker, 1877).

Pecten (Aequipecten) nux; Dautzenberg & Bavay, 1912: 23.

Figs. 1-16. Shells of *Cryptopecten* species in the Indo-Pacific. 1-2, *C. vesiculosus* (Dkr.); 1, lateral views of the left and right valve of the holotype of *Pecten hyssinodes* Melv. (NMW 1955.158.07), locality unknown, h. 21.6 × w. 22.4 mm; 2, anterior view of complete specimen (HPW 497a), Astuma Bay, Aichi Prefecture, Japan, h. 24.8 × d. 10.8 mm. 3-5, *C. bernardi* (Phil.); 3, lateral views of the left and right valve of the holotype of *Pecten bernardi* (BMNH 1923.7.13.7), locality unknown, h. 20.2 (top overhang included) × w. 20.6 mm; 4, lateral views of the left and right valve of the holotype of *Pecten hastingsii* Melv. (NMW 1955.158.06), Japan, h. 24.1 (top overhang included) × w. 24.9 mm; 5, anterior view of complete specimen (RMNH), Marquesas Is., h. 18.1 (top overhang included) × d. 12.6 mm. 6-9, *C. nux* (Ree); 6, lateral views of the left and right valve of the lectotype of *Pecten nux* (BMNH 1950.11.14.52), Port Anna Maria, Nukihiva, Marquesas Is., h. 13.6 × w. 14.9 mm; 7, anterior view of the lectotype of *P. nux* (BMNH 1950.11.14.52), Port Anna Maria, Nukihiva, Marquesas Is., h. 13.6 × d. 8.3 mm; 8, anterior view of complete specimen (HPW 499b), Panglao, Bohol, Philippines, h. 14.5 × d. 8.3 mm; 9, lateral views of the left and right valve of the syntypes of *Chlamys corymbiatus* Hedl. (AMS C27532), Hope Is., Queensland, h. 15.0 × w. 15.5 mm (left valve) and h. 12.9 × w. 13.0 mm (right valve). 10-13, *C. guendolinae* (Melv.); 10, lateral views of the left and right valve of the holotype of *Pecten guendolinae* (NMW 1955.158.02), Mauritius, h. 14.3 × w. 14.7 mm; 11, anterior view of complete specimen (NMW), Mauritius, h. 13.3 × d. 6.0 mm; 12, anterior view of a complete specimen (HPW 1341), Panglao, Bohol, Philippines, h. 14.4 × d. 6.4 mm; 13, lateral views of the left and right valve of a complete specimen (HPW 1341), Panglao, Bohol, Philippines, h. 14.2 × w. 14.2 mm. 14-16, *C. bullatus* (Dta. & Bav.); 14, lateral views of the left and right valve of the holotype of *C. alli* Dall, Btsch. & Rehd. (USNM 173194), S. coast Oahu, Hawaii Is., h. 22.1 × w. 22.8 mm; 15, lateral view of a left valve (HPW 501), Panglao, Bohol, Philippines, h. 18.8 × w. 20.0 mm; 16, anterior view of a complete specimen (HPW 501), Panglao, Bohol, Philippines, h. 18.8 × d. 4.5 mm.



Cryptopecten nux; Habe, 1968: 174, pl. 53 fig. 8.

Cryptopecten nux (part); Hayami, 1982: 233.

Cryptopecten bernardi; Wagner, 1988: 37 (not Philippi, 1851).

Material examined.—SOUTH AFRICA: Natal, 1980, leg. Mrs. C. M. Connolly, HPW/ 2 lv.; Cape Natal (Durban), at 54 fathoms, Pieter Faure sta. 10661, SAM A9938/ 4 lv., 1 rv.; Umhloti, at 40 fathoms, Pieter Faure sta. 10983, SAM A 9939/ 4 lv., 3 rv., 3 fragments; off Tugela River (Natal), at 47 fathoms, Pieter Faure sta. 11097, SAM A9940/ 1 lv.; Illovo, at 27-30 fathoms, Pieter Faure sta. 11528, SAM A9941/ 1 rv.; Cape Morgan, at 52 fathoms, Pieter Faure sta. 13342, SAM A9942/ 1 rv.; off Amanzimtoti, Natal, 30°06.4'S 31°00.8'E, medium sand, at 160-170 m, dredged, 9 July 1985, R. V. Meiring Naudé sta. XX62, NM D1485/ 2 lv.; INDONESIA: Madura-strait, 7°25'S 113°16'E, grey mud with some radiolariae, at 56 m, trawl, 8 March 1899, Siboga sta. 2, ZMA/ 1 rv.; Bay of Badjo, W. coast of Flores, mud, sand and shells, up to 40 m, dredge, trawl and shore-exploration, 16/18 April 1899, Siboga sta. 50 ZMA/ 1 sp.; W. entrance Samau-strait, 10°22'7 S 123°16'5 E, coarse coral-sand with small stones, 390 m, dredge, Siboga sta. 59, ZMA/ 3 rv.; 08°30'S 119°07'.5 E (Flores Sea), sand with few pieces of dead coral, at 73 m, dredge, 12 February 1900, Siboga sta. 310, ZMA/ 2 rv.; near Kampong Kelang, S coast of Manipa Island, coral sand, at 36 m, dredge, townet, 11/12 September 1899, Siboga sta. 184, ZMA/ 2 sp.; 2.3 miles N., 63°W from the N. point of Nuhu Jaan, Kei-islands, 5°36'.5 S 132°55'.2 E., sand, coral and shells, at 90 m, Blake dredge, 16 and 18 December 1899, Siboga sta. 260, ZMA/ 1 rv.; PHILIPPINES: Panglao, Bohol, at 80-150 m, tangle nets, leg. A. Moncur, HPW 499b/ 10 sp., NMW/ 2 lv., 1 rv.; RMNH 5 lv., 5 rv.; Punta Engano, Mactan Island, from deepwater shell-grit, leg. F. J. Springsteen, HPW 499a/ 1 sp., 1lv., 1 rv.; tangle nets, at 300 m, PVP 4089/ 1 sp.; Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu Archipelago, *Lithothamnion*-bottom, sand and coral, at 12 m, dredge, townet, shore-exploration, 24/25 June 1899, Siboga sta. 93, ZMA/ 1 lv.; Anchorage off Pulu Tongkil, Sulu Archipelago, *Lithothamnion*-bottom, at 13 m, dredge, townet, 5/6 July 1899, Siboga sta. 109, ZMA/ 1 sp.; 6°9' N 120°21' E, Sulu Archipelago, sand, at 350 m, dredge, 28 June 1899, Siboga sta. 98, ZMA/ 6 lv., 3 rv.; RMNH/ 3 lv., 1 rv.; PAPUA NEW GUINEA: on sand and rubble bottom, at 40 feet, collected by SCUBA diver, HPW 499/ 1 sp.; AUSTRALIA: Hope Islands, Queensland, 5-10 fathoms, AMS C27532/ 3 lv., 2 rv. (syntypes of *Chlamys corymbiatus* Hedley, 1909); Queensland, Melvill-Tomlin collection, NMW 1955.158.793/ 3 lv. (syntypes of *Chlamys corymbiatus* Hedley, 1909); Queensland, collection J. Mulder, RMNH/ 2 lv.;? MARQUESAS: Port Anna Maria, Nukihiva, in 7 fathoms on a sandy bottom, collection H. Cumming, acc. 1829, BMNH 1950.11.14.52/ 1 sp. (lectotype of *Pecten nux* Reeve, 1853).

Description.—Shell solid, globose, approximately as long as wide, max. h. 16.8 mm, w. 16.8 mm, d.10.2 mm. Valves inaequilateral, right valve up to 1.92 times more convex than left one; left valve with 16-19 ribs, equally pronounced, sometimes distally ornamented with short, broad squamae, the central part of the valve somewhat flattened; right valve has also 16-19 equally pronounced ribs; lunulae smooth. Microsculpture as described for the genus. Anterior auricles 1.7-1.9 times as large as the posterior ones; anterior auricle of the left valve with 6-7 ribs, of the right valve with 4-5; posterior auricle of the left valve with 5-6 ribs, of the right valve with 6. Byssal notch with 5-7 teeth, as there exists a double row of teeth between the lunula and the ctenolium. Resilium small and triangular. Top angle varying between 95° (in young specimens) and 107° (in large specimens). Colour pattern of the shells generally of a creamy white background, with variably sized red-brown to violet tent-like markings or V-shaped streaks. Pink to violet coloured specimens also occur, and one right valve examined (RMNH) was yellow/white. Internally the valves are generally violet.

Remarks.—Originally I considered *C. nux* a synonym of *C. bernardi*, a point of view that was generally shared by many others. As explained under *C. bernardi*, this initially seemed justified, especially in the light of the poor knowledge of the group. Another species easily mixed up with *C. nux* is *C. guendolene* (Melvill, 1888). A comparison of

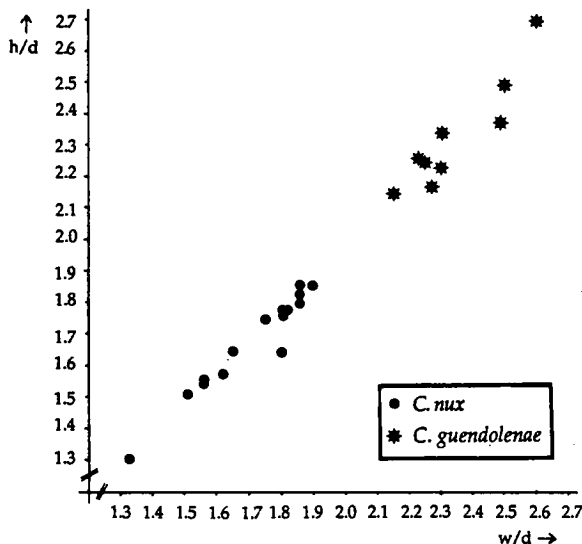


Fig. 17. Relative ratio's of height and width with respect to the depth of complete shells of *Cryptopecten nux* (Rve) and *C. guendolena* (Melv.). For abbreviations see text.

the relative ratio's of the complete shells and the right valves of *C. nux* and *C. guendolena*, shows clearly that *C. nux* has a more convex right valve as well as a more globose shell in general than *C. guendolena* (figs. 17-18). Due to the fact that some species of *Cryptopecten* occur sympatrically, and that I only examined the figured syntype of *C. nux*, I do not know whether the other syntype material belongs to the same species only, and therefore I consider it appropriate to designate the figured syntype to be lectotype of *C. nux*.

Although the condition of the South African material examined is rather poor, it can be assigned to this species on the basis of the globose right valve, smooth lunulae, and, above all, the number of ribs, that constantly differs from that of *C. guendolena*.

As explained under *C. bernardi* the original type-locality is most probably wrong, and in order to avoid confusion in future it seems justified to designate a new type-locality for the species.

Type-locality (new designation).—Panglao, Bohol, Philippines.

Distribution.—Indian Ocean and Western Pacific.

Cryptopecten guendolena (Melvill, 1888)
figs. 10-13, 17-18

Pecten guendolena Melvill, 1888: 279, pl. 2 fig. 6.

Chlamys smithi Sowerby^{3rd}, 1908: 18, pl. 1 figs. 6-7.

Chlamys (*Argopecten*) *nux*; Dijkstra, 1983: 5, figured (non Reeve, 1853).

Material examined.—MAURITIUS: Melvill-Tomlin collection, NMW 1955.158.02/ 1 sp. (holotype of *Pecten guendolena* Melvill, 1888); NMW/ 1 sp.; collection V. de Robillard, BMNH 1908.5.30.63 (holotype

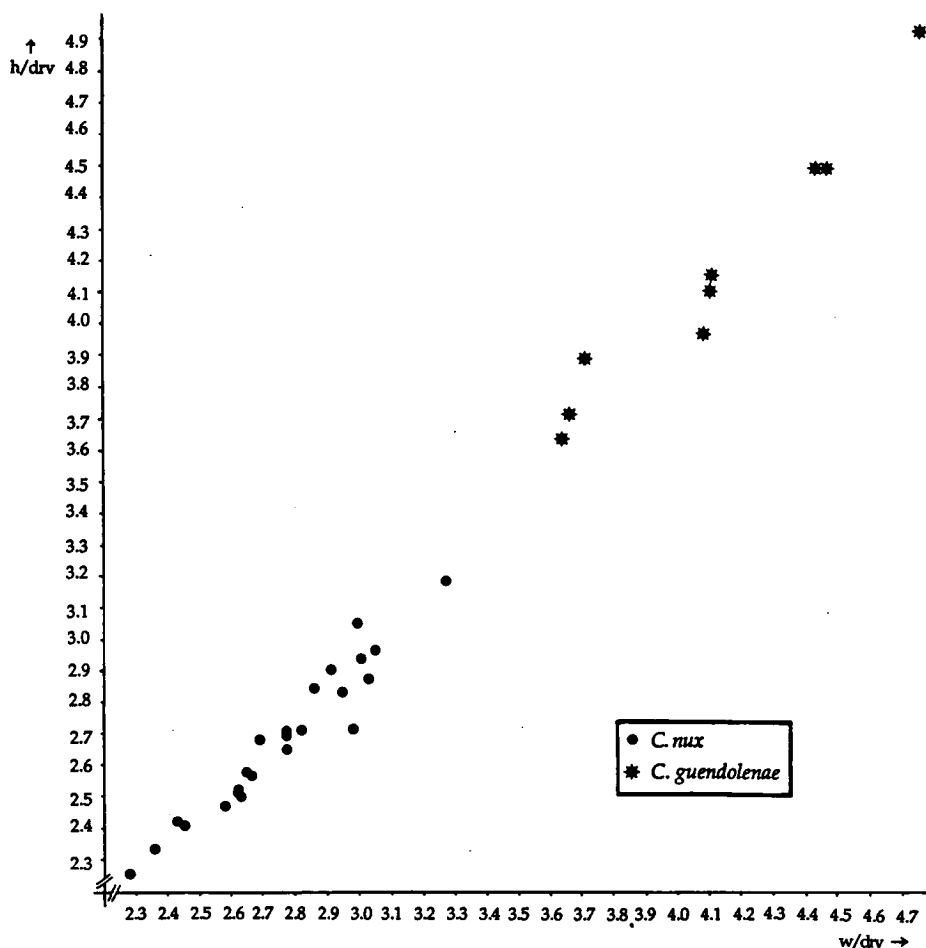


Fig. 18. Relative ratio's of height and width with respect to the depth of the right valves of *Cryptopecten nux* (Rve) and *C. guendolenae* (Melv.). For abbreviations see text.

of *Chlamys smithi* Sowerby^{3rd}, 1908); PHILIPPINES: Panglao, Bohol, at 80-150 m, tangle nets, 1985, leg. A. Moncur, HPW 1341/ 4 sp.; RMNH/ 1 lv., 1rv.; AVP/ 1 lv.; Punta Engano, Mactan Island, tangle nets, at 300 m, PVP 4415/ 1 sp.; from deepwater shell-grit, leg. F. J. Springsteen, HPW/ 1 lv., 2 rv.; off Oslob, Cebu, June 1986, leg. A. Moncur, HPW 1341a/ 1 juv. sp.

Description.—Shell delicate, semi-translucent, approximately as long as wide, max. h. 16.2 mm, w. 16.9 mm, d. 6.8 mm. Valves inaequilateral, right valve up to 1.34 times more convex than the left one; left valve with 20-22 ribs, among which 5 more pronounced with distally long tall squamae; right valve with 20-21 equally pronounced ribs, squamae generally present on the lunulae in fresh specimens, but very fragile.

Microsculpture as described for the genus. Anterior auricles 1.6-1.7 times as large as the posterior ones; anterior auricle of left valve with 5-6 ribs, of the right valve with 4-5; posterior auricle of the left valve with 5-6 ribs, of right valve with 6. Byssal notch broad and long, 3-5 teeth observed. Ctenolium broad. Resilium small and triangular. Top angle between 98° (in young specimens) and 104° (in large specimens). Colour pattern of the shell a yellow-orange background with orange or red flecks, the pronounced ribs almost pure yellow. Internally the valves are yellow with only a tinge of violet near the auricles. One of the valves examined was bright red, with lighter rays where the pronounced ribs are situated.

Remarks.—This species was formerly confused with *C. nux*, which it very closely resembles. The photograph given by Dijkstra (1983:5) is not quite in focus; the specimen figured most probably belongs to *C. guendolena*, being orange-red in colour and with ca. 20 ribs. Also his remarks in the additional description refer to *C. guendolena* rather than to *C. nux*, as he states that the right valve is slightly more convex than the left one, which is true for *C. guendolena*, while in *C. nux* the right valve is 1.4-1.92 times more convex than in *C. guendolena*. It can be easily distinguished by a simple row of teeth between the lunula and the ctenolium, the presence of squamate lunulae, the presence of pronounced ribs, the larger number of ribs (20-22 versus 16-19), the distinctly less convex right valve in comparison to the left valve (relative ratio's), being more fragile, and the generally vividly golden-yellow colour pattern.

Sowerby, like all other authors, overlooked Melvill's description of *C. guendolena* and described (from the same locality as Melvill's specimen) his *Chlamys smithi*. However, the somewhat bleached holotype of *Chlamys smithi* shows all typical characters of *C. guendolena*.

Type-locality.—Mauritius.

Distribution.—The species is only known from Mauritius and the southern Philippines, but probably can be found elsewhere in the central Indian Ocean and Western Pacific, as it was always confused with *C. nux*.

Cryptopecten bullatus (Dautzenberg & Bavay, 1912)
figs. 14-16

Pecten (Chlamys) bullatus Dautzenberg & Bavay, 1912: 17, pl. 27 figs. 1-2.

Cryptopecten alli Dall, Bartsch & Rehder, 1938: 93, pl. 23 figs. 1-4, 7; Hayami, 1982: 235; Abbott & Dance, 1982: 308, figured.

Cryptopecten tissotti; Habe, 1968: 174, pl. 58 fig. 8 (not Bernardi, 1861).

Cryptopecten (Chlamys) alli; Barnett, 1987: 9.

Cryptopecten bullata (sic); Wagner, 1988: 37.

Cryptopecten bullatus; Dijkstra, 1987: 8.

Material examined.—SOUTH AFRICA: off Quora River, Transkei, sand, at 400 m, dredged, 14 June 1983, R. V. Meiring Naudé sta. sm48, NM C4898/ 5 lv., 3 rv.; off Mendu Point, Transkei, $32^{\circ}24.0' S$ $28^{\circ}59.0' E$, coarse sand, rubble, few sponges, at 250 m, dredged, 12 July 1984, R. V. Meiring Naudé sta. R11, NM C6393/ 3 rv.; off Umlaas Canal, Natal, $30^{\circ}00.4' S$ $31^{\circ}03.0' E$, muddy sand, at 100 m, dredged, 10 July 1985, R. V. Meiring Naudé, sta. XX76, NM D1078/ 2 lv.; INDONESIA: W. entrance Samau-strait, $10^{\circ}22'.7 S$ $123^{\circ}166'.5 E$, coarse coral-sand with small stones, at 390 m, dredge, 26 April 1899, Siboga sta. 59, ZMA/ 1 lv., 2 rv.; Haingsisi, Samau-island, *Lithothamnion*, up to 36 m, dredge, 2/5 February 1900, Siboga sta. 303, ZMA/ 1 lv.; 2.3 miles N., $63^{\circ} W$ of the N. point Nuhu Jaan, Kei Islands, at 90 m, Siboga sta. 260, ZMA/ 2 juv. sp. [paratypes of *Pecten (Chlamys) bullatus* Dautzenberg & Bavay, 1912];

PHILIPPINES: 5°43' .5 N 119°40' E, Sulu Archipelago, stony bottom, at 522 m, dredge, 26 June 1899, Siboga sta. 95, ZMA/ 1 lv.; Sulu Archipelago, Siboga sta. 98, ZMA/ 2 rv.; 6°8' N 121°19' E, Sulu Archipelago, at 275 m, Siboga sta. 105, ZMA/ 1 sp. [holotype of *Pecten* (*Chlamys*) *bullatus* Dautzenberg & Bavay, 1912]; 0°7' .2 N 130°25' E, Sulu Archipelago, grey muddy sand, shells and *Lithothamnion*, at 83 m, dredge, 14 August 1899, Siboga sta. 154, ZMA/ 1 rv.; Panglao, Bohol, at 80-150 m, tangle nets, 1985, leg. A. Moncur, HPW 501/ 5 sp.; RMNH/ 1 lv., 1 rv.; Cebu, at 150 m, 1987, leg. R. Martin, ZMA/ 9 lv., 1 rv.; HAWAII: S. coast of Oahu, 70°30' S, at 238-252 fathoms, sta. 3811, USNM 173194/ 1 sp. [holotype of *Cryptopecten alli* Dall, Bartsch & Rehder, 1938 (label: *Chlamys oahuensis* Dall MS name)]; W. coast of Hawaii Island, 49°, at 147-198 fathoms, sta. 4045, USNM 335667/ 1 lv. [figured paratype of *C. alli* D., B & R., 1938 (label: *Chlamys intersectus* Dall MS name)]; vicinity of Kauai Island, 46.8°, at 257-312 fathoms, sta. 4132, USNM 190440/ 1 lv. [paratype of *C. alli* D., B & R., 1938 (label: *Pecten oahuensis* Dall MS name)].

Description.—Shell extremely delicate, semi-translucent, oblique towards posterior half, distinctly wider than long, h. 23.0 mm, w. 25.9 mm, d. 5.5 mm. Valves inaequilateral, right valve up to 1.28 times more convex than left one; left valve with (19-) 21-26 ribs, 3 more pronounced and distally with short broad squamae; right valve with (19-) 21-26 equally pronounced ribs. Microsculpture as described for the genus. Anterior auricles 1.1-1.3 times as large as the posterior ones; anterior auricle of the left valve with 5 ribs, of the right valve also with 5 ribs; posterior auricle of the left valve with 6 ribs, of the right valve also with 6 ribs. Byssal notch with 3-5 teeth. Resilium small and triangular. Top angle varying between 106° (in young specimens) and 115° (in large specimens). Colour pattern of the shells violet to red-brown background with fine red and white V-shaped markings and lighter coloured rays accompanying the pronounced ribs. Internally the valves are pale violet. Among the material examined there are both pure red and yellow valves.

Remarks.—The number of ribs, in contrast to the other species of the genus, varies with the size of the shell; the specimens from Hawaii are somewhat more oblique in shape and have a lower number of ribs than specimens of about equal size from the Philippines and Indonesia. The specimens from South Africa from 250 and 400 m depth closely resemble the Hawaiian specimens in shape and number of ribs. One of the valves of the South African specimens dredged at 100 m depth resembles the Philippine form, the other valve is intermediate in shape, but has the same number of ribs as the Philippine form. Therefore I think that both forms represent one species, but that the differences are due to the differences in bathymetric distribution as shown by the samples from South Africa.

In Japan this species was known under the name *Cryptopecten tissotti*, but the type specimen of *Pecten tissotti* Bernardi, 1861 (kept in the MP), represents a juvenile *Aequipecten* (*Perapecten*) *flabellum* (Gmelin, 1791) (see also Dijkstra, 1987: 8).

Type-locality.—6°8' N 121°19' E, Sulu Archipelago, at 275 m.

Distribution.—The species can be found from South Africa to the Hawaiian Islands.

To identify juveniles the relative ratio's are a reliable character but one must examine right valves or complete specimens to use this character to discriminate between *C. nux* and *C. guendolenae*. When beached or single valves must be identified, some of the important characters cannot be seen any more. Then it very well might be possible that the extremely large tooth on each valve of *C. bernardi* or the squamae on the lunulae of both *C. bernardi* and *C. guendolenae* can be worn off. Only counting ribs and measuring top-angles (when the shells are not broken) can give some informa-

tion, but for correct identification experience with the group is required, an argument, of course, that in fact applies to each group that is complex and poorly known.

I am much indebted to all curators and keepers in charge of the material studied, viz. Prof. Dr. E. Gittenberger (RMNH), Dr. T. Gosliner (formerly SAM), Dr. R. N. Kilburn (NM), Dr. B. Métivier (MP), Mr. R. G. Moolenbeek (ZMA), Mrs. S. Morris (BMNH), Mrs. A. Trew (NMW), Mrs. D. M. Tyler (USNM), Mrs. J. Waterhouse (AMS), and to the private collectors Mr. W. J. H. Onverwagt (Egmond aan Zee), Mr. P. L. van Pel (Egmond aan Zee), and Mr. A. D. P. van Peursen (Apeldoorn) for the loan of their specimens. Dr. A. C. van Bruggen (Leiden University) and my wife Elsa are acknowledged for reading and commenting upon the manuscript. Financial support received from the Koninklijke Shell Nederland B.V. through the medium of Mr. A. F. J. Jansen (Bovenkarspel) has made the printing of the colour plate possible.

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