

Pectinoidea (Bivalvia: Propeamussiidae and Pectinidae) from the Panglao region, Philippine Islands

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ABSTRACT

Sixty one Pectinoidea species (11 Propeamussiidae and 50 Pectinidae) collected by the 2004 Panglao Marine Biodiversity Project (PMBP) to Panglao, Philippines, and the PANGLAO 2005 Deep-Sea Cruise are described. One Propeamussiidae species is new to science: *Parvamussium largoi* spec. nov. Three pectinoidean species (1 Propeamussiidae, 2 Pectinidae) are new records for the Philippines: *Similipecten eous* (Melvill in Melvill & Standen, 1907), "*Mimachlamys*" *kauiensis* (Dall, Bartsch & Rehder, 1938) and *Haumea rehderi* (Grau, 1960). Records of species in the ZMA collection (now Naturalis Biodiversity Center) from the Philippines, not sampled by PMBP 2004 and PANGLAO 2005, are given. *Amussium electrum* Pelseneer, 1911 is newly synonymised with *Propeamussium caducum* (E.A. Smith, 1885). Type data, references, descriptions, horizontal and vertical distribution and habitat of each species are provided.

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		In the first decades of the nineteenth th century only a very few scallop species were known from the Philippine Archipelago. During a voyage to the Philippines in 1836-1840 H. Cuming collected several unknown pectinids, which were described by G.B. Sowerby 2 nd in 1842 and by L.A. Reeve during the years 1852 and 1853. The first expedition after Cuming's voyage was H.M.S. "Samarang" (1843-1846), treated by Adams & Reeve in 1849 and 1850 (Trew, 1992). Only a few pectinids were discovered as new for science, viz. <i>Hemipecten forbesianus</i> Adams & Reeve, 1849 (Petit, 2007: 99) and <i>Pecten fulvicostatus</i> Adams & Reeve, 1850, both species from the Sulu Archipelago. Both pectinid species are recently sampled again by the PMBP 2004 and PANGLAO 2005. The voyage of the H.M.S. "Challenger" (1872-1876) only visited the Philippines briefly, reported by E.A. Smith in 1885 (Trew, 1993). He listed four shallow water pectinid species, <i>Pecten lemniscatus</i> Reeve, 1853 (now <i>Scaeoichlamys squamea</i> Dijkstra & Maestrati, 2009), and a variation of <i>Pecten senatorius</i> (Gmelin, 1791), now <i>Mimachlamys sanguinea</i> (Linnaeus, 1758), <i>Amusium</i> [sic] <i>pleuronectes</i> (Linnaeus, 1758), and the deep-water pectinid <i>Pecten vitreus</i> (Chemnitz [invalid]), now <i>Delectopecten alcocki</i> (E.A. Smith, 1904) from three stations in the Philippines of 100 to 700 fathoms [= 183 to 1280 m]. For the first time two deep-water glass scallops (Propeamussiidae) from that region, i.e. <i>Amusium caducum</i> E.A. Smith, 1885, now <i>Propeamusium caducum</i> (E.A. Smith, 1885), and <i>Amusium jeffreysii</i> E.A. Smith, 1885, now <i>Propeamusium jeffreysii</i> (E.A. Smith, 1885) were described from 700 fathoms [= 1280 m] and 375 fathoms [= 686 m] respectively. The "Siboga" Expedition (1899-1900) to the Indonesian Archipelago also briefly explored the Sulu Archipelago, resulting in few pectinoids, that is four shallow water pectinids and three bathyal pectinoids (2 Pectinidae and one new Propeamus-	
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siidae). The bivalved molluscs sampled by the MUSOR-STOM 1 expedition of 1976 to the bathyal zone and the continental shelf of the Lubang area, are treated by Poutiers in 1981, resulting in four pectinid species, of which *Delectopecten musorstomi* Poutiers, 1981 is newly described. Recently the AURORA campaign (2007) and the LUMIWAN 2008 expedition are held, and the results of the collected pectinoidea will be compared with the present pectinoid material and published elsewhere in the near future.

In literature several publications with an enumeration of Philippine Mollusca could be consulted, of which Hidalgo (1903) was the first author who catalogued and annotated 20 pectinid species (with an asterisk) from that region, mainly based on Cuming's material. In 1928 Faustino summarized 35 pectinoid records from previous references, many of which are currently considered synonymous. In the first book on Philippine marine molluscs by Springsteen & Leobera (1986) 21 pectinid species are described and figured. Recently Raines in Poppe (2010) enumerated and figured 53 pectinid species from the Philippines. In the subsequent volume Dijkstra in Poppe (2011) has treated 10 propeamussiid species from the Philippines, of which 3 species, i.e. *Parvamussium aldeynzeri* Dijkstra, 2004, *Parvamussium squalidulum* Dijkstra, 1995, and *Parvamussium vesiculatum* Dijkstra, 1995, all from around Balicasag Island, are not sampled by the PMBP 2004 and PANGLAO 2005 cruise.

MATERIALS AND METHODS

The present pectinoidean material in this paper is sampled by the Panglao Marine Biodiversity Project (PMBP) 2004 and the PANGLAO 2005 Deep-Sea Cruise (see Bouchet et al., 2009; Richer de Forges et al., 2009, for expedition reports and station data). Additional live-taken pectinoidean material from the Zoological Museum at Amsterdam (now Naturalis Biodiversity Center, see Acronyms) is included, when only dead material is collected by PMBP 2004 and/or PANGLAO 2005.

Pectinoidean material of the PMBP 2004 is obtained by several sampling techniques: from the littoral zone by intertidal picking (stns M1-61), dive hand picking (stns R1-78), brushing dead coral and stones for epibenthos (stns B1-42), dredging (stns D1-16), and collecting sea bottom samples by suction sampling using a "vacuum cleaner" (stns S1-53); sublittorally and bathyally by "lumun lumun" nets (stns L35-75), tangle nets (stns P1-7), trawling (stns T1-44), and grabbing (stn G1).

Pectinoidean material of the PANGLAO 2005 is collected by trawling (beam-trawl, CP stns) or by dredging (Warén dredge, DW stns) bathyally from the Bohol Sea around Panglao Island to the eastern periphery of the Sulu Sea.

All the present species are treated systematically and relevant references, type data, description, geographical and bathymetrical distribution together with information on habitat are given. A map for each species is presented with stations of the PMBP 2004 and/or PANGLAO 2005, showing

live (solid symbol) and dead (open symbol) collected specimens. The following depth ranges are used: intertidal (0-2 m), littoral (2-20 m), sublittoral (20-40 m), below sublittoral (40-80 m), upper bathyal (80-500 m), and lower bathyal (500-2000 m). Photographs of all the present species are provided, supplemented by some species of the ZMA collection (now in the Naturalis Biodiversity Center collection) from the Panglao region, which are not taken by the PMBP 2004 and PANGLAO 2005 cruise.

The holotype of *Parvamussium largoi* spec. nov. is deposited in the Carcinological Reference Collection of the National Museum of the Philippines at Manila. All other studied material is preserved in the Muséum national d'Histoire naturelle (MNHN) in Paris, with voucher material in the reference collection of the author.

ABBREVIATIONS

Acronyms of institutions and repositories

AIM	Auckland Institute and Museum, Auckland, New Zealand
AMS	The Australian Museum, Sydney, Australia
ANSP	Academy of Natural Sciences, Philadelphia, U.S.A.
BMNH	(now NHM) The Natural History Museum, London, U.K.
IOAS	Institute of Oceanology, Academia Sinica, Qingdao, China
IRD	Institut de Recherche pour le Développement, Nouméa, New Caledonia
KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium
LMAD	Aquazoo-Löbbecke Museum, Düsseldorf, Germany
LSL	Linnean Society of London, Burlington House, London, U.K.
MHNB	Muséum d'Histoire Naturelle, Bordeaux, France
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MSNP	Museo di Storia Naturale e del Territorio, Calci, Italy
NMCR	National Museum of the Philippines - Carcinological Reference Collections, Manila City, Philippines
NMNS	National Museum of Natural Science, Taichung, Taiwan
NMW	National Museum of Wales, Cardiff, U.K.
NNM	Nationaal Natuurhistorisch Museum Naturalis (now NCB Naturalis), Leiden, The Netherlands
NSMT	National Science Museum, Tokyo, Japan
RMNH	Naturalis Biodiversity Center, Leiden, The Netherlands
SMNH	Swedish Museum of Natural History, Stockholm, Sweden
SMTD	Staatliches Museum für Tierkunde, Dresden, Germany

TMMT	National Taiwan Museum, Taipei, Taiwan
UMZC	University Museum of Zoology, Cambridge, U.K.
USNM	National Museum of Natural History, Washington, DC, U.S.A.
UUZM	University of Uppsala, Zoological Museum, Uppsala, Sweden
ZMA	Zoological Museum Amsterdam, Amsterdam, The Netherlands (now in Naturalis Biodiversity Center, Leiden, The Netherlands)
ZMB	Museum of Natural History, Humboldt University, Berlin, Germany
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen
ZSI	Zoological Survey of India, New Alipur, Calcutta, India

Stations data

B	brushing
CP	chalut à perche (beam trawl)
D	dredge
DW	drague Warén (Warén dredge)
G	grab
L	"lumun lumun" nets
M	intertidal picking
P	tangle nets
R	dive hand picking
S	suction sampling ("vacuum cleaner")
T	trawl
s/n	station number lacking

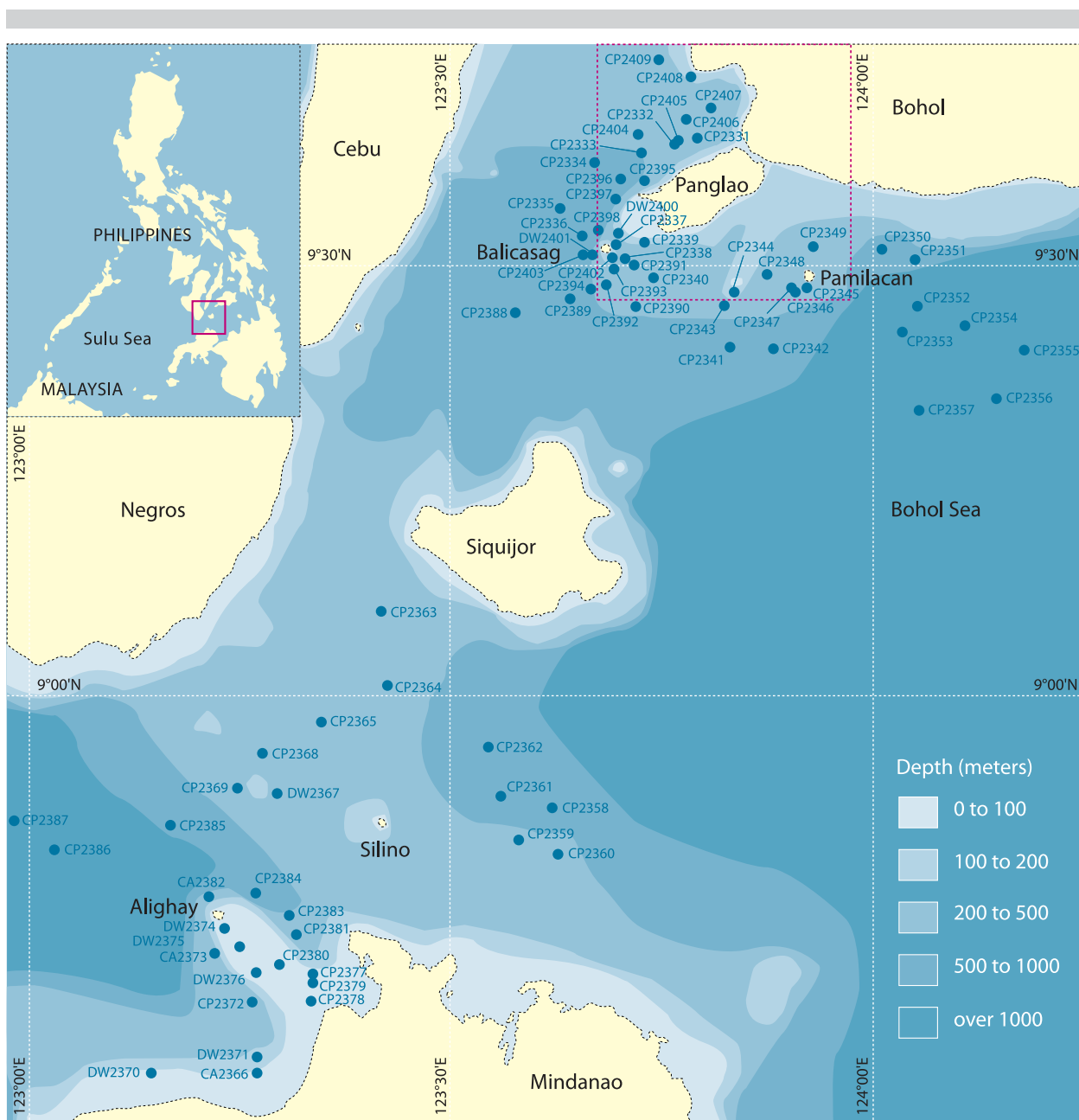


Fig. 1. Map showing the area investigated around Panglao, Pamilican Island and part of the northern Bohol Sea; and the area between Siquijor and northern Mindanao, just entering the Sulu Sea south of Negros, showing all PANGLAO 2004 and PANGLAO 2005 station with their station numbers. For a more detailed overview of PANGLAO 2004 stations, here indicated in the red-bordered rectangle around Panglao Island, see Ter Poorten (2009: fig.1).

Other abbreviations

A	found partly alive
H	height
L	length
lv	left valve(s)
rv	right valve(s)
pv	live-taken specimen(s)
v	valve(s)
W	width

RESULTS

Fifty six Pectinoidea species of which 9 Propeamussiidae species (8 alive and one dead) and 47 Pectinidae species (40 alive and 7 dead) consisting of 13,786 specimens (8,658 alive and 5,128 dead) from 562 samples are recorded during the PMBP 2004, which is about 75% of the presently known Pectinoidea from the Philippine Archipelago (Dijkstra, unpubl. data). None of these species are endemic to the Philippine waters, which agrees with the large geographical distribution through the tropical Indo-West Pacific of most Pectinoidea. Almost all Propeamussiidae species are living bathyally on soft (generally muddy) bottom assemblages, except *Parvamussium pauciliratum* (E.A. Smith, 1903), which also occurs in shallower waters. None of these are coral dwelling shallow water species. *Propeamussium jeffreysii* (E.A. Smith, 1885) is taken in large quantity (30 samples with a total of 3,437 specimens (2,129 alive, 1,308 dead), followed by *Propeamussium caducum* (E.A. Smith, 1885) (26 samples with a total of 1,150 specimens (883 alive, 267 dead)) of both expeditions (Table 1). *Similipecten eous* (Melvill in Melvill & Standen, 1907) is a new record for the Philippines, which is only live collected by PMBP 2004. Four pectinid species are also preferring deep water, i.e. *Delectopecten alcocki* (E.A. Smith, 1904), *Delectopecten musorstomi* Poutiers, 1981, *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912) and *Cryptopecten nux* (Reeve, 1853), the latter taken by 44 samples with a total of 2,485 specimens (1,079 alive, 1,406 dead), followed by *D. alcocki* with 55 samples with a total of 1,094 specimens (354 alive, 740 dead) of both expeditions (see Table 1).

In contrast, most of the Pectinidae species prefer a littoral environment (subtidally to sublittorally) of coral, stones, gravel or rubble with soft sediments of sand and mud (see also Ter Poorten, 2009: 16). *Pedum spondyloideum* (Gmelin 1791) is living in cavities in the upper lateral surfaces of the massive coral *Porites*. Another coral dweller is *Coralichlamys madreporarum* (G.B. Sowerby 2nd, 1842), which is embedded in branches of the coral *Acropora*. Most of the shallow water pectinids are living underside of coral boulders or amongst coral rubble on sandy bottoms. A few scallops prefer open water and are living in colonies on soft sediments like *Amusium pleuronectes* (Linnaeus, 1758). Two pectinid species are new records for the Philippines, i.e. the small shallow water living *Haumea rehderi* (Grau, 1960), and the small deeper water living "*Mimachlamys*" *kauaiensis* (Dall, Bartsch

& Rehder, 1938). The systematic position of the latter is not yet well established.

It is quite remarkable, that several well-known Pectinidae are not sampled or only dead collected in a very small quantity, i.e. *Decatopecten plica* (Linnaeus, 1758), *Bractechlamys vexillum* (Reeve, 1853), *Mimachlamys sanguinea* (Linnaeus, 1758) and *Annachlamys striatula* (Linnaeus, 1758) (see also Table 3). It is possible, that these scallops are more common in other areas of the Philippines than around Panglao.

Twenty three Pectinoidea species of which 7 Propeamussiidae species (6 alive and one dead) and 16 Pectinidae species (2 alive and 14 dead) consisting of 5,592 specimens (3,449 alive and 2,143 dead) from 158 samples are recorded during the PANGLAO 2005 (see Table 1). It was expected, that this deep-water cruise should sample more propeamussiid than pectinid material.

SYSTEMATIC PART**PECTINOIDEA Rafinesque, 1815**

Pectinoidea Rafinesque, 1815: 148 (ex subfamily Pecten Rafinesque)

PROPEAMUSSIIDAE Abbott, 1954

Propeamussiidae Abbott, 1954: 361, 369.

Diagnosis. — Free or byssate Pectinoidea with outer foliated calcitic layer on left valve and prismatic calcitic layer on right valve present on the main part of the disc; inner layer crossed-lamellar aragonite beyond pallial line, in some species almost to distal margins; byssal notch without ctenolium.

Distribution. — Middle Triassic to Recent; Worldwide (Waller, 2006b: 314).

Remarks. — Hertlein (1969: N350) placed *Propeamussium* de Gregorio, 1884 with the subgenus *Parvamussium* Sacco, 1897, together with *Amusium* Röding, 1798 and *Korobkovia* Glibert & van de Poel, 1965 in his *Amusium* group, although noting that these genera may have been derived from different groups of Pectinidae. Abbott (1954), however, introduced a new family name Propeamussiidae, emended by Waller (1978: 353), for representative species of *Propeamussium*. Waller (1984) also included several other related genera in Propeamussiidae, viz. *Parvamussium* Sacco, 1897, *Cyclopecten* Verrill, 1897, *Similipecten* Winckworth, 1932, and *Catillopecten* Iredale, 1939. Hayami (1988a) mentioned also *Polynemamussium* Habe, 1951 as an extant genus in Propeamussiidae, and treated *Parvamussium* as a synonym of *Propeamussium*. Subsequently, Hayami & Kase (1993: 54) raised *Parvamussium* in rank to an extant genus. Schein (1989) introduced *Bathypecten* as a valid genus of Propeamussiinae, a subfamily of Pectinidae, together with *Cyclopecten*, *Parvamussium*, *Propeamussium* and *Similipecten*.

	PMBP 2004					PANGLAO 2005				
	Alive or dead	number of samples	number of specimens		Habitat category	Alive or dead	number of samples	number of specimens		
PROPEAMUSIIDAE										
1	<i>Propeamussium caducum</i>	1	1	7 pv	36 v	C	1	25	876 pv	231 v
2	<i>Propeamussium jeffreysii</i>	1	3	17 pv	153 v	C	1	27	2112 pv	1155 v
3	<i>Propeamussium rubrotinctum</i>	—	—	—	—	C	1	13	132 pv	7 v
4	<i>Propeamussium sibogai</i>	0	1	—	1 v	C	1	12	74 pv	45 v
5	<i>Propeamussium siratama</i>	—	—	—	—	C	1	6	3 pv	9 v
6	<i>Parvamussium araneum</i>	1	3	1 pv	—	C	1	1	1pv	—
7	<i>Parvamussium cristatellum</i>	1	15	493 pv	430 v	C	0	1	—	62 v
8	<i>Parvamussium largoi</i> spec. nov.	1	7	2 pv	41 v	C	—	—	—	—
9	<i>Parvamussium pauciliratum</i>	1	17	14 pv	139 v	B, C	—	—	—	—
10	<i>Parvamussium scitulum</i>	1	17	13 pv	711 v	C	—	—	—	—
11	<i>Similipecten eous</i>	1	1	35 pv	—	C	—	—	—	—
PECTINIDAE										
Camptonectinae										
12	<i>Delectopecten alcocki</i>	1	11	104 pv	281 v	C	1	44	250 pv	459 v
13	<i>Delectopecten musorstomi</i>	1	4	95 pv	1 v	C	—	—	—	—
Palliolinae										
14	<i>Palliolium minutulum</i>	1	7	3 pv	24 v	A, C	—	—	—	—
Pectininae										
15	<i>Decatopecten plica</i>	0	1	—	1 v	C	—	—	—	—
16	<i>Decatopecten radula radula</i>	1	19	26 pv	1 v	A, B, C	—	—	—	—
17	<i>Anguipecten picturatus</i>	1	3	8 pv	—	C	—	—	—	—
18	<i>Anguipecten superbus</i>	0	1	—	1 v	C	—	—	—	—
19	<i>Bractechlamys oweni</i>	—	—	—	—	C	0	1	—	1 v
20	<i>Excellichlamys spectabilis</i>	1	20	28 pv	125 v	A, C	—	—	—	—
21	<i>Glorichlamys elegantissima</i>	0	3	—	3v	A, C	0	1	—	4 v
22	<i>Glorichlamys quadrilirata</i>	0	3	—	9 v	C	—	—	—	—
23	<i>Gloripallium pallium</i>	1	64	318 pv	249 v	A, C	0	2	—	2 v
24	<i>Gloripallium speciosum</i>	1	7	2 pv	9 v	A, C	0	1	—	1 v
25	<i>Juxtamusium coudeini</i>	0	1	—	1 v	C	—	—	—	—
26	<i>Juxtamusium maldivense</i>	1	7	86 pv	47 v	C	—	—	—	—
27	<i>Mirapekten mirificus</i>	1	7	19 pv	62 v	C	—	—	—	—
28	<i>Mirapekten moluccensis</i>	1	14	9 pv	20 v	A, C	—	—	—	—
29	<i>Mirapekten rastellum</i>	1	21	473 pv	761 v	A, C	0	1	—	1 v
30	<i>Amusium pleuronectes</i>	1	4	10 pv	17 v	C	—	—	—	—
31	<i>Dentamusium obliteratum</i>	1	5	350 pv	255 v	C	—	—	—	—
32	<i>Serratovola rubicunda</i>	1	12	1 pv	42 v	C	0	3	—	3 v
Chlamydinae										
33	<i>Complicachlamys wardiana</i>	1	3	2 pv	1 v	A, C	—	—	—	—
34	<i>Coralichlamys madreporarum</i>	1	9	8 pv	9 v	A	—	—	—	—
35	<i>Hemipekten forbesianus</i>	1	2	1 pv	1 v	A	—	—	—	—
36	<i>Laevichlamys aliae</i>	1	10	11 pv	12 v	C	—	—	—	—
37	<i>Laevichlamys cuneata</i>	1	15	10 pv	18 v	A	—	—	—	—
38	<i>Laevichlamys deliciosa</i>	1	7	2 pv	6 v	C	0	1	—	1 v
39	<i>Laevichlamys gladysiae</i>	1	19	314 pv	119 v	C	0	1	—	1 v
40	<i>Laevichlamys mollita</i>	1	14	14 pv	15 v	A, C	—	—	—	—

	PMBP 2004					PANGLAO 2005				
	Alive or dead	number of samples	number of specimens	Habitat category		Alive or dead	number of samples	number of specimens		
Chlamydinae (continued)										
41 <i>Laevichlamys multisqualida</i>	1	1	2 pv	—	C	0	1	—	—	1 v
42 <i>Laevichlamys squamosa</i>	1	11	10 pv	8 v	A	—	—	—	—	—
43 <i>Laevichlamys wilhelminae</i>	1	19	9 pv	14 v	A	—	—	—	—	—
44 <i>Paschinnites coruscans coruscans</i>	1	4	1 pv	5 v	A	—	—	—	—	—
45 <i>Pedum spondyloideum</i>	1	5	6 pv	2 v	A	—	—	—	—	—
46 <i>Scaeoichlamys squamea</i>	1	2	2 pv	—	C	—	—	—	—	—
47 <i>Semipallium barnetti</i>	1	3	4 pv	27 v	C	—	—	—	—	—
48 <i>Semipallium diana</i>	0	1	—	1 v	C	—	—	—	—	—
49 <i>Semipallium dringi</i>	1	17	11 pv	42 v	A, C	—	—	—	—	—
50 <i>Semipallium flavicans</i>	1	1	1 pv	—	A	—	—	—	—	—
51 <i>Semipallium fulvicostatum</i>	1	3	1 pv	20 v	A, C	—	—	—	—	—
52 <i>Veprichlamys deynzerorum</i>	—	—	—	—	—	0	1	—	—	3 v
53 <i>Mimachlamys albolineata</i>	1	9	10 pv	3 v	A, B	—	—	—	—	—
54 <i>Mimachlamys cloacata</i>	1	4	1 pv	3 v	B, C	0	3	—	—	10 v
55 <i>Mimachlamys gloriosa</i>	1	1	3 pv	—	C	—	—	—	—	—
56 " <i>Mimachlamys</i> " <i>kauaiensis</i>	1	5	5 pv	12 v	C	—	—	—	—	—
57 <i>Mimachlamys lentiginosa</i>	1	57	44 pv	66 v	A, B, C	0	1	—	—	1 v
58 <i>Mimachlamys sanguinea</i>	—	—	—	—	—	0	1	—	—	1 v
59 <i>Cryptopecten bullatus</i>	1	14	13 pv	17 v	C	1	4	1 pv	—	3 v
60 <i>Cryptopecten nux</i>	1	37	1079 pv	1264 v	C	0	7	—	—	142 v
61 <i>Haumea rehderi</i>	0	10	—	36 v	A, C	—	—	—	—	—
Total	48(1), 8(0)	562	8658 pv	5133v		8(1), 15(0)	158	3449 pv	—	2143 v
Total number of specimens:				12791						5592

Table 1. Pectinoidea (Propeamussiidae and Pectinidae) recorded during two Philippine expeditions: PMBP 2004 and PANGLAO 2005.

1 = found alive, 0 = found dead only, — = absent.

Habitat categories relating to PMBP 2004 records only: A = littoral (sand + coral rubble), B = littoral (lagoon, mud / sand / seagrass), C = sublittoral to upper bathyal (trawled, dredged, lumen lumen, tangle nets), see page 5 for more information.

However, Dijkstra & Gofas (2004) consider *Bathypecten* a junior synonym of *Catillopecten*. As Hayami (1988b) and Waller (1991, 1993, 2006a) mentioned, the suprageneric classification of the Pectinoidea is still in disorder and under study. Currently the following genera are placed in the Propeamussiidae: *Propeamussium* de Gregorio, 1884, *Parvamussium* Sacco, 1897, *Cyclopecten* Verrill, 1897, *Similipecten* Winckworth, 1932, *Cyclochlamys* Finlay, 1926 (under study), *Catillopecten* Iredale, 1939, and *Sinepecten* Schein, 2006 (Dijkstra & Marshall, 2008: 40).

***Propeamussium* de Gregorio, 1884**

Propeamussium de Gregorio, 1884: 119 (proposed as a subgenus of *Pecten*).

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

Paramussium Verrill, 1897: 72. Type species (by original designation): *Amussium dalli* E.A. Smith, 1885; Recent, off Bermuda, W Atlantic, 796 m.

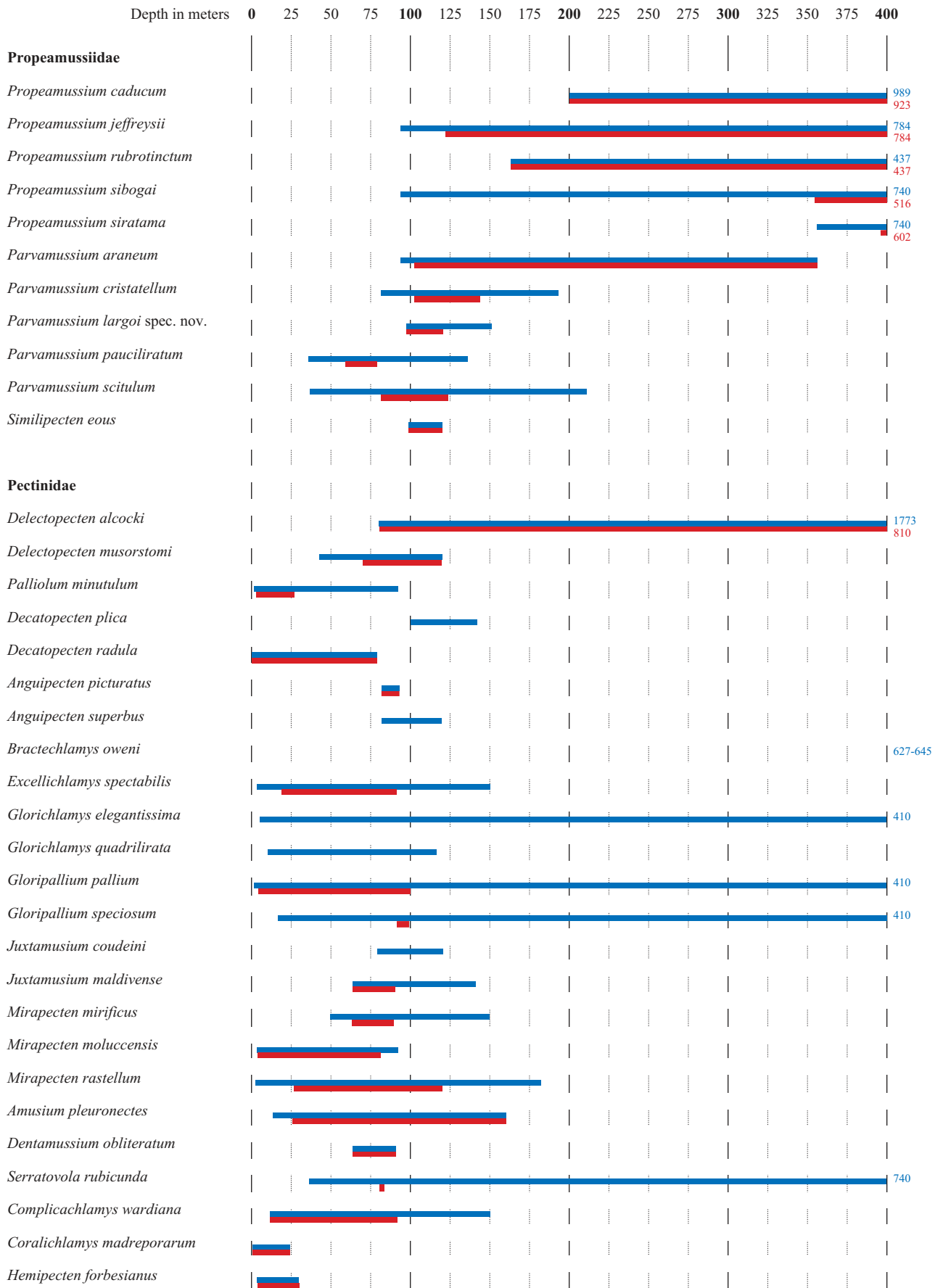
Occultamussium Korobkov, 1937: 56 (proposed as a subgenus of *Amussium*).

Type species (by original designation): *Pecten semiradiatus* Mayer, 1861; Upper Eocene, Tirol, Austria.

Pseudopalliorum Oyama, 1944: 244 (proposed as a subgenus of *Propeamussium*).

Type species (by original designation): *Pecten interradiatus* Gabb, 1869; Eocene, E of New Idria, San Bernardino County, California, U.S.A.

Bathyamussium Habe, 1951: 71 (proposed as a subgenus of *Ctenamussium*).



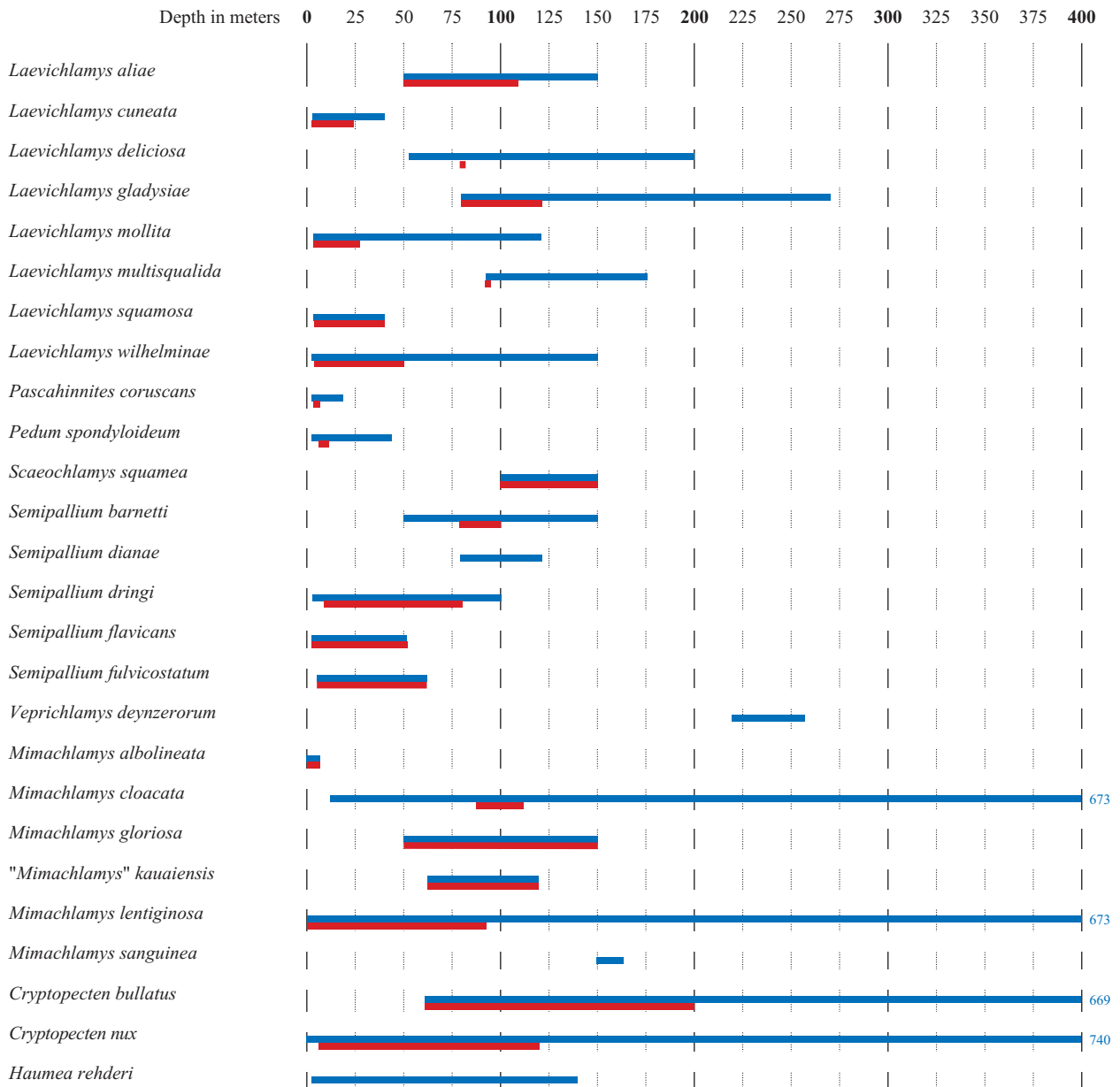


Table 2. Bathymetrical range of PMBP 2004 and PANGLAO 2005 Pectinoidea.

Live recorded specimens (pv) with minimum depth range. Dead recorded specimens (v) with maximum depth range, partly related to downslope transportation. For taxa with recordings over 400 m the maximum depth is given.

■ dead specimens
 ■ live specimens

Type species (by original designation): *Amussium jeffreysii* E.A. Smith, 1885; Recent, N Sulu Sea, Philippine Islands, 686 m.

Micramussium Oyama, 1951: 80 (proposed as a subgenus of *Ctenamussium*).

Type species (by original designation): *Ctenamussium (Micramussium) siratama* Oyama, 1951; Recent, Sagami Bay, Japan, 234-291 m.

Flavamussium Habe, 1951: 71 (proposed as a subgenus of *Parvamussium*).

Type species (by original designation): *Amussium caducum* E.A. Smith, 1885; Recent, W of Luzon, Philippine Islands, 1280 m.

Luteamussium Oyama, 1951: 82. Type species (by original designation): *Amussium sibogai* Dautzenberg & Bavay, 1904; Recent, Bali Sea, Indonesia, 289 m.

Diagnosis. — Shell almost equivalve, fragile, rather small and transparent in most species, 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 almost equal to subequal; byssal notch moderately slight; ctenolium lacking; internal riblets commence early in ontogeny and extend to central or submarginal region.

Distribution. — Jurassic to Recent. Worldwide; living bathyally to upper abyssally (Waller, 1971).

Remarks. — Grau (1959) restated the original diagnosis of *Propeamussium* de Gregorio, 1884, and of the type species *P. ceciliae*, with a translation in English. The type specimen subsequently was figured by de Gregorio (1898: pl. 4 figs 10-12). Gregorio's figures 13 and 14, also mentioned by Grau (1959: 9), do not show the type species. Hertlein (1969:

N350) supposedly refigured the right [sic] valve of the holotype, although North (1951b: 123) reported that he could not trace the holotype.

Grau (1959: 9) placed *Paramussium*, *Pseudopalliorum*, *Flavamussium* and *Luteamussium* in the synonymy of *Propeamussium*, and Hertlein (1969: N350) subsequently added also *Occultamussium*, and *Actinopecten* with a question mark. Hayami (1988a) enumerated also *Parvamussium* Sacco, 1897 (type species: *Pecten duodecimlamellatus* Bronn, 1832: 624), *Ctenamussium* [sic; = *Ctenamussium*] Iredale, 1929 (type species: *Amussium thetidis* Hedley, 1902: 304), "*Graptamussium* Oyama, 1944" [sic; = *Glyptamussium* Iredale, 1939] (type species: *Amussium torresi* E.A. Smith, 1885: 311), *Bathyamussium* and *Micramussium* Oyama, 1951, synonyms of *Propeamussium*. The type species of *Ctenamussium* and *Glyptamussium* are morphologically inseparable from *Parvamussium*, whereas the type species of *Bathyamussium* and *Micramussium* are more nearly similar to the morphological characters of *Propeamussium*.

Propeamussium caducum (E.A. Smith, 1885)

Pl. 1 figs 1a-d, Pl. 4 fig. 1

Amussium caducum E.A. Smith, 1885: 309, pl. 23 figs 1-1c.

Amussium electrum Pelseneer, 1911: pl. 12 figs 4A-B, 5. **New synonym.**

Amussium weberi Dautzenberg & Bavay, 1912: 32, pl. 28 figs 9-13.

Propeamussium nakazawai Kuroda, (1929-35) 1932: 87, figs 101-102. Nomen nudum.

Parvamussium (Flavamussium) caducum (Smith); Oyama, 1951: 81, pl. 13 figs 11-12; Kira, 1967: 138, pl. 49 fig. 15.

Species	Source	Philippine localities
Propeamussiidae		
<i>Parvamussium aldeynzeri</i> Dijkstra, 2004	ZMA	Panglao Island
<i>Parvamussium carbaceum</i> Dijkstra, 1991	ZMA	Balicasag Island
<i>Parvamussium texturatum</i> (Dautzenberg & Bavay, 1912)	ZMA	Balicasag Island
<i>Propeamussium rubrotinctum</i> (Oyama, 1951)	ZMA	Balicasag Island
<i>Cyclopecten cancellus</i> Dijkstra, 1991	ZMA	Panglao Island
Pectinidae		
<i>Annachlamys reevei</i> (Adams in Adams & Reeve, 1850)	ZMA	Sulu Archipelago
<i>Annachlamys striatula</i> (Linnaeus, 1758)	ZMA	Sulu Archipelago
<i>Bractechlamys vexillum</i> (Reeve, 1853) Pl. 8 Figs 3a-d	ZMA	Sulu Archipelago
<i>Excellichlamys histrionica</i> (Gmelin, 1791)	ZMA	Punta Engano
<i>Haumea minuta</i> (Linnaeus, 1758)	ZMA	Batangas Bay
<i>Laevichlamys limatula</i> (Reeve, 1853)	ZMA	Sulu Archipelago
<i>Minnivola pyxidata</i> (Born, 1778)	ZMA	Mactan Island
<i>Serratovola angusticostata</i> Dijkstra, 2008 Pl. 15 Figs 1a-d	ZMA	Balicasag Island

Table 3. Pectinoidea species known from Panglao or adjacent region that were not recorded during PMBP 2004 and PANGLAO 2005. Records of a few pectinoidean species in the ZMA collection only labelled as "Philippines" are considered too general and are not taken into account.

Propeamussium caducum (Smith); Hayami, 1988b: 476; Okutani et al., 1989: 58, figs; Dijkstra, 1991: 6, figs 1-2; Dijkstra, 1995b: 15, figs 9-10, 129-132; Dijkstra & Kastoro, 1997: 247, figs 5-8; Hayami, 2000: 913, pl. 454 fig. 1; Dijkstra, 2001: 75; Wang, 2002: 152, pl. 2 fig. 2; Dijkstra & Maestrati, 2008: 82; Xu & Zhang, 2008: 77, fig. 208.

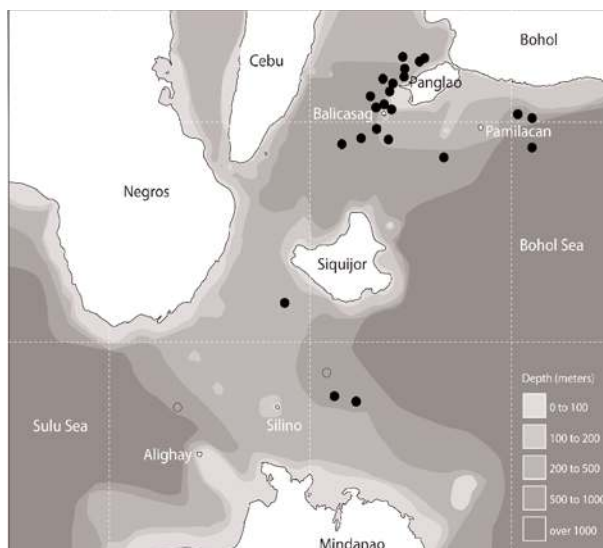
Propeamussium (Propeamussium) caducum (Smith); Wang, 1984a: 599, pl. 1 figs 3-4, text fig. 2; Dijkstra, 1990a: 9-10.

Type data. — *Amussium caducum* E.A. Smith: Lectotype (H 20.9 mm, pv) designated by Dijkstra (1995b: 17, figs 129-132) BMNH 1887.2.9.3310, 4 paralectotypes (pv) BMNH 1887.2.9.3311/1-4. The anterior and posterior margins of the left valve and the marginal apron of the right valve of the lectotype of *A. caducum* are broken off; in consequence the measurements differ slightly from the original ones. Type locality: Philippine Islands, W of Luzon, 12°21'N, 122°15'E, 700 fathoms [= 1280 m], alive, blue mud, 16.i.1875 (Challenger stn 207).

Amussium electrum Pelseneer, 1911: Holotype (only soft parts figured) KBIN, not traced (see Remarks).

Amussium weberi Dautzenberg & Bavay: Lectotype (pv) designated by Dijkstra (1995b: 17), figured in Dautzenberg & Bavay (1912: figs 9-10, 12-13 [text incorrect, should be "Mer de Bali, drag. 538 m"] ZMA Moll. 312013 (stn 316), paralectotypes: 5 pv KBIN IG 10.591 (stn 314), 1 pv MCZ 064492 (stn 314), 2 v RMNH.MOL. 112107 (stn. 316), 2 pv + 7 v ZMA Moll. 312014 (stn 316), 1 pv ZMA Moll. 312015 (stn 85), 1 pv ZMA Moll. 312016 (stn 87), 4 v ZMA Moll. 312017 (stn 212), 7 v ZMA Moll. 312018 (stn 314). Type locality: Indonesia, Bali Sea, 7°19.4'S, 116°49.5'E, 538 m, alive, fine, dark brown sandy mud, trawl, 19.ii.1900 (Siboga stn 316).

Propeamussium nakazawai Kuroda: Holotype not seen. Although Kuroda (1932: 87) proposed a new species name with type figures, measurements and type locality, it is not described nor compared with any other congeneric species. According to the I.C.Z.N. (article 11) *P. nakazawai* is a nomen nudum. Type locality: Japan, Suruga Bay, 549-732 m, alive.



Material examined. — **Philippines:** PMBP 2004, Stn P1, 90-200 m, 7 pv (A), 36 v. PANGLAO 2005, Stn CP 2332, 396-418 m, 76 pv (A), 11 v; Stn CP 2333, 584-596 m, 16 pv (A), 23 v; Stn CP 2334, 606-631 m, 31 pv (A), 29 v; Stn CP 2335, 729-733 m, 8 pv (A); Stn 2336, 757-760 m, 22 pv (A); Stn CP 2341, 544-712 m, 7 pv (A), 13 v; Stn CP 2350, 602-738 m, 18 pv (A), 15 v; Stn CP 2351, 810-812 m, 2 pv (A), 2 v; Stn CP 2352, 923-1260 m, 1 pv (A), 6 v; Stn CP 2358, 569-583 m, 19 pv (A), 1 v; Stn CP 2361, 516-543 m, 1 pv (A); Stn CP 2362, 679-740 m, 1 v; Stn CP 2363, 437-439 m, 9 pv (A), 27 v; Stn CP 2385, 982-989 m, 3 v; Stn CP 2388, 762-786 m, 184 pv (A), 60 v; Stn CP 2389, 784-786 m, 254 pv (A); Stn CP 2390, 627-645 m, 123 pv (A), 12 v; Stn CP 2394, 470-566 m, 4 pv (A), 1 v; Stn CP 2395, 382-434 m, 27 pv (A); Stn CP 2396, 609-673 m, 20 pv (A), 9 v; Stn CP 2397, 642-669 m, 17 pv (A), 1 v; Stn CP 2398, 713-731 m, 14 pv (A), 6 v; Stn CP 2399, 309-342 m, 1 pv (A), 1 v; Stn CP 2404, 481-505 m, 12 pv (A), 10 v; Stn CP 2405, 387-453 m, 10 pv (A).

Description. — Shell fragile, glossy, transparent or opaque, up to c. 25 mm high, inequivalve, equilateral, somewhat higher than wide, left valve slightly more convex than right, with lateral gape, umbonal angle c. 90°, prodissoconch c. 215 µm in height (Knudsen, 1967). Cream or brownish, right valve somewhat brighter than left.

Left valve smooth, with commarginal growth lines, no radial striations. Auricles small, also smooth, somewhat raised near margins. Right valve with wide-set commarginal lirae, commencing at 3 mm shell height and extending to submarginal area, with interstitial microscopic radial scratches. Auricles with very delicate commarginal striae, prominent scales produced on marginal areas of hinge. Hinge line straight near umbo, then rising near anterior and posterior dorsal margins. Internal riblets 10 in number in most specimens, 9 or 11 in a few, slightly nodulose at distal ends. Riblets of right valve somewhat more prominent than in left valve. No byssal notch.

Distribution. — Gulf of Aden: 1295 m, Zanzibar area: 786 m, Arabian Sea and Bay of Bengal: 691-1483 m, Japanese waters: c. 200 m and Philippine Islands: 548-1500 m (Knudsen, 1967); Indonesian Archipelago: 452-840 m (Knudsen, 1967; Dijkstra, 1991; Dijkstra & Kastoro, 1997); New Caledonia: 450-960 m (Dijkstra (1995b, 2001); Vanuatu Archipelago: 602-650 m (Dijkstra, 2001); Solomon: 367-696 m (Dijkstra & Maestrati, 2008). Present material from the Philippines alive in 200-923 m (minimum depth range). The bathymetric range of live-taken specimens is now 90-1500 m.

Remarks. — Pelseneer (1911) only described and figured the soft parts of *A. electrum*, which he had used for his comprehensive anatomical study, but not the valves. These valves and soft parts have not been recovered in the KBIN. The specific epithet is probably reduced from Bavay's manuscript name "*Amussium electricum*" [KBIN], which he later changed to *Amussium weberi*. However, as the anatomy was described by Pelseneer (1911), *A. electrum* is an available name, a further synonym of *A. caducum*. *Amussium weberi* is morphologically similar to *A. caducum*, although in typical material the colouration (*A. caducum* hyaline and whitish, *A. weberi* hyaline and creamy) and internal ribs (*A. caducum* eight, *A. weberi* seven) are slightly different. However, intermediate variations are also observed (MNH, ZMA).

All morphological characters of the present material are identical to the type specimens.

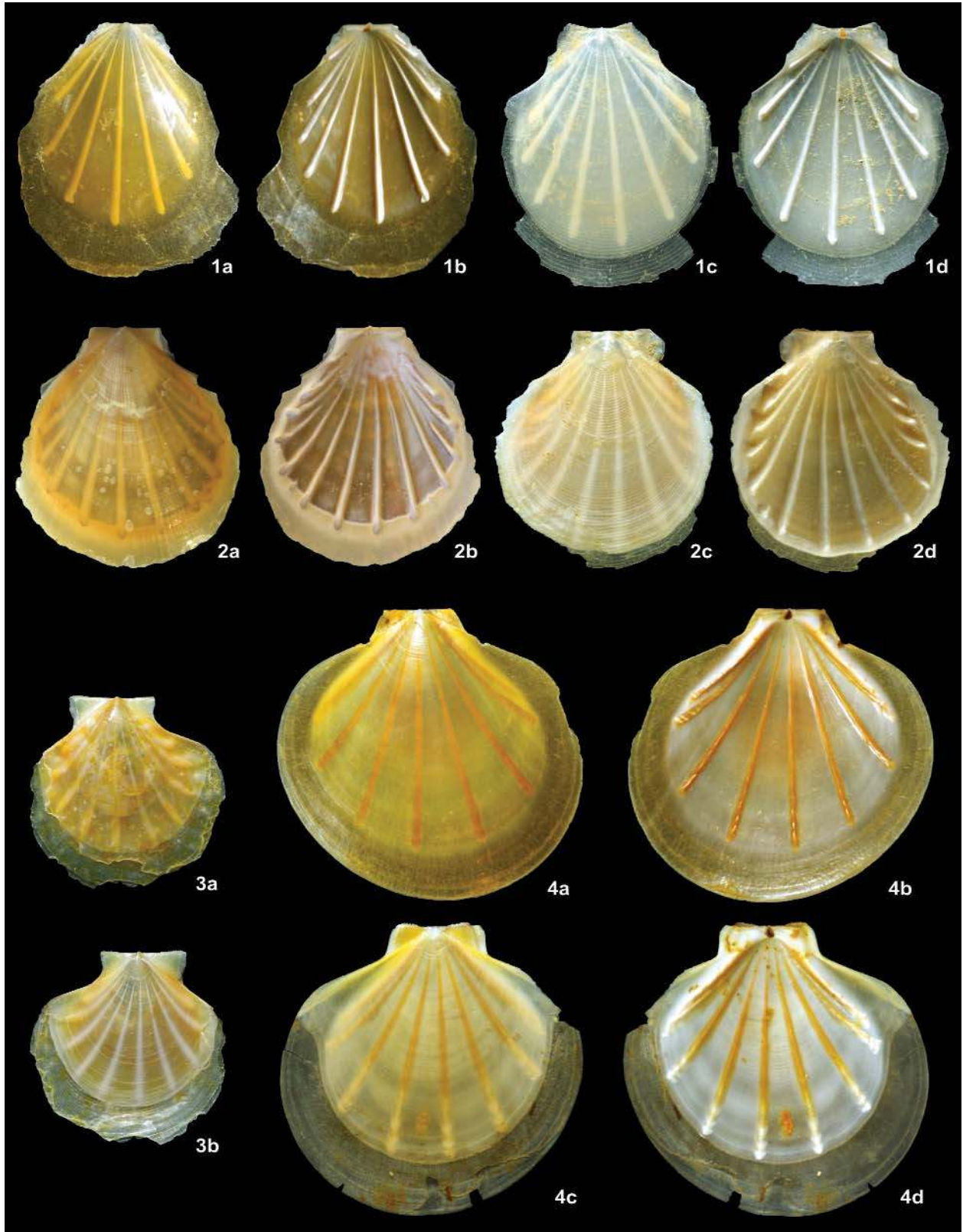


PLATE 1

Figs 1a-d. *Propeamussium caducum* (E.A. Smith, 1885), PMBP 2004 Stn P1, pv. **1a-b.** lv exterior and interior, H 18.5 mm. **1c-d.** rv exterior and interior (marginal apron almost broken off), H 16.1 mm. **Figs 2a-d.** *Propeamussium jeffreysii* (E.A. Smith, 1885), PANGLAO 2005 Stn CP 2394, pv. **2a-b.** lv exterior and interior, H 17.9 mm. **2c-d.** rv exterior and interior (marginal apron almost broken off), H 16 mm. **Figs 3a-b.** *Propeamussium rubrotinctum* (Oyama, 1951), PANGLAO 2005 Stn CP 2409, pv. **3a.** lv exterior, H 15 mm. **3b.** rv exterior (marginal apron broken off), H 12.5 mm. **Figs 4a-d.** *Propeamussium sibogai* (Dautzenberg & Bavay, 1904), PANGLAO 2005 Stn CP 2406, pv. **4a-b.** lv exterior and interior, H 47 mm. **4c-d.** rv exterior and interior, H 46.5 mm.

***Propeamussium jeffreysii* (E.A. Smith, 1885)**

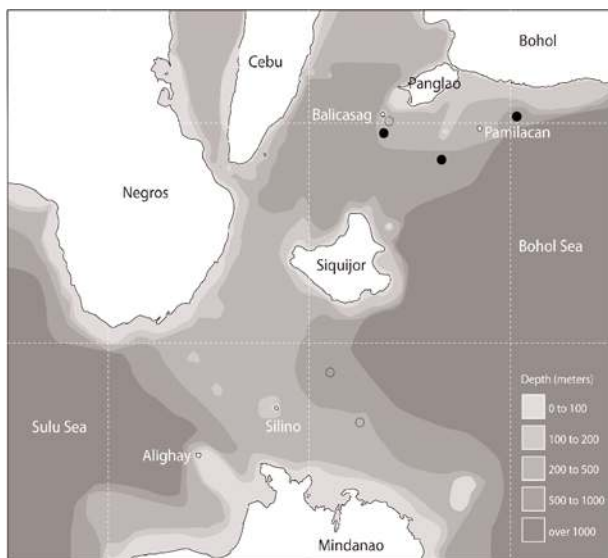
Pl. 1 figs 2a-d, Pl. 4 figs 2a-b

Amussium jeffreysii E.A. Smith, 1885: 310, pl. 23, figs 2-2c; Knudsen, 1967: 276, pl. 1 fig. 19.

Propeamussium jeffreysi [sic] (Smith); Bernard, Cai & Morton, 1993: 53; Hayami, 2000: 913, pl. 454 fig. 3; Dijkstra, 2001: 76, figs 5-12; Dijkstra & Maestrati, 2008: 83; Dijkstra, 2011: 44, pl. 1017 figs 3a-b.

Propeamussium jeffreysi [sic] (Smith); Xu & Zhang, 2008: 77, fig. 211.

Type data. — Lectotype (H 20.3 mm, pv) designated by Dijkstra (2001: 76) BMNH 1887.2.9.3313, 2 paralectotypes BMNH 1887.2.9.3314-15. The marginal apron (prismatic calcite outer layer) of the right valves of the type material is damaged or broken off, due to its fragility. Type locality: Philippine Islands, E of Panay, 9°26'N, 123°45'E, 375 fathoms [= 686 m], alive, blue mud, 25.i.1875 (Challenger stn 210).



Material examined. — **Philippines:** PMBP 2004, Stn L49, 90 m, 1 v; Stn P1, 90-200 m, 16 pv (A), 151 v; Stn P4, 80-120 m, 1 pv (A), 1 v. PANGLAO 2005, Stn CP 2332, 396-418 m, 2 pv (A); Stn CP 2333, 584-596 m, 408 pv (A), 189 v; Stn CP 2334, 606-631 m, 105 pv (A), 169 v; Stn CP 2335, 729-733 m, 35 pv (A), 5 v; Stn CP 2336, 757-760 m, 16 pv (A), 23 v; Stn CP 2341, 544-712 m, 65 pv (A), 60 v; Stn CP 2350, 602-738 m, 3 v; Stn CP 2358, 569-583 m, 302 pv (A); Stn CP 2359, 437-476 m, 1 pv (A); Stn CP 2360, 357-372 m, 4 pv (A), 1 v; Stn CP 2361, 516-543 m, 16 pv (A); Stn CP 2362, 679-740 m, 42 v; Stn CP 2363, 437-439 m, 271 pv (A), 40 v; Stn CP 2388, 762-786 m, 92 pv (A), 323 v; Stn CP 2389, 784-786 m, 30 pv (A), 163 v; Stn CP 2390, 627-645 m, 10 pv (A), 7 v; Stn CP 2392, 242-400 m, 18 pv (A), 6 v; Stn CP 2394, 470-566 m, 86 pv (A), 5 v; Stn CP 2396, 609-673 m, 163 pv (A), 71 v; Stn CP 2397, 642-669 m, 151 pv (A); Stn CP 2398, 713-731 m, 51 pv (A), 18 v; Stn CP 2399, 309-342 m, 1 pv (A), 1 v; Stn CP 2404, 481-505 m, 76 pv (A), 66 v; Stn CP 2405, 387-453 m, 206 pv (A); Stn CP 2406, 334-387 m, 1 pv (A); Stn CP 2409, 220-257 m, 2 pv (A); Stn DW 2391, 323-336 m, 3 v.

Description. — Shell relatively small, fragile and semi-transparent, up to 28 mm high, commonly 20-23 mm, slightly higher than wide, equilateral, inequivalve, weakly inflated, left valve somewhat more than right, auricles equal, umbonal angle c. 100-110°. Prodissoconch c. 210 µm. Colour of left valve orangebrown-tinted, of right whitish. Left valve has a delicate regular latticed sculpture in early growth stage, distinct near the umbo, but tends to be obsolete near the ventral margin. Anterior and posterior auricles are relatively small,

equal in size, with fine radial riblets, weaker on right valve. Right valve sculptured with fine regularly spaced concentric lirae. Internal riblets 10 with 2 auricular riblets, and a few (2-4) intercostal rudimentary riblets near the periphery. Hinge line straight. Resilifer triangular. No byssal fasciole, or byssal notch, no ctenolium.

Soft parts, reproduction and food described by Knudsen (1967: 277).

Distribution. — SE Africa: 430 m (alive), Gulf of Aden: 655-732 m (alive), Maldives Islands: 400-797 m (alive) (Knudsen 1967: 276); Japan, Taiwan, East and South China Sea, Philippines: 100-1000 m (Bernard, Cai & Morton, 1993: 53; Hayami, 2000: 913; Xu & Zhang, 2008: 77); Wallis and Futuna, and Vanuatu: 470-775 m (Dijkstra 2001: 78); Fiji: 596-729 m (Dijkstra & Maestrati, 2008: 83). Present material from the Philippines alive in 120-784 m (minimum depth range). The bathymetric range of live-taken specimens is now 80-797 m.

Remarks. — All morphological characters of the present material are identical to the type specimens. The internal ribs are generally 10-11 in number. The interstitial rudimentary riblets vary strongly (1-4) or are sometimes lacking. The sculpture on the left valve is also variable in prominence (very weak to more prominent) and development (varying from the early ontogeny to the central part of the disc).

***Propeamussium rubrotinctum* (Oyama, 1951)**

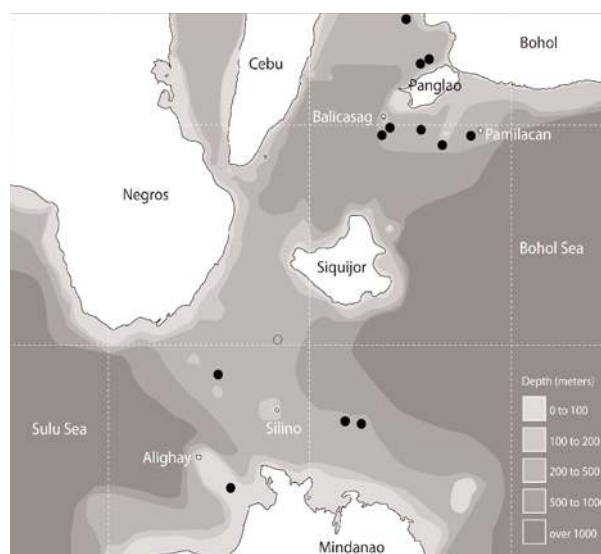
Pl. 1 figs 3a-b, Pl. 4 fig. 3

Parvamussium (*Parvamussium*) *rubrotinctum* Oyama, 1951: 81, pl. 13 figs 8-10.

Propeamussium (*Propeamussium*) *stella* Wang, 1984a: 600, 602, pl. 1 figs 11-14.

Propeamussium rubrotinctum (Oyama); Hayami, 1988a: 80; Dijkstra, 1995b: 21, figs 23-26; 2001: 81; Dijkstra & Marshall, 1997: 77, pl. 2 figs 6-8; Dijkstra & Kastoro, 1997: 250, figs 16-19; Hayami, 2000: 913, pl. 454 fig. 4; Dijkstra & Maestrati, 2008: 83; Dijkstra, 2011: 44, pl. 1017 figs 2a-b.

Propeamussium stella Wang; Xu & Zhang, 2008: 77, fig. 209.



Type data. — *Parvamussium (Parvamussium) rubrotinctum* Oyama: Type material probably in the private collection of Dr K. Oyama at Toba, Japan (I. Hayama, pers. comm.). Type locality: Japan, Gulf of Tosa, Shikuko, depth and date not recorded.

Propeamussium (Propeamussium) stella Wang: Holotype (H 17 mm, pv) IOAS M25778, paratype IOAS M25779. Type locality: South China Sea, 19°00'N, 112°05'E, 290 m, alive, sandy bottom, 19.iv.1959.

Material examined. — **Philippines:** PANGLAO 2005, Stn CP 2331, 255-268 m, 10 pv (A); Stn CP 2332, 396-418 m, 2 pv (A); Stn CP 2340, 271-318 m, 5 pv (A), 1 v; Stn CP 2343, 273-356 m, 74 pv (A); Stn DW 2347, 198-233 m, 1 pv (A); Stn CP 2359, 437-476 m, 1 pv (A); Stn CP 2360, 357-372 m, 5 pv (A); Stn DW 2364, 427 m, 1 v; Stn CP 2368, 318-322 m, 1 pv (A); Stn CP 2380, 150-163 m, 2 pv (A), 1 v; Stn CP 2392, 242-400 m, 1 pv (A), 3 v; Stn CP 2393, 356-396 m, 9 pv (A); Stn CP 2409, 220-257 m, 21 pv (A), 1 v.

Description. — Shell fragile, transparent or opaque, sub-circular, inequivalve, inequilateral, up to c. 20 mm high, left valve somewhat more inflated than right. Valves gaping laterally. Auricles relatively small and unequal. Umbonal angle about 90°. Prodissoconch c. 200 µm in height. Colour of left valve with light orange patches and small white dots, right valve pale orange-tinted with translucent whitish internal radial riblets. Left valve sculptured with minute commarginal lamellae in late growth stage near the periphery, otherwise smooth and glossy with a few concentric plications, one or two delicate radial plicae near posterior margin. Auricles smooth.

Right valve sculptured with regularly spaced commarginal lirae and interstitial microscopic radial scratches. Auricles with commarginal striae and somewhat serrated on dorsal margin. Internal ribs generally 10, an auricular lira on each side. Internal ribs of right valve somewhat broader than of left valve. Resilifer triangular, elongate. Outer ligament rather broad. Hinge line straight. Small byssal notch, no ctenolium.

Distribution. — Kii Peninsula (Japan) southwards to tropical West Pacific: 200-300 m (Hayami, 2000: 913); Indonesia: 210-268 m (Dijkstra & Kastoro, 1997: 250); Solomons, Fiji and Tonga: 300-869 m (Dijkstra & Maestrati, 2008: 84); New Caledonia and Loyalty Islands: 380-490 m (Dijkstra, 1995: 21); Norfolk Island: 280-350 m, dead (Dijkstra & Marshall, 1997: 79); Wallis and Futuna, and Vanuatu: 265-460 m (Dijkstra, 2001: 81). Present material from the Philippines alive in 163-437 m (minimum depth range). The bathymetric range of live-taken specimens is now extended to 150-869 m.

Remarks. — Wang (1984a) described a new species, *P. stella*, from the South China Sea, which is morphologically similar to the present species. He compared it with *P. caducum* and overlooked the similar congeneric species *P. rubrotinctum*, known from the tropical western Pacific, and the closely allied congener *Propeamussium steindachneri* (Sturany, 1901), known from the Red Sea and the western Arabian Sea (see Dijkstra 1995: 23; Dijkstra & Marshall, 2007: 79).

The present specimens are similar to Oyama's original description, but the original figured specimen (type material untraceable) is somewhat more circular of shape and has inte-

rior interstitial rudimentary riblets. Oyama reported (1951: 81) other specimens lacking intercalated riblets, just as in the present material from the Philippines.

***Propeamussium sibogai* (Dautzenberg & Bavay, 1904)**

Pl. 1 figs 4a-d, Pl. 4 fig. 4

Amussium sibogai Dautzenberg & Bavay, 1904: 207, figs 1-4; Dautzenberg & Bavay, 1912: 31, pl. 28 figs 1-4.

Amussium sibogae [sic] Dautzenberg & Bavay; Pelseneer, 1911: pl. 11 fig. 8 (soft parts).

Luteamussium sibogai (Dautzenberg & Bavay); Oyama, 1951: 82, fig. 1; Kira, 1967: 138, pl. 49 fig. 14.

Propeamussium sibogai (Dautzenberg & Bavay); Knudsen, 1967: 272, pl. 1 figs 23-24; Abbott & Dance, 1982: 303, fig.; Hayami, 1988a: 479, 480, figs.; Okutani et al., 1989: 59, fig.; Rombouts, 1991: 66, pl. 27 figs 1-1a.; Lamprell & Whitehead, 1992: [16], pl. 6 fig. 34; Dijkstra, 1995b: 23, figs 19-22; Dijkstra & Kastoro, 1997: 253, figs 24-29.; Dijkstra & Marshall, 1997: 79, pl. 3 figs 1-3.; Dijkstra, 2001: 81; Wang, 2002: 151, pl. 5 fig. 7; Dijkstra & Marshall, 2008: 5, figs 1, 3H-J; Dijkstra & Maestrati, 2008: 84; Xu & Zhang, 2008: 77, fig. 207; Dijkstra, 2011: 44, pl. 1017 figs 4a-b.

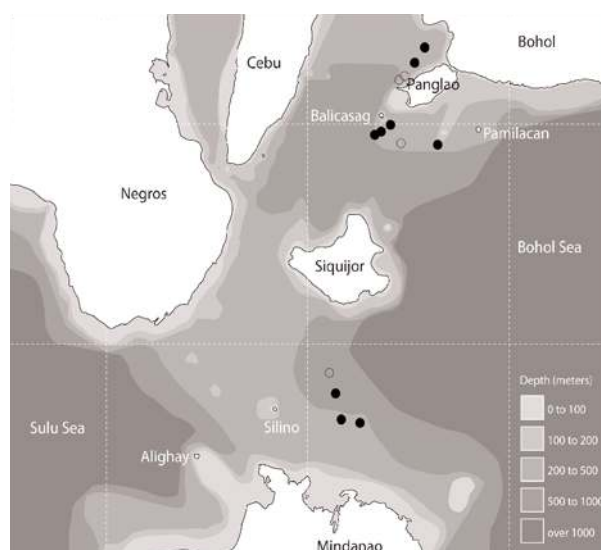
Amussium cf. sibogai (Dautzenberg & Bavay); Barnard, 1969: 655, pl. 1 figs a-d.

Propeamussium (Luteamussium) sibogai (Dautzenberg & Bavay); Koyama et al., 1981: 62.

Propeamussium (Propeamussium) sibogai (Dautzenberg & Bavay); Wang, 1984a: 599, pl. 1 figs 1-2, text fig. 1; Dijkstra, 1990a: 9.

Luteamussium [sic] *sibogae* [sic] (Dautzenberg & Bavay); Kosuge, 1985: 59, pl. 23 fig. 12.

Type data. — Holotype (H 48.5 mm, pv) ZMA Moll. 304001. Type locality: Indonesia, Bali Sea, 7°15'S, 115°15'E, 289 m, alive, mud and broken shells, 14.iii.1899 (Siboga stn 12).



Material examined. — **Philippines**: PMBP 2004, Stn P1, 90-200 m, 1 v. PANGLAO 2005, Stn CP 2332, 396-418 m, 22 pv (A), 12 v; Stn CP 2343, 273-356 m, 3 pv (A); Stn CP 2359, 437-476 m, 18 pv (A), 2 v; Stn CP 2360, 357-372 m, 1 pv (A); Stn CP 2361, 516-543 m, 4 pv (A), 2 v; Stn CP 2362, 679-740 m, 7 v; Stn CP 2390, 627-645 m, 1 v; Stn CP 2392, 242-400 m, 10 pv (A), 5 v; Stn CP 2393, 356-396 m, 2 pv (A); Stn CP 2394, 470-566 m, 3 pv (A); Stn CP 2395, 382-434 m, 7 v; Stn CP 2406, 334-387 m, 11 pv (A), 9 v.

Description. — Shell fragile, hyaline, almost circular, inequivalve, somewhat inequilateral, slightly oblique, up to c. 65 mm high (generally smaller up to c. 50 mm in height), left valve more inflated than right valve, laterally gaping rather strongly, auricles small and equal in size, umbonal angle about 125°. Prodissoconch c. 210 µm high (Knudsen, 1967). Left valve creamy brown, right valve cream. Left valve covered with a few delicate commarginal growth lines; a few minute commarginal lamellae present near ventral margin of some specimens. Delicate radial lirae developed near posterior margin. Auricles smooth, somewhat raised on lateral margins. Hinge line straight. Internal costae 8 in most specimens, deep brown on left valve, white and broader on right valve. Marginal costae with 4 or 5 small nodules, visible through lateral gape. Right valve with widely spaced commarginal lirae, weaker at periphery, and microscopic interstitial granules. Marginal apron lacking from most specimens due to the very thin layer of prismatic calcite (Hayami, 1988: fig. 4). Auricles smooth. Resilifer triangular, elongate. No byssal notch.

Descriptions of the soft parts, reproduction and food are given by Knudsen (1967: 272).

Distribution. — Southern Japanese waters to tropical Indo-West Pacific: 150-300 m (Hayami, 2000); Bali Sea (Indonesia): 289 m (Dautzenberg & Bavay, 1912); Banda Sea (Indonesia): 210-348 m (Dijkstra & Kastoro, 1997; Knudsen, 1967); Philippine Islands: 300-710 m, the Arafura Sea: 390 m, and off Durban (South Africa): 435-450 m (Knudsen, 1967); New Caledonia: 400-680 m, the Loyalty Islands: 430-575 m, Wallis and Futuna Islands: 355-430 m, and Vanuatu Archipelago: 425-455 m (Dijkstra, 1995b; 2001); Fiji: 392-506 m, Tonga: 331-549 m (dead), Solomons: 464-482 (dead) (Dijkstra & Maestrati, 2008). Present material from the Philippines alive in 356-516 m (minimum depth range). The bathymetric range of live-taken specimens is now extended to 90-740 m.

Remarks. — All morphological characters of the present material are identical to the holotype from the Bali Sea, Indonesia. These characters are rather constant and can slightly vary in number of the internal ribs. Occasionally on both sides the lateral rib is divided into two separated ribs. The South-African morph has one rib less.

Propeamussium sibogai is the type species of *Luteamussium* Oyama (1951: 82), which was treated by Hertlein (1969: N350) as a junior synonym of *Propeamussium*, subsequently followed in literature by most authors (see references).

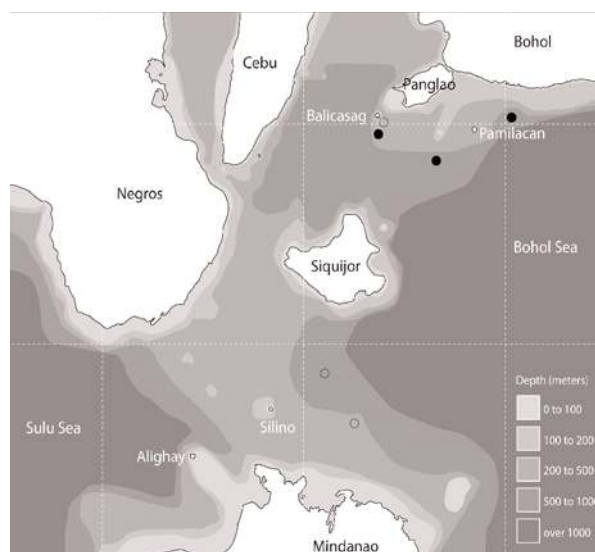
Propeamussium siratama (Oyama, 1951)

Pl. 2 figs 1a-d, Pl. 4 fig. 5

Ctenamussium (*Micramussium*) *siratama* Oyama, 1951: 80, pl. 13 figs 5-7.

Propeamussium siratama (Oyama); Dijkstra & Kastoro, 1997: 253, figs 20-23; Hayami, 2000: 913, pl. 454 fig. 6; Dijkstra, 2001: 81, figs 21-24; Dijkstra & Maestrati, 2008: 85; 2009: 39, pl. 1 figs 1-4.

Type data. — Holotype (H 7.4 mm, pv), the type material is possible in the Toba Aquarium at Toba, Japan, but Oyama (pers. comm.) could not trace it. Type locality: Japan, Sagami Sea, off Manazuruzaki, 159-128 fathoms [= 291-234 m], alive.



Material examined. — **Philippines**: PANGLAO 2005, Stn CP 2341, 544-712 m, 1 pv (A), 3 v; Stn CP 2350, 602-738 m, 1 pv (A), 1 v; Stn CP 2360, 357-372 m, 1 v; Stn CP 2362, 679-740 m, 2 v; Stn CP 2392, 242-400 m, 1 pv (A), 1 v; Stn DW 2401, 397-410 m, 1 v.

Description. — Shell fragile, up to c. 19 mm high, generally smaller up to c. 12 mm in height, circular, nearly equivalve, equilateral, slightly inflated, auricles equal in shape and size, umbonal angle 110-115°. Prodissoconch c. 200 µm in height. Colour whitish or pale-brown transparent. Left valve sculptured with delicate, irregularly spaced radial lirae from early growth stage until beyond central part of disc, with microscopic regularly spaced commarginal lamellae, smooth central part and periphery. Auricles frequently smooth, sometimes with fine commarginal lirae. Right valve sculptured with delicate, regularly spaced commarginal lirae, more prominent near ventral margin. Inner surface with 9-10 ribs, sometimes with a rudimentary intercostal riblet. Hinge line straight. No byssal fasciole, or byssal notch. Ctenolium lacking.

Distribution. — Japan: 100-300 m (Hayami, 2000: 913), Taiwan: 310-440 m (Dijkstra & Maestrati, 2009: 39); Indonesia: 283-285 m (Dijkstra & Kastoro, 1997: 253), Solomons and Fiji: 273-1004 m (Dijkstra & Maestrati, 2008: 85); New Caledonia: 316-533 m (Dijkstra, 2001: 82). Present material

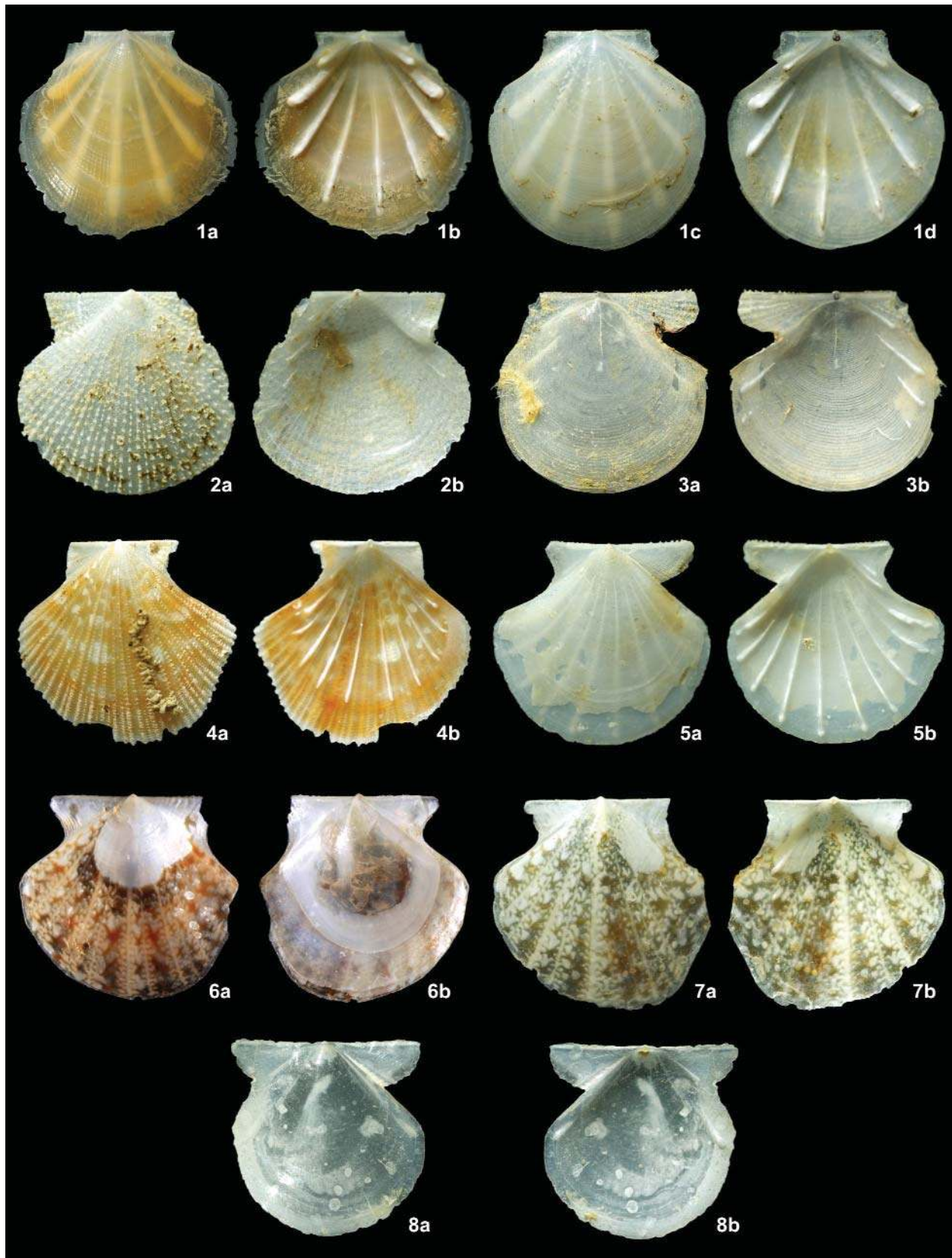


PLATE 2

Figs 1a-d. *Propeamussium siratama* (Oyama, 1951), PANGLAO 2005 Stn CP 2341, pv. **1a-b.** lv exterior and interior, H 6.9 mm. **1c-d.** rv exterior and interior, H 6.5 mm. **Figs 2-3.** *Parvamussium araneum* Dijkstra, 1991. **2a-b.** PMBP 2004 Stn P1, lv exterior and interior, H 6.5 mm. **3a-b.** Balicasag Island, 9°30'N, 123°41'E, 120-180 m, live, tangle-net, 2006, rv exterior and interior, H 5.1 mm (ZMA Moll. 146725). **Figs 4-5.** *Parvamussium cristatellum* (Dautzenberg & Bavay, 1912). **4a-b.** PMBP 2004 Stn T36, lv exterior and interior, H 8.9 mm. **5a-b.** Balicasag Island, 9°30'N, 123°41'E, 90-250 m, live, tangle-net, 2006, rv exterior and interior, H 8.5 mm (ZMA Moll. 147028). **Figs 6-8.** *Parvamussium largoi* spec. nov. **6a-b.** PMBP 2004 Stn T9, lv and rv exterior (marginal apron broken off), H 5.9 mm (NMCR 39007, pv holotype). **7a-b.** PMBP T39, lv exterior and interior, H 7.0 mm. **8a-b.** PMBP 2009 Stn T9, rv exterior and interior, H 4.7 mm (MNHN 23192, paratype).

from the Philippines alive in 400-602 m (minimum depth range). The bathymetric range of live-taken specimens is 100-1004 m.

Remarks. — The present specimens from the Philippines fit the original description (type material untraceable) and studied material from Japan (ZMA, NSMT), but differ in having fewer internal ribs (7 + 2 auricular, typical 8 + 2 auricular), and in colour (left valve orange, typical whitish). Other morphological characters are identical.

Parvamussium Sacco, 1897

Parvamussium Sacco, 1897a: 102 (proposed as a subgenus of *Amussium* Herrmannsen, 1846 (invalid emendation of *Amusium* Röding, 1798)); no diagnosis given, but type species designated. *Parvamussium* Sacco, 1897b: 48 (diagnosis).

Type species (by original designation): *Pecten* (*Pleuronectes*) *duodecimlamellatus* Bronn, 1832; Upper Miocene, Northern Italy, Tabbiano.

Variamussium Sacco, 1897a: 102 (proposed as a subgenus of *Amussium* Herrmannsen, 1846); no diagnosis given, but type species designated. *Variamussium* Sacco, 1897b: 49 (diagnosis).

Type species (by original designation): *Amussium cancellatum* E.A. Smith, 1885; Recent, off Bermuda, W Atlantic, 796 m.

Ctenamussium Iredale, 1929: 164.

Type species (by original designation): *Amusium thetidis* Hedley, 1902; Recent, off Port Kembla, New South Wales, Australia, 115-137 m.

Glyptamussium Iredale, 1939: 370.

Type species (by original designation): *Amussium torresi* Smith, 1885; Recent, E of Cape York, Queensland, Australia, 283 m.

Squamamussium Oyama, 1944: 245 (proposed as a subgenus of *Propeamussium*).

Type species (by original designation): *Amussium squamigerum* E.A. Smith, 1885; Recent, off E Puerto Rico, West Indies, 713 m.

Polynemamussium Habe, 1951: 72 (proposed as a subgenus of *Parvamussium*).

Type species (by original designation): *Pecten intuscostatus* Yokoyama, 1920; Pleistocene, Kami-Miyata, Miura City, Kanagawa Prefecture, Japan.

Diagnosis. — Shell inequivalve, circular to oblique, most species small, to c. 20 mm high, laterally compressed, with no lateral gap; left valve of most species strongly sculptured with radial and/or commarginal riblets or striae, right valve with commarginal lamellae; auricles unequal; byssal notch well-developed; no ctenolium; internal lirae extend to submarginal or marginal region.

Distribution. — Cretaceous to Recent. Worldwide; living upper bathyally to upper abyssally.

Remarks. — *Parvamussium* differs from *Propeamussium* mainly in the presence of a byssal sinus (no byssus is obser-

ved in *Propeamussium*), the inequality of the auricles (equal in *Propeamussium*), more prominent sculpture (absent or very weak in *Propeamussium*), the position and number of internal radial costae (commencing in early ontogeny and extending to central part in *Propeamussium*), and the absence of lateral gaps (present in *Propeamussium*).

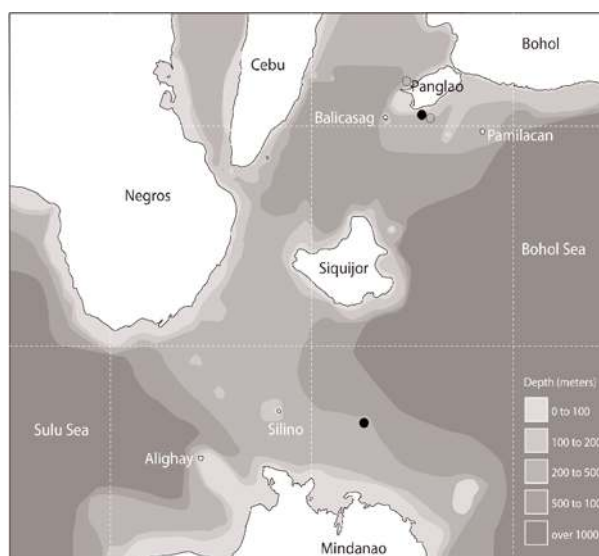
Grau (1959: 15) and Hertlein (1969: N350) treated *Parvamussium* as a subgenus of *Propeamussium* and listed *Variamussium*, *Ctenamussium*, *Glyptamussium*, *Xenamussium*, *Squamamussium*, *Polynemamussium*, *Bathymussium* and *Micramussium* as synonyms of *Parvamussium*. Hertlein (1969: N350) also mentioned in the synonymy *Graptamussium* Oyama, 1944, which is an error for *Glyptamussium*. The morphological characters of *Bathymussium* and *Micramussium* are identical to those of *Propeamussium* (see remarks under *Propeamussium*), and characters of *Xenamussium* Oyama, 1951 are identical to those of *Cyclopecten* Verrill, 1897 (see remarks under *Cyclopecten*).

Parvamussium araneum Dijkstra, 1991

Pl. 2 figs 2a-b, 3a-b, Pl. 4 figs 6a-b

Parvamussium araneum Dijkstra, 1991: 8, figs 3-10; 2001: 82; Dijkstra & Kastoro, 1997: 255, figs 30-38; Dijkstra & Maestrati, 2008: 85; Dijkstra, 2011: 40, pl. 1015 figs 1a-b.

Type data. — Holotype (H 8.9 mm, pv) RMNH 56531, 6 paratypes (1 pv + 5 v) RMNH 56532-3. Type locality: Indonesia, NE of coast of Sumba, E of Melolo, 9°51.8'S, 120°46.4'E, 240 m, alive, large calcareous stone, small stones, scarce epifauna, rectangular dredge, 14.ix.1984 (Snellius-II stn 4.060).



Material examined. — Philippines: PMBP 2004, Stn P1, 90-200 m, 2 v; Stn T1, 83-102 m, 1 pv (A), 5 v; Stn T2, 152 m, 3 v. PANGLAO 2005, Stn CP 2360, 357-372 m, 1 pv (A).

Description. — Shell fragile, up to c. 9 mm high, hyaline to opaque, weakly inflated, circular, auricles unequal, umbo-

nal angle c. 105°, colour milky-white. Left valve with c. 25 evenly spaced radial costae, increasing in number near ventral margin, crossed by commarginal lamellae, less conspicuous than costae (forming reticulate sculpture), with spines at intersections. Near umbonal area only commarginal lamellae present, with delicate interstitial irregular threads. Identical sculpture on auricles. Right valve sculptured with evenly spaced commarginal lamellae, more close-set near umbonal area, with interstitial scratches. Auricles with irregular reticulate sculpture. Byssal notch narrow. Inner surface of both valves with 3 rudimentary riblets, one additional on posterior auricle. Hinge line straight. Resilifer triangular.

Distribution. — Indonesian Archipelago: 240-300 m (Dijkstra, 1991; Dijkstra & Kastoro (1997); Vanuatu Archipelago: 154-179 m (Dijkstra, 2001); Fiji: 567-699 m, Tonga: 523-806 m, Solomon Islands: 194-286 m (dead) (Dijkstra & Maestrati, 2008). Present material from the Philippines alive in 102-357 m (minimum depth range). The bathymetric range of live-taken specimens is extended to 83-806 m.

Remarks. — The present specimens from the Philippines are identical to the type specimens of *Parvamussium araneum* from Indonesia, although the sculpture of the left valve is somewhat more closely spaced with intercostal commarginal lamellae. This species is a new record for the Philippines.

***Parvamussium cristatellum* (Dautzenberg & Bavay, 1912)**

Pl. 2 figs 4a-b, 5a-b, Pl. 4 figs 7a-b

Pecten (Amussium) cristatum [sic] Bavay, 1905a: 187, pl. 17 figs 2a-c [not *Pecten cristatus* Bronn, 1828].

Amussium cristatellum Dautzenberg & Bavay, 1912: 36, pl. 28 figs 5-8 [nom. nov. for *Pecten (Amussium) cristatus* Bavay].

Parvamussium cristatellum (Dautzenberg & Bavay); Dijkstra, 1991: 13, figs 28-32; Dijkstra & Marshall, 1997: 80, pl. 3

figs 4-8, pl. 4 figs 1-2; Dijkstra & Marshall, 2008: 7, figs 5, 6A-D; Dijkstra & Maestrati, 2008: 86; 2009: 42, pl. 2 figs 14-17; 2010: 336; Dijkstra, 2011: 40, pl. 1015 figs 2, 3a-b.

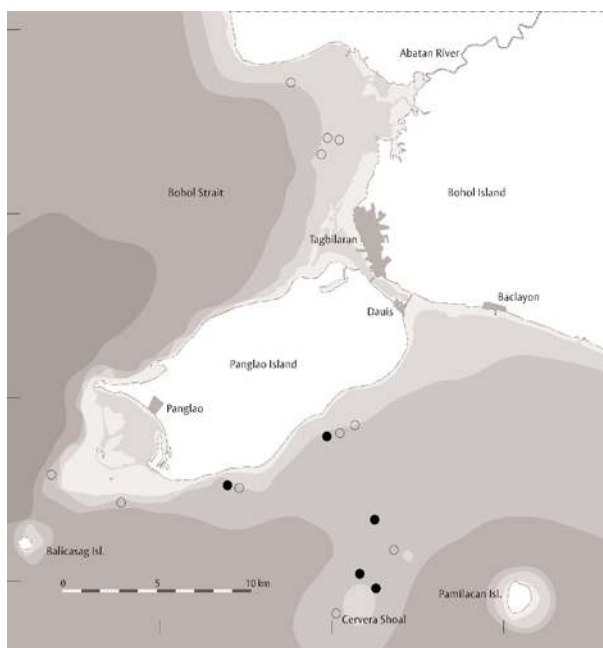
Type data. — Lectotype (H 7.1 mm, lv, illustrated by Bavay, 1905b, pl. 17 fig. 2a) ZSI M3360/1, 2 paralectotypes ZSI M3360/2-3, designated by Dijkstra & Kastoro (1997: 261). Type locality: "I Masandam" [= Oman, Musandam Peninsula], depth not recorded.

Material examined. — **Philippines**: PMBP 2004, Stn G1, 100 m, 77 v; Stn T1, 83-102 m, 3 pv (A), 10 v; Stn T2, 152 m, 104 v; Stn T9, 97-120 m, 351 pv (A); Stn T10, 117-124 m, 23 v; Stn T14, 101-110 m, 13 v; Stn T18, 80-100 m, 40 v; Stn T26, 123-135 m, 5 v; Stn T27, 106-137 m, 19 v; Stn T31, 100-140 m, 14 v; Stn T34, 145-163 m, 136 pv (A); Stn T36, 95-128 m, 2 pv (A), 100 v; Stn T37, 134-190 m, 7 v; Stn T39, 100-138 m, 16 v; Stn T41, 110-112 m, 1 pv (A), 2 v. PANGLAO 2005, Stn DW 2339, 164-176 m, 62 v.

Description. — Shell fragile, up to c. 10 mm high, subcircular, weakly inflated, inequivalve, nearly equilateral, right valve slightly more convex than left, auricles somewhat unequal in size, umbonal angle c. 120°. Prodissoconch c. 190 µm in height (Dijkstra & Marshall, 2008: 7). Left valve creamy, with milky-white dots, right valve more uniform white. Left valve sculptured with delicate commarginal lamellae near the umbo, irregularly spaced radial costae commence about 1 mm below the umbo. Commarginal lamellae are developed over the radial costae, forming more or less prominent squamae on the intersections. Anterior auricle with some fine radiation and commarginal lamellae, more delicate on the posterior. Right valve sculptured with regularly spaced commarginal lirae. Anterior auricle with some small radial costae near the byssal fasciole, and commarginal lamellae, prominent near the dorsal edge. Posterior auricle only with commarginal lamellae. Internal ribs 10-12, sometimes with a few interstitial rudimentary riblets. Hinge line straight. Byssal notch narrow.

Distribution. — Oman, Musandam Peninsula: depth unknown (Bavay, 1905a: 187), Taiwan: 260-442 m, dead (Dijkstra & Maestrati, 2009: 42), Indonesia: 74-445 m, dead (Dijkstra, 1991: 14; Dijkstra & Kastoro, 2007: 261), Kermadec Islands: 510 m, (Dijkstra & Marshall, 1997: 80), New Caledonia, Wallis and Futuna, Vanuatu: 330-495 m (Dijkstra & Marshall, 2008: 7), Solomon Islands and Fiji: 194-200 m (Dijkstra & Maestrati, 2008: 87), and Austral Islands: 140-750 m, dead (Dijkstra & Maestrati, 2010: 338). Present material from the Philippines alive in 102-145 m (minimum depth range). The bathymetric range of live-taken specimens is extended to 80-510 m.

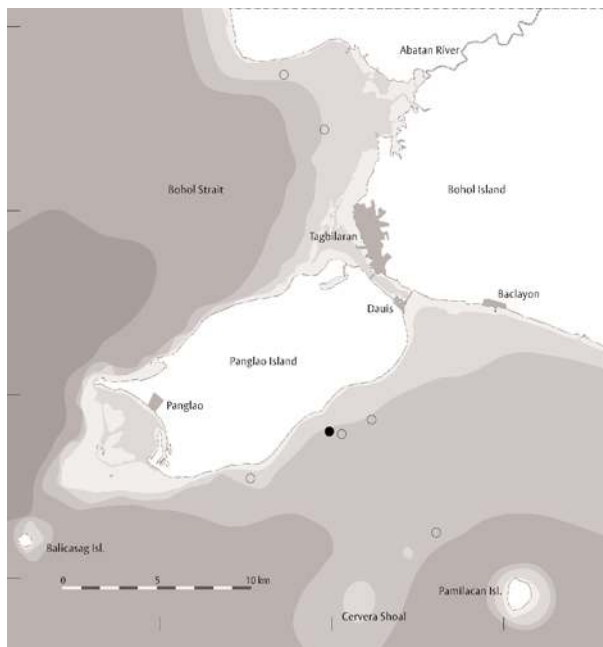
Remarks. — The present material is rather variable in sculpture of the left valve. The radial ribs are weak to prominent and closely to widely spaced. The commarginal lamellae are more widely spaced in the central part of the disc to more closely arranged near the periphery. Internal ribs also vary in number (10 to 12, usually 10, with one or two interstitial rudimentary ones). This variation is also observed in other studied material (MNHN, ZMA) from the tropical Indo-Pacific. All conchological characters are identical to the type material from Indonesia.



***Parvamussium largoi* spec. nov.**

Pl. 2 figs 6-8, Pl. 4 figs 8a-c

Holotype. — PMBP 2004, Stn T9, Panglao Island, off San Isidro, 9°33.5'/33.9'N, 123°49.5'/50.5'E, 97-120 m, alive, fine sand with seagrass, 14.vi.2004. 1 pv (NMCR-39007). Paratypes as listed below.



Other material examined. — **Philippines:** PMBP 2004, Stn G1, 100 m, 2 lv, 1 rv; Stn T2, 152 m, 1 lv, 1 rv; Stn T9, 97-120 m, (A), 1 pv, 6 lv, 8 rv (15 paratypes, MNHN MOLL 23192), 1 lv, 1 rv (2 paratypes, ZMA Moll. 411001); Stn T10, 117-124 m, 7 lv, 4 rv; Stn T26, 123-135 m, 3 lv; Stn T27, 106-137 m, 2 lv; Stn T39, 100-138 m, 3 lv, 1 rv.

Description. — Shell fragile, up to c. 6 mm high, transparent, left and right valves equally convex, weakly inflated, almost circular, inequivalve, equilateral, auricles almost equal in size, umbonal angle c. 90°. Left valve with orange and milky white maculations, right valve with milky oblong white dot umbonally. Both valves smooth and glossy, with traces of commarginal growth lines on left valve, some specimens with very weak, closely spaced commarginal lamellae near the periphery of the disc. Anterior auricle of left valve smooth, some specimens with prominent commarginal lamellae near periphery, posterior auricle smooth with very closely spaced commarginal growth lines near periphery. Auricles of right valve smooth, with scales on the hinge line. Hinge line straight. Byssal notch relatively deep. Interior surface with a rudimentary short riblet on each side, one weak auricular riblet anteriorly and posteriorly.

Measurements of holotype: H 5.9 mm, W 6.5 mm, D 1.2 mm.

Distribution. — Known so far from the Philippines, dead in 100-152 m, alive in 97-120 m.

Etymology. — At the request of Philippe Bouchet, the specific epithet honors Dr Danilo Largo, University of San

Carlos, Cebu City, Philippines, joint project co-ordinator of the Panglao Marine Biodiversity Project.

Remarks. — *Parvamussium largoi* spec. nov. is somewhat similar to *P. torresi* (E.A. Smith, 1885) from the southwestern Pacific, but differs in size (*P. largoi* is c. 6 mm high, *P. torresi* is larger, up to c. 9 mm high), in external sculpture (right valve of *P. largoi* is smooth, right valve of *P. torresi* has weak commarginal lamellae) and internal sculpture (*P. largoi* has a few rudimentary riblets, *P. torresi* has 10 prominent, well developed radial ribs). *Parvamussium vesiculatum* Dijkstra, 1995, also known from the southwestern Pacific also has rudimentary internal riblets, somewhat similar to the present species, but differs strongly externally (*P. largoi* is almost smooth, *P. vesiculatum* is prominently sculptured).

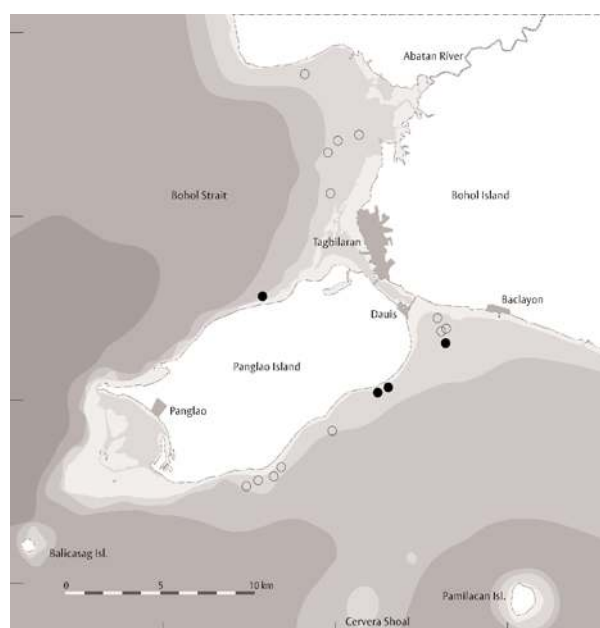
***Parvamussium pauciliratum* (E.A. Smith, 1903)**

Pl. 3 figs 1a-d, Pl. 4 fig. 9

Amussium paucilirata [sic] E.A. Smith, 1903: 622, pl. 36 figs 23-24.

Parvamussium pauciliratum (Smith); Dijkstra, 1991: 14, figs 33-34; Dijkstra, 1995b: 26, figs 107-110, 151-152; Dijkstra & Kastoro, 1997: 261, figs 73-74; Dijkstra, 1998a: 12, pl. 1 figs 1-2; Dijkstra & Maestrati, 2008: 92; Dijkstra & Moolenbeek, 2008: 16; Xu & Zhang, 2008: 78, fig. 215; Dijkstra, 2011: 42, pl. 1016 figs 2, 3a-b, 4.

Type data. — Lectotype (H 7.5 mm, pv) BMNH 1903.9.17.17, 2 paralectotypes (pv) BMNH 1903.9.17.18/1-2, designated by Dijkstra (1995b: 28, figs 151-152). Although the original registration number indicated 4 specimens, only 3 types are now present in the BMNH. Type locality: Maldive Islands, S Nilandu Atoll, 2-66 m, alive.



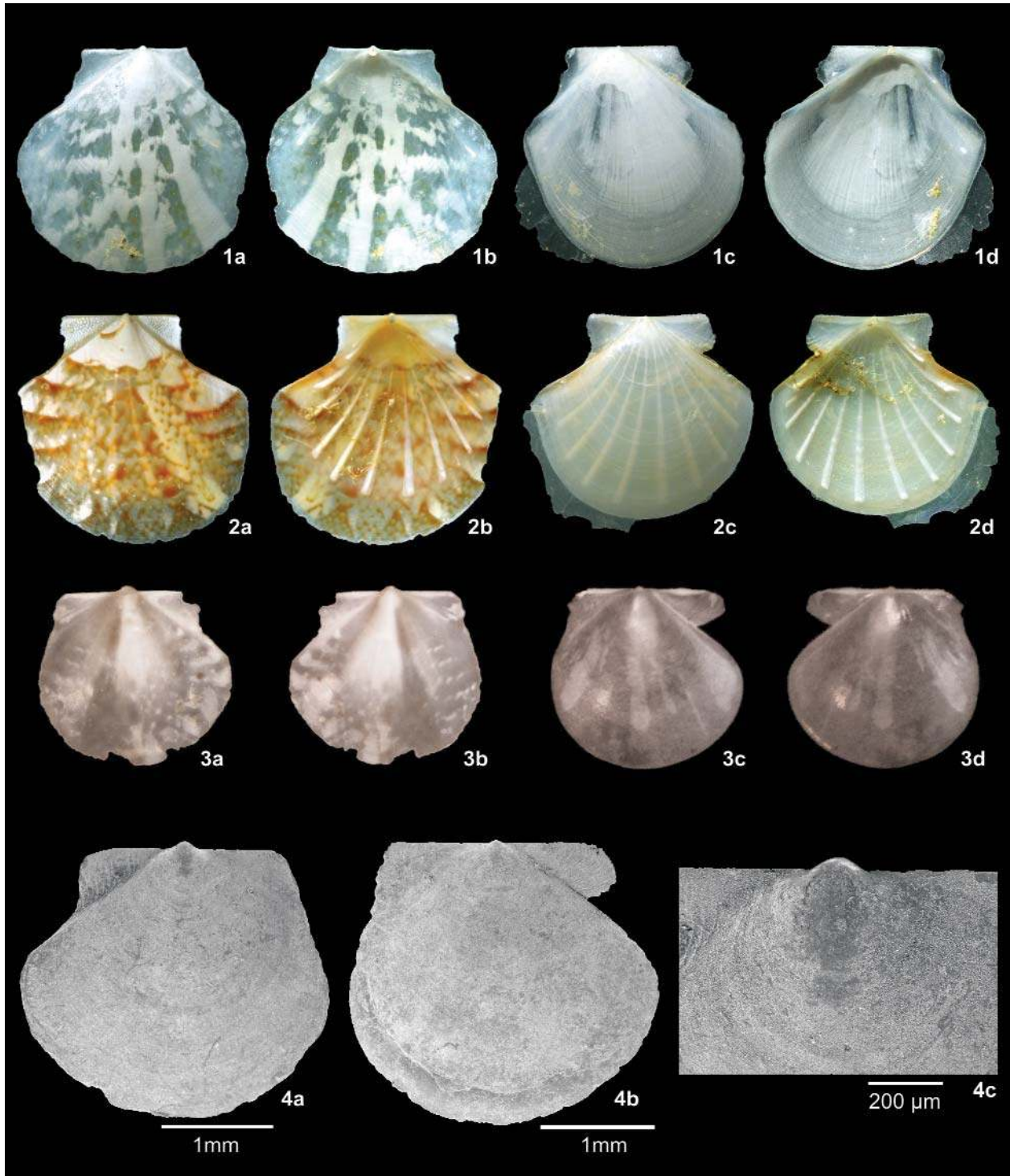


PLATE 3

Fig. 1a-d. *Parvamussium pauciliratum* (E.A. Smith, 1903), PMBP 2004 Stn T6. **1a-b.** lv exterior and interior, H 6.1 mm. **1c-d.** rv exterior and interior, H 6.5 mm. **Fig. 2a-d.** *Parvamussium scitulum* (E.A. Smith, 1885), PMBP 2004 Stn 36, pv. **2a-b.** lv exterior and interior, H 10.1 mm. **2c-d.** rv exterior and interior (marginal apron partly broken off), H 8.6 mm. **Figs 3-4.** *Similipecten eous* (Melvill in Melvill & Standen, 1907), PMBP 2004 Stn T9, pv. **3a-b.** lv exterior and interior, H 3.1 mm. **3c-d.** rv exterior and interior, H 3.1 mm. **4a.** lv exterior, H 2.4 mm. **4b.** rv exterior, H 2.5 mm. **4c.** lv post-larval stage.

Material examined. — **Philippines**:PMBP 2004, Stn D2, 41-46 m, 1 v; Stn D15, 53-83 m, 5 v; Stn G1, 100 m, 2 v; Stn L51-60, 43-62 m, 2 pv (A); Stn T1, 83-102 m, 2 v; Stn T4, 82 m, 3 v; Stn T6, 34-82 m, 10 pv (A), 15 v; Stn T9, 97-120 m, 6 v; Stn T11, 78-95 m, 7 v; Stn T23, 35-45 m, 1 v; Stn T26, 123-135 m, 3 v; Stn T28, 80 m, 1 pv (A), 59 v; Stn T30, 59-65 m, 2 v; Stn T32, 60-62 m, 15 v; Stn T33, 67-74 m, 1 pv (A); Stn T43, 70-96 m, 2 v; Stn T44, 83-86 m, 16 v.

Description. — Shell fragile, up to c. 8 mm high, hyaline or opaque, sub-circular, inequivalve, right valve more inflated than left, slightly inequilateral, auricles almost equal, umbonal angle c. 105°. Prodissoconch c. 200 µm in height. Left valve creamy-white stained with white dots, right valve uniform white. Left valve glossy, with a few minute growth lines, covered with microscopic granules. Auricles smooth on most specimens, a few have delicate commarginal lirae near anterior margin. Right valve also glossy, smooth apart from microscopic granules. Anterior auricle with minute commarginal lirae. Hinge line straight. Internal riblets rudimentary, 1 or 2 laterally, with a small auricular lira on each side in most specimens. Resilifer triangular. Byssal notch very narrow.

Distribution. — Maldive Islands: 2-66 m (Smith, 1903); Indonesia: 34-467 m (dead) (Dijkstra, 1991; Dijkstra & Kastoro, 1997); Papua New Guinea: 48-125 m (Dijkstra, 1998a); Chesterfield Islands (Coral Sea): 150-225 m (dead), New Caledonia: 27-45 m (Dijkstra, 1995b). Present material from the Philippines alive in 62-80 m (minimum depth range). The bathymetric range of live-taken specimens is extended to 45-80 m. Living free on soft bottom assemblages (sand and coral rubble, muddy sand or mud).

Remarks. — The present specimens from the Philippines are identical to the type specimens from the Maldive Islands (Indian Ocean).

Parvamussium scitulum (E.A. Smith, 1885)

Pl. 3 figs 2a-d, Pl. 4 fig. 10

Amusium scitulum E.A. Smith, 1885: 312, pl. 23 figs 4-4b.

Amusium (*Propeamusium*) [sic] *scitulum* var.? *cmadoritinctum* Kuroda, (1929-35) 1931: 77, figs 81-82.

Ctenamusium (*Ctenamusium*) *cmadoritinctum* (Kuroda); Oyama, 1951: 80, pl. 13 figs 3-4.

Ctenamussium [sic] *cmadoritinctum* (Kuroda); Habe, 1964b: 173, pl. 53 fig. 4.

Ctenamussium [sic] *scitulum* (Smith); Koyama et al., 1981: 63.

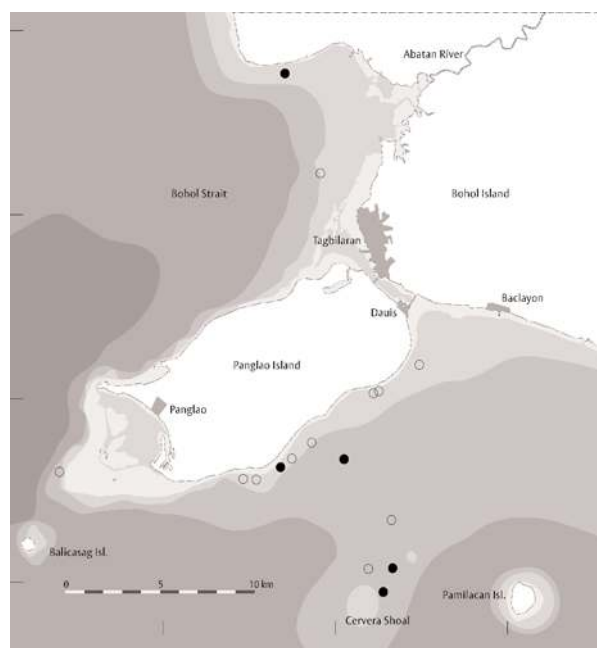
Propeamusium cmadoritinctum (Kuroda); Hayami, 1988a: 479, figs 2-1, 2.

Propeamusium (*Parvamussium*) *scitulum* (Smith); Dijkstra, 1990a: 3.

Parvamussium scitulum (Smith); Dijkstra, 1991: 16, figs 35-43; Dijkstra, 1995b: 31, figs 43-46, 153-154; Dijkstra, 1998a: 14, pl. 1 figs 3-6; Lamprell & Whitehead, 1992: [16], 179; Dijkstra & Kastoro, 1997: 261, figs 75-78; Hayami, 2000: 913, pl. 454 fig. 7; Dijkstra, 2001: 86; Dijkstra & Maestrati, 2008: 94; 2010: 339; Xu & Zhang, 2008: 78, fig. 217; Dijkstra, 2011: 42, pl. 1016 figs 5, 6, 7, 8a-b.

Type data. — *Amusium scitulum* Smith: Lectotype (H 4.4 mm, lv) BMNH 1887.2.9.3319/1; 6 paralectotypes (v) BMNH 1887.2.9.3319/2-7, designated by Dijkstra (1995b: 31, figs 153-154). Type locality: S of New Guinea, 9°59'S, 139°42'E, 28 fathoms [= 51 m], dead, green mud, 10.ix.1874 (Challenger stn 188).

Amusium scitulum var. *cmadoritinctum* Kuroda: Kikuchi Shell Museum, Kuroda collection. Type locality: Japan, Kyushu, Kagoshima Prefecture, Yakushima Island.



Material examined. — **Philippines**:PMBP 2004, Stn T1, 83-102 m, 42 v; Stn T2, 152 m, 41 v; Stn T4, 82 m, 4 pv (A), 83 v; Stn T5, 84-87 m, 13 v; Stn T6, 34-82 m, 19 v; Stn T9, 97-120 m, 23 v; Stn T25, 160-210 m, 8 v; Stn T26, 123-135 m, 2 pv (A), 7 v; Stn T27, 106-137 m, 1 pv (A), 6 v; Stn T28, 80 m, 155 v; Stn T31, 100-140 m, 4 v; Stn T34, 145-163 m, 3 v; Stn T36, 95-128 m, 3 pv (A), 228 v; Stn T37, 134-190 m, 1 v; T39, 100-138 m, 3 pv (A), 16 v; Stn T41, 110-112 m, 22 v; Stn T44, 83-86 m, 40 v.

Description. — Shell fragile, up to c. 10 mm high, sub-circular, compressed, inequivalve, inequilateral, right valve more convex than left, auricles rather small and unequal, umbonal angle c. 120°, prodissoconch c. 210 µm in height. Left valve stained, opaque, right valve semi-transparent white. Left valve very weakly inflated, weakly sculptured with delicate, variable radial striations, somewhat stronger near posterior margin than elsewhere. Microscopic close-set commarginal striae developed on disc of some specimens, somewhat more widely spaced near umbonal area. Anterior auricle with prominent commarginal lamellae close to flank of disc, decreasing in prominence or absent near antero-dorsal margin; posterior auricle with fine radial and commarginal striations, almost absent from some specimens. Right valve either smooth or weakly sculptured with a few growth lines. Internal riblets extending to submarginal area, 9 or 10 in most specimens, some specimens with 1 or 2 rudimentary interstitial riblets. Resilifer triangular. Hinge line straight. Byssal notch narrow.

Distribution. — Japan to tropical western Pacific: 40-500 m (Hayami, 2000: 913); Indonesia: 50-385 m (dead) (Dijkstra, 1990a: 3; 1991: 17; Dijkstra & Kastoro, 1997: 262); Papua New Guinea: 60-125 m, Chesterfield Islands (Coral Sea): 300 m, New Caledonia: 250-350 m, Loyalty Islands: 70-200 m, Wallis and Futuna Islands: 200-240 m (dead) (Dijkstra, 1995b: 31; 1998a: 14; 2001: 86; Dijkstra & Maestrati, 2008: 94); Fiji: 80-120 m, Tonga: 327-360 m (dead) and the Austral Islands: 200-620 m (dead) (Dijkstra & Maestrati, 2008: 94; 2010: 339). Present material from the Philippines alive in 82-123 m (minimum depth range). Living free on soft bottom assemblages (sand, muddy sand or mud with coral rubble or gravel).

Remarks. — The present material from the Philippines is morphologically similar to the type specimens from eastern Indonesia.

Kuroda (1931: 77) described a possible new variation of the present species from Japan, which is more colourful and much larger in size than the type material of *Parvamussium scitulum*. Smith (1885: 312) suggested that the type specimens from New Guinea are possibly juveniles. The present specimens from the Philippines are indeed larger than the type material and the colour is highly variable.

Similipecten Winckworth, 1932

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

Arctinula Thiele, 1935: 806 (proposed as a section of *Palliolium*). Type species (by original designation): *Pecten greenlandicus* G.B. Sowerby 2nd, 1842; Recent, Greenland.

Diagnosis. — A free-living, small to medium-sized, flattened propeamussiid; shell (sub)circular, opaque or transparent, smooth or sculptured with minute commarginal growth lines or fine striae; auricles almost equal in size, anterior auricle of right valve demarcated from shell disc, other auricles less clearly demarcated; byssal gape moderately deep; ctenolium absent; hinge dentition rather broad.

Distribution. — Eocene to Recent. Arctic to tropical Atlantic, NW Indian Ocean eastwards to southwestern Pacific; living bathyally.

Remarks. — *Similipecten* was proposed by Winckworth (1932: 241) as a subgenus of *Chlamys*. Hertlein (1969: N354), however, placed *Similipecten* in the *Eburneopecten* group as a synonym of *Palliolium* (*Delectopecten*) Stewart, 1930. Now *Similipecten* is assigned to the Propeamussiidae (Waller, 1984: 213; Dijkstra, 1991: 23; Dijkstra, 2002b: 189), or to Propeamussiinae (Schein, 1989: 95). The morphological characters of *Arctinula* and *Similipecten* are identical (shell very fragile and subcircular, laterally flattened, hyaline to opaque, generally smooth, lacking internal ribs, byssal gape moderately developed, lacking a ctenolium).

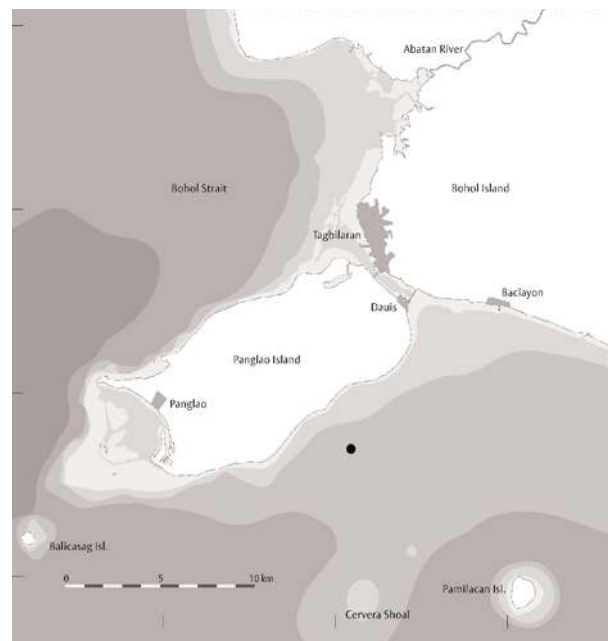
Similipecten eous (Melvill in Melvill & Standen, 1907)

Pl. 3 figs 3a-d, 4a-c

Pecten eous Melvill in Melvill & Standen, 1907: 808, pl. 55, fig. 9.

Similipecten eous (Melvill); Oliver, 1992: 74, text-figs 9a-b; Bosch, Dance, Moolenbeek & Oliver, 1995: 232; Dijkstra & Knudsen, 1998: 50, pl. 3, figs 10- 11).

Type data. — Lectotype (H 3.75 mm, lv) BMNH 1907.5.3.18, 2 paralectotypes (v) BMNH 1907.5.3.19-20, 17 paralectotypes (v) NMW 1955.158.673, designated by Dijkstra & Knudsen (1998: 50). Several paralectotypes deposited in other museums (Dijkstra, personal observation). Type locality: Gulf of Oman, 24°58'N, 56°54'E, 285 m, dead, shell-sand.



Material examined. — **Philippines**: PMBP 2004, Stn T9, 97-120 m, 35 pv (A).

Description. — Shell fragile, up to c. 4 mm high, hyaline or opaque, semi-circular, inequivalve, subequilateral, right valve more inflated than left one. Both valves with some long milky-white spots. Left valve smooth, sometimes with minute commarginal lirae near the ventral margin. Right valve also smooth, with a microscopic granular structure. Anterior auricles with delicate commarginal lirae, posterior auricles smooth. Internal ribs lacking. Byssal notch small. Ctenolium absent.

Distribution. — Red Sea, Gulf of Oman, Arabian Sea, Persian Gulf and Indonesia (Dijkstra, 1991: 23). Present material from the Philippines alive in 97-120 m. The bathymetric range of live-taken specimens is 97-410 m (MNHN, ZMA). Living on soft bottom assemblages of sediments (mud, muddy sand, shellgrit).

Remarks. — The present specimens from the Philippines are morphologically similar to the type material from the Gulf of Oman.

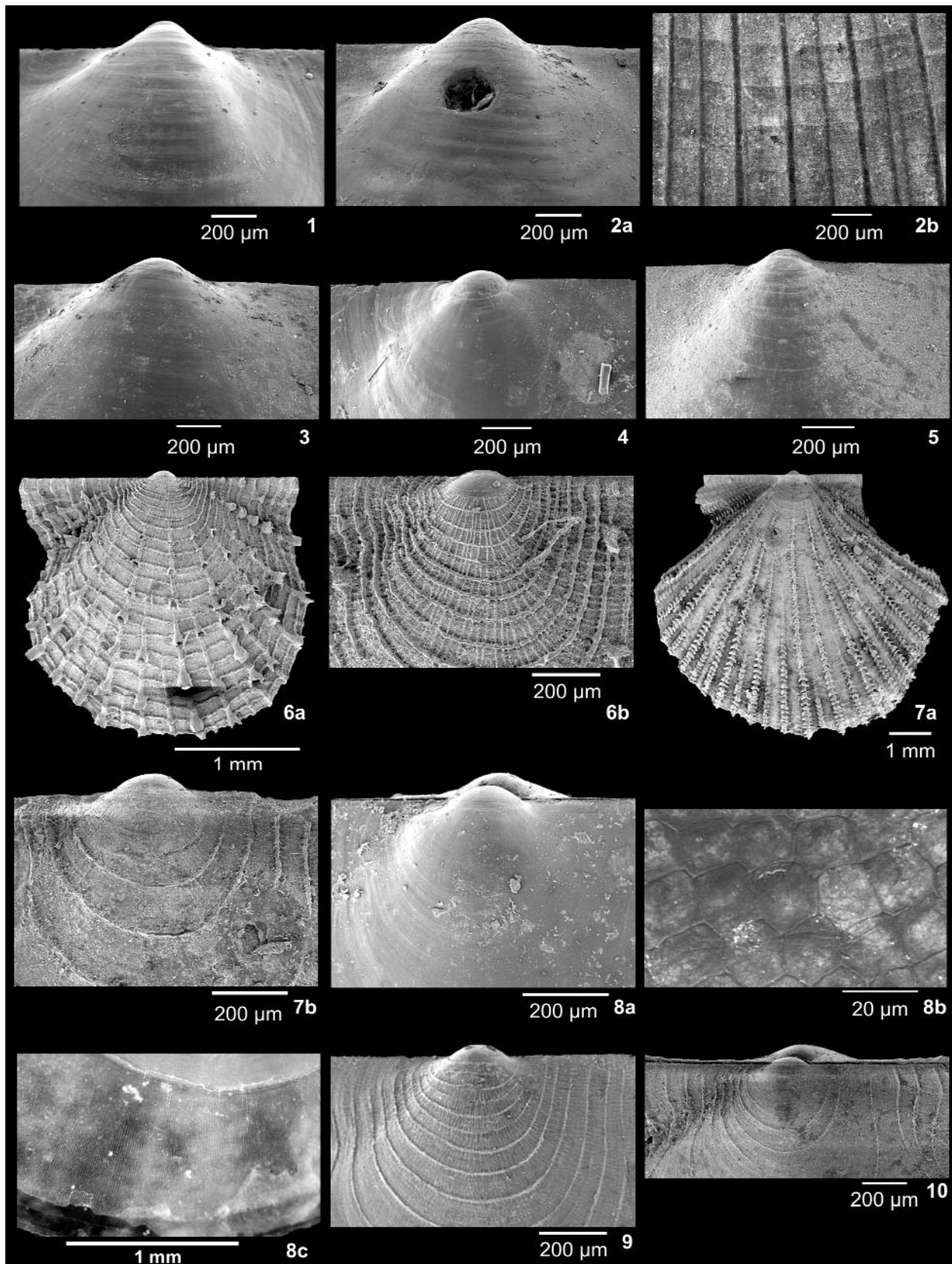


PLATE 4

Fig. 1. *Propeamussium caducum* (E.A. Smith, 1885), PMBP 2004 Stn P1, lv post-larval stage. **Figs 2a-b.** *Propeamussium jeffreysii* (E.A. Smith, 1885), Bohol Sea, 9°24.5'N, 123°49.7'E, 544-712 m, live, dredged, 2005 (ZMA Moll. 146994). **2a.** lv post-larval stage. **2b.** lv central part of shell disc. **Fig. 3.** *Propeamussium rubrotinctum* (Oyama, 1951), PANGLAO 2005 Stn CP2343, lv post-larval stage. **Fig. 4.** *Propeamussium sibogai* (Dautzenberg & Bavay, 1904), PANGLAO 2005 Stn CP2359, lv post-larval stage. **Fig. 5.** *Propeamussium siratama* (Oyama, 1951), PANGLAO 2005 Stn CP2341, lv post-larval stage. **Figs 6a-b.** *Parvamussium araneum* Dijkstra, 1991, PMBP 2004 Stn T1. **6a.** lv exterior, H 2.1 mm. **6b.** lv post-larval stage. **Figs 7a-b.** *Parvamussium cristatellum* (Dautzenberg & Bavay, 1912), PMBP 2004 Stn T36. **7a.** lv exterior, H 6.5 mm. **7b.** lv post-larval stage. **Figs 8a-c.** *Parvamussium largoi* spec. nov., PMBP 2004 Stn T9, holotype. **8a.** lv post-larval stage. **8b.** rv micro-structure shell layer. **8c.** rv marginal apron. **Fig. 9.** *Parvamussium pauciliratum* (E.A. Smith, 1903), PMBP 2004 Stn T28, lv post-larval stage. **Fig. 10.** *Parvamussium scitulum* (E.A. Smith, 1885), PMBP 2004 Stn T39, lv post-larval stage.

A similar-looking species, *Similipecten similis* (Laskey, 1811) known from the eastern Atlantic, is larger in size (up to c. 7 mm high) and more brightly coloured. Another similar-looking, recently new described species from Tonga, *Similipecten herosae* Dijkstra & Maestrati (2008: 100), has radial sculpture on the left valve (lacking in *S. eous*) and internal ribs (also lacking in *S. eous*).

This species is a **new record** for the Philippine Islands.

PECTINIDAE Rafinesque, 1815

Pectinidae Rafinesque, 1815: 148 (ex subfamily Pectenina Rafinesque) [emend. Waller, 1978], formerly attributed to Wilkes (1810: 32), but that work is not entirely binominal (Waller & Stanley 2005: 38; Dijkstra & Marshall 2008: 2).

Diagnosis. — Byssate, cemented, or free living Pectinoidea with outer, prismatic calcite layer on right valve; some taxa with crossed-lamellar aragonite inside pallial line; with an aragonitic myostracum; byssal notch with ctenolium, at least in early growth stages; resilium single, triangular.

CAMPTONECTINAE Habe, 1977

Camptonectinae Habe, 1977: 87 [in Japanese]; Waller & Marinovich, 1992: 218 [English translation].

Diagnosis. — Pectinidae without prominent macrosculpture; with antimarginal microsculpture throughout ontogeny; shell microstructure of outer lathic or foliated calcite, inner crossed-lamellar aragonitic layer extending to margins; posterior auricle not significantly demarcated from the disc; byssal notch well-developed, ctenolium present.

Remarks. — For emended diagnostic characters and discussion of Camptonectinae see Waller & Marinovich (1992: 218-219).

Delectopecten Stewart, 1930

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

Diagnosis. — Inequivalve, small, fragile, almost circular camptonectinines, valves almost equal convex, sculptured with commarginal rows of scales or vesicles, spinose radial ridges and/or fine antimarginal striae; byssal notch well-developed; ctenolium prominent.

Distribution. — Lower Cretaceous to Recent. Worldwide; living upper bathyally to upper hadally.

Remarks. — Grau (1959: 38) considered *Delectopecten* to be a subgenus of *Cyclopecten* Verrill, 1897, and placed *Arcti-*

nula Thiele, 1935 and *Catillopecten* Iredale, 1939 in its synonymy. The morphological characters of *Arctinula*, however, are identical to those of *Similipecten* Winckworth, 1932 (Schein, 1989: 96), at present placed in Propeamussiidae. *Catillopecten* is also considered to be a Recent genus of Propeamussiidae (Schein-Fatton, 1988; Schein, 1989), and a senior synonym of *Bathypecten* Schein-Fatton, 1985 (Dijkstra & Marshall, 2008: 38).

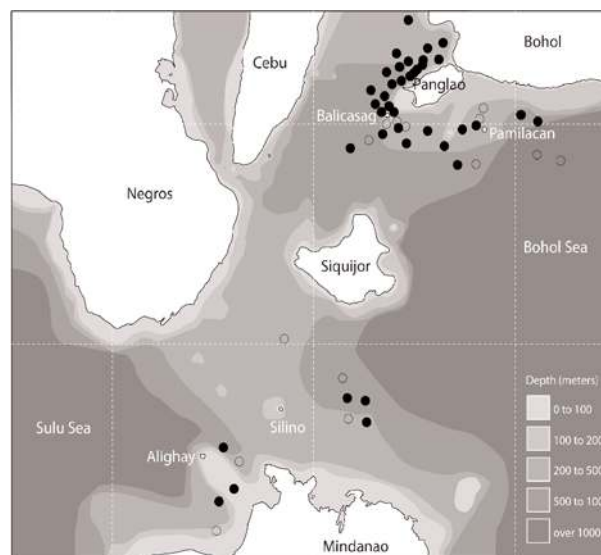
Hertlein (1969: N354) treated *Delectopecten* as a subgenus of *Palliolium* Monterosato, 1884, placed in the *Eburnepecten* group. Currently, however, *Delectopecten* is interpreted as a Recent genus of Pectinidae (Moore, 1984: B13; Waller, 1991: 13; Waller & Marinovich, 1992: 219; Beu, 1995: 11; Coan, Valentich Scott & Bernard, 2000) and classed in the subfamily Camptonectinae Habe, 1977 (Waller, 2006a: 10).

Delectopecten alcocki (E.A. Smith, 1904)

Pl. 5 figs 1a-d

Pecten alcocki Smith, 1904: 13; Alcock et al., 1907: pl. 18 fig. 4-4b; Knudsen, 1967: 282, pl. 2 figs 3-4, textfig. 19.

Delectopecten alcocki (Smith); Poutiers, 1981: 331, pl. 1 fig. 1; Dijkstra, 1991: 26, fig. 87; Dijkstra, 1995b: 50, figs 111-114, 147-150 (lectotype); Dijkstra & Kastoro, 1997: 265, figs 101-108; Dijkstra, 2001: 91; Raines & Poppe, 2006: 56, 57, upper figs; pl. 2 figs 3, 4, 6, 9; Dijkstra & Maestrati, 2008: 105; Raines, 2010: 594, pl. 988 figs 1, 2.



Type data. — Lectotype (H 19 mm, pv) ZSI M669/1, 29 paralectotypes (pv) ZSI M667-668, M670-698/1, designated by Dijkstra (1995b: 50, figs 147-150). Type locality: Arabian Sea, off southern India, 7°17'30"N 76°54'30"E, 430 fathoms [= 786 m], alive, grey mud, 19.x.1897 (Investigator stn 232).

Although Smith (1904: 13) indicated the measurements of a type specimen, this specimen was not selected from the type lot and several other type specimens are of similar size. Therefore I selected a specimen from the type lot, during a

visit to the ZSI (1991) which has identical measurements to those mentioned by Smith in his original description, and designated this specimen as the lectotype (Dijkstra 1995b: 50).

Material examined. — **Philippines:** PMBP 2004, Stn L43, 80 m, 1 v; Stn L44, 85-100 m, 3 v; Stn L49, 90 m, 3 pv (A), 12 v; Stn L76, c. 80 m, 1 pv (A); Stn P1, 90-200 m, 53 pv (A), 196 v; Stn P2, 400 m, 22 pv (A), 11 v; Stn P3, c. 100 m, 11 pv (A), 12 v; Stn P4, 80-120 m, 1 pv (A), 39 v; Stn P5, c. 100 m, 1 pv (A); Stn P6-7, 121-138 m, 1 pv (A); Stn T25, 160-210 m, 4 v. PANGLAO 2005, Stn CP 2331, 255-268 m, 8 pv (A), 24 v; Stn CP 2332, 396-418 m, 34 pv (A), 74 v; Stn CP 2333, 584-596 m, 2 pv (A), 3 v; Stn CP 2334, 606-631 m, 4 pv (A), 1 v; Stn CP 2335, 729-733 m, 35 pv (A), 47 v; Stn CP 2336, 757-760 m, 11 pv (A), 10 v; Stn CP 2340, 271-318 m, 6 pv (A), 2 v; Stn CP 2341, 544-712 m, 5 pv (A), 11 v; Stn CP 2342, 1240-1258 m, 3 v; Stn CP 2343, 273-356 m, 4 pv (A); Stn CP 2348, 196-216 m, 2 pv (A), 2 v; Stn CP 2349, 219-240 m, 3 v; Stn CP 2350, 602-738 m, 16 pv (A), 2 v; Stn CP 2351, 810-812 m, 2 pv (A), 13 v; Stn CP 2352, 923-1260 m, 3 v; Stn CP 2354, 1769-1773, 1 v; Stn CP 2358, 569-583 m, 2 pv (A), 4 v; Stn CP 2359, 437-476 m, 11 v; Stn CP 2360, 357-372 m, 1 pv (A), 19 v; Stn CP 2361, 516-543 m, 1 pv (A), 1 v; Stn CP 2362, 679-740 m, 4 v; Stn DW 2364, 427 m, 5 v; Stn DW 2371, 172-175 m, 1 v; Stn CP 2372, 255-301 m, 1 pv (A), 2 v; Stn CP 2380, 150-163 m, 1 pv (A), 4 v; Stn CP 2383, 338-251 m, 1 v; Stn CP 2384, 624-647 m, 1 pv (A), 4 v; Stn CP 2388, 762-786 m, 3 pv (A), 23 v; Stn CP 2389, 784-786 m, 1 v; Stn CP 2390, 627-645 m, 2 pv (A), 7 v; Stn DW 2391, 323-336 m, 2 v; Stn CP 2392, 242-400 m, 10 pv (A), 13 v; Stn CP 2393, 356-396 m, 5 v; Stn CP 2394, 470-566 m, 21 pv (A), 40 v; Stn CP 2395, 382-434 m, 11 pv (A), 31 v; Stn CP 2396, 609-673 m, 4 pv (A); Stn CP 2397, 642-669 m, 9 pv (A), 11 v; Stn CP 2398, 713-731 m, 11 pv (A), 8 v; Stn DW 2401, 397-410 m, 1 v; Stn CP 2404, 481-505 m, 8 pv (A), 3 v; Stn CP 2405, 387-453 m, 23 pv (A), 18 v; Stn CP 2406, 334-387 m, 2 pv (A), 32 v; Stn CP 2407, 256-268 m, 5 pv (A), 4 v; Stn CP 2409, 220-257 m, 5 pv (A), 4 v.

Description. — Shell up to c. 15 mm high, circular, hyaline or opaque, whitish, auricles almost equal in size, umbonal angle c. 125°. Left valve with delicate antimarginal striae over entire disc. Commarginal growth lines crenulated, with radially aligned scales. Disc also smooth. Auricles identically sculptured, posterior auricle continuous with disc. Hinge line straight. Right valve sculptured as on left valve, although sculpture somewhat weaker. Anterior auricle separated from disc by suture bearing 2-4 antimarginal ridges. Byssal fasciole and notch strongly developed. Inactive and active ctenolium (with 3-5 teeth) present. Resilifer triangular. External sculpture barely visible from interior.

Soft parts are described by Knudsen (1967: 282).

Distribution. — Eastern Africa: 1079 m (Thiele & Jaeckel, 1931), Gulf of Aden: 274-732 m (Knudsen, 1967), S India: 786 m, ?alive (Smith, 1904), western Sumatra: 614-750 m (Thiele & Jaeckel, 1931), eastern Indonesia: 176-688 m, alive (Dijkstra & Kastoro, 1997), Philippine Islands: 150-750 m (Knudsen, 1967; Raines, 2010: 594), Japan: 274-1010 m (Higo, Callomon & Goto, 1999), Chesterfield Islands: 650-660 m (Dijkstra, 1995b), New Caledonia: 464-647 m (Dijkstra, 2001) and the Solomon Islands: 509-564 m (Dijkstra & Maestrati, 2008). Present specimens from the Philippines alive at 80-810 m (minimum depth range). The bathymetric range of live-taken specimens is now extended to 80-1079 m. Living on soft bottom assemblages of sediments (mud and/or sand).

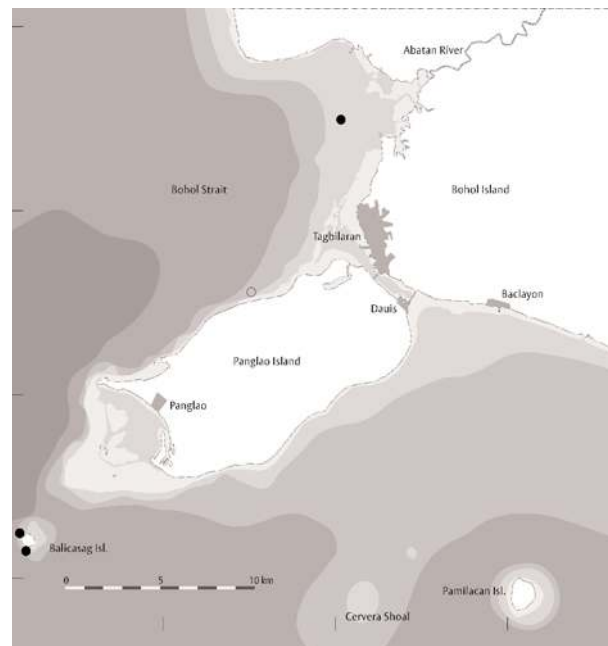
Remarks. — The present specimens from the Philippines are identical in all morphological characters to the type material. Specimens are strongly variable in sculpture from nearly smooth to prominent sculptured.

Delectopecten musorstomi Poutiers, 1981

Pl. 5 figs 2a-d

Delectopecten musorstomi Poutiers, 1981: 331, pl. 1 figs 2-3; Dijkstra, 1991: 26; Dijkstra, 1995b: 53, figs 69-70; Dijkstra & Marshall, 1997: 88, pl. 8 figs 1-6; Dijkstra & Knudsen, 1998: 51, pl. 7 figs 31-32; Dijkstra, 2001: 91; Dijkstra & Kilburn, 2001: 269, figs 1-2; Raines & Poppe, 2006: 58, 59, lower figs; pl. 2 fig. 1; Dijkstra & Maestrati, 2008: 105; Dijkstra & Maestrati, 2009: 44, pl. 4 figs 29-31.

Type data. — Holotype (H 4.9 mm, pv) MNHN Moll 21162. Type locality: Philippine Islands, N of Lubang, 13°57'N, 120°16.5'E, 150-159 m, alive, gravel and coral rubble, 21.iii.1976 (MUSORSTOM I stn 18).



Material examined. — **Philippines:** PMBP 2004, Stn L51-60, 43-62 m, 1 v; Stn T43, 70-96 m, 1 pv (A); Stn L61-64, 87-111 m, 92 pv (A); Stn L74-75, 120-139 m, 2 pv (A).

Description. — Shell fragile, up to c. 5 mm high, circular, hyaline or opaque, equivalve, equilateral, anterior auricle somewhat larger than posterior, umbonal angle c. 120°. Prodissoconch c. 200 µm in height. Whitish with a few white spots; external sculpture visible from interior. Left valve with microscopic antimarginal striae and 14-20 delicate, unevenly spaced, scaly radial lirae commencing at c. 1 mm shell height, enlarging progressively. Commarginal growth lines fine, evenly spaced, somewhat crenulated. Scales broken on many specimens. Auricles continuous with disc and similarly sculptured. Hinge line straight. Right valve sculpture similar to that of left valve, with slightly stronger microscopic commarginal lirae on early disc, commencing at about 1.5 mm shell height. Anterior auricle with 4-5 antimarginal ridges and commarginal lamellae, the latter strongly developed at dorsal margin, separated from disc by distinct suture. Byssal fasciole and notch well developed. Functional ctenolium with 2-3 teeth. Resilifer triangular.

Distribution. — Red Sea: 121-350 m, dead (Dijkstra & Knudsen, 1998: 53), South Africa: 70-305 m (Dijkstra & Kilburn, 2001: 270), Taiwan: 234 m, dead (Dijkstra & Maestrati, 2009: 45); Philippine Islands: 150-159 m (Poutiers, 1981: 332), Indonesia: 175-185 m (Dijkstra, 1991: 27), New Caledonia: 250 m (Dijkstra, 1995b: 53), Norfolk Island: 210 m, dead (Dijkstra & Marshall, 1997: 88), Solomon Islands: 302-396 m, dead (Dijkstra & Maestrati, 2008: 105), and the Austral Islands: 176-340 m, dead (Dijkstra & Maestrati, 2010: 344). Present specimens from the Philippines alive at 70-120 m (minimum depth range). The bathymetric range of live-taken specimens is 70-305 m. Living attached amongst sponge or coral rubble on mud or sand.

Remarks. — *Delectopecten musorstomi* is significantly smaller (up to 5 mm in height) than *D. alcocki* (up to 15 mm in height) and *D. fosterianus* (up to 20 mm in height). Its sculpture differs mainly in having numerous prominent radial scaly riblets, which are lacking in *D. alcocki* and *D. fosterianus*.

PALLIOLINAE Korobkov in Eberzin, 1960

Palliolinae Korobkov in Eberzin, 1960: 84 (as Pallioliminae; emend. Waller, 2006a: 10).

Diagnosis. — Pectinidae with an inner shell surface microstructure of irregularly foliated calcite, producing small reflective surfaces on the inner surface of well-preserved shells.

Remarks. — This subfamily was defined for the first time by Waller (2006a: 10, fig. 1.2) for genera related to *Palliolum* and *Mesopeplum*. Based on morphology and time ranges, he proposed that *Palliolum* was the stem genus of both Palliolini and Mesopeplini, and evolved from the largely Mesozoic genus *Dhontichlamys* during late Paleocene time.

PALLIOLINI Korobkov in Eberzin, 1960

Palliolini Korobkov in Eberzin, 1960: 84 (Waller, 2006a: 17).

Diagnosis. — Palliolinae with preradial dissoconch on the left valve with antimarginal and commarginal microsculpture, highly reflective patches of uniformly oriented calcite laths outside the pallial line, a delicate ctenolium with closely spaced teeth, a moderately shallow byssal notch, and without internal rib carinae.

Palliolum Monterosato, 1884

Palliolum Monterosato, 1884: 5. Type species (subsequent designation by Crosse, 1885): *Pecten incomparabilis* Risso, 1826; Recent, Mediterranean and adjacent E Atlantic.

Diagnosis. — Palliolini with prominent antimarginal microsculpture, radial macrosculpture almost absent, no sha-

green microsculpture or commarginal macrosculpture, foliated calcite (uniformly oriented laths) outside pallial line, byssal notch and sinus shallow throughout ontogeny, a weak ctenolium with closely spaced teeth, and few, weakly developed hinge teeth.

Distribution. — Eocene-Recent (Hertlein, 1969: N354). Boreal Atlantic (Waller, 1991: 35) and southwestern Pacific; littorally to bathyally.

Remarks. — So far the present species is the only living *Palliolum* from the Indo-West Pacific region. Representative genera of Palliolini, mainly fossil, were enumerated by Beu (1995) and Beu & Darragh (2001) from New Zealand and southern Australia, but Waller (2006a: 20) transferred all these to his new tribe Mesopeplini.

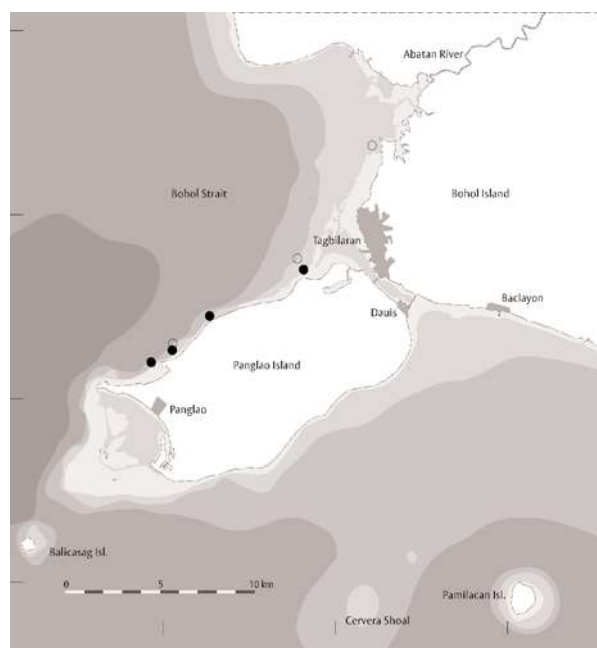
For phylogeny and stratigraphy see Waller (1991: 35; 1993: 198; 2006a: 17-21), Waller & Marincovich (1992: 219), Beu (1995: 19) and Beu & Darragh (2001: 154).

Palliolum minutulum Dijkstra & Southgate, 2000

Pl. 5 figs 3a-d

Palliolum minutulum Dijkstra & Southgate, 2000: 13-18, figs 1-7; Raines & Poppe, 2006: 72, 73, upper figs; pl. 5 figs 1-3; Dijkstra & Moolenbeek, 2008: 22; Raines, 2010: 594, pl. 988 figs 3, 5, 6.

Type data. — Holotype (H 6.8 mm, pv) MNHN Moll 21160, 6 paratypes (pv), 5 MNHN Moll 21161, 1 ZMA Moll. 400011. Type locality: New Caledonia, coral reef lagoon off Koumac, between mainland and Infernet reef, 20°34.4'S, 164°13.0'E, 12-14 m, alive, bottom of flat slabs with gorgonians and ooze, x.1993 (Montrouzier stn 1299).



Material examined. — **Philippines:** PMBP 2004, Stn B14, 2-4 m, 1 pv (A); Stn B15, 2-4 m, 1 v; Stn B36, 24 m, 1 pv (A); Stn L49, 90 m, 1 v; Stn L76, c. 80 m, 16 v; Stn S21, 4-12 m, 6 v; Stn S28, 28-32 m, 1 pv (A).

Description. — Shell extremely fragile, up to c. 9 mm high, translucent, circular, almost equiconvex and equilateral, auricles almost equal in size, umbonal angle about 90°; base colour highly variable, translucent white, cream, pink, reddish, or brownish, with white tent-shaped maculations. Both valves smooth and glossy, with minute antimarginal scratches and commarginal growth lines. Auricles of left valve gradually merging into disc without demarcating disc flanks. Anterior auricle of right valve demarcated from disc flank, prominent, somewhat curved, with four unevenly spaced radial riblets bearing delicate gemmae where crossed by fine commarginal lirae. Posterior auricle of right valve not demarcated from disc flank. Hinge line almost straight, antero-dorsal margin slightly raised. Resilifer widely triangular. Byssal notch shallow, byssal fasciole rather broad, functional ctenolium well-developed with c. 10 small teeth. Hinge teeth lacking.

Distribution. — Solomon Islands, northern Queensland, New Caledonia, Fiji and Kiribati: 6-16 m (Dijkstra & Southgate, 2000: 16), Indonesia: littoral depth (Dijkstra & Moolenbeek, 2008: 22); Philippines: 50-100 m (Raines, 2010: 594). Present specimens from the Philippines alive at 4-28 m (minimum depth range). The bathymetric range of live-taken specimens is 2-100 m. Living generally amongst algae on substrata.

Remarks. — Specimens from the Philippines are identical to the type material from New Caledonia. This tiny small alga-dwelling species strongly vary in colour.

PECTININAE Rafinesque, 1815

Pectininae Rafinesque, 1815: 148 ((ex subfamily Pecten Rafinesque) [emend. Waller, 1978]).

Diagnosis. — Pectinidae with prominent radial costae, commarginal and/or antimarginal sculpture, and auricles separated from the disc by a groove.

DECATOPECTININI Waller, 1986

Decatopectini Waller, 1986: 40.

Diagnosis. — Pectininae with very closely spaced commarginal lamellae, delicate antimarginal microsculpture restricted to the preradial growth stage, absent from auricles and lateral sides of disc; dentition with dorsal and/or intermediate teeth, the latter multiple or absent in some taxa, resilial teeth weak or absent. Internal rib carinae or plicae with carinate riblets near ventral margin.

Remarks. — Waller (1986: 40) introduced a new tribe Decatopectinini with *Decatopecten* Rüppell in Sowerby, 1839 as the type genus and the following representative genera: *Anguipecten* Dall, Bartsch & Rehder, 1938, *Annachlamys* Iredale, 1939, *Bractechlamys* Iredale, 1939, *Excellichlamys* Iredale, 1939, *Flexopecten* Sacco, 1897, *Gloripallium* Iredale, 1939, *Juxtamusium* Iredale, 1939, *Mirapekten* Dall, Bartsch &

Rehder, 1938, and *Somalipecten* Waller, 1986. Subsequently, Dijkstra (1991) included a new genus *Glorichlamys*, Dijkstra & Kilburn (2001: 283) synonymized *Somalipecten* Waller, 1986 with *Mirapekten* Dall, Bartsch & Rehder, 1938, and Waller (2006a: 27, fig. 1.3) transferred *Annachlamys* to tribe Pectinini and *Flexopecten* to tribe Aequipectinini.

Decatopecten G.B. Sowerby 2nd, 1839

Decatopecten Sowerby 2nd, 1839: 37, 78, 121, fig. 172. Type species (by monotypy): *Pecten* [sic] *plica* Linnaeus, 1758 (= *Ostrea plica* Linnaeus, 1758); Recent, Indonesia (see Dijkstra, 1999: 404). "*Decatopecten*" is not an available name (ICZN, 1999: 42, Article 33.3). See also Hertlein (1969: N365).

Pallium Schumacher, 1817: 41, 120 (junior homonym of *Pallium* Schröter, 1802). Type species (by monotypy): *Pallium striatum* Schumacher, 1817 (= *Ostrea plica* Linnaeus, 1758); Recent, Indonesia.

Dentipekten Gray, 1847: 200 (no diagnosis, obj.). Type species (by original designation): *Ostrea plica* Linnaeus, 1758.

Comptopallium Iredale, 1939: 359. Type species (by original designation): *Comptopallium pauciplicatum* Iredale, 1939 (= *Ostrea radula* Linnaeus, 1758); Recent, Queensland. See Waller (1986: 40).

Diagnosis. — Elongate plicate Decatopectinini with closely spaced commarginal lamellae and delicate antimarginal microsculpture in early ontogeny, and with secondary radial sculpture in late ontogeny; hinge dentition dominated by prominent dorsal and/or intermediate teeth; resilial teeth obsolete or absent; byssal notch small, ctenolium weak; internal plicae with short carinate riblets near margin.

Distribution. — Miocene to Recent (Hayami, 1989: 15). (Sub)tropical Indo-West Pacific; living littorally to sublittorally on soft sediments.

Remarks. — Grau (1959: 366) and later Hertlein (1969: N366) placed *Comptopallium* in the synonymy of *Semipallium* Jousseaume in Lamy, 1928. However, Waller (1972: 245) indicated that this is unacceptable, based on differences in shell microsculpture. Waller (1986: 40) treated *Comptopallium* as a junior synonym of *Decatopecten*, and (Waller 1991) placed *Semipallium* in Chlamyдини.

Decatopecten plica (Linnaeus, 1758)

Pl. 6 figs 2a-b, Pl. 7 figs 1a-d

Ostrea plica Linnaeus, 1758: 696, no. 162; Dijkstra, 1999: 404, figs 2A-D (lectotype).

Pallium striatum Schumacher, 1817: 120.

Pecten velutinus G.B. Sowerby 2nd, 1842: 63, pl. 13 fig. 31; Reeve, 1852 (in 1852-53): pl. 2 fig. 12; Rombouts, 1991: 37, pl. 13 fig. 11.

Pecten subplicatus G.B. Sowerby 2nd, 1842: 64, pl. 13 fig. 37,

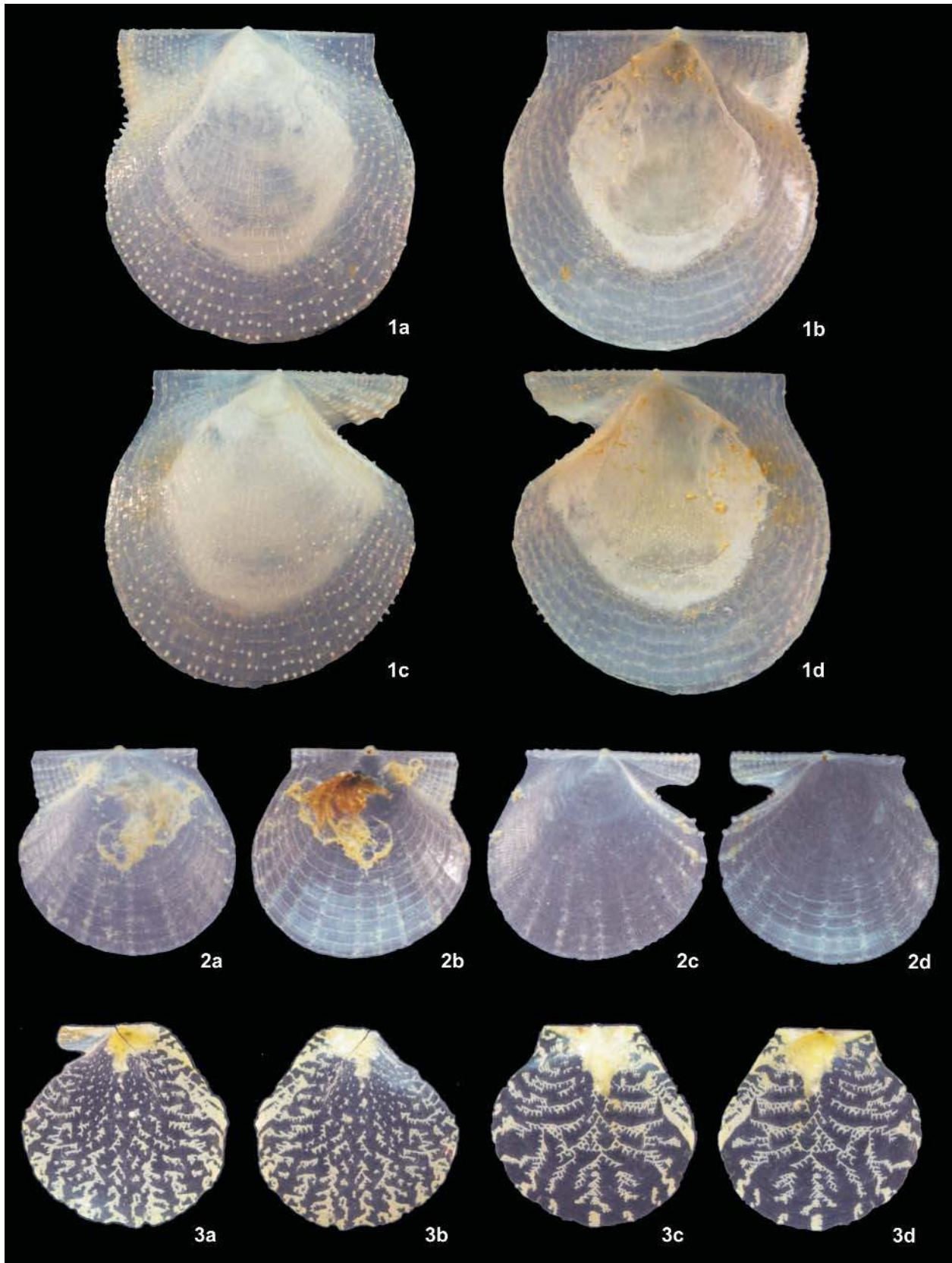


PLATE 5

Figs 1a-d. *Delectopecten alcocki* (E.A. Smith, 1904), PMBP 2004 Stn L77, pv, H 7.3 mm. **1a.** lv exterior. **1b.** rv exterior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Delectopecten musorstomi* Poutiers, 1981, PMBP 2004 Stn L61-64, pv, H 3.8 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Palliolum minutulum* Dijkstra & Southgate, 2000, PMBP 2004 Stn L76, pv, H 6 mm. **3a.** rv interior. **3b.** rv exterior. **3c.** lv exterior. **3d.** lv interior.

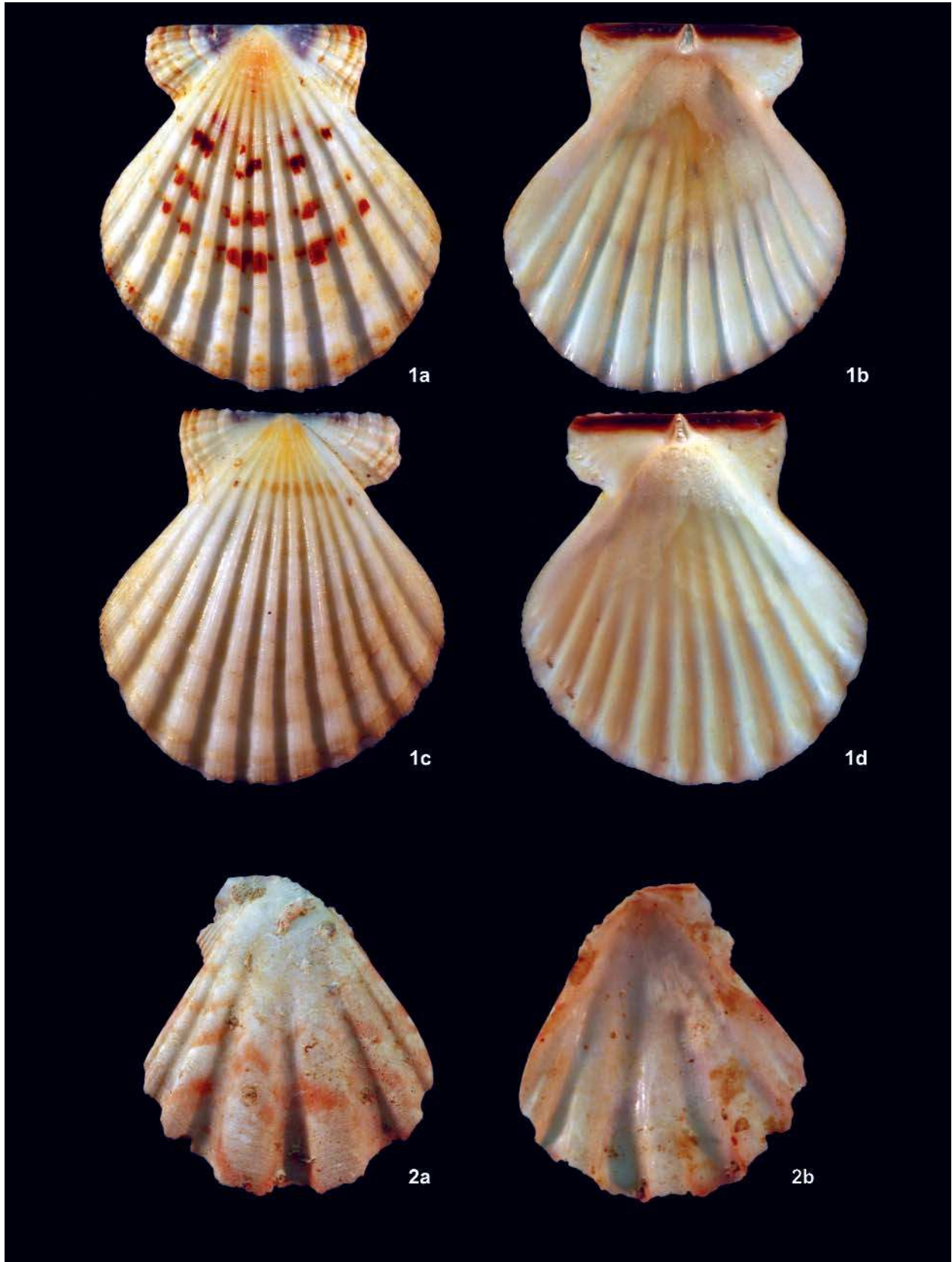


PLATE 6

Figs 1a-d. *Decatopecten radula radula* (Linnaeus, 1758), PMBP 2004 Stn R66, pv, H 47.1 mm. 1a. rv exterior. 1b. lv interior. 1c. rv exterior. 1d. rv interior. Figs 2a-b. *Decatopecten plica* (Linnaeus, 1758), PMBP 2004 Stn T39, H 21.3 mm. 2a. rv exterior. 2b. rv interior.

pl. 14 figs 72-73; Reeve, 1852 (in 1852-53): pl. 3 figs 17a-b; Rombouts, 1991: 37, pl. 13 fig. 10.

Decatopecten striatus (Schumacher); Kira, 1962: 139, pl. 50 fig. 6.

Decatopecten striatum (Schumacher); Bernard, Cai & Morton, 1993: 51.

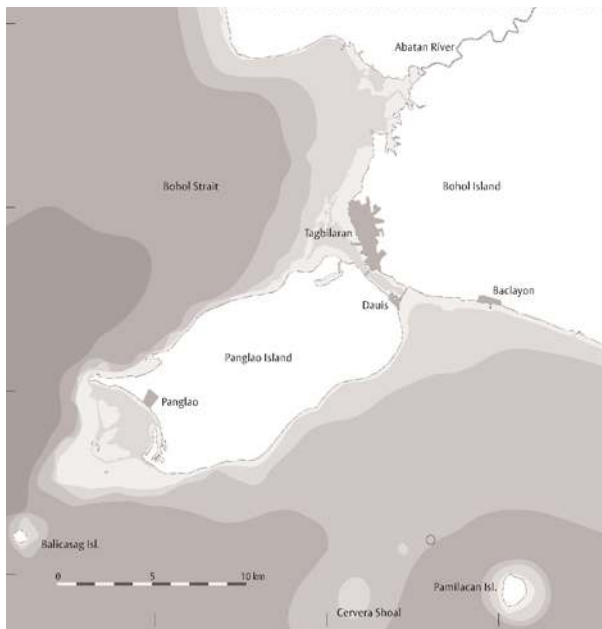
Decatopecten plica (Linnaeus); Dijkstra & Knudsen, 1998: 55, pl. 9 figs 40-41; Dijkstra & Kilburn, 2001: 277, figs 12-13; Raines & Poppe, 2006: 106, pl. 47 figs 1-5, 7-8, pl. 48 figs 1, 3-6, pl. 49 figs 1-7; Raines, 2010: 602, pl. 992 figs 1-5.

Type data. — *Ostrea plica* Linnaeus: Lectotype (H 35 mm, pv) LSL [not registered] designated by Dijkstra (1999: 404, figs 2A-D), 3 paralectotypes (pv) (2 LSL [not registered], 1 UUZM [not registered]), 2 possible paralectotypes (UUZM [not registered]). Type locality: "Habitat in *O. Indico*." Restricted to "Amboina" (Ambon, Maluku, Indonesia) by Iredale (1939: 361).

Pallium striatum Schumacher: Lectotype (H 45.1 mm, pv) ZMUC BIV-59, paralectotype (pv) ZMUC BIV-60, designated by Dijkstra & Kilburn (2001: 278). Type locality: Not given, although "Canton" (Guangzhou, Guangdong, China) on type labels.

Pecten velutinus Sowerby: Lectotype (H 28.1 mm, pv) BMNH 1996405/1, figured by Reeve (1852: pl. 2 fig. 12), 2 paralectotypes BMNH 1996405/2-3, designated by Dijkstra & Kilburn (2001: 278). Type locality: "Macassar" (Ujung Pandang, Sulawesi, Indonesia).

Pecten subplicatus Sowerby: Type material not present in the BMNH (K. Way, pers. comm.). Type locality: "Amboina" (Ambon, Maluku, Indonesia).



Material examined. — Philippines: PMBP 2004, Stn T39, 100-138 m, 1 v.

Additional material examined. — Sulu Sea, Laminusa Island, 5 m, alive, 2 pv (ZMA 141347); Manila Bay, 55 m, alive on muddy sand, 11 pv (ZMA Moll. 143224); Basilan Strait, off Zamboanga, 30-40 m, alive on muddy sand with algae, 2 pv (ZMA Moll. 143229); Talikud, Matanos, 55 m, alive, 20 pv (ZMA Moll. 145081); Off Puerto Princesa, 30 m, alive (ZMA Moll. 147964); Tayabas Bay, 8-15 m, alive, 2 pv (ZMA Moll. 148601).

Description. — Shell solid, up to 55 mm high, adults generally 30-35 mm, elongate, nearly equivalve and equilateral, auricles small and subequal, umbonal angle c. 85°-95°. Colour strongly variable cream, yellow, orange or brown with lighter or darker markings, occasionally uniform in colour, right valve paler than left valve. Both valves strongly inflated to more compressed, with prominent radial plicae (3-5, usually 3) and smaller ribs (2-3) laterally, both plicae and their intervals radial striated. Microsculpture of closely spaced commarginal lamellae. Auricles with several radial riblets (8-14) and very delicate commarginal lamellae. Hinge small and straight. Byssal fasciole lacking, byssal notch narrow. Active ctenolium with a few small teeth (1-3) on suture, sometimes absent. Resilifer elongate, triangular. Auricular crura strongly developed, resilial teeth weak or absent. Inner surface slightly plicated.

Distribution. — Throughout (sub)tropical Indo-Pacific, except Hawaii and Polynesia, southwestern limit northern Zululand, South Africa. South Africa and Mozambique: 34-47 m (Dijkstra & Kilburn, 2001: 278), Red Sea: 2-40 m (Dijkstra & Knudsen, 1998: 56), Indonesia: 48-57, dead (Dijkstra, 1991: 41), Philippines: 10-25 m (Raines, 2010: 602), South China Sea, Taiwan to Honshu, Japan: intertidal to 50 m (Bernard, Cai & Morton, 1993: 51). Present specimens from the Philippines alive at 5-55 m. The bathymetric range of live-taken specimens is from intertidal to 55 m. Living amongst rubble on muddy or clean sand bottoms.

Remarks. — The present material from the Philippines is in all characters similar to the type material. This species is polymorphic in valve convexity (inflated to compressed), in development of radial plicae (weak to prominent), in number of plicae (3-5, with 2 or 3 lateral ribs), and in coloration. Material from Japan (in literature often identified as *D. striatus*) may be considered as a local form of *D. plica*. It is possible, that the similar-looking species, *D. amiculum* (Philippi, 1851), with some more radial plicae (8-11), and living in the same habitat as *D. plica*, also belongs to the polymorphic variability of *D. plica*.

Decatopecten radula radula (Linnaeus, 1758)

Pl. 6 figs 1a-d

Ostrea radula Linnaeus, 1758: 697, no. 161; Dijkstra, 1999: 402, fig. 8A (lectotype).

Pecten radula (Linnaeus); G.B. Sowerby 2nd, 1842: 63, pl. 17 figs 154-155; Chenu, (1842-54) 1843: 4, pl. 15 figs 8-10; Reeve, 1853 (in 1852-53): sp. 83, pl. 21 fig. 83.

Comptopallium radula (Linnaeus); Kira, 1962: 141, pl. 50 fig. 15; Waller, 1972: 245, pl. 5 figs 84-85; Abbott & Dance, 1982: 307, fig.; Dijkstra, 1984 (in 1983-94): 11, figs; Springsteen & Leobrera, 1986: 328, pl. 93 fig. 14; Dijkstra et al., 1989: 24; Dijkstra et al., 1990: 7, 8, fig.; Dijkstra, 1991: 43; Rombouts, 1991: 35, pl. 13 fig.4; Dharma, 1992: 84, pl. 20 fig. 12; Lamprell & Whitehead, 1992: [28], pl. 12 fig.74; Bernard et al., 1993: 50; Hayami, 2000: 903, pl. 449 fig. 32; Dharma, 2005:250, pl. 100, figs 4a-c.

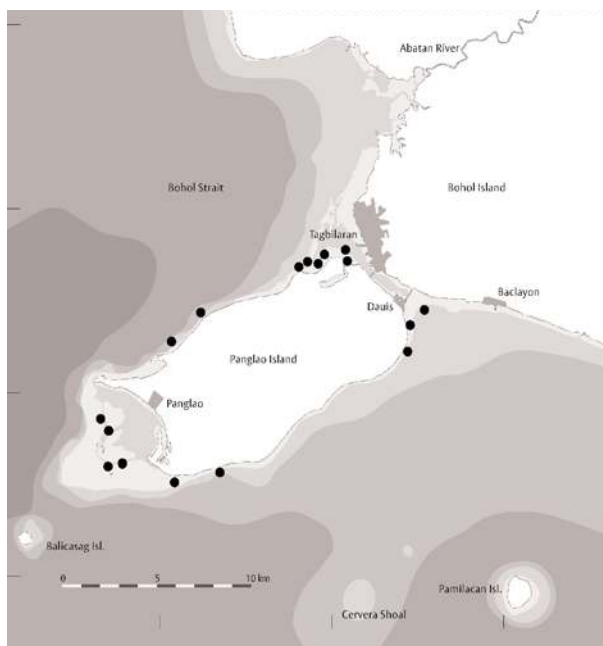
Decatopecten radula (Linnaeus); Dijkstra, 1997: 329, figs 33-34, 35; Dijkstra, 1999: 403; Wang, 2002: 204, fig. 86; Slack-Smith & Bryce, 2004: 237; Xu & Zhang, 2008: 87, figs 242a-b; Raines, 2010: 604, pl. 993 figs 1-6.

Decatopecten radula radula (Linnaeus); Raines & Poppe, 2006: 106, 107, lower figs; pl. 50 figs 1-7; pl. 51 figs 1-3, 5, 6; pl. 295 fig. 2.

Type data. — *Ostrea radula* Linnaeus: Lectotype (H 57 mm, pv) UUZM [not registered] designated by Dijkstra (1999: 403), a paralectotype (pv) and possible paralectotype (pv) UUZM [not registered], and a possible paralectotype (pv) LSL [not registered]. Type locality: "Habitat in *O. Indico*", restricted to Indonesia by Dijkstra (1999: 402).

Comptopallium pauciplicatum Iredale, 1939: Syntypes not recognised with certainty in AMS. Type locality: Queensland. Iredale (1939: 359) did not indicate or figure type material in the original description of *C. pauciplicatum*. He mentioned as type locality "Queensland" on page 359, and subsequently as additional localities on page 371 "Shore, Station XIX" at Low Isles. In the AMS collection several lots are preserved from Queensland and Low Isles (Dijkstra, pers. obs.), but none of these was labelled by Iredale as type material, so it is not possible to recognise the syntypes with any certainty.

Pecten (Comptopallium) radula [var.] *griggi* Webb, 1957: Holotype (H 50.8 mm, pv) ANSP 225038. Type locality: Western Australia, Escape Pass near Cape Leveque, from tidewater to 6 fathoms [= 11 m]. Although Webb (1957: 53) indicated several paratypes of *P. (C.) radula griggi*, these are not held in the ANSP collection. Perhaps Webb kept some in his own collection and distributed some to other institutions (not traced yet).



Material examined. — **Philippines:** PMBP 2004, Stn B1, 8-14 m, 1 pv (A); Stn B7, 4-30 m, 1 pv (A); Stn B14, 2-4 m, 1 pv (A); Stn B18, 3-5 m, 1 pv (A); Stn L76, c. 80 m, 1 pv (A); Stn M11, 0-3 m, 2 pv (A); Stn M18, 0-1 m, 1 pv (A); Stn M51, 0 m, 1 pv (A); Stn R12, 2-20 m, 1 pv (A); Stn R19, 2-54 m, 1 pv (A); Stn R3, 5-24 m, 1 pv (A); Stn R23, 2-5 m, 3 pv (A); Stn R26, 1-5 m, 2 pv (A); Stn R32, 4 m, 1 pv (A); Stn R42, 8-22 m, 3 pv (A); Stn R44, 2 m, 2 pv (A); Stn R65, 1-2 m, 2 pv (A); Stn R66, 1-3 m, 1 pv (A); Stn S7, 1-4 m, 1 v.

Description. — Shell solid, up to c. 120 mm high, most specimens 60-70 mm, oblong, left valve flat to weakly inflated, right valve more convex, inequivalve, inequilateral (posterior margin longer than anterior), auricles well-developed, slightly unequal in shape and size, umbonal angle about 85°; left valve cream with commarginal brown spots and bands, right valve paler or whitish, interior of hinge plate dark brown. Both valve sculptured with 9-13 primary radial plicae; secondary riblets on plicae and in interspaces in late growth stage. Closely spaced, delicate to coarse commarginal lamellae on plicae. Auricles with 3-8 weak to coarse radial costae. Hinge line straight. Byssal notch shallow, byssal fasciole moderately wide, functional ctenolium weak or lacking in mature specimens. Resilial pit triangular and oblong. Hinge teeth very weak or lacking.

Distribution. — Throughout the Indo-West Pacific from southern Japan southwards to Australia, westwards to the Maldive Islands and eastwards to the Samoa Islands. South China Sea: intertidal zone to 20 m (Bernard, Cai & Morton, 1993: 50), Philippines: 9-25 m (Raines, 2010: 604), Indonesia: intertidal to 6 m (Dijkstra, 1991: 43), Papua New Guinea: 2-30 m (Dijkstra, 1998a: 18). Present specimens from the Philippines alive at intertidal to c. 80 m. The bathymetric range of live-taken specimens is from intertidal to 120 m (ZMA, unpublished data). Commonly living free in different habitats: 1) Under large slabs in silty mud at extreme low tide. 2) Amongst branched corals and rubble inside calm lagoons usually in clean shallow water. 3) In shallow water on clean sand, surrounded by large groups of sea urchins. 4) Amongst coral slabs and rubble in shallow water on soft sediment (muddy bottoms) in strong currents. 5) Rarely in deep water amongst rubble on soft sediments of muddy sand or mud.

Remarks. — Most examined material from Indonesia and northwards to China and southern Japan has 11-13 radial lirae, although a few specimens have been examined with 9-10 costae from Singapore and southern Japan (NSMT). The 9-11 ribbed geographical form with weak commarginal lamellae on the radial lirae, similar to *Comptopallium pauciplicatum*, has a wide distribution from the Northern Territory through Queensland, P.N.G. and eastwards to Samoa. Examined material from off Kimberley (northwestern Australia) is more similar to *Decatopecten radula griggi* (9-ribbed with closely spaced, strong commarginal lamellae on the radial lirae). This ecomorph is restricted to the northwestern coast of Australia. The present specimens from the Philippines are morphologically similar to the type specimens.

Geographical subspecies could be determined as:

Decatopecten radula radula (11-14 ribbed, most specimens 11-13): Indonesian Archipelago, Philippine Islands, China and southern Japan.

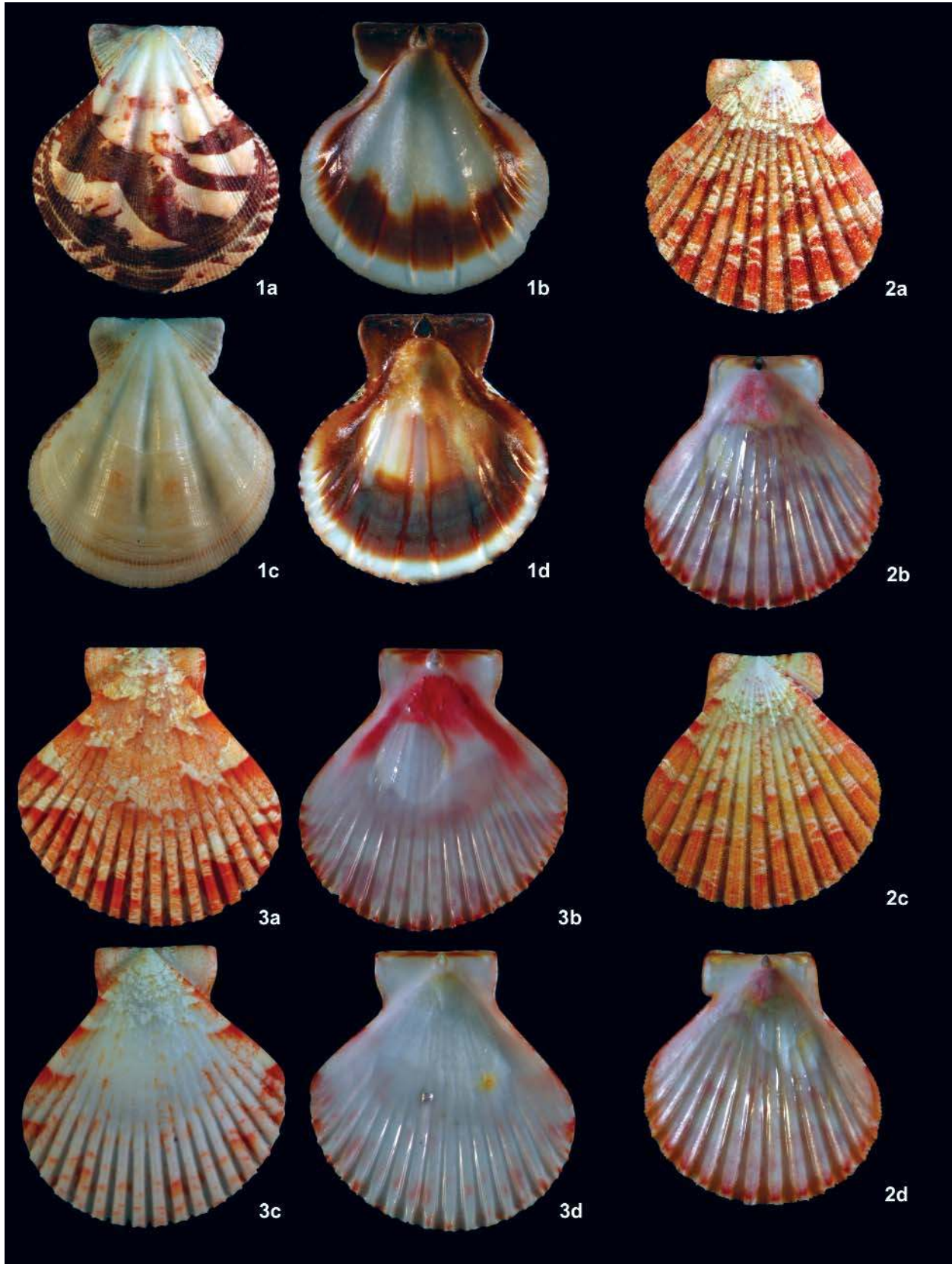


PLATE 7

Figs 1a-d. *Decatopecten plica* (Linnaeus, 1758), Manila Bay, 14°31'N, 120°46'E, 55 m, live, muddy sand, trawled, pv, H 39.9 mm (ZMA Moll. 143224). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Anguipecten picturatus* Dijkstra, 1995, PMBP 2004 Stn P4, pv, H 31.2 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Anguipecten superbus* (G.B. Sowerby II, 1842), Balicasag Island, 9°31'N, 123°41'E, 140 m, live, tangle-net, iii.1998, pv, H 40.9 mm (ZMA Moll. 146385).

Decatopecten radula pauciplicatus (9-11 ribbed, usually 9-10): Northern Territory, S Arafura Sea (Indonesia), Papua New Guinea, Solomon Islands, Coral Sea, New Caledonia, Fiji Islands, Samoa. The 9-ribbed *D. radula griggi* (Webb, 1957) from Kimberley (Northwestern Australia) is in my opinion a junior synonym of *D. radula pauciplicatus*.

Anguipecten Dall, Bartsch & Rehder, 1938

Anguipecten Dall, Bartsch & Rehder, 1938: 92. Type species (by original designation): *Anguipecten gregoryi* Dall, Bartsch & Rehder, 1938 (= *Pecten lamberti* Souverbie in Souverbie & Montrouzier, 1874); Recent, Hawaiian Islands and New Caledonia.

Diagnosis. — Subcircular to oblong Decatopectinini with 6-40 radial costae, laterally compressed, sculptured with delicate closely spaced commarginal lamellae; auricles unusually small, subequal to equal; byssal notch obsolete, no byssal fasciole, ctenolium weakly developed. Hinge teeth consisting of weak resilial and short prominent intermediate and dorsal teeth. Internal rib carinae well-developed.

Distribution. — Miocene to Recent, Indo-West Pacific (Hayami, 1989: 15); living sublittorally to upper bathyally.

Remarks. — Species of *Anguipecten* occur only in the (sub)tropical Indo-West Pacific. The following species are included: *Anguipecten superbus* (G.B. Sowerby 2nd, 1842) known from southern Japan southwards to northern Australia and eastwards to the Solomon Islands; *Anguipecten lamberti* (Souverbie in Souverbie & Montrouzier, 1874) from New Caledonia and the Hawaiian Islands (*gregoryi* morph); *Anguipecten picturatus* Dijkstra, 1995 (a replacement name for *Pecten aurantiacus* Adams & Reeve, 1850) from southern Japan southwards to northern Australia, westwards to northern Zululand (South Africa), and eastwards to the Solomon Islands; *Anguipecten pacificus* Dijkstra, 2002 from the Marquesas Islands (French Polynesia); and recently *Anguipecten simoneae* Morrison & Whisson, 2009 from northern Western Australia.

Anguipecten picturatus Dijkstra, 1995

Pl. 7 figs 2a-d, Pl. 9 figs 1a-b, Pl. 26 figs 1a-b

Pecten aurantiacus A. Adams & Reeve, 1850: 74, pl. 21 fig. 12 (junior synonym of *Pecten aurantiacus* of Röding, 1798, of J. Sowerby, 1820, and of DeFrance, 1825); Reeve, 1853 (in 1852-53): sp. 105, pl. 26 fig. 105.

Anguipecten aurantiacus (Adams & Reeve); Dijkstra, 1991: 41; Dijkstra, 1984 (in 1983-89): 9, figs; Dijkstra, 1991 (in 1983-94): 18, figs; 1992 (in 1983-94): 34; Dijkstra et al., 1998: 4, fig. 1; Wang, 2002: 209, fig. 89.

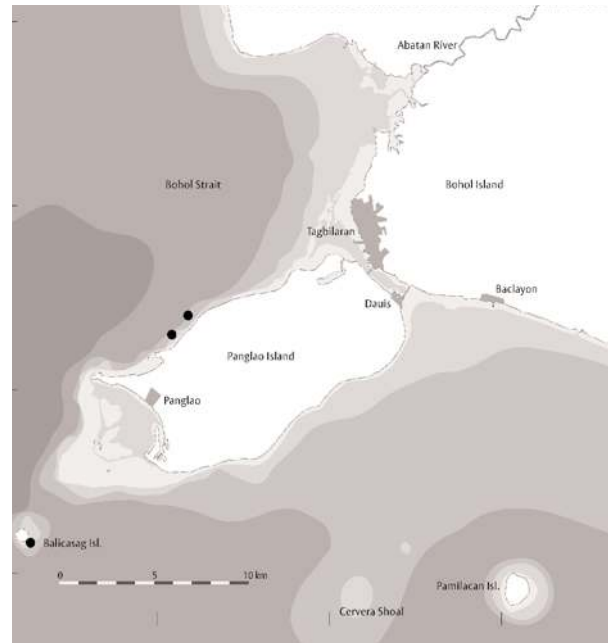
Decatopecten (Anguipecten) aurantiacus (Adams & Reeve); Rombouts, 1991: 38, pl. 13 fig. 12.

Bractechlamys aurantiaca (Adams & Reeve); Bernard et al., 1993: 50; Lan, 1993: 161, fig.; Higo et al., 1999: 444; Higo

et al., 2001: 156, fig. B462 (holotype).

Anguipecten picturatus Dijkstra, 1995a: 15-19 (replacement name for *P. aurantiacus* Adams & Reeve); Dijkstra, 1998a: 14, pl. 2 fig. 1; Dijkstra, 1998b: 250; Hayami, 2000: 903, pl. 449 fig. 29; Dijkstra, 2002a: 140, fig. 8; Raines & Poppe, 2006: 89, 90, pl. 24 figs 1-3, 5-7; Raines, 2010: 596, pl. 989 figs 1, 2, 3.

Type data. — Holotype (H 27.5 mm, pv) BMNH 1950.11.14.8. Type locality: "China Sea" [= South China Sea].



Material examined. — Philippines: PMBP 2004, Stn L46, 90-110 m, 2 pv (A); Stn L76, c. 80 m, 1 pv (A); Stn P4, 80-120 m, 5 pv (A).

Description. — Shell solid, up to c. 50 mm high, most specimens smaller, somewhat triangularly elongate, posterior margin longer than anterior, left valve almost flat, right valve weakly convex, slightly inequivalve and inequilateral, auricles short and almost equal in size, umbonal angle 80°-85°; cream, maculated with dots and streaks, right valve paler and more uniform in colour than left. Both valves sculptured with 12-14 primary radial costae and secondary radial riblets, riblets somewhat more prominent on costae than in interstices. Microsculpture of closely spaced commarginal lamellae. Auricles weakly sculptured with radial riblets near disc flank, sculpture of anterior auricle of right valve most prominent. Hinge line straight, somewhat raised on right valve. Inner surface plicated, internal rib carinae weak, carinate riblets present near margin. Adductor scar insertion prominent. Resilifer triangular, oblong, resilial teeth weak, intermediate teeth strongly developed. Byssal notch shallow, byssal fasciole absent; functional ctenolium weak, with 3 teeth.

Distribution. — Indo-West Pacific, from southern Japan to northern Australia, westwards to the east coast of Africa and eastwards to Fiji. Okinawa (Japan) southwards to tropical West Pacific: 10-50 m (Hayami, 2000: 903), Taiwan, South China Sea: intertidal zone to 25 m (Bernard, Cai & Morton,

1993: 50), Philippines: 25 m (Raines, 2010: 596), Indonesia: 59-275 m, dead (Dijkstra, 1991: 41), Zululand, South Africa: 100 m, dead (Dijkstra & Kilburn, 2001: 273). Present specimens from the Philippines alive at 80-90 m. The bathymetric range of live-taken specimens is from 10-120 m. Living under coral slabs or boulders or amongst coral rubble on soft sediment (sandy bottoms).

Remarks. — The present specimens from the Philippines are morphologically identical to the type specimen from the South China Sea.

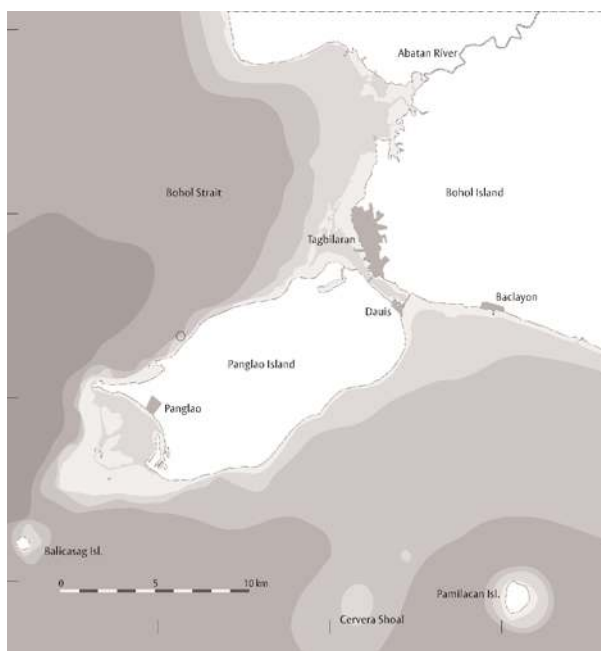
***Anguipecten superbus* (G.B. Sowerby 2nd, 1842)**

Pl. 7 figs 3a-d, Pl. 9 figs 2a-b

Pecten superbus Sowerby 2nd, 1842: 62, pl. 12 fig. 11; Reeve, 1853 (in 1852-53): sp. 107, pl. 26 fig. 107.

Anguipecten superbus (Sowerby); Koyama et al., 1981: 69, pl. 1 fig. 3; Abbott & Dance, 1982: 312, fig.; Dijkstra, 1984 (in 1983-89): 8, figs; Springsteen & Leobrera, 1986, 328, pl. 93 fig. 8; Bernard et al., 1993: 51 [in part]; Dijkstra, 1998a: 15, pl. 2 figs 2-3; Hayami, 2000: 903, pl. 449, fig. 31; Dijkstra, 2002a: 140, fig. 9; Wang, 2002: 206, fig. 87; Raines & Poppe, 2006: 90, 91, pl. 25 figs 1-5; Xu & Zhang, 2008: 85, fig. 235; Raines, 2010: 596, pl. 989 figs 4-6.

Decatopecten (Anguipecten) superbus (Sowerby); Rombouts, 1991: 38, pl. 14 figs 2, 2a.



Type data. — Two syntypes (pv) BMNH 1950.11.14.78-79. Type locality: not mentioned. The type lot consists of two selected articulated specimens. However, Sowerby recorded in his original description: “We have only seen one specimen of this magnificent shell which is in the collection of Mr. Cuming.” One of the specimens (potential lectotype) is closest to the measurements mentioned by Sowerby: “Long. 2.40; lat. 0.65; alt. 2.60; poll.” [= width 60.89 mm, thickness 16.49

mm, height 65.96 mm] and to Reeve’s figure (1853: pl. 26, fig. 107). Although no type locality was indicated by Sowerby, “Amboina” [= Ambon, Maluku, Indonesia] is written on labels of the type lot.

Material examined. — **Philippines:** PMBP 2004, Stn P4, 80-120 m, 1 v. Additional material examined. — Balicasag Island, 10-40 m, alive, 4 pv [juveniles] (ZMA Moll. 147013); Calituban Island, 20-25 m, 1 pv (ZMA Moll. 146630).

Description. — Shell solid, up to c. 70 mm high, most specimens smaller, somewhat triangularly oblong, weakly inflated, posterior margin longer than anterior, left and right valves almost equally convex, slightly inequivalve and somewhat inequilateral, auricles short and almost equal in size, umbonal angle 85°-90°; cream maculated with dots and streaks (cream, orange, red or brown), right valve paler and more uniform than left. Both valves sculptured with 20-25 evenly spaced radial costae, with only a few secondary radial riblets on anterior and posterior ends. Microsculpture of very closely spaced commarginal lamellae. Auricles almost smooth, anterior auricle of right valve weakly sculptured with radial riblets. Hinge line straight. Inner surface plicated, internal rib carinae weak near margin with a few carinate riblets. Adductor scar insertion prominent. Resilifer triangular, with sides erect. Resilial teeth weak, intermediate teeth well-developed. Byssal notch shallow in juveniles, almost absent in adults, byssal fasciole absent. Weak functional ctenolium with 1-3 teeth in juveniles, absent from adults.

Distribution. — Indo-West Pacific, from southern Japan southwards to northern Australia, westwards Zululand (South Africa), and eastwards to the Austral Islands. Zululand (South Africa): 100 m, dead (Dijkstra & Kilburn, 2001: 273); Amami Islands, southwards to tropical West Pacific: 10-30 m (Hayami, 2000: 903); Philippines: 10-30 m (Raines, 2010: 596); East and South China Sea, Borneo, Indian Ocean: intertidal zone – 50 m (Bernard, Cai & Morton, 1993: 51, in part); Japan and SW Pacific: 10-80 m (Abbott & Dance, 1982: 312); Papua New Guinea: shallow water (Dijkstra, 1998a: 15). Present specimen from the Philippines dead at 80-120 m.

Living under coral slabs or boulders or amongst coral rubble on soft bottom assemblages.

Remarks. — Present material from the Philippines is morphologically similar to the type specimen from Indonesia.

Bractechlamys Iredale, 1939

*Bractechlamys Iredale, 1939: 366. Type species (OD): *Bractechlamys evecta* Iredale, 1939; Recent, 0.5 ml SE of Lizard Isle, Queensland, 19 fathoms [= 35 m].*

Diagnosis. — Decatopectinini with 8-15 primary radial plicae, some species with nodules on plicae; with secondary radial riblets; shape oblong to subcircular; with prominent intermediate teeth, a relatively deep byssal notch, prominent costae on auricles, and an obsolete ctenolium.

Distribution. — Recent. Tropical Indo-West Pacific and eastern Atlantic; littorally to sublittorally.

Remarks. — Grau (1959: 120) and subsequently Hertlein (1969: N366) treated *Bractechlamys*, together with *Comptopallium* Iredale, 1939 and *Complicachlamys* Iredale, 1939, as junior synonyms of *Semipallium* Jousseume in Lamy, 1928 in the *Decatopecten* group. Waller (1972: 245) pointed out that *Semipallium* has reticulate (“shagreen”) microsculpture, lacking on *Bractechlamys* and its relatives, and belongs in tribe Chlamydini. At present *Bractechlamys* is a valid genus, placed in Decatopectinini by Waller (1986: 40).

***Bractechlamys oweni* (de Gregorio, 1884)**

Pl. 8 figs 1a-d, 4a-b

Pecten pictus G.B. Sowerby 2nd, 1842: 62, pl. 20 fig. 233; Sowerby, 1842: 163; Reeve, 1853 (in 1852-53): sp. 116, pl. 28 fig. 116 (junior primary homonym of *Pecten pictus* of da Costa, 1778, of Röding, 1798, of Deshayes in Laborde, 1830, and of Goldfuss, 1833).

Pecten oweni de Gregorio, 1884: 133 (replacement name for *P. pictus* Sowerby, 1842).

Cryptopecten oweni (de Gregorio); Habe, 1951: 77; Habe, 1977: 84; Koyama et al., 1981: 67, pl. 5 fig. 2; Bernard et al., 1993: 50; Higo et al., 1999: B479.

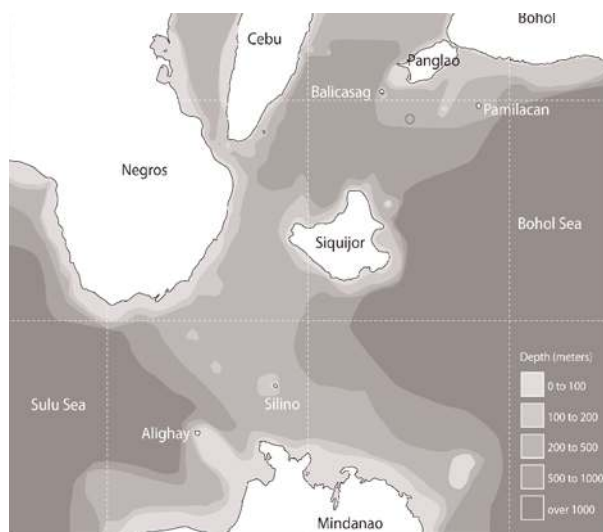
Semipallium (*Semipallium*) *oweni* (de Gregorio); Dijkstra, 1990a: 8.

Chlamys (*Cryptopecten*) *oweni* (de Gregorio); Rombouts, 1991: 24, pl. 8 fig. 4.

Bractechlamys oweni (de Gregorio); Dijkstra, 1998a: 16; Wang, 2002: 193, fig. 81; Raines & Poppe, 2006: 102, 103, lower figs; pl. 38 figs 1-6; pl. 51 fig. 4; Xu & Zhang, 2008: 85, fig. 237; Raines, 2010: 600, pl. 991 figs 1-2.

Bractechlamys [sic] *oweni* (de Gregorio); Hayami, 2000: 907, pl. 450 fig. 42.

Type data. — Holotype (H 21.6 mm, pv) BMNH 1950.11.14.53. Type locality: “Isle of Baicus”. More precisely: Philippine Islands, Negros Island, “Baicus Isle”, 13 m, in coarse sand.



Material examined. — **Philippines:** PANGLAO 2005, Stn CP 2390, 627-645 m, 1 v.

Additional material examined. — Balicasag Island, 10-15 m, alive, 2 pv (ZMA Moll. 146948); Off Panglao Island, Virgin Island, 15-25 m, alive, 1 pv (ZMA Moll. 148839); Off Masbate, 30-50 m, alive, 1 pv (ZMA Moll. 146642); Offshore Bohol, 10-15 m, alive, 1 pv (ZMA Moll. 146775); Olango Island, 25-30 m, alive, 1 pv (ZMA Moll. 146806); Buruaga, Aldan, Buruanga Point, 20-25 m, alive, 1 pv (ZMA Moll. 147128).

Description. — Shell solid, up to c. 30 mm high, moderately inflated, adults somewhat pyxoid, almost circular, adult shells slightly higher than wide, almost equivalve and equilateral, auricles unequal in shape and size, umbonal angle c. 90°; colour of left valve highly variable with cream, orange, red, pink or brown spots, many specimens with 3 uniformly coloured (cream or yellowish) radial costae, right valve paler and more uniform in colour (cream or whitish), laterally some blotches. Inner surface of left valve usually reddish, of right valve whitish, dorsally reddish or brownish. Both valves sculptured with 11-13 radial costae and covered with closely spaced commarginal microsculpture. A few secondary interstitial radial riblets near ventral margin on some specimens. Anterior auricle of right valve with 4 prominent noduliferous radial costae, other auricles weakly ribbed or almost smooth. Dorsal margin of right valve with tubercles. Hinge line straight. Byssal fasciole small, byssal notch moderately deep, functional ctenolium with 3-4 teeth beneath suture ridge. Resilial pit triangular and elongate. Intermediate and dorsal teeth well developed. Internal rib carinae weak, more prominent near margin.

Distribution. — (Sub)tropical West Pacific from southern Japan southwards to northern Australia. Amami Islands (Japan) southwards to tropical West Pacific: 10-20 m (Hayami, 2000: 907); East China Sea, Taiwan, South China Sea: intertidal to 20 m (Bernard, Cai & Morton, 1993: 50); Philippines: 10-25 m (Raines, 2010: 600); Tiur Island (Indonesia): 54 m (Dijkstra, 1990a: 8; Hansa Bay (Papua New Guinea): 3-25 m (Dijkstra, 1998a: 16). Present specimen from the Philippines dead at 627-645 m. Bathymetric range of live-taken specimens is intertidal to 60 m (ZMA, unpubl. data).

Living free amongst gravel or coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines differ slightly from the type specimen in their greater convexity, the more prominent sculpture on the anterior auricle of the right valve and the number of radial lirae (one less). However, in other observed material (MNHN, ZMA) this falls within the variation range of *B. oweni*.

***Excellichlamys* Iredale, 1939**

Excellichlamys Iredale, 1939: 366. Type species (by original designation): *Pecten spectabilis* Reeve, 1853; Recent, unknown locality [(Sub) tropical Indo-West Pacific].

Diagnosis. — Small to medium-sized Decatopectinini with 9-12 radial plicae, elongate to subcircular, most species



PLATE 8

Figs 1a-d. *Bractechlamys oweni* (Gregorio, 1884), Off Panglao, Virgin Island, 9°34'N, 123°43'E, 15-25 m, live, dive, 2002, pv, H 32.1 mm (ZMA Moll. 148839). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Excellichlamys spectabilis* (Reeve, 1853), PMBP 2004 Stn B41, pv, H 19.4 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Bractechlamys vexillum* (Reeve, 1853), Palawan, Coron, 11°59'N, 120°12'E, 15-20 m, live, dive, pv, H 38.5 mm (ZMA Moll. 140208). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** *Bractechlamys oweni* (Gregorio, 1884), Balicasag Island, 9°30'N, 123°41'E, 10-40 m, live, dive, 2006, pv (juvenile), H 10.5 mm (ZMA Moll. 147018). **4a.** lv exterior. **4b.** rv exterior.

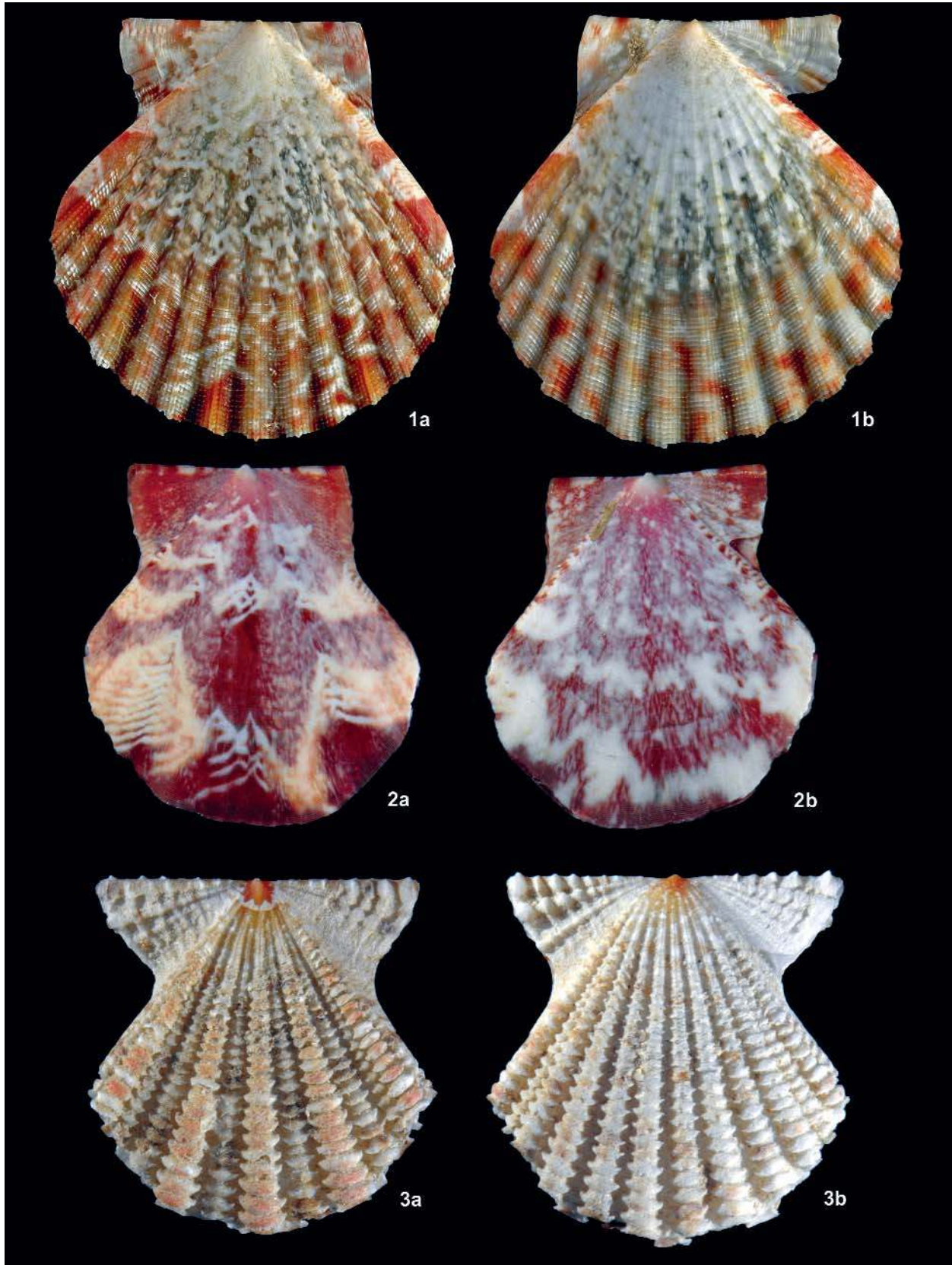


PLATE 9

Figs 1a-b. *Anguipecten picturatus* Dijkstra, 1995, PMBP 2004 Stn L46, pv (juvenile), H 14.3 mm. **1a.** lv exterior. **1b.** rv exterior. **Figs 2a-b.** *Anguipecten superbus* (G.B. Sowerby II, 1842), Balicasag Island, 9°30'N, 123°41'E, 10-40 m, live, dive, 2006, pv (juvenile), H 7.5 mm (ZMA Moll. 147.013). **2a.** lv exterior. **2b.** rv exterior. **Figs 3a-b.** *Excelllichlamys spectabilis* (Reeve, 1853), PMBP 2004 Stn L49, pv (juvenile), H 9.0 mm. **3a.** lv exterior. **3b.** rv exterior.

with large unequal auricles; with commarginal macro- and microsculpture, prominent noduliferous radial sculpture on auricles, internal rib carinae, weak resilial hinge teeth (dorsal and intermediate teeth absent), byssal notch shallow, ctenolium obsolete to prominent.

Distribution. — Miocene to Recent (Hayami, 1989: 15). Tropical Indo-West Pacific; littorally to sublittorally.

Remarks. — Hertlein (1969: N366) treated *Excellichlamys* as a subgenus of *Semipallium* Jousseaume in Lamy, 1928, placed in the *Decatopecten* group. However, *Excellichlamys* differs strongly in morphology from *Semipallium*. Waller (1986: 40) raised *Excellichlamys* to a genus and placed it in Decatopectinini.

***Excellichlamys spectabilis* (Reeve, 1853)**

Pl. 8 figs 2a-d, Pl. 9 figs 3a-b, Pl. 26 figs 2a-b

Pecten parvus G.B. Sowerby 1st, 1835: 110 (not of da Costa, 1778); Sowerby 2nd, 1842: 67, pl. 20 figs 227-228; Reeve, 1853 (in 1852-53): sp. 133, pl. 29 fig. 133.

Pecten spectabilis Reeve, 1853 (in 1852-53): sp. 128, pl. 29 fig. 128.

Pecten (Aequipecten) histrionicus var. *spectabilis* Reeve; Dautzenberg & Bavay, 1912: 22.

Excellichlamys spectabilis (Reeve); Iredale, 1939: 366; Kuroda et al., 1971: 366, pl. 79 figs 12-13; Waller, 1972: 224, 225F, 227, 246-250, 247F, 248T, 258, 259, pl. 5 figs 87-92; pl. 6 figs 93-102; Dijkstra, 1987 (in 1983-94): 9, figs; Dijkstra, 1991: 44; Dharma, 2005: 250, pl. 100 fig. 5; Raines & Poppe, 2006: 110, 111, lower figs; pl. 55 figs 1-7; Dijkstra & Moolenbeek, 2008: 22; Raines, 2010: 606, pl. 994 figs 1-4.

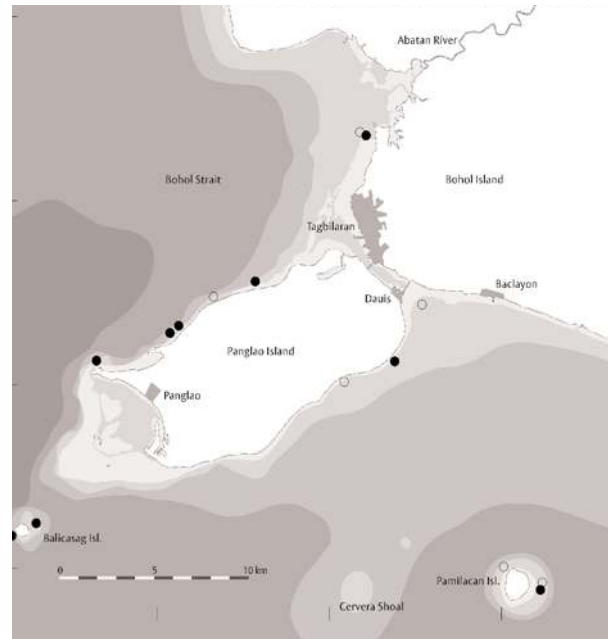
Semipallium (Excellichlamys) xishaensis Wang, 1985: 504, figs 4a-d.

Excellichlamys sowerbyi Dijkstra, 1998b: 247 (nom. nov. for *P. parvus* Sowerby).

Type data. — *Pecten parvus* Sowerby: Holotype (H 20.3 mm, pv) BMNH 197011, refigured by Waller (1972: pl. 6 figs 97-102). Type locality: French Polynesia, Tuamotu Archipelago, Actaeon Group, Lord Hood's Island (now Marutea), in coral sand on the reefs.

Pecten spectabilis Reeve: Holotype (H 22.8 mm, pv) UMZC 1461 (Jane Saul collection). Type locality unknown. A sample consisting of three articulated specimens (BMNH, not registered) from Mauritius is similar to the holotype of *Pecten spectabilis* and could have come from the same lot as the Saul collection. According to labels written by S. Morris, these specimens have no type status.

Semipallium (Excellichlamys) xishaensis Wang: Holotype (H 21 mm, pv) IOAS M25777. Type locality: China, South China Sea, Xishi Islands, Jinqing Island, intertidal, leg. F. Xu, 1.v.1958.



Material examined. — **Philippines:** PMBP 2004, Stn B7, 4-30 m, 2 pv (A); Stn B12, 24-27 m, 1 pv (A); Stn B20, 2-8 m, 2 pv (A); Stn B24, 38 m, 1 pv (A); Stn B41, 17-19 m, 1 pv (A), 1 v; Stn L49, 90 m, 3 pv (A), 31 v; Stn L51-60, 43-62 m, 2 pv (A), 2 v; Stn L65-68, 55-81 m, 1 v; Stn L76, c. 80 m, 12 pv (A), 46 v; Stn P4, 80-120 m, 1 pv (A), 17 v; Stn R20, 7-48 m, 1 pv (A); Stn R38, 6-37 m, 2 v; Stn S1, 5 m, 1 v; Stn S8, 28-32 m, 1 v; Stn S13, 8-15 m, 1 v; Stn S21, 4-12 m, 14 v; Stn S28, 28-32 m, 1 v; Stn S45, 17 m, 1 v.

Description. — Shell solid, up to c. 30 mm high, most specimens to about 20 mm, circular to slightly oblong, inequivalve, right valve more convex than left, equilateral, auricles unequal to almost equal in size, umbonal angle c. 90°; plicae unpigmented or pinkish, with brown maculations, umbones tinted red; right valve paler; interior white.

Both valves sculptured with about 12 variable high plicae with rounded crests, bearing strongly developed recurved squamae; radial grooves with intercalated radial riblets commencing at about 10 mm shell height and increasing in prominence to ventral margin, subdividing plicae into bifid or trifid groups after about 20 mm shell height. Microsculpture of closely spaced commarginal lamellae on plicae and interspaces, weak on anterior auricle of left valve. Auricles with 4-10 radial costae (anterior 4-9, posterior 4-10), stronger on dorsal areas than on lower areas of auricles near disc. Byssal notch moderately deep, byssal fasciole rather wide, functional ctenolium with 3-5 teeth. Hinge teeth very weak or lacking. Hinge surface with minute, irregularly formed, transverse grooves. Internal plicae with carinate riblets near margin.

Distribution. — Throughout the tropical Indo-West Pacific, from southern Japan to northern Australia, westwards into the Indian Ocean to Mauritius and Réunion and the Red Sea, and eastwards into the central Pacific to the Tuamotu Archipelago (Waller, 1972: 249-250, fig. 6; Dijkstra, 1998a: 20; Dijkstra & Knudsen, 1998: 58; Raines & Poppe, 2006: 110; Raines, 2010: 606). Present specimens from the Philippines alive at 19-90 m. Living byssally attached to undersides of coral slabs or amongst coral rubble on soft sediments (sand or muddy sand).

Remarks. — Wang (1985: 504) described species from Jinqing Island (China), *Semipallium* (*Excellichlamys*) *xishanensis*, which resembles *E. spectabilis* but has strongly unequal auricles (the posterior ones are rudimentary) and fewer primary radial plicae. This form is identical to the French Polynesian morph, *E. spectabilis parva* (Sowerby 1st, 1835) (see also Waller, 1972: 248), and is part of the variation of *E. spectabilis*.

The tropical western Pacific species *E. histrionica* (Gmelin, 1791) differs from *E. spectabilis* in lacking costae in the interspaces between plicae or in developing them weakly in the late growth stage. The plicae of most specimens are narrower, of even amplitude and the interspaces broader than in *E. spectabilis*.

Glorichlamys Dijkstra, 1991

Glorichlamys Dijkstra, 1991: 45. Type species (by original designation): *Pecten elegantissimus* Deshayes in Maillard, 1863; Recent, Réunion.

Diagnosis. — Small Decatopectinini, elongate to subcircular, with evenly to unevenly spaced radial costae, undivided to quadripartite; widely spaced interstitial commarginal macrosculpture (microsculpture almost lacking), auricles very unequal in size, with antimarginal and commarginal sculpture; weak resilial hinge teeth present (dorsal and/or intermediate teeth absent); byssal notch deep, ctenolium well developed. Internal plicae present, rib carinae lacking.

Distribution. — Recent. Tropical Indo-West Pacific; living littorally to upper bathyally.

Remarks. — For comparison of the present genus with *Gloripallium* Iredale, 1939, *Excellichlamys* Iredale, 1939, and *Bractechlamys* Iredale, 1939 see Dijkstra (1991: 45). The morphological characters of *Glorichlamys* indicate a position in Decatopectinini.

Glorichlamys elegantissima (Deshayes in Maillard, 1863)

Pl. 10 figs 1a-d, 4a-b, Pl. 26 figs 3a-b

Pecten elegantissimus Deshayes in Maillard, 1863: 32, pl. 4 figs 11-12.

Pecten (*Chlamys*) *elegantissimus* Deshayes; Bavay, 1903: 403, pl. 8 figs 5-7.

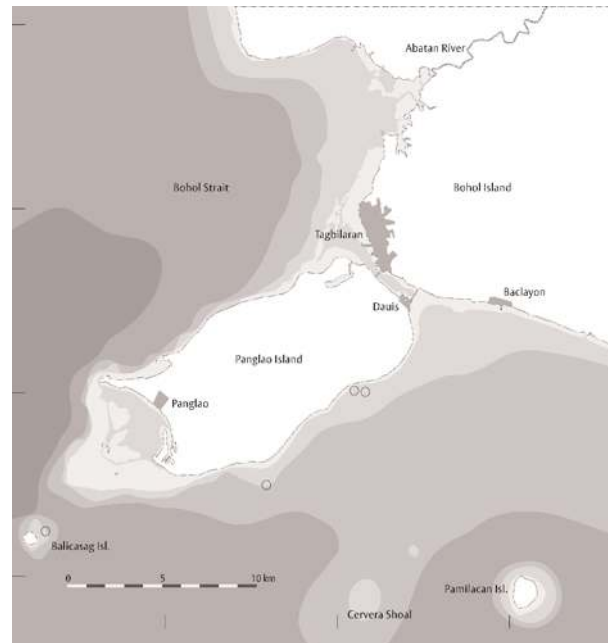
Pecten cooperi E.A. Smith, 1903: 621, pl. 36 figs 15-18.

Glorichlamys elegantissima (Deshayes); Dijkstra, 1991: 45, fig. 91; Dijkstra, 1992 (in 1983-94): 6, 22, figs; Dijkstra, 1998a: 20, pl. 2 figs 5-6; Dijkstra & Kilburn, 2001: 279; Raines & Poppe, 2006: 116, 117, upper figs; pl. 68 figs 1-3, 6, 7; Raines, 2010: 606, pl. 994 figs 5-6.

Type data. — *Pecten elegantissimus* Deshayes: depository of type material unknown; not in MNHN (V. Héros, pers. comm.). Type locality: Réunion.

Pecten cooperi E.A. Smith: Holotype (H 14.5 mm, pv)

BMNH 1903.9.17.47. Type locality: Maldives, Felidu Atoll, 1-35 fathoms [= 2-64 m].



Material examined. — **Philippines**: PMBP 2004, Stn B4, 24 m, 1 v; Stn S1, 5 m, 1 v; Stn T28, 80 m, 1 v. PANGLAO 2005, Stn DW 2401, 397-410 m, 1 v. Additional material examined. — Off Masbate, 30-50 m, alive, 1 pv (ZMA Moll. 146644); Balicasag Island, 10-40 m, alive, 2 pv, 1 v (ZMA Moll. 147003); Balicasag Island, N-coast, 15-20 m, alive, 1 pv (ZMA Moll. 147326); Pandanan Island, 20-25 m, alive, 1 pv (ZMA Moll. 147720).

Description. — Shell up to c. 20 mm high, moderately flattened, some specimens more inflated, with curved ventral margin, almost circular to oblong, inequivalve (ribbing of valves discrepant), inequilateral, auricles very unequal in shape and size, umbonal angle c. 90°; cream with pink or brown maculations, right valve paler. Left valve with 9-13 prominent radial costae and 1-3 intercalated secondary riblets, one of which is dominant, in each radial interspace. Costae bearing irregular lamellae, slightly noduliferous on some specimens. Interspaces bearing commarginal lamellae. Anterior auricle much larger than posterior (c. 3:1), sculptured with 4-6 lamellate, noduliferous radial costae; posterior auricle almost smooth. Right valve with 9-13 prominent radial costae, subdivided into 3-4 lamellate secondary riblets, interspaces each narrower than one costa, commarginally lamellate. Anterior auricle with 5-7 noduliferous and/or lamellate radial riblets, less prominent than on left valve. Posterior auricle nodulous. Hinge line straight. Byssal notch relatively deep, byssal fasciole broad. Functional ctenolium with 3-5 teeth. Resilifer oblique-triangular oblong.

Distribution. — Throughout the tropical Indo-West Pacific, from southern Japan to northern Australia, westwards into the Indian Ocean to South Africa and Mozambique, and eastwards into the central Pacific to the Tuamotu Archipelago (Raines & Poppe, 2006: 116; Raines, 2010: 606). Present specimens from the Philippines dead at 5-410 m. Living byssally attached to undersides of coral slabs amongst live coral or amongst coral rubble on sandy bottoms.

Remarks. — The present material closely resembles topotype specimens from Réunion (MNHN, ZMA), although the sculpture is more delicate (typical material has c. 10 prominent primary radial costae, present material 13) with more divided secondary radial riblets. Examined material from the Indo-West Pacific is strongly variable and intermediate variations are observed (MNHN, ZMA).

E.A. Smith (1903: 621) described the new species *Pecten cooperi* from the Maldives, but it is indistinguishable from *E. elegantissima*. He probably overlooked Deshayes' description of the right valve and Bavay's subsequent description of the left valve, some time before his description of *P. cooperi*.

A closely related species is *G. quadrilirata* (Lischke, 1870), with a similar distribution. It differs from *G. elegantissima* in its quadri- or tripartite radial costae and more delicate commarginal sculpture.

***Glorichlamys quadrilirata* (Lischke, 1870)**

Pl. 10 figs 2a-d, Pl. 26 figs 4a-b

Pecten quadriliratus Lischke, 1870: 29; Lischke, 1871: 158, pl. 9 figs 5, 6; Dunker, 1882: 240; Küster & Kobelt, 1886: 136, pl. 37 figs 6, 7.

Pecten (Chlamys) quadriliratus Lischke; Dautzenberg & Bavay, 1912: 4.

Chlamys quadrilirata (Lischke); Kuroda, (1929-35) 1932: 93; Lamy, 1935: 307; Kira, 1967: 136, pl. 49, fig. 6; Dharma, 2005, p. 248, pl. 99 fig. 8.

Chlamys (Chlamys) quadrilirata (Lischke); Habe, 1951: 74; Azuma, 1960: 75.

Bractechlamys quadrilirata (Lischke); Habe, 1977: 83; Wang, 1983b: 531, 533, pl. 1 figs 8-10; Hayami, 2000: 903, pl. 449, fig. 30; Xu & Zhang, 2008: 85, fig. 238.

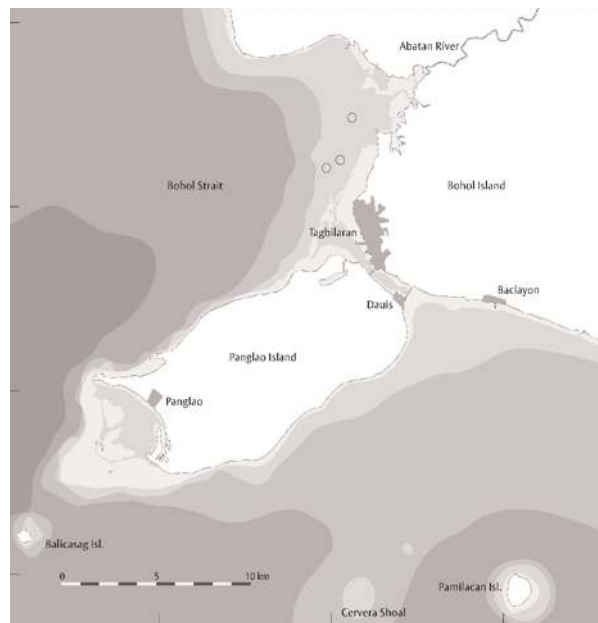
"*Chlamys*" *quadrilirata* (Lischke); Dijkstra, 1989 (in 1983-89): 14, figs.

Glorichlamys quadrilirata (Lischke); Dijkstra, 1991: 45; Dijkstra, 1993 (in 1983-94): 10, figs; Dijkstra & Knudsen, 1998: 60, pl. 10 figs 46-47; Wang, 2002: 195; Raines & Poppe, 2006: 116, 117, lower figs; pl. 68 figs 4, 5.

Type data. — Depository of type material unknown (not found in the Aquazoo-Löbbecke Museum, Düsseldorf; Dijkstra, pers. obs.). Type locality: Nagasaki, Japan.

Material examined. — **Philippines:** PMBP 2004, Stn T11, 78-95 m, 5 v; Stn T16, 88-116 m, 1 v; Stn T19, 10-26 m, 3 v.

Additional material examined. — Off Davao, 25-30 m, alive amongst coral rubble on sand, 1 pv (ZMA Moll. 147818).



Description. — Shell up to c. 25 mm high, subcircular (juveniles) to oblong (adult, inequivalve (ribbing discrepant), slightly inequilateral, both valves weakly inflated, interior plicate, umbonal angle c. 85-90°, auricles highly unequal in shape and size; left valve cream with purple or brown maculations, right valve paler or whitish. Left valve sculptured with 8-11 prominent quadripartite (in mature individuals) radial costae with rounded crests and 1-3 intercalated radial riblets in each interspace. Microsculpture of closely spaced commarginal lamellae. Anterior auricle with 10-12 weakly to strongly developed radial riblets, lamellate and noduliferous on dorsal margin; posterior auricle very small, with few fine radial riblets. Right valve with broad prominent quadripartite radial costae, crests less rounded than on left valve; one interstitial radial riblet in each interspace. Microsculpture as on left valve. Anterior auricle with c. 10 squamose radial riblets. Byssal notch weak, byssal fasciole small, functional ctenolium with 4-6 teeth.

Distribution. — Throughout the tropical Indo-West Pacific, from southern Japan to northern Australia, westwards into the Indian Ocean to Madagascar and into the Red Sea, and eastwards into the central Pacific to Fiji (Raines & Poppe, 2006: 116). Present specimens from the Philippines dead at 10-116 m. Bathymetric range of live-taken specimens is 20-80 m (ZMA, unpubl. data). Living amongst coral rubble on sandy or muddy sand bottoms.

Remarks. — The present material from the Philippines is indistinguishable from examined specimens from Japan (NSMT, ZMA) and from the original description by Lischke.

For comparison with the congeneric species *Glorichlamys elegantissima* see Dijkstra (1989: 12). Both species seems to prefer a coral environment with a similar habitat (byssally attached to the underside of living coral or amongst dead coral rubble on sandy bottoms).

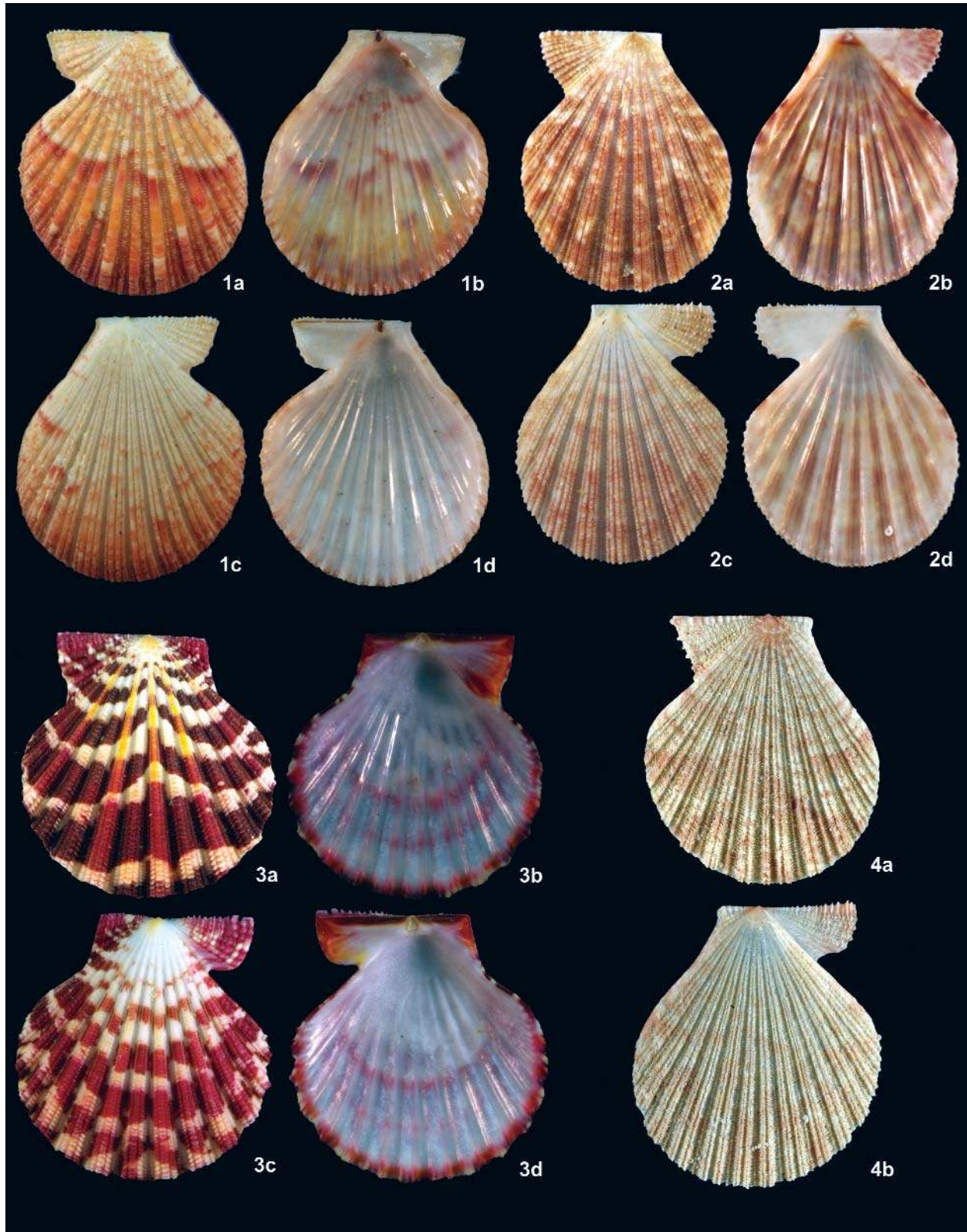


PLATE 10

Figs 1a-d. *Glorichlamys elegantissima* (Deshayes in Maillard, 1863), Off Masbate, 12°22'N, 123°27'E, 30-50 m, live, dredged, 2005, pv, H 20 mm (ZMA Moll. 146644). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Glorichlamys quadrilirata* (Lischke, 1870), Mindanao, off Davao, 7°05'N, 125°38'E, 25-30 m, live, amongst coral rubble, sandy bottom, dive, 2008, pv, H 23 mm (ZMA Moll. 147818). **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Gloripallium pallium* (Linnaeus, 1758), PMBP 2004 Stn R51, pv, H 38.7 mm. **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** *Glorichlamys elegantissima* (Deshayes in Maillard, 1863), PMBP 2004 Stn T11, juveniles. **4a.** lv exterior, H 10.9 mm. **4b.** rv exterior, H 13 mm.

***Gloripallium* Iredale, 1939**

Gloripallium Iredale, 1939: 357. Type species (by original designation): *Ostrea pallium* Linnaeus, 1758; Recent, Indonesia.

Diagnosis. — Medium-sized Decatopectinini with 7-14 radial costae; subcircular to circular; with prominent commarginal lamellae on costae; secondary sculpture of radial riblets (lacking from some specimens); noduliferous radial macrosculpture on auricles, commarginal microsculpture on auricles and on disc in early growth stage of some specimens; internal rib carinae prominent; hinge with prominent dorsal teeth and weak resilial teeth; byssal notch deep, ctenolium well-developed.

Distribution. — Miocene to Recent (Hayami, 1989: 15). Tropical Indo-West Pacific; living littorally to sublittorally.

Remarks. — Hertlein (1969: N357) treated *Gloripallium* as a subjective junior synonym of *Cryptopecten* Dall, Bartsch & Rehder, 1938, a subgenus of *Chlamys* Röding, 1798, placed in the *Chlamys* group. Waller (1986: 40) placed *Gloripallium* as a valid genus in Decatopectinini.

***Gloripallium pallium* (Linnaeus, 1758)**

Pl. 10 figs 3a-d, Pl. 27 figs 1a-b

Ostrea pallium Linnaeus, 1758: 697, no. 163; Dijkstra, 1999: 405, figs 2E-F, 3A-B [lectotype].

Pecten pallium (Linnaeus); Reeve, 1853 (in 1852-53): sp. 63, pl. 17 figs 63a-c.

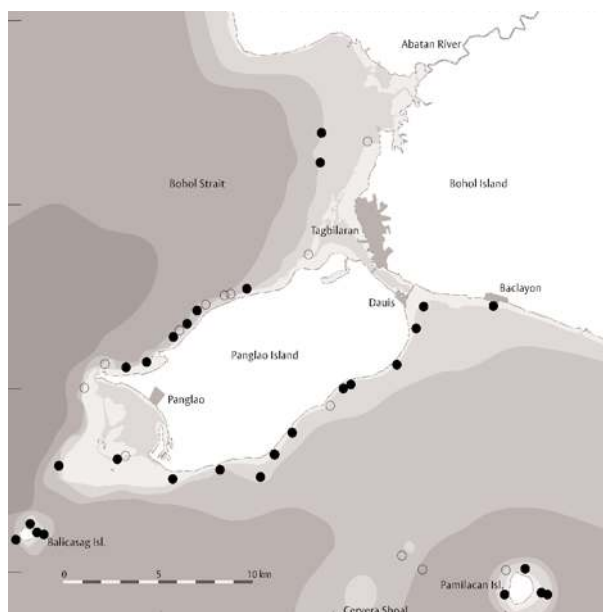
Pecten novaeguinae Tenison Woods, 1878: 267.

Gloripallium pallium (Linnaeus); Iredale, 1939: 357; Kira, 1962: 140, pl. 50 fig. 10; Waller, 1972: 239, pl. 3 figs 45-56; Mastaller, 1979: 140; Dijkstra, 1984 (in 1983-94): 17, figs; Springsteen & Leobrera, 1986: 328, pl. 93 fig. 9; Mastaller, 1987: 210; Dijkstra, 1989: 14, 18, figs; Dijkstra et al., 1989: 24; Dijkstra et al., 1990: 3; Rombouts, 1991: 42, pl. 15 figs 4, 4a; Dharma, 1992: 84, pl. 20 fig. 18; Lamprell & Whitehead, 1992: [26], pl. 11, fig. 67; Bernard et al., 1993: 50; Dijkstra, 1997: 316, 328, figs 28-31, 32; Dijkstra & Knudsen, 1998: 63, pl. 10 figs 48-49; Hayami, 2000: 903, pl. 449 fig 33; Wang, 2002: 218, pl. 4 fig. 1; Dharma, 2005: 250, 364, pl. 100 fig. 8; pl. 147 figs 11a-d; Raines & Poppe, 2006: 118, 119, lower figs; pl. 70 figs 1-6; pl. 71 figs 1-6; pl. 72 figs 1-5; pl. 294 figs 1-5; Dijkstra & Moolenbeek, 2008: 23; Xu & Zhang, 2008: 89, fig. 249; Raines, 2010: 608, pl. 995 figs 1-5.

Type data. — *Ostrea pallium* Linnaeus: Lectotype (H 42 mm, pv) LSL [not registered] designated by Dijkstra (1999: 406), 3 (lv + 2 rv) paralectotypes LSL [not registered], 2 (pv + rv) possible paralectotypes (pr) UUZM [not registered], paralectotype MSNP [not registered]. Type locality: "Habitat in *O. australiore* & *Indico*". Restricted to the Moluccas [Maluku], Indonesia by Dijkstra (1999: 406).

Pecten novaeguinae Tenison Woods: Holotype not traced

in Tasmanian Museum and Art Gallery, Hobart (Kemp, pers. comm.). Type locality: Pleistocene, Hall Sound, Papua New Guinea.



Material examined. — **Philippines:** PMBP 2004, Stn B1, 8-14 m, 2 pv (A); Stn B4, 24 m, 1 pv (A), 1 v; Stn B5, 4 m, 1 pv (A); Stn B7, 4-30 m, 2 pv (A), 7 v; Stn B9, 8-10 m, 2 v; Stn B10, 3-14 m, 3 v; Stn B11, 2-4 m, 1 v; Stn B12, 24-27 m, 2 v; Stn B13, 3-5 m, 1 v; Stn B15, 2-4 m, 1 v; Stn B16, 20 m, 1 pv (A); Stn B17, 3-21 m, 1 v; Stn B19, 17 m, 1 pv (A); Stn B23, 20-25 m, 1 pv (A); Stn B24, 38 m, 1 v; Stn B25, 16 m, 1 pv (A); Stn B29, 26 m, 2 v; Stn B30, 25 m, 1 v; Stn B38, 17-18 m, 8 v; Stn B39, 17-25 m, 2 pv (A), 3 v; Stn B40, 22 m, 6 v; Stn B41, 17-19 m, 1 pv (A), 1 v; Stn B42, 30-33 m, 2 pv (A), 1 v; Stn G1, 100 m, 1 pv (A); L49, 90 m, 149 pv (A); L65-68, 55-81 m, 2 v; Stn L76, c. 80 m, 22 pv (A), 67 v; Stn L77, c. 120 m, 1 v; Stn P4, 80-120 m, 91 pv (A); Stn R3, 5-24 m, 4 pv (A), 2 v; Stn R4, 2-30 m, 1 pv (A); Stn R5, 5-16 m, 1 pv (A); Stn R6, 5-12 m, 1 pv (A); Stn R8, 4-24 m, 2 pv (A); Stn R9, 5-22 m, 1 pv (A); Stn R10, 2-10 m, 2 pv (A); Stn R11, 4 m, 3 pv (A); Stn R12, 2-20 m, 1 pv (A); Stn R17, 3-15 m, 5 pv (A); Stn R19, 2-54 m, 2 v; Stn R20, 7-48 m, 2 pv (A); Stn R40, 8-33 m, 1 pv (A); Stn R41, 11-40 m, 1 v; Stn R42, 8-22 m, 1 pv (A); Stn R43, 3-41 m, 3 pv (A); Stn R49, 1-32 m, 1 pv (A), 2 v; Stn R50, 3-7 m, 3 pv (A); Stn R51, 2-52 m, 3 pv (A); Stn R57, 1-2 m, 1 v; Stn R70, 20 m, 1 pv (A); Stn R73, 2-30 m, 1 pv (A); Stn R75, 3-35 m, 1 pv (A), 1 v; Stn S1, 5 m, 23 v; Stn S4, 4-30 m, 1 v; Stn S8, 28-32 m, 7 v; Stn S13, 8-15 m, 23 v; Stn S15, 4-6 m, 1 pv (A), 2 v; Stn S21, 4-12 m, 2 v; Stn S28, 28-32 m, 8 v; Stn S29, 32 m, 1 pv (A); Stn S42, 15-20 m, 1 v; Stn S46, 14 m, 1 v. PANGLAO 2005, Stn CP 2348, 196-216 m, 1 v; Stn DW 2401, 397-410 m, 1 v.

Description. — Shell solid, up to 90 mm high, most specimens c. 60 mm; solid, inflated, circular, equivalve, equilateral, auricles unequal in shape and size, umbonal angle c. 90-95°; vividly coloured with highly variable blotches and/or bands of red, yellow, purple, maroon or brown; interior whitish with orange or purple near margins and on auricles. Both valves with 12-15 primary radial costae, most specimens with 13 (somewhat narrower on left valve than on right), and 2-4 secondary riblets on costae (3 on most specimens; lacking near anterior and posterior margins) and in radial interspaces. Commarginal lamellae on costae in early growth, costae becoming more tripartite near ventral margin. Auricles with 3-6 squamous or nodulous radial costae. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium with 3-6 teeth. Resilifer triangularly oblong. Marginal auricular gape present between auricular crura. Resilial teeth weak, dorsal

teeth prominent. Inner surface plicate, with prominent internal rib carinae.

Distribution. — Throughout the tropical Indo-Pacific (except the Red Sea and the Hawaiian Islands) from southern Japan to northern Australia, westwards into the Indian Ocean to South Africa and Mozambique, and eastwards into the eastern central Pacific to the Marquesas Islands and Tuamotu Archipelago (Raines & Poppe, 2006: 118; Raines, 2010: 608). Present specimens from the Philippines alive at 4-100 m (minimum depth range). Bathymetric range of live-taken specimens from intertidal to below sublittoral. Examined live-taken specimens of tangle-net fishing in the Philippines from bathyal depths are plausible, due to the inaccurate data. Living byssally attached to coral slabs or to rubble under the slab, a few specimens found amongst small rocks and rubble on steep slopes. Adults appear to be able to move to the open water area at night to feed and then move back into the rubble pile during the day.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material and the sculpture is rather constant, except for the lamellae on the radial costae.

For comparison with *Gloripallium spiniferum* (Sowerby 1st, 1835) from French Polynesia and *Gloripallium maculosum* (Forsskål, 1775) from the Red Sea see Dijkstra & Kilburn (2001: 281).

***Gloripallium speciosum* (Reeve, 1853)**

Pl. 11 figs 1a-d, Pl. 32 figs 3a-b

Pecten speciosus Reeve, 1853 (in 1852-53): sp. 112, pl. 27 fig. 112.

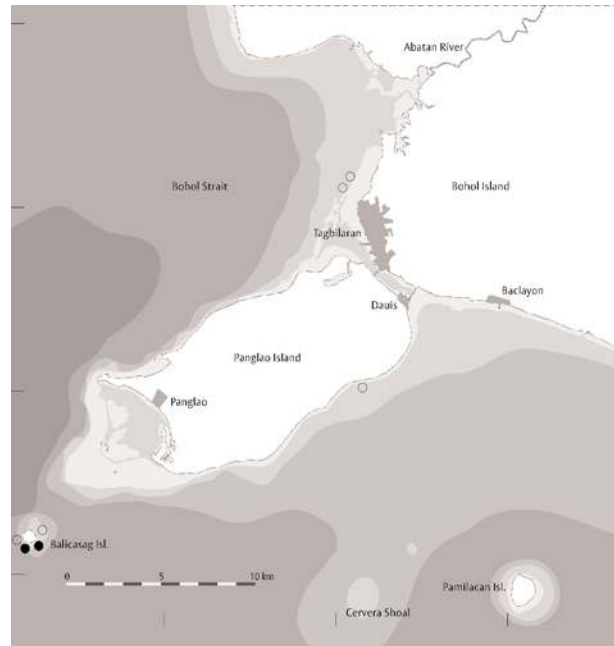
Pecten (Aequipecten) pallium var. *speciosa* [sic] Reeve; Dautzenberg & Bavay, 1912: 20.

Cryptopecten speciosum [sic] (Reeve); Abbott & Dance, 1982: 309, fig.

Gloripallium speciosum (Reeve); Springsteen & Leobrera, 1986: 326, pl. 93 fig. 6; Rombouts, 1991: 43, pl. 15 figs 8, 8a-c; Hayami, 2000: 905, pl. 449 fig. 34; Dharma, 2005: 250, pl. 100 fig. 7; Raines & Poppe, 2006: 120, 121, pl. 73 figs 1-7; Raines, 2010: 606, pl. 994 figs 7-8.

Type data. — *Pecten speciosus* Reeve: Holotype (H 27.5 mm, pv) BMNH 1950.11.14.67, refigured by Waller (1972: pl. 3 figs 51-56). Type locality: Philippine Islands.

Material examined. — **Philippines:** PMBP 2004, Stn B38, 17-18 m, 1 v; Stn L46, 90-110 m, 1 pv (A); Stn L69-73, 90-98 m, 1 pv (A); Stn T6, 34-82 m, 3 v; Stn T11, 78-95 m, 1 v; Stn T13, 90-100 m, 1 v. PANGLAO 2005, Stn DW 2401, 397-410 m, 1 v.



Description. — Shell solid, up to 60 mm high, most adult specimens 35-45 mm in height; nearly equally inflated, circular, equivalve, equilateral, auricles unequal in shape and size, umbonal angle c. 90-95°; vividly coloured with highly variable blotches and/or bands of red, yellow, purple, maroon or brown, sometimes uniformly coloured, right valve paler; interior whitish. Both valves with 11-13 primary radial plicae. Commarginal squamae on costae in early growth stages, developed to curved lamellae in adult stage (not trifold as in *G. pallium*). Auricles with 3-6 squamous or nodulous radial costae. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium with 3-6 teeth. Resilifer triangularly oblong. Marginal auricular gape present between auricular crura. Resilial teeth weak, dorsal teeth prominent. Inner surface plicate, with prominent internal rib carinae.

Distribution. — Throughout the tropical Indo-West Pacific (except the Red Sea and the Hawaiian Islands) from southern Japan to northern Australia, westwards into the Indian Ocean to South Africa and Mozambique, and eastwards into the central Pacific (Raines & Poppe, 2006: 120; Raines, 2010: 606). Present specimens from the Philippines alive at 90-98 m (minimum depth range). Living byssally attached to coral slabs or to rubble under the slab and amongst coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material and the sculpture is rather constant, except for the lamellae on the radial costae. Most deep-water specimens have undivided costae and strongly developed lamellae in the adult stage. Formerly in literature *G. speciosum* was treated as a subspecies or variant of *G. pallium*, but Raines & Poppe (2006: 118-123) maintained these *pallium* and *speciosum* forms as separate species again.

For comparison with *G. spiniferum* (Sowerby 1st, 1835) from French Polynesia and *G. maculosum* (Forsskål, 1775) from the Red Sea see Dijkstra & Kilburn (2001: 281).

***Juxtamusium* Iredale, 1939**

Juxtamusium Iredale, 1939: 368. Type species (by original designation): *Juxtamusium oblectatum* Iredale, 1939 (= *Pecten (Chlamys) coudeini* Bavay, 1903); Recent, 0.5 ml W of North Direction Isle, Queensland, in 20 fath.[= 37 m].

Diagnosis. — Small, thin-shelled, subcircular to circular Decatopectinini with depressed, unevenly to evenly spaced, weak lirae or costae; narrowly spaced, delicate commarginal microsculpture throughout ontogeny; resilifer oblique, strongly erect on one side, strong internal hinge ligament, hinge plate very flat, lacking crura or denticles; ctenolium on both valves (see Waller, 1984: 211), byssal notch shallow.

Distribution. — Recent. Tropical Indo-West Pacific; living littorally to sublittorally.

Remarks. — Hertlein (1969: N357) treated *Juxtamusium* as a subgenus of *Chlamys* Röding, 1798 in the *Chlamys* group. Waller (1986: 40) raised *Juxtamusium* to a genus in Decatopectinini.

***Juxtamusium coudeini* (Bavay, 1903)**

Pl. 11 figs 3a-d, Pl. 27 figs 2a-b

Pecten (Chlamys) coudeini Bavay, 1903: 401, pl. 8 figs 3-4; Bavay, 1904: 206; Dautzenberg & Bavay, 1912: 17.

Juxtamusium oblectatum Iredale, 1939: 368, pl. 5 figs 27, 27a.

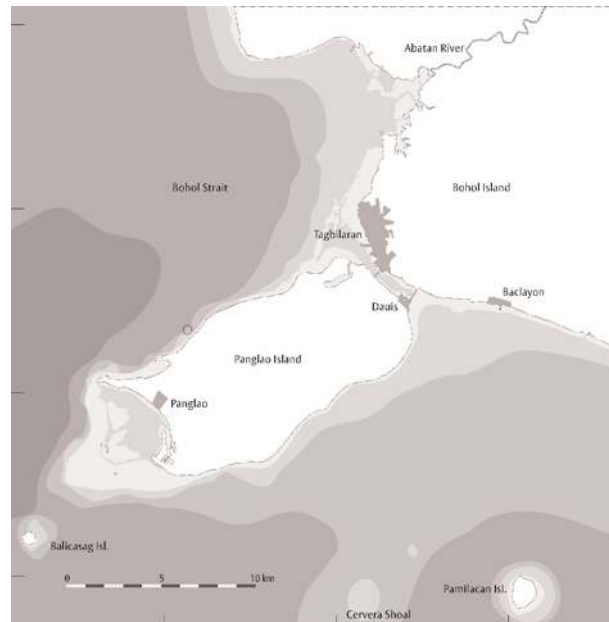
Juxtamusium oblectatum Iredale; Waller, 1972: 250, 252, 254, pl. 8 figs 128-133, 135.

Juxtamusium coudeini (Bavay); Waller, 1984: 211; Dijkstra, 1984 (in 1983-89): 8, figs; Dijkstra, 1985 (in 1983-94): 10, figs; Dijkstra, 1998a: 22; Dharma, 2005: 250, pl. 100 fig. 9; Raines & Poppe, 2006: 124, 125, lower figs; pl. 74 figs 2, 4, 6, 7; Raines, 2010: 608, pl. 995 figs 12-15.

Typedata. — *Pecten (Chlamys) coudeini* Bavay: Holotype (H 24 mm, pv) KBIN IG 10591. Type locality: New Caledonia.

Juxtamusium oblectatum Iredale: Holotype (H 22.5 mm, pv) AMS C.75282. Type locality: Australia, N Queensland, 0.5 ml W of North Direction Isle, 36.5 m (Great Barrier Reef Expedition stn 16).

Material examined. — **Philippines:** PMBP 2004, Stn P4, 80-120 m, 1 v. Additional material examined. — Calituban Island, 20-30 m, alive, 1 pv (ZMA Moll. 139895).



Description. — Shell up to 32 mm high, most specimens c. 20 mm; rather thin, circular to ovate, flattened (left valve almost flat, right valve weakly inflated), inequivalve, almost equilateral, auricles unequal in shape and size, umbonal angle c. 85-95°; brightly coloured with white, red, yellowish or brown blotches, right valve paler. Both valves sculptured with almost obsolete, evenly spaced radial costae and minute, closely spaced commarginal striae continuing across costae throughout. Auricles with only commarginal microsculpture, as on disc. Internal rib carinae present near ventral margin. Functional ctenolia on right and left valve very weak or even lacking. Byssal notch and fasciole absent. Resilium oblong and oblique.

Distribution. — Throughout the tropical Indo-West Pacific from the Philippine Islands to northern Australia and westwards to the central Indian Ocean (not recorded from the western Indian Ocean), and eastwards into the Pacific to the Fiji Islands (Raines & Poppe, 2006: 126; Raines, 2010: 608). Present specimen from the Philippines dead at 80-120 m. Bathymetric range of live-taken specimens is 20-50 m (ZMA, unpubl. data).

Living littorally to upper bathyally amongst coral rubble or algae on flat sandy bottoms.

Remarks. — The present specimens from the Philippines are indistinguishable from the type specimen of New Caledonia.

The closely related congener is *Juxtamusium maldivense* (Smith, 1903) differs somewhat in having more prominent radial sculpture, which is more unevenly spaced, and in having a more persistent ctenolia.

For information on functional morphology (in particular of the left and right ctenolia and oblique resilium) see Waller (1972: 253) and Thayer (1975: 447).

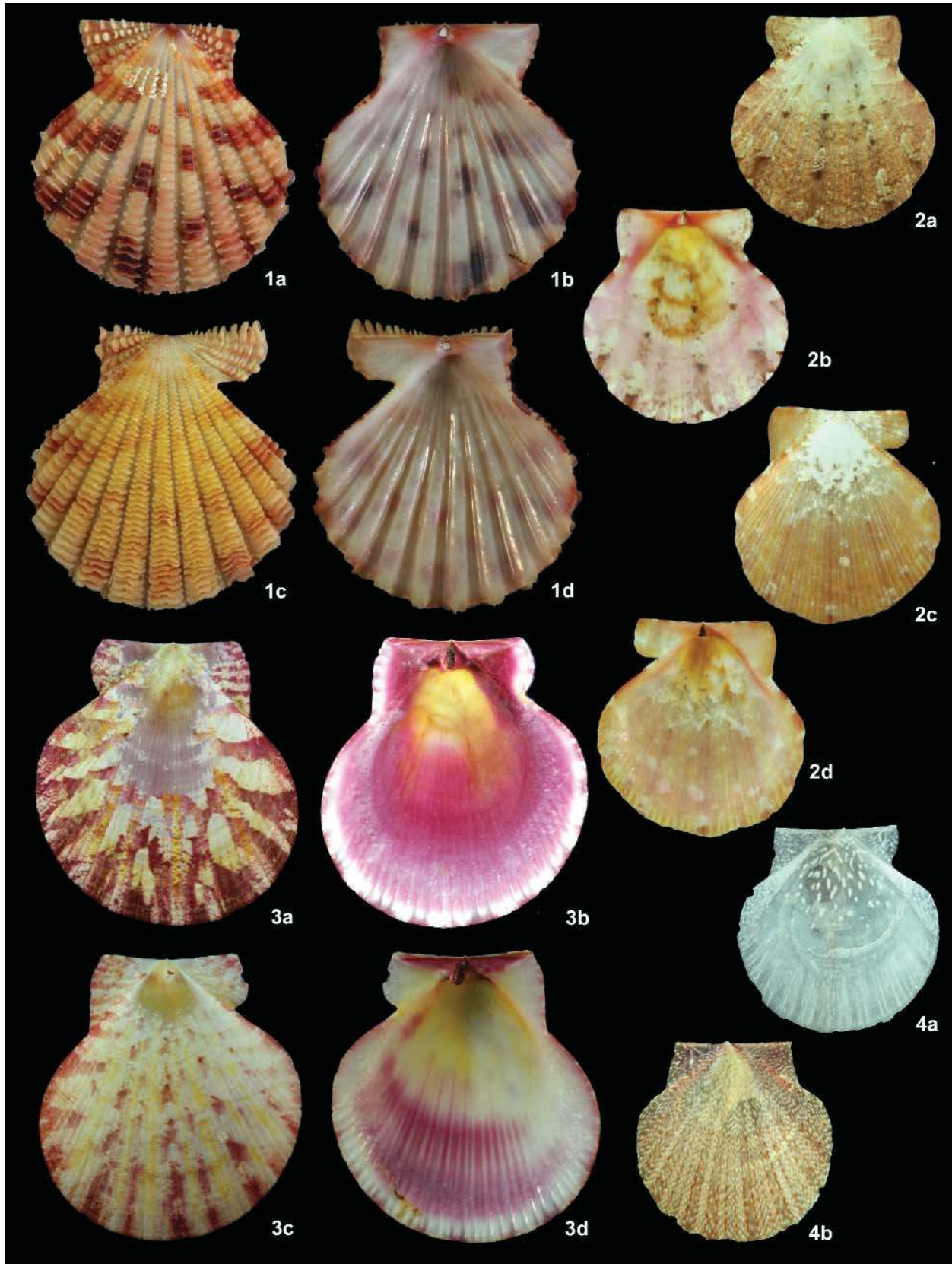


PLATE 11

Figs 1a-d. *Gloripallium speciosum* (Reeve, 1853), Mactan, 10°17'N, 124°02'E, 25 m, live, amongst coral rubble on sand, scuba, xii.1978, pv, H 32 mm (ZMA Moll. 140475). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Juxtamusium maldivense* (E.A. Smith, 1903), PMBP 2004 Stn L46, pv, H 14.1 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Juxtamusium coudeini* (Bavay, 1903), Bohol, Calituban Island, 10°15'N, 124°18'E, 20-25 m, live, dive, 1996, pv, H 28.1 mm (ZMA Moll. 139895). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** *Amusium pleuronectes* (Linnaeus, 1758), PMBP 2004 Stn T19, pv (juvenile), H 7 mm. **4a.** rv exterior. **4b.** lv exterior.

***Juxtamusium maldivense* (E.A. Smith, 1903)**

Pl. 11 figs 2a-d, Pl. 13 figs 2a-b, Pl. 27 figs 3a-b

Pecten maldivensis E.A. Smith, 1903: 622, pl. 36 figs 19-20; Waller, 1972: 250, pl. 7 figs 111-112 [lectotype].

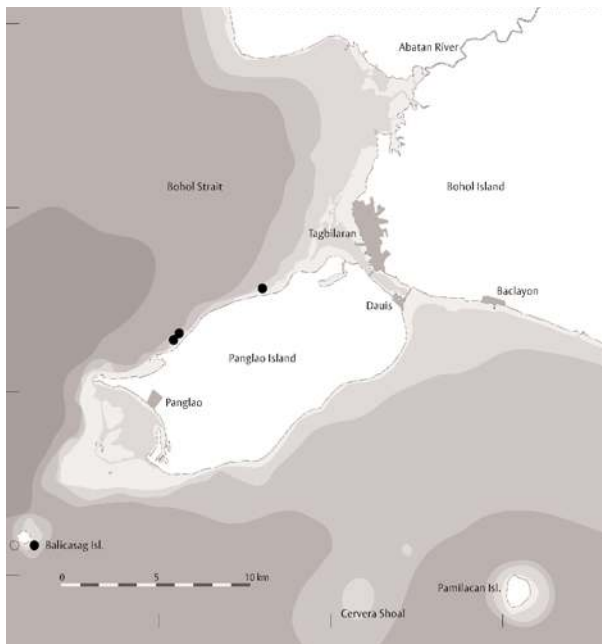
Pecten maldivensis Smith; Melvill & Standen, 1907: 809; Hedley, 1909: 423; Melvill, 1909: 126.

Juxtamusium maldivense (Smith); Iredale, 1939: 368; Waller, 1972: 250, pl. 7 figs 111-127, pl. 8 fig. 134; Thayer, 1975: 447-449, 3 figs; Abbott & Dance, 1982: 315, fig; Dijkstra, 1984 (in 1983-89): 8, figs; Sharabati, 1984: pl. 44 figs 4-4a; Waller, 1984: 211; Dijkstra, 1990: 4, figs; Dijkstra, 1992 (in 1983-94): 24, figs; Dijkstra, 1998a: 23, pl. 3 figs 1-3; Dijkstra et al., 1998: 7, fig. 11; Dijkstra & Knudsen, 1998: 64, pl. 5 fig. 22; Hayami, 2000: 901, pl. 447, fig. 17; Dijkstra & Kilburn, 2001: 281, figs 14-15; Raines & Poppe, 2006: 127, 127, pl. 74 figs 1, 3; pl. 75, figs 1-7; Raines, 2010: 608, pl. 995 figs 6-11.

Chlamys (Juxtamusium) maldivensis (Smith); Oliver, 1992: 71, 76, pl. 12 figs 5a-b, text-figs 10a-b.

Type data. — *Pecten maldivensis* E.A. Smith: Lectotype (H 14.9 mm, second-largest pv) BMNH 1903.9.17.49, designated and refigured by Waller (1972: 250, pl. 7, figs 111-112), 4 paralectotypes (pv) BMNH 1903.9.17.50-53. Type locality: Indian Ocean, Maldive Islands, 1-44 fathoms [= 2-80 m].

Remarks. — Although Smith (1903: 622) recorded three localities for *Pecten maldivensis*, viz. Suvadiva Atoll (5-44 fathoms), Kolumadulu Atoll (1-40 fathoms), and Mulaku Atoll (1-40 fathoms) of the Maldive Islands, the types were not segregated into these separate localities.



Material examined. — **Philippines:** PMBP 2004, Stn L46, 90-110 m, 4 pv (A); Stn L49, 90 m, 76 pv (A); Stn L51-60, 43-62 m, 1 pv (A), 3 v; Stn L74-75, 120-139 m, 1 v; Stn L76, c. 80 m, 3 pv (A), 10 v; Stn P4, 80-120 m, 1 pv (A), 31 v.

Description. — Shell up to c. 25 mm high, most specimens c. 15 mm; flattened (left valve almost flat, right valve weakly inflated), thin, circular to ovate, slightly higher than wide, inequivalve, almost equilateral, auricles unequal in shape and size, umbonal angle c. 85-90°; cream to pink, with shades of red or brown, and paler and darker blotches, interior purple or reddish, right valve paler. Both valves sculptured with numerous fine, unevenly spaced radial riblets of angular section (with narrow crests), increasing by bifurcation and/or intercalation, and very closely spaced, microscopic commarginal lamellae. Posterior auricle larger than anterior, with c. 3-7 radial riblets, riblets very weak on some specimens. Byssal notch and fasciole weak to almost lacking. Functional left and right ctenolia with a few teeth, lacking from some specimens. Resilifer oblong, oblique. Internal rib carinae present. Hinge teeth weak.

Distribution. — Throughout the tropical Indo-West Pacific, from southern Japan to northern Australia, westwards into the Indian Ocean to South Africa and in the Red Sea, eastwards into the Pacific to Wallis and Futuna Islands [MNHN, ZMA, unpublished data] (Raines & Poppe, 2006: 126; Raines, 2010: 608). Present specimens from the Philippines alive at 62-90 m (minimum depth range). Living byssally attached to coral branches, under rocks or amongst coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material from the Maldive Islands.

***Mirapekten* Dall, Bartsch & Rehder, 1938**

Mirapekten Dall, Bartsch & Rehder, 1938: 84, pl. 21 figs 7-8.

Type species (by original designation): *Mirapekten thaanumi* Dall, Bartsch & Rehder, 1938 (= *Pecten mirificus* Reeve, 1853 (in 1852-53)); Recent, off south coast of Molokai, Hawaii, in 70-99 fathoms [= 128-181 m].

Somalipekten Waller, 1986: 41. Type species (by original diagnosis): *Somalipekten cranmerorum* Waller, 1986; Recent, off Somalia, 150-300 m.

Diagnosis. — Medium sized Decatopectinini with from 5-7 evenly spaced primary squamous costae to 7-11 unevenly spaced primary and secondary costae, squamous on most specimens, noduliferous or smooth on others; valves flattened, subcircular to circular, right valve slightly more convex than left, inequivalve, inequilateral to equilateral, auricles unequal in size; microsculpture of closely spaced commarginal lamellae; internal rib carinae present. Hinge with prominent dorsal teeth and weak resilial teeth, intermediate teeth lacking; byssal notch moderately deep, byssal fasciole rather narrow, ctenolium well-developed.

Distribution. — Miocene to Recent (Hayami, 1989: 16). Tropical Indo-West Pacific; living littorally to sublittorally.

Remarks. — Hertlein (1969: N366) treated *Mirapekten* as a subgenus of *Semipallium* Jousseaume in Lamy, 1928 and placed it in the suprageneric group of *Decatopecten*. Waller

(1986: 40), followed by Vaught (1989: 119), considered *Mirapecten* to be a full genus in the tribe Decatopectinini. For comparison with *Somalipecten* Waller, 1986, see Dijkstra & Kilburn (2001: 283).

***Mirapecten mirificus* (Reeve, 1853)**

Pl. 12 figs 1a-d, Pl. 13 figs 3a-b

Pecten mirificus Reeve, 1853 (in 1852-53): sp. 104, pl. 26 fig. 104.

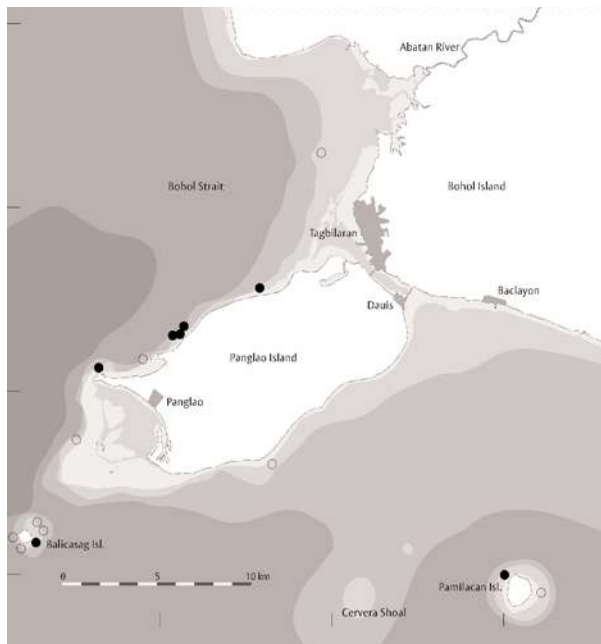
Mirapecten thaanumi Dall, Bartsch & Rehder, 1938: 84, pl. 21 figs 7-8.

Chlamys (Mirapecten) mirifica (Reeve); Springsteen & Leobrera, 1986: 329, pl. 93 fig. 17; Rombouts, 1991: 31, pl. 12 figs 3, 3a.

Mirapecten mirificus (Reeve); Kay, 1979: 526, figs 158B, 169A, B; Dijkstra, 1991: 48; Dijkstra, 1994 (in 1983-94): 8, figs 1-4; Hayami, 2000: 903, pl. 449 fig. 28 (rv only, lv is *M. rastellum*); Raines & Poppe, 2006: 130, 131, upper figs; pl. 77 figs 1-7; pl. 78 figs 1-7; pl. 79 figs 1-7; Raines, 2010: 610, pl. 996 figs 1-8.

Type data. — *Pecten mirificus* Reeve: Holotype (H 27.5 mm, pv) BMNH 1950.11.14.46. Type locality: “Amboyna” [Ambon, Indonesia].

Mirapecten thaanumi Dall, Bartsch & Rehder: Holotype (H 14.8 mm, lv) USNM 173195. Type locality: Hawaiian Islands, off the south coast of Molokai, 21°08'N, 157°00'W, 70-99 fathoms [= 128-181 m] (Albatross stn 3819).



Material examined. — **Philippines:** Bohol Island, Maribohoc Bay, PANGLAO 2004 Stn T14, 101-110 m, 1 juv. dd., 9.2 x 6.6 mm (Pl. 8 fig. 6). “Philippines”, 1 sh., AV0658, 16.1 x 11.1 mm.

Description. — Shell up to 40 mm high, most specimens to c. 30 mm, rather thin, somewhat posteriorly oblique and roundly triangular, strongly inequivalve, inequilateral, left valve almost flat, right valve inflated, auricles somewhat unequal in shape and size, umbonal angle c. 90°; intenal rib carinae present; colour highly variable, cream, yellow, red, purple, brownish to almost black, some specimens mottled; interior porcelanous, somewhat paler than exterior; resilial teeth weak or lacking, dorsal teeth prominent. Left valve sculptured with 4-5 distinct primary radial costae, one secondary costa intercalated in each interspace on most specimens, very weak or lacking on some. Primary costae bearing widely spaced, thorn-like, curled scales, variable in prominence; lacking on secondary costae. Primary and secondary costae unevenly spaced. Very closely spaced, fine commarginal microsculpture throughout. Posterior auricle somewhat larger than anterior, with one scaly radial costa; costa weaker on anterior auricle. Hinge line straight. Right valve with 7-9 unevenly spaced radial costae (4 main costae more or less bifurcated); secondary costae lacking. Anterior auricle with 4-6 radial costae, lacking or very weak on posterior; dorsal margin scaly. Byssal notch moderately deep, byssal fasciole broad. Functional ctenolium with 4-6 well-developed teeth.

Distribution. — Tropical Indo-West Pacific and Hawaiian Islands, from southern Japan to Indonesia and the Coral Sea (not recorded from Australia), westward into the Indian Ocean to Thailand and eastward into the Pacific to the Easter Islands (Raines & Poppe, 2006: 130; Raines, 2010: 610). Present specimens from the Philippines alive at 62-90 m (minimum depth range). Living byssally attached to hard substrates or amongst coral rubble on sandy bottoms.

Remarks. — For comparison with congeneric species see Dijkstra & Kilburn (2001: 285).

***Mirapecten moluccensis* Dijkstra, 1988**

Pl. 12 figs 2a-d, Pl. 13 figs 5a-b

Mirapecten moluccensis Dijkstra, 1988a: 12, figs; Raines & Poppe, 2006: 130, 131, lower figs; pl. 80 figs 1-8; Raines, 2010: 612, pl. 997 figs 1-3.

Type data. — Holotype (H 28.8 mm, pv) ZMA Moll. 388034, 10 paratypes (8 pv & 2 v), 1 (pv) MNHN Moll 21159, 9 ZMA Moll. 388035-36, 388062-65. Type locality: Moluccas [Maluku], Indonesia.

Material examined. — **Philippines:** PMBP 2004, Stn B10, 3-14 m, 1 pv (A), 1 v; Stn B15, 2-4 m, 1 pv (A), 4 v; Stn B16, 20 m, 3 pv (A); Stn B20, 2-8 m, 1 pv (A); Stn B32, 20 m, 3 v; Stn B39, 17-25 m, 1 pv (A); Stn B42, 30-33 m, 1 v; Stn L49, 90 m, 1 v; Stn L51-60, 43-62 m, 1 pv (A); Stn L76, c. 80 m, 2 v; Stn P4, 80-120 m, 1 pv (A), 1 v; Stn S8, 28-32 m, 1 v; Stn S21, 4-12 m, 1 v; Stn S28, 28-32 m, 5 v.

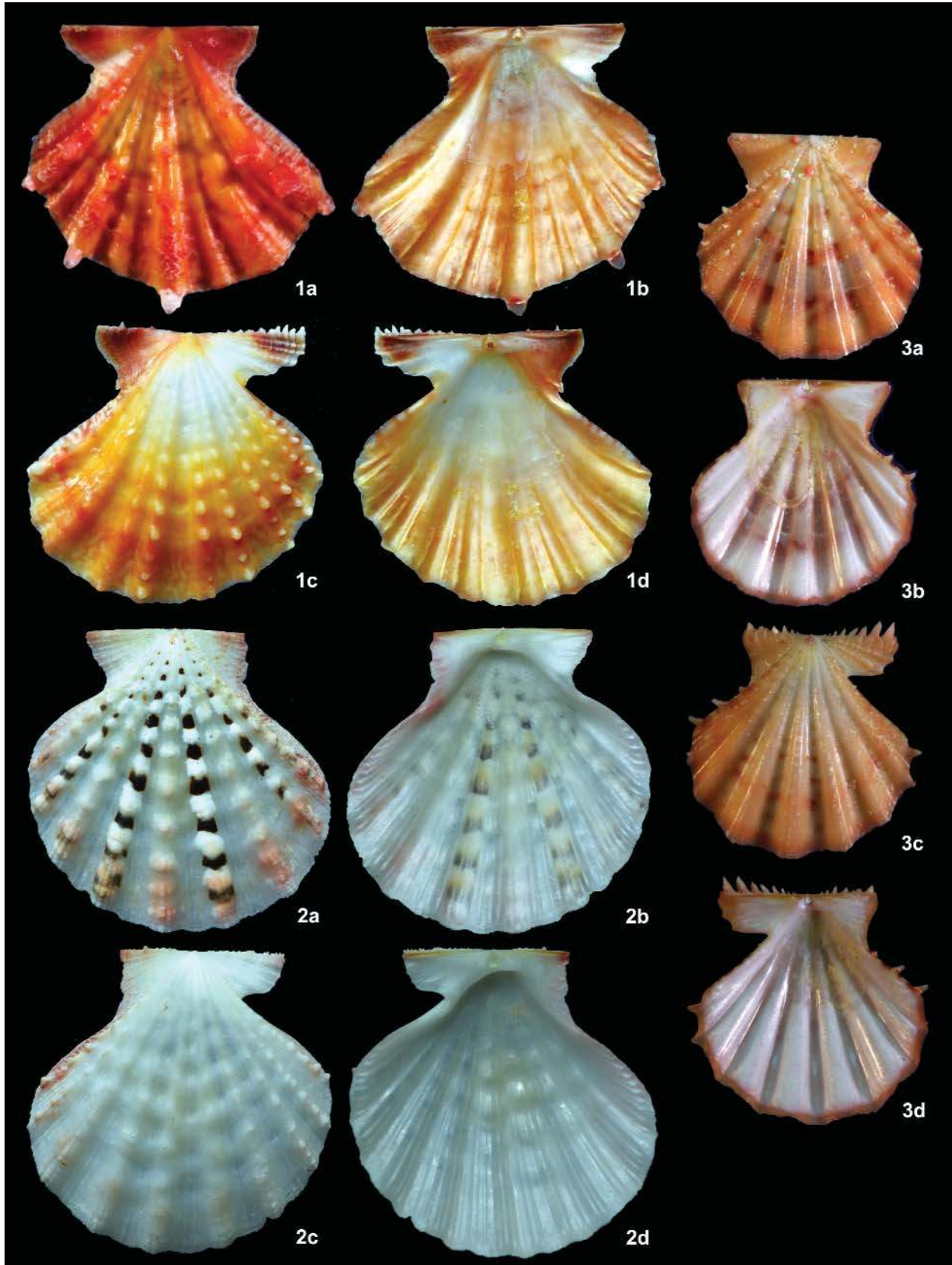
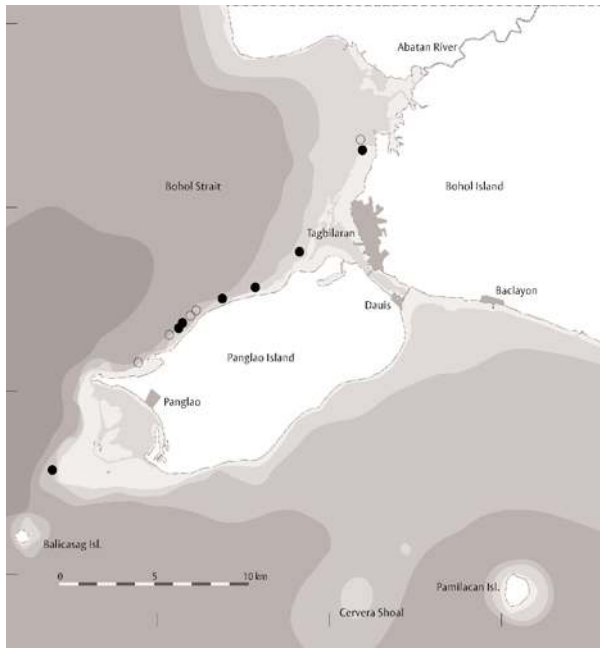


PLATE 12

Figs 1a-d. *Mirapecten mirificus* (Reeve, 1853), Bohol, off Panglao, 9°35'N, 123°45'E, 140-150 m, live, tangle-net, iv.1980, pv, H 28 mm (ZMA Moll. 140498). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Mirapecten moluccensis* Dijkstra, 1988, Bohol, Calituban Island, 10°15'N, 124°17'E, 25-35 m, live, amongst coral rubble, scuba, 1998, pv, H 37.6 mm (ZMA Moll. 148877). **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Mirapecten rastellum* (Lamarck, 1819), PMBP 2004 Stn P4, pv, H 27 mm. **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.



Description. — Shell up to c. 35 mm high, subcircular, radially undulated, almost equivalve and equilateral, right valve somewhat more inflated than left, auricles unequal in shape and size, umbonal angle c. 90°; internal lirae with rib carinae; hinge teeth weak; left valve cream or whitish with red, black or white spots, or uniform whitish; right valve cream or whitish without maculations; interior ventral margin reddish on most specimens. Left valve sculptured with 8-9 prominent, nodulous radial costae, with evenly and closely spaced secondary radial riblets on costae and in interspaces. Very closely spaced, fine commarginal microsculpture throughout. Anterior auricle with 7-9 radial riblets, each bearing small nodules, more prominent dorsally. Right valve with similar sculpture to left, but nodules on radial costae weaker and costae on disc ends more spinose than on left valve. Auricles somewhat declined laterally, with scaly dorsal margins. Byssal notch moderately deep, byssal fasciole rather broad. Functional ctenolium with about 5 prominent teeth.

Distribution. — Tropical Indo-West Pacific. Philippine Islands southwards to northern Australia, and eastwards to the Marshall Islands, Solomon Islands and Loyalty Islands (ZMA, unpublished data; Raines & Poppe, 2006: 132). Present specimens from the Philippines alive at 4-80 m (minimum depth range). Living attached on the undersides of coral boulders or amongst coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines are morphologically similar to the type material from Indonesia.

For comparison with congeneric species see Dijkstra & Kilburn (2001: 285).

Mirapecten rastellum (Lamarck, 1819)

Pl. 12 figs 3a-d, Pl. 13 figs 4a-b

Pecten rastellum Lamarck, 1819: 166; Delessert, 1841: pl. 16 figs 2a-b (holotype); Chenu, (1842-54) 1845: pl. 15 figs 2, 2a-b (holotype); Dijkstra, 1994a: 474, pl. 6 figs 17-20 (holotype).

Pecten amaliae Kobelt, 1887: 84, 198, pl. 53 figs 5-6.

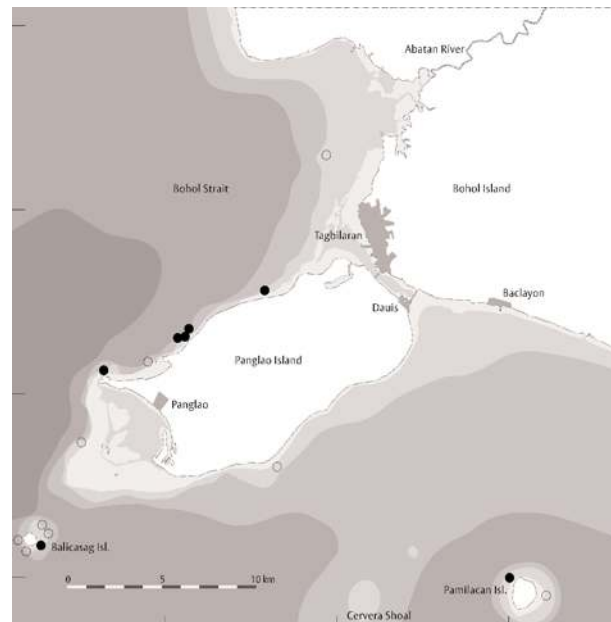
Chlamys (*Mirapecten*) *rastellum* (Lamarck); Springsteen & Leobrera, 1986: 329, pl.

93 fig. 20; Rombouts, 1991: 31, pl. 12 figs 4, 4a-b.

Mirapecten rastellum (Lamarck); Dijkstra, 1991 (in 1983-94): 22, figs; Dijkstra, 1991: 48; Lamprell & Whitehead, 1992: [32], pl. 14 fig. 82; Dijkstra, 1998a: 24, pl. 3 figs 7-8; Raines & Poppe, 2006: 132, 133, upper figs; pl. 81 figs 1-6; pl. 82 figs 1-6; Dijkstra & Moolenbeek, 2008: 23; Raines, 2010: 612, pl. 997 figs 4-8.

Type data. — *Pecten rastellum* Lamarck: Holotype (H 32.5 mm, pv) MHNG no. 1088/24. Type locality: “Habite les mers du Nord” [error]. A new type locality was designated by Dijkstra (1994a: 474): Off Punta Engaño, Mactan Island, Cebu, Philippine Islands. For nomenclatural notes on *Pecten rastellum* var. “beta” see Dijkstra (1994a: 474).

Pecten amaliae Kobelt: Syntype (H 27.8 mm, lv) LMAD [not registered]. Type locality: “Amboyna?”. It is likely that the type specimen was found in the Moluccas. Similar material from eastern Indonesia has been examined (NNM). The author traced only the left valve (Kobelt’s fig. 5) of an articulated specimen (see Kobelt, 1887: pl. 53 figs 5-6) of *Pecten amaliae* in the LMAD collection.



Material examined. — **Philippines:** PMBP 2004, Stn B12, 24-27 m, 1 pv (A); Stn B28, 25 m, 1 v; Stn B30, 25 m, 1 v; Stn B36, 24 m, 1 v; Stn B41, 17-19 m, 1 v; Stn L46, 90-110 m, 19 pv (A), 2 v; Stn L49, 90 m, 200 pv (A), 241 v; Stn L51-60, 43-62 m, 12 pv (A), 7 v; Stn L65-68, 55-81 m, 4 pv (A), 5 v; Stn L69-73, 90-98 m, 3 v; Stn L74-75, 120-139 m, 4 pv (A), 3 v; Stn L76, c. 80 m, 33 pv (A), 139 v; Stn P3, c. 100 m, 1 v; Stn P4, 80-120 m, 200 pv (A), 251 v; Stn R29, 3-35 m, 1 v; Stn R43, 3-41 m, 1 v; Stn S8, 28-32 m, 6 v; Stn S28, 28-32 m, 5 v; Stn T4, 82 m, 2 v. PANGLAO 2005, Stn DW 2400, 111-115 m, 1 v.

Description. — Shell up to 40 mm high, most specimens to c. 25 mm; subcircular, left valve flattened, right valve more inflated, slightly inequivalve and equilateral, auricles somewhat unequal in shape and size, umbonal angle about 85-90°; internal lirae with rib carinae in most specimens (lacking in a few); hinge teeth weak; colour highly variable, white, cream, yellow, red, purple, brownish, uniform or mottled. Both valves sculptured with 7-9 evenly spaced radial costae, with widely spaced curved scales (larger on left valve than on right), more prominent marginally. Costae and interstices equally wide. Auricles with very closely spaced commarginal microsculpture (almost lacking on disc), macrosculpture lacking except for 2-3 radial riblets on anterior auricle of right valve; dorsal margin spinose. Byssal notch moderately deep, byssal fasciole rather broad. Functional ctenolium with 5-8 prominent teeth.

Distribution. — Tropical Indo-West and central Pacific from southern Japan southwards to northern Australia, eastwards to the Line Islands (not recorded from the Hawaiian Islands and French Polynesia) (ZMA, unpublished data; Raines & Poppe, 2006: 132). Present specimens from the Philippines alive at 27-120 m (minimum depth range). Living amongst coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines are indistinguishable from the type specimen.

For comparison with congeneric species see Dijkstra & Kilburn (2001: 285).

AMUSIINI Habe, 1977

Amusiini Habe, 1977: 75 (Waller, 2006a: 22).

Diagnosis. — Pectininae with weak radial macrosculpture or smooth, internal rib carinae present, disc microsculpture of closely spaced commarginal lamellae, hinge teeth well developed, consisting of resilial and dorsal teeth, intermediate teeth weak or lacking, auricular crura prominent.

Remarks. — Waller (2006a: 22-27, fig. 1.3) separated the *Amusium* and *Pecten* groups into their own tribes for the first time because of phylogenetic separation. He demonstrated that *Amusium* Röding, 1798, *Euvola* Dall, 1898 and *Leopecten* Masuda, 1971 all evolved from *Amusiopecten* Sacco, 1893, whereas *Annachlamys* Iredale, 1939 and *Pecten* evolved from *Gigantopecten* Rovereto, 1899.

Amusium Röding, 1798

Amusium Röding, 1798: 165. Type species (by subsequent designation, Herrmannsen, 1846): *Ostrea pleuronectes* Linnaeus, 1758. Recent, Indonesia.

Pleuronectia Swainson, 1840: 388. Type species (by monotypy): *Pleuronectia laevigata* Swainson, 1840 (= *Ostrea pleuronectes* Linnaeus, 1758). Recent, Indo-West Pacific.

Amusium Herrmannsen, 1846: 46. Invalid name: unjustified emendation of *Amusium*.

Diagnosis. — Amusiini with (sub)circular shape, flattened, both valves slightly convex, exterior surface of disc and auricles smooth, interior with many narrow, prominent radial riblets, auricles equal in length, intermediate hinge teeth absent, byssal notch and ctenolium weak in early ontogeny, absent later.

Distribution. — Lower Miocene to Recent. Tropical and subtropical Indo-West Pacific; living littorally.

Remarks. — Hertlein (1969: N349) placed *Amusium* in the *Amusium* group, together with *Korobkovia* Glibert & van der Poel, 1965 (Miocene), and *Propeamussium* de Gregorio, 1884 (Jurassic to Recent) and stated that these “genera may have been derived from different groups”. *Propeamussium* is currently included in the Propeamussiidae.

Waller (1991: 38) suggested that true *Amusium* evolved from *Amusiopecten* Sacco, 1897, during the Oligocene within the Pacific region, and placed *Amusium* in the *Pecten* group, and subsequently in Pectinini (Waller, 1993). Most recently, Waller (2006a) subdivided Pectinini, and transferred *Amusium* to the new tribe Amusiini.

Dijkstra (1990b) introduced *Dentamussium* as a new subgenus of *Amusium*. *Amusium* (*Dentamussium*) differs from *Amusium* sensu stricto by having a well developed byssal notch (weak in *Amusium*) and a functional ctenolium (absent at least in late ontogeny of *Amusium*).

Amusium pleuronectes (Linnaeus, 1758)

Pl. 11 figs 4a-b, Pl. 13 figs 1a-d

Ostrea pleuronectes Linnaeus, 1758: 696, no. 159; Dijkstra, 1999: 399, figs 1C-F (lectotype).

Amusium magneticum Röding, 1798: 165.

Pleuronectia laevigata Swainson, 1840: 388.

Pecten pleuronectes (Linnaeus); Reeve, 1853 (in 1852-53): sp. 48, pl. 13 fig. 48.

Pecten (*Amusium*) *milneedwardsi* de Gregorio, 1898: 6, pl. 1 figs 1, 6.

Amusium pleuronectes (Linnaeus); Oyama, 1951: 84, text-fig. 4; Kira, 1962: 138, pl. 49 fig. 16; Morton, 1980: 375-404; Abbott & Dance, 1982: 303, fig.; Grecchi, 1983: 7-9, figs.; Dijkstra, 1990a: 9, 10; Rombouts, 1991: 4, pl. 3 fig. 3; Dharma, 1992: 84, pl. 20 fig. 1; Bernard et al., 1993: 52; Dijkstra, 1997: 319; Taylor & Glover, 2004: 262; Raines & Poppe, 2006: 138, 139, lower figs; pl. 87 figs 1-5; Raines, 2010: 614, pl. 998 figs 1-2.

Amusium pleuronectes pleuronectes (Linnaeus); Habe, 1964a: 2, pl. 1 figs 3-4; Wang, 1984: 247, figs 2-3; Matsukuma et al., 1991: pl. 133 fig. 11; Dharma, 2005: 250, 364, pl. 100 fig. 18; pl. 147, figs 12a, b; Xu & Zhang, 2008: 78, fig. 218.

Amusium pleuronectes australiae Habe, 1964a: 2, pl. 1 figs 1-2; Dharma, 2005: 250, pl. 100 fig. 17.

Amusium pleuronectes nanshaensis Wang & Chen, 1991: 152, 160, fig. 3.

Remarks. — Röding (1798) introduced a new species name “species 126 *Amusium Magneticum*” for Gmelin’s “*Ostrea pleuronectes*” [after Linnaeus], which he also reported higher up the same page as “species 124 *Amusium Pleuronectes*”. This is an objective junior synonym of *A. pleuronectes* (Linnaeus, 1758).

Pleuronectia laevigata Swainson, 1840, the type species of *Pleuronectia* Swainson, 1840, is based on a reference to Lamarck (1816: pl. 208, fig. 3), which is clearly the present species.

De Gregorio (1898) extensively described and figured a new species *Pecten (Amusium) milneedwardsi* from New Caledonia, which closely resembles the present species. This is a subjective junior synonym of *A. pleuronectes*.

Habe (1964a) described a new subspecies from the Arafura Sea, which differs in his opinion from *A. pleuronectes*, by having fewer internal rib carinae (22-24, *A. pleuronectes* 26-34) and a somewhat different colour of the left valve. However, the number of internal carinae varies strongly and intermediates are also observed. Also the bluish radial lines and interstitial small pale dots are highly variable. In our opinion this subspecies falls within the variation range of the present species.

Recently Wang & Chen (1991) introduced a new subspecies from China which can be distinguished in their opinion from *A. pleuronectes* by “the shell (almost rounded), the radial lines (reddish) and by the white and brown spots”. These characters are also observed in other material of the present species from the Southwest Pacific.

Type data. — *Ostrea pleuronectes* Linnaeus: Lectotype (H 46 mm, pv) LSL [not registered] designated by Dijkstra (1999: 400), paralectotype (lv) MSNP [not registered]. Type locality: “Habitat in Indiis” [= Indonesia].

Amusium magneticum Röding: Type material lost. Type locality not indicated.

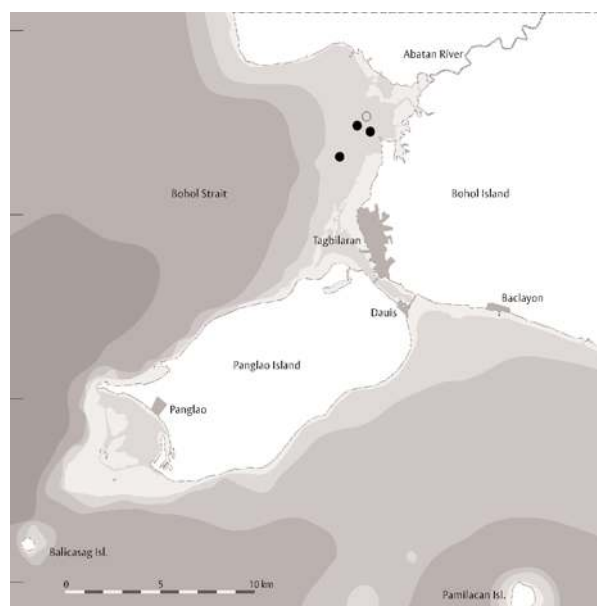
Pleuronectia laevigata Swainson: Type material unknown, not in the Manchester Museum or in the Natural History Museum, London. Type locality not indicated.

Pecten (Amusium) milneedwardsi Gregorio: Type material lost. Type locality: New Caledonia.

Amusium pleuronectes australiae Habe: Holotype (H 73.5 mm, pv) NSMT-Mo 54544. Type locality: Arafura Sea.

Amusium pleuronectes nanshaensis Wang & Chen: Holotype (H 45 mm, pv) IOAS M11600. Type locality: China, Nansha Islands, 4°08’N, 112°53’E, 62 m, muddy sand.

Material examined. — **Philippines**: PMBP 2004, Stn T19, 10-26 m, 8 pv (A), 13 v; Stn T21, 12 m, 2 v; Stn T24, 35-57 m, 1 pv (A); Stn T25, 160-210 m, 1 pv (A), 2 v.



Description. — Shell (sub)circular, up to c. 100 mm high, most specimens smaller; rather thin, weakly inflated, right valve slightly more convex than left, gaping at anterior and posterior margins, somewhat higher (dorso-ventrally) than wide in adult stage, inequivalve, equilateral; auricles small, equal in size, umbonal angle c. 120°. Left valve variable in colour, cream, pinkish or brownish with variable bluish or reddish radial lines and intermediate minute paler and darker dots; right valve and interior of most specimens white. Outer surface of both valves smooth and glossy, inner surface with 20-34 rib carinae, clearly arranged in pairs. Hinge line straight, byssal notch shallow, ctenolium lacking in adult stage.

Distribution. — Throughout the western and southwestern Pacific, from southern Japan southwards to northern and northeastern Australia (as far south as northern New South Wales), westwards into the Indian Ocean to southern India and eastwards into the Pacific to the Solomon Islands (Raines & Poppe, 2006: 138). Present specimens from the Philippines alive at 26-160 m (minimum depth range). Living free in shallow water on clean sand with silt and shell rubble, partially buried with the lower (right) valve in soft sediment.

Remarks. — The present specimens from the Philippines are morphologically similar to the type material from Indonesia.

Morton (1980) suggested that “swimming” of *A. pleuronectes* is not a response to predation, but apparently related to a seasonal migration, possible linked to reproduction, although this was doubted by Brand (2006, pp. 707-711). This phenomenon was also observed by Rumphius (1705). Del Norte (1988) reported that the major spawning season for the Lingayen Gulf (northern Philippine Islands) is in February and another minor one takes place from July to September.

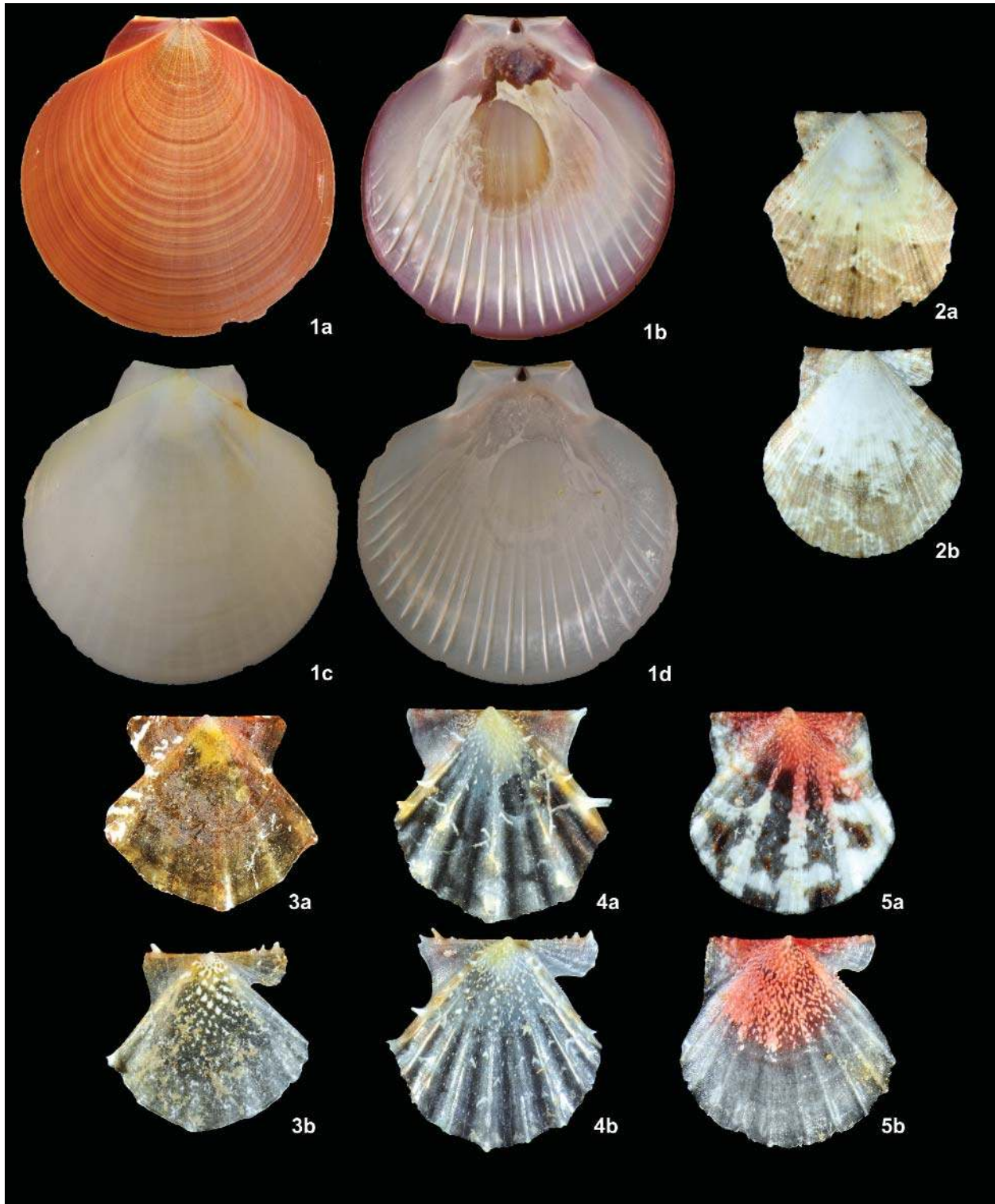


PLATE 13

Figs 1a-d. *Amusium pleuronectes* (Linnaeus, 1758), PMBP 2004 Stn T24, pv, H 57.1 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-b.** *Juxtamusium maldivense* (E.A. Smith, 1903), PMBP 2004 Stn L46, pv (juvenile), H 7.9 mm. **2a.** lv exterior. **2b.** rv exterior. **Figs 3a-b.** *Mirapecten mirificus* (Reeve, 1853), PMBP 2004 Stn P4, pv (juvenile), H 7 mm. **3a.** lv exterior. **3b.** rv exterior. **Figs 4a-b.** *Mirapecten rastellum* (Lamarck, 1819), PMBP 2004 Stn L46, pv (juvenile), H 4.5 mm. **4a.** lv exterior. **4b.** rv exterior. **Figs 5a-b.** *Mirapecten moluccensis* Dijkstra, 1988, PMBP 2004 Stn B39, pv (juvenile), H 3 mm. **5a.** lv exterior. **5b.** rv exterior.

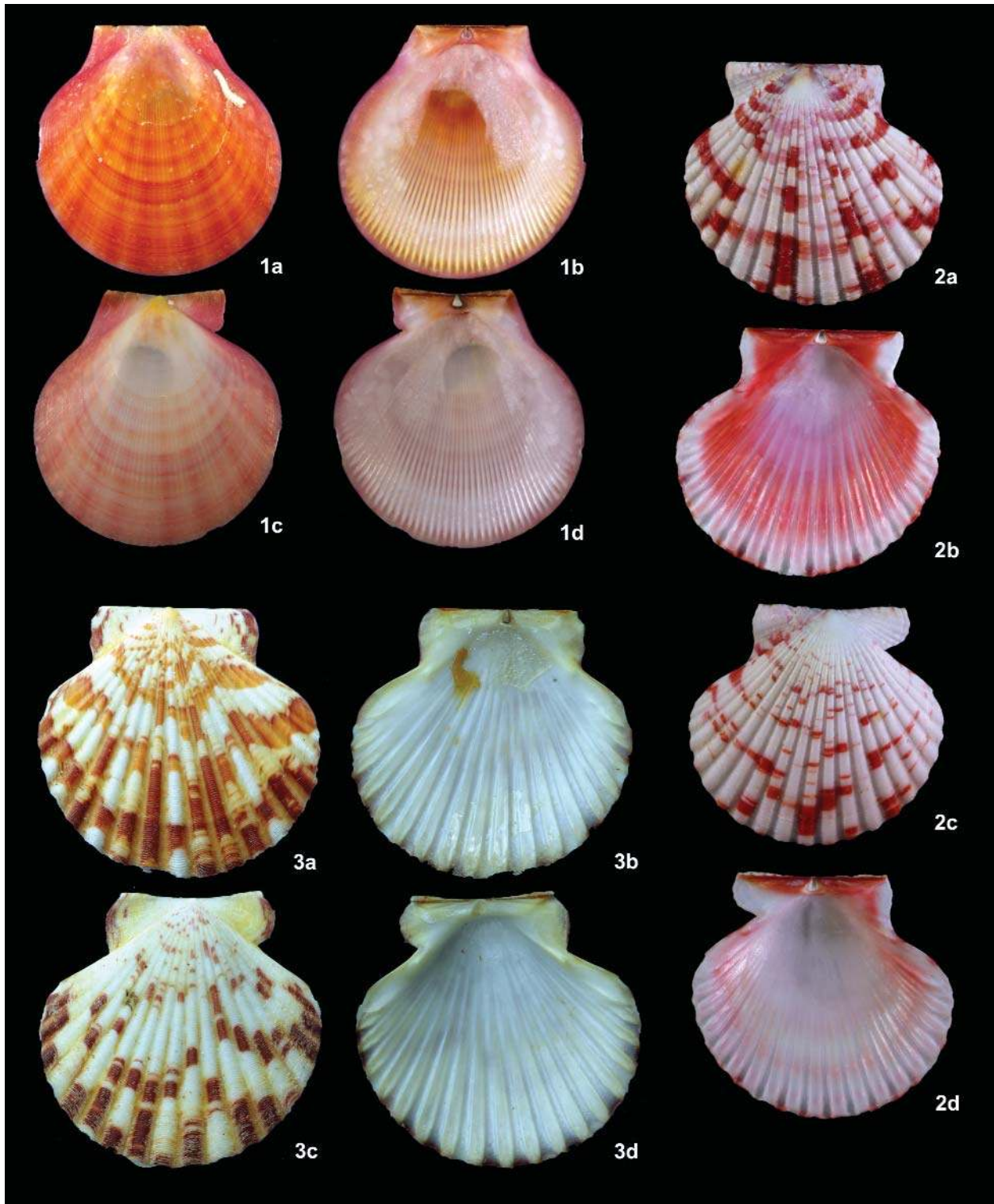


PLATE 14

Figs 1a-d. *Dentamussium obliteratum* (Linnaeus, 1758), PMBP 2004 Stn P4, pv, H 40.3 mm. 1a. lv exterior. 1b. lv interior. 1c. rv exterior. 1d. rv interior. **Figs 2a-d.** *Annachlamys reevei* (Adams in Adams & Reeve, 1850), Sulu Sea, Laminusa Island, 5°33'N, 120°55'E, 5-10 m, live, amongst coral rubble in sand, dive, 1983, pv, H 39.2 mm (ZMA Moll. 141346). 2a. lv exterior. 2b. lv interior. 2c. rv exterior. 2d. rv interior. **Figs 3a-d.** *Annachlamys striatula* (Linnaeus, 1758), Sulu Sea, Siasi Island, 8 m, live, sandy bottom, dredge, ii.1979, pv, H 35.8 mm (ZMA Moll. 140505). 3a. lv exterior. 3b. lv interior. 3c. rv exterior. 3d. rv interior.

***Dentamussium* Dijkstra, 1990**

Amusium (*Dentamussium*) Dijkstra, 1990b: 51. Type species (by original designation): *Ostrea obliterata* Linnaeus, 1758; Recent; restricted by Dijkstra (1999: 401) to Indonesia, Moluccas.

Diagnosis. — Thin byssate Amusiini with circular shape, flattened, both valves slightly convex, equivalve, equilateral; macrosculpture lacking, delicate antimarginal microsculpture throughout; auricles equal in length; interior with many narrow, distinct prominent radial ribs; dorsal teeth prominent, intermediate hinge teeth absent; byssal notch moderately deep, ctenolium present.

Distribution. — Recent. Tropical western Pacific; living sublittorally to upper bathyally.

***Dentamussium obliteratum* (Linnaeus, 1758)**

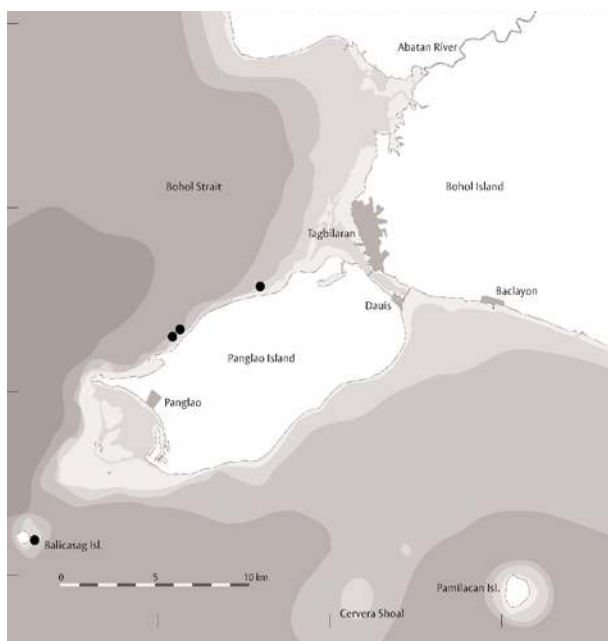
Pl. 14 figs 1a-d, Pl. 16 figs 4a-b

Ostrea obliterata Linnaeus, 1758: 697; Dijkstra, 1999: 400, figs 9A, B (lectotype); 2010: 17, fig. 49.

Amusium (*Dentamussium*) *obliteratum* (Linnaeus); Dijkstra, 1990b: 50-56, figs; 1997: 318, figs 1-4.

Dentamussium obliteratum (Linnaeus); Raines & Poppe, 2006: 140, pl. 88 figs 1-5; Raines, 2010: 614, pl. 998 figs 3-4.

Type data. — Lectotype (H 45 mm, pv) UUZM, paralectotype (pv) UUZM, paralectotype (pv) MSNP, designated by Dijkstra (1999: 401). Type locality: "Habitat in *O. australiore*." Locality incorrect and designated by Dijkstra (1999: 401) to the Moluccas, Indonesia.



Material examined. — **Philippines:** PMBP 2004, Stn L46, 90-110 m, 34 pv (A), 1 v; L49, 90 m, 100 pv (A), 101 v; Stn L51-60, 43-62 m, 1 pv (A); Stn L76, c. 80 m, 15 pv (A), 45 v; Stn P4, 80-120 m, 200 pv (A), 108 v.

Description. — Shell rather thin, up to 60 mm high, weakly inflated, nearly circular, equivalve, slightly inequilateral, auricles subequal in size, umbonal angle c. 115°. Colour orange to red with radiating pale or dark red bands of left valve, right valve paler, interior whitish, yellowish, brownish or purplish. Both valves smooth, inner surface with c. 50 small regular spaced radial lirae. Microsculpture of antimarginal striae in early growth stage and on the central part radial striae, near the ventral margin delicate radial grooves. Hinge line straight, byssal notch moderately shallow, ctenolium weak.

Distribution. — Tropical Indo-West Pacific from the Philippine Islands southwards to Indonesia (Raines & Poppe, 2006: 140). Present specimens from the Philippines alive at 62-90 m (minimum depth range). Living on soft bottom assemblages (sand and mud).

Remarks. — The present specimens from the Philippines are morphologically similar to the type material from Indonesia.

PECTININI Rafinesque, 1815

Diagnosis. — Pectininae with undivided radial costae, preradial microsculpture of left valve tall and smooth, internal rib carinae present, disc microsculpture of widely spaced commarginal lamellae, and hinge teeth well developed, with dorsal, resilial and intermediate teeth.

Remarks. — As pointed out under Amusiini, Waller (2006a: 22-27, fig. 1.3) demonstrated that tribes Amusiini and Pectinini deserve separation, and that *Annachlamys* belongs in Pectinini.

***Serratovola* Habe, 1951**

Serratovola Habe, 1951: 81. Type species (OD): *Pecten tricarinatus* Anton, 1838 (junior primary homonym of *P. tricarinatus* DeFrance, 1825) (= *Pecten rubicundus* Récluz in Chenu, 1843); Recent, China.

Diagnosis. — Pectinini with an almost flat to somewhat concave left valve and convex right valve, subcircular, inaequivalve, slightly inaequilateral, auricles unequal in shape and almost equal in size, radial macrosculpture of solid or hollow segmented costae, byssal notch and ctenolium rudimentary in late ontogeny. Internal rib carinae prominent. Resilial and dorsal teeth weak.

Distribution. — Pliocene to Recent. Indo-West Pacific (Hayami, 1989: 16); living littorally to sublittorally.

Remarks. — Habe (1951) introduced *Serratovola* as an extant genus, but Hertlein (1969: N367) considered it to be a synonym of *Pecten*. *Serratovola* differs from *Pecten* by its small size, its subcircular shape, its less equal auricles, and the hollow sections in the radial costae.

Huber (2010: 624) argued that, in his opinion, Habe had misidentified the type species of *Serratovola*, and that in fact

Janira gardineri E.A. Smith, 1903, was meant. He further declared "the type species of *Serratovola* is *Pecten tricarinatus* Habe, 1951 non Anton, 1839 (= *gardineri*)". Such a declaration does not follow Art. 70.3 of the Code and is invalid. In my opinion, Habe's suboptimal figure does not rule out that it represents a worn specimen of *Pecten tricarinatus* (the radial ribs are often tripartite in worn specimens, due to the hollow sections on each side). To stabilize the matter, under Art. 70.3 of the Code, I here select as type of *Serratovola* the nominal species previously cited by Habe as type species, i.e. *Pecten tricarinatus* Anton, 1838.

***Serratovola rubicunda* (Récluz in Chenu, 1843)**

Pl. 15 figs 2a-d, Pl. 17 figs 4a-b, Pl. 27 figs 4a-b

Pecten tricarinatus Anton, 1838: 19 (junior primary homonym of *Pecten tricarinatus* DeFrance, 1825); Philippi, 1845: 99, pl. 1 fig. 4; Küster & Kobelt, 1858-59: 80, pl. 20 fig. 4; Dautzenberg & Bavay, 1912: 3; Bernard et al., 1993: 52; Dijkstra, 1998a: 29, pl. 4 figs 7-8 (lectotype).

Pecten asper G.B. Sowerby 2nd, 1842: 50, pl. 19 figs 196-197; Reeve, 1852 (in 1852-53): sp. 10, pl. 2 fig. 10 (junior primary homonym of *Pecten asper* Lamarck, 1819).

Pecten rubicundus [Récluz in] Chenu, (1842-54) 1843: 3, pl. 7 figs 4-5 (replacement name for *Pecten asper* Sowerby, 1842).

Pecten passerinus Hinds, (1844-45) 1845: 61 (replacement name for *P. asper* Sowerby, 1842).

Pecten (Vola) asper Sowerby; Küster & Kobelt, 1888: 238, pl. 63 figs 2-3.

Pecten (Serratovola) tricarinatus Anton; Kira, 1967: 136, pl. 49 fig. 5; Koyama et al., 1981: 70; Dharma, 2005: 250, pl. 100 fig. 12.

Serratovola tricarinata (Anton); Abbott & Dance, 1982: 304, fig.

Serratovola aspera [sic] (Sowerby); Springsteen & Leobrera, 1986: 326, pl. 93 fig. 4.

Serratovola tricarinatus [sic] (Anton); Wang, 1989: 181, pl. 1 figs 3-4.

Serratovola rubicunda (Récluz in Chenu); Dijkstra, 1998a: 29, pl. 4 figs 7-8; Raines & Poppe, 2006: 176, 177, lower figs; pl. 123, figs 1, 2; Dijkstra & Maestrati, 2008: 110, figs 46, 47; Raines, 2010: 616, pl. 999 figs 4-5.

Serratovola passerina (Hinds); Hayami, 2000: 909, pl. 452 fig. 53; Xu & Zhang, 2008: 91, fig. 261.

Serratovola tricarinatus [sic] (Anton); Wang, 2002: 241.

Serratovola asper (Sowerby); Wang, 2002: 242, fig. 101.

Remarks. — Anton (1838) overlooked *Pecten tricarinatus* DeFrance, 1825, a fossil pectinid from the environs of Rome, which has nomenclatural priority.

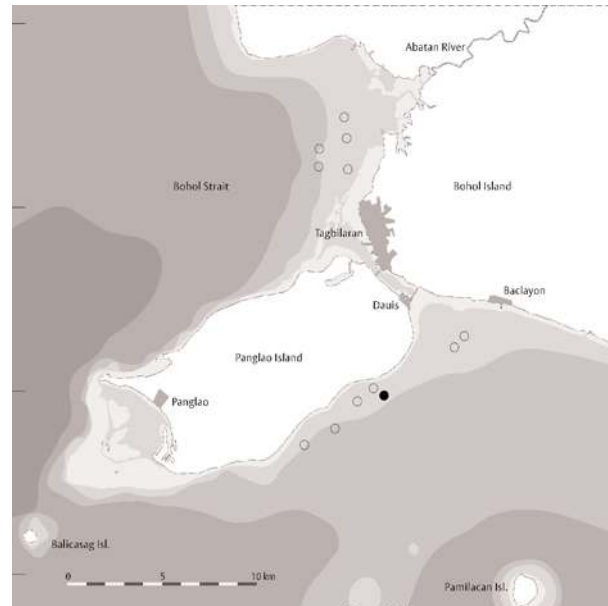
Sowerby's (1842) species name *P. asper* was preoccupied by Lamarck (1819) for a fossil pectinid (see also ICZN Opinion 311).

Récluz (1843) and Hinds (1845) both introduced a new replacement name for *P. asper* Sowerby (*P. rubicundus* and

P. passerinus respectively). Récluz' name, *P. rubicundus*, has priority and should be used for the present species.

Type data. — *Pecten tricarinatus* Anton: Lectotype (H 28.8 mm, pv) SMTD 6937, designated by Dijkstra (1998a: 29), figured in Dijkstra (2008: 59, figs 19-24). Type locality: China.

Pecten asper Sowerby: Possible syntypes (7 pv) BMNH 20080065, figured in Dijkstra (2008: 59, figs 13-18). Type locality: "New Guinea".



Material examined. — Philippines: PMBP 2004, Stn T6, 34-82 m, 8 v; Stn T7, 61-62 m, 1 v; Stn T9, 97-120 m, 3 v; Stn T11, 78-95 m, 5 v; Stn T14, 101-110 m, 6 v; Stn T18, 80-100 m, 4 v; Stn T25, 160-210 m, 2 v; Stn T28, 80 m, 1 pv (A), 8 v; Stn T29, 77-84 m, 2 v; Stn T30, 59-65 m, 1 v; Stn T43, 70-96 m, 1 v; Stn T44, 83-86 m, 1 v. PANGLAO 2005, Stn CP 2362, 679-740 m, 1 v; Stn DW 2371, 172-175 m, 1 v; Stn CP 2408, 121-137 m, 1 v.

Description. — Shell up to c. 35 mm high, circular, inequivalve, equilateral, left valve flat or very weakly inflated, right valve convex, auricles almost equal in size, unequal in shape; umbonal angle c. 115°; internal rib carinae prominent; hinge teeth weak; left valve with numerous red dots and/or streaks, right valve paler or whitish. Left valve sculptured with 17-18 evenly spaced radial costae of angular section (with sloping sides and narrow crests), solid or with hollow sections laterally. Each interspace slightly wider than one costa; interspaces bearing widely spaced commarginal lamellae; more closely spaced lamellae present on costae late in ontogeny. Posterior auricle slightly larger and closely similar in shape to anterior one, both with similar sculpture of closely spaced commarginal lamellae and a few very weak radial ridges. Right valve with 18-19 evenly spaced radial costae, angular in section in early growth stage but with more rounded crests in late ontogeny, with similar microsculpture to left valve. Byssal notch very shallow, functional ctenolium lacking.

Distribution. — Tropical Indo-West Pacific from southern Japan southwards to northern Australia, and eastwards to

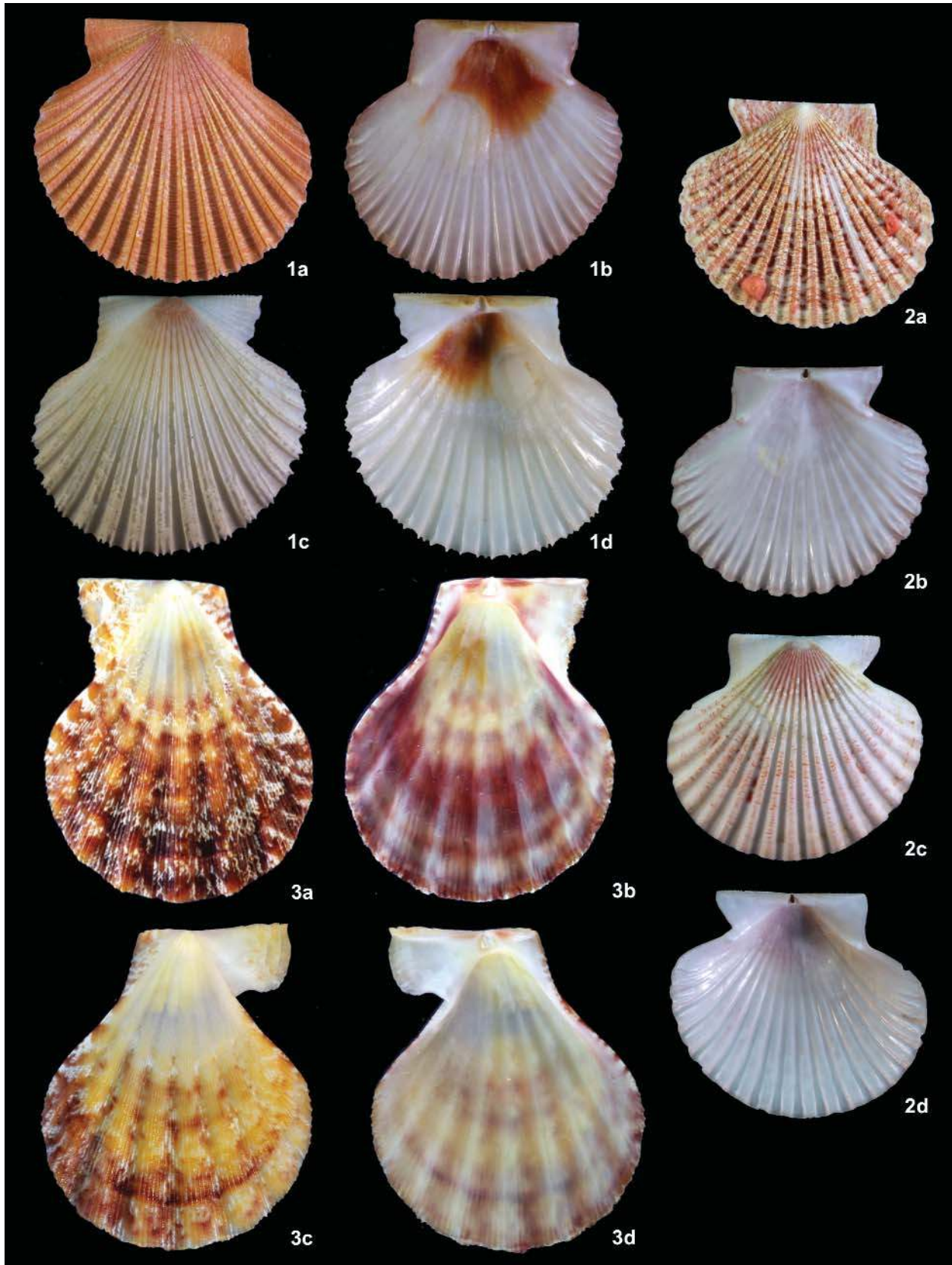


PLATE 15

Figs 1a-d. *Serratovola angusticostata* Dijkstra, 2008, Cebu, Mactan Island, off Punta Engano, 10°19'N, 124°01'E, 80-150 m, live, tangle-net, 1981, pv, H 30.1 mm (ZMA Moll. 147248, paratype). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Serratovola rubicunda* (Récluz in Chenu, 1843), Bohol, offshore, 9°32'N, 123°54'E, 100-120 m, live, tangle-net, 1984, pv, H 32.9 mm (ZMA Moll. 142737). **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Complicachlamys wardiana* Iredale, 1939, Balicasag Island, 9°31'N, 123°41'E, 120-130 m, live, tangle-net, iv.1996, pv, H 31.5 mm (ZMA Moll. 139558). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.

Tonga, Southern Japan, Taiwan, East and South China Sea, Philippine Islands and Borneo: 10-100 m (Bernard, Cai & Morton, 1993: 52); Papua New Guinea: 45-100 m (Dijkstra, 1998a: 29); Solomon Islands: 191-381 m, dead, Fiji: 80-120 m, and Tonga: 79-82 m (Dijkstra & Maestrati, 2008: 111). Present specimen from the Philippines alive at 80 m. Living rarely in shallow waters, more frequent in deep water to upper bathyally, on bottoms of soft sediments (sand and/or mud).

Remarks. — The present material from the Philippines is identical to *S. rubicunda* in all characters. In the literature, *Serratovola* species from the Indo-West Pacific are often misidentified or references are mixed. For clarification of different taxa see Dijkstra (2008: 60).

CHLAMYDINAE Teppner, 1922

Diagnosis. — Pectinidae having a persistent byssal notch and ctenolium, most species with radial costae or plicae that crenulate valve margins. Internal rib carinae lacking. Dentition simple, of dorsal and resilial teeth.

CHLAMYDINI Teppner, 1922 [emend. Waller, 1993]

Diagnosis. — Chlamydinae with microsculpture in early ontogeny of fine antimarginal ridgelets, crossing early radial sculpture once it develops; shagreen microsculpture present in early growth stage of many taxa and throughout ontogeny in some. Internal rib carinae lacking except in *Notochlamys* and *Equichlamys*. Primary radial costae subdividing or intercalated, to increase rather irregularly. Dorsal and resilial teeth present.

Complicachlamys Iredale, 1939

Complicachlamys Iredale, 1939: 362. Type species (by original designation): *Complicachlamys wardiana* Iredale, 1939; Recent, Queensland, Australia.

Diagnosis. — Elongate, medium-sized Chlamydini with 7-9 primary and numerous secondary radial costae; valves flattened, subequilateral; interstitial commarginal sculpture present, but no shagreen microsculpture; auricles very unequal, anterior large, posterior small; hinge teeth small, with obsolete resilial teeth and prominent dorsal teeth, intermediate teeth lacking; byssal notch deep, ctenolium well-developed.

Distribution. — Pliocene to Recent. Tropical southwestern Pacific; living littorally.

Remarks. — Iredale (1939: 362) introduced *Complicachlamys* and included several 'representative' species, viz. *Complicachlamys fulvicostata* A. Adams & Reeve, 1850 [sic], *Complicachlamys luculenta* Reeve, 1853 (in 1852-53) [sic] = *Complicachlamys dringi* Reeve, 1853 (in 1852-53) [sic], and *Complicachlamys crouchi* Smith, 1892 [sic]. All these species

have shagreen microsculpture and should be placed in *Semipallium* Jousseume in Lamy, 1928. *Complicachlamys* does not have this peculiar microsculpture, although Iredale (1939: 362) mentioned sculpture in the interstices of the secondary radial costae "producing a honeycomb effect", which is somewhat similar to the shagreen sculpture of *Semipallium*. *Complicachlamys* has interstitial commarginal sculpture of curved lamellae, producing hollow sections on most specimens.

Hertlein (1969: N366) treated *Complicachlamys* as a junior synonym of *Semipallium*, followed by Vaught (1989: 119). Wagner (1989b: 111) considered *Complicachlamys* to be a junior synonym of *Chlamys* Röding, 1798.

Complicachlamys differs from *Chlamys* and *Semipallium* in lacking shagreen microsculpture. Other characters (outline, primary and secondary radial costae, highly unequal auricles, deep byssal notch, well-developed ctenolium) are almost indistinguishable from those of *Semipallium*, and it is possible that *C. wardiana* is simply a species of *Semipallium* that has lost shagreen sculpture.

Complicachlamys wardiana Iredale, 1939

Pl. 15 figs 3a-d, Pl. 28 figs 1a-b

Pecten dringi Reeve, 1853 (in 1852-53): sp. 152, pl. 33 fig. 152a (in part); Wagner, 1989b: 114, figs 6, 7 (paralectotypes).

Complicachlamys wardiana Iredale, 1939: 362, pl. 5 figs 25, 25a; Wagner, 1989b: 114, fig. 8 [holotype]; Dijkstra, 1991: 37; Lamprell & Whitehead, 1992: [28], pl. 12 fig. 73; Slack-Smith & Bryce, 2004: 236; Taylor & Glover, 2004: 262; Raines & Poppe, 2006: 186, 187, lower figs; pl. 89 figs 1-3; pl. 135 figs 1-7; pl. 190 figs 1-9; Raines, 2010: 618, pl. 1000 figs 1-7.

Semipallium wardiana (Iredale); Abbott & Dance, 1982: 308, fig.; Wang, 2002: 217, pl. 3 fig. 4.

Semipallium (*Semipallium*) *fulvicostatum* (Adams & Reeve); Wang, 1985: 502, fig. 2 (not *Pecten fulvicostatus* Adams & Reeve, 1850).

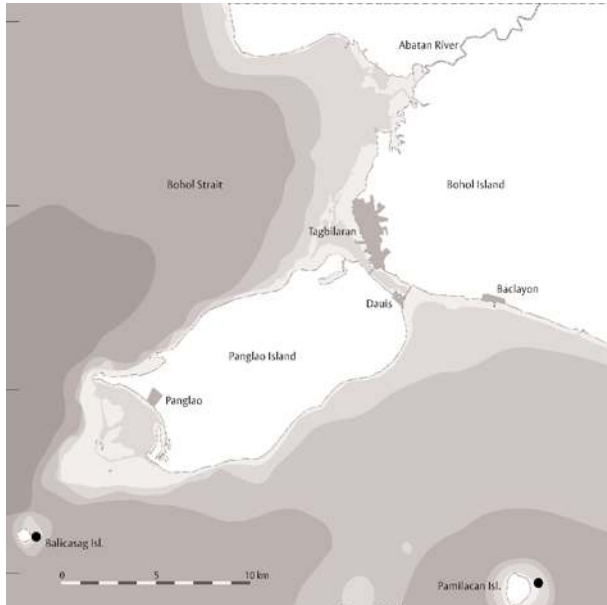
Semipallium luculentum (Reeve); Springsteen & Leobrera, 1986: 328, pl. 93 fig. 15 (not *Pecten luculentus* Reeve, 1853 (in 1852-53)).

Complicachlamys dringi (Reeve); Lamprell & Whitehead, 1992: [28], pl. 12 fig. 72 (in part).

Semipallium fulvicosta (Adams & Reeve) [sic]; Xu & Zhang, 2008: 87, figs 247a-c (not *Pecten fulvicostatus* Adams & Reeve, 1850).

Type data. — Holotype (H 29.5 mm, pv) AMS C.90373. Type locality: Queensland, Whitsunday Passage, Hayman Island.

The paralectotypes of *Pecten dringi* Reeve, 1853 are in fact *Complicachlamys wardiana* Iredale, 1939, collected from Bathurst Island, see Wagner (1989b: 114). The lectotype is *Pecten dringi* Reeve, 1853, a species in *Semipallium*.



Material examined. — **Philippines**: PMBP 2004, Stn L46, 90-110 m, 1 pv (A); Stn S10, 6-14 m, 1 pv (A).

Description. — Shell up to 60 mm high, most specimens to c. 40 mm; rather solid, somewhat prosocline, left valve flattened, right valve slightly more inflated, inequivalve, inequilateral, auricles highly unequal in shape and size, umbonal angle c. 80-85°; colour highly variable, white, cream, yellowish, orange, red, purple, brown or almost black; uniform, mottled or with paler zig-zag streaks. Both valves with 7-9 (8 on most specimens) evenly spaced, low (in Queensland-morph) to more angulate (in WA-morph) radial costae. Numerous closely spaced radial riblets on costae (3-5) and in interspaces (7-10), with rather coarse lamellae on costae in WA-morph, lamellae delicate or lacking in Queensland-morph. Microscopic interstitial commarginal lamellae in WA-morph, more minute or lacking in Queensland-morph. Anterior auricles much larger than posterior, with c. 8-10 fine radial riblets on left valve, c. 5-6 more prominent ones on right valve. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium with c. 8 well-developed teeth.

Distribution. — Tropical Indo-West Pacific from China to the Gulf of Siam and from the Philippine Islands to northern Australia (Raines & Poppe, 2006: 188). Present specimens from the Philippines alive at 14-90 m (minimum depth range). Living byssally attached to undersides of coral slabs on hard reef at extreme low tide, often in silty conditions. Adults may become detached and lie in the silt under slabs.

Remarks. — Present material from the Philippines is indistinguishable from the type material from Queensland.

Specimens from northwestern Australia have coarser sculpture than those from Queensland, but specimens from central northern Australia intergrade slightly.

Coralichlamys Iredale, 1939

Coralichlamys Iredale, 1939: 355. Type species (by original designation): *Coralichlamys acroporicola* Iredale, 1939 (= *Pecten madreporarum* G.B. Sowerby 2nd, 1842); Recent, Australia.

Diagnosis. — Small, coral-dwelling Chlamydini, irregularly shaped, with numerous unevenly spaced radial riblets; auricles highly unequal, posterior declined; antimarginal microsculpture in early ontogeny, secondary commarginal sculpture on anterior auricles and in late ontogeny; with prominent resilial and dorsal teeth; byssal notch deep, ctenolium well developed.

Distribution. — Miocene to Recent (Hayami, 1989: 15). Indo-West Pacific; living subtidally to shallow sublittorally.

Remarks. — Hertlein (1969: N355) treated *Coralichlamys* as a junior synonym of *Chlamys* Röding, 1798 in the *Chlamys* group. Currently the monotypic *Coralichlamys* is regarded as a genus in Chlamydini (Waller, 1993: 203).

Coralichlamys madreporarum (G.B. Sowerby 2nd, 1842)

Pl. 16 figs 1a-d

Pecten madreporarum Sowerby 2nd, 1842: 68, pl. 14, fig. 68; Reeve, 1853 (in 1852-53): sp. 117, pl. 28 fig. 117.

Pecten nigromaculatus Kobelt in Küster & Kobelt, 1888: 273, pl. 71 figs 7-8.

Coralichlamys acroporicola Iredale, 1939: 355, pl. 5 figs 26, 26a.

Chlamys madreporarum (Sowerby); Waller, 1972: 238, pl. 3 fig. 42; Dharma, 2005: 248, pl. 99 figs 10a-d; Xu & Zhang, 2008: 81, fig. 226.

Chlamys (*Coralichlamys*) *madreporarum* (Sowerby); Kira, 1967: 137, pl. 49, fig. 12; Wang, 1983c: 47, pl. 1 fig. 11; Dijkstra, 1986 (in 1983-94): 7, figs; Rombouts, 1991: 23, pl. 24 fig. 10; Hayami, 2000: 899, pl. 447 fig. 15.

Coralichlamys madreporarum (Sowerby); Dijkstra et al., 1990: 7, 8, figs; Dijkstra, 1991: 32; Dijkstra, 1998a: 30; Dijkstra & Knudsen, 1998: 73, pl. 10 figs 44-45; Subba Rao & Dey, 2000: 223; Wang, 2002: 182, pl. 5 fig. 2; Slack-Smith & Bryce, 2004: 236; Raines & Poppe, 2006: 188, 189, pl. 136 figs 2, 4-6; Dijkstra & Moolenbeek, 2008: 18; Raines, 2010: 618, pl. 1000 figs 8-9.

Chlamys (*Chlamys*) *madreporarum* (Sowerby); Lamprell & Whitehead, 1992: [20], pl. 8 fig. 44.

Type data. — *Pecten madreporarum* Sowerby: Lectotype (H 20.1 mm, pv) BMNH 1995083/1 designated by Dijkstra & Knudsen (1998: 75), figured by Sowerby (1842: sp. 70, pl. 14, fig. 68); paralectotype (pr) BMNH 1995083/2, figured by Reeve (1853: sp. 117, pl. 28, fig. 117), paralectotype (pr) BMNH 1995083/3 (not figured). Type locality: "Red Sea" (original description), "Java" (label).

Pecten nigromaculatus Kobelt: Lectotype (H 22 mm, pv) ZMB Moll. 114.608, designated by Dijkstra & Köhler (2008:

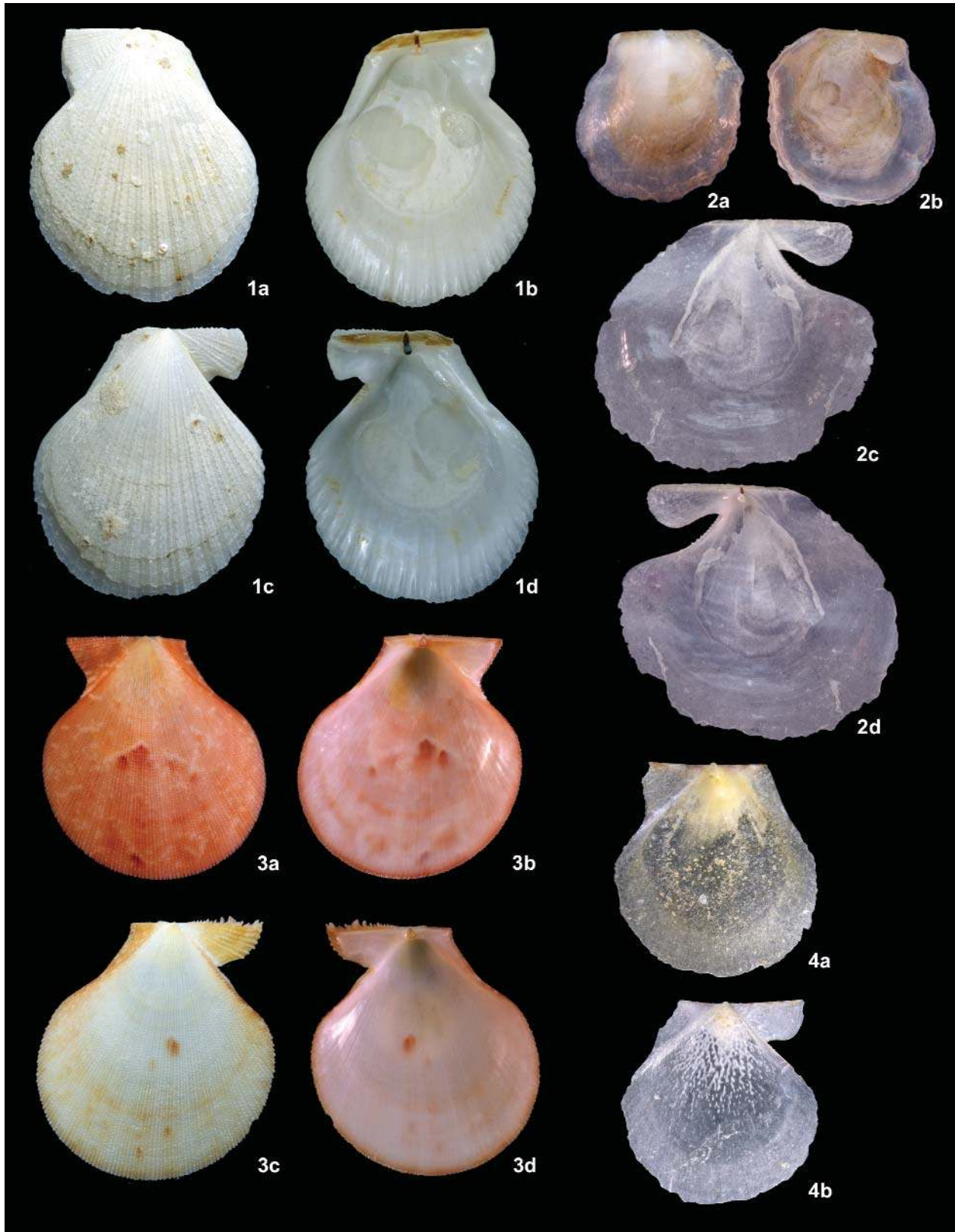
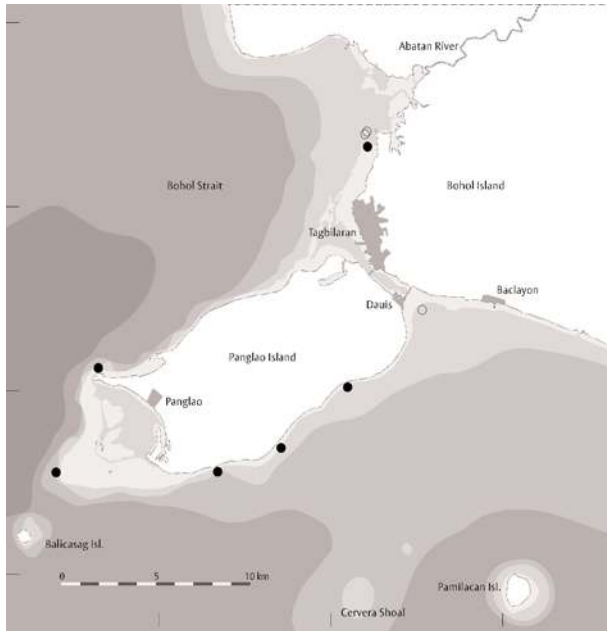


PLATE 16

Figs 1a-d. *Coralichlamys madreporarum* (G.B. Sowerby II, 1842), PMBP 2004 Stn B12, pv, H 16 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Hemipecten forbesianus* A. Adams & Reeve, 1849. **2a-b.** PMBP 2004 Stn B7, pv (young), H 5.6 mm. **2a.** lv exterior. **2b.** rv exterior. **2c-d.** PMBP 2004 Stn B41, rv (adult), H 15.2 mm. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Laevichlamys aliae* (Dijkstra, 1988), PMBP 2004 Stn L79, pv, H 25.8 mm. **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** *Dentamussium obliteratum* (Linnaeus, 1758), PMBP 2004 Stn L46, v. **4a.** lv exterior, H 6 mm. **4b.** rv exterior, H 5.3 mm.

39), labelled "*Pecten nigromaculatus* Dkr/Viti Isl.", i.e., Fiji Islands (Dijkstra & Köhler, 2008: 39, fig. 3e).

Coralichlamys acroporicola Iredale: Holotype (H 29 mm, pv) AMS C.90374. Type locality: Queensland, Low Isles, near Port Douglas.



Material examined. — **Philippines:** PMBP 2004, Stn B3, 8 m, 1 pv (A); Stn B12, 24-27 m, 2 pv (A); Stn B20, 2-8 m, 2 pv (A), 3 v; Stn B39, 17-25 m, 1 pv (A); Stn M1, 0-1 m, 1 pv (A); Stn R10, 2-10 m, 1 pv (A); Stn S13, 8-15 m, 2 v; Stn S21, 4-12 m, 3 v; Stn S25, 21 m, 1 v.

Diagnosis. — Shell up to c. 30 mm high, most specimens xenomorphic or irregular in shape, oblong, prosocline, inequivalve, with right valve slightly more convex than left, inequilateral, auricles unequal in shape and size, umbonal angle 80°-90°; cream or whitish, left valve of most specimens with fine brown maculations, right valve paler and without brown markings in most specimens. Both valves sculptured with numerous, unevenly spaced, scabrous fasciculated radial riblets. Near ventral margin, costae bear microsculpture of fine commarginal lamellae; near posterior margin some specimens also have interstitial microscopic antimarginal striae. Auricles highly unequal, anterior much larger than posterior, bearing fine radial riblets and commarginal lamellae; posterior ones with weaker sculpture, dorsal margin strongly declined. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium with 4-6 teeth. Hinge with prominent resilial teeth; resilium strongly triangularly oblong.

Distribution. — Tropical Indo-West Pacific from southern Japan to northern Australia, westwards into the Indian Ocean into the Red Sea, Gulf of Aden, Malagasy and Mauritius, and eastwards into the Pacific to Samoa (Raines & Poppe, 2006: 188). Present specimens from the Philippines alive at intertidal to 24 m (minimum depth range). Bathymetric range of live-taken specimens is intertidal to 35 m (ZMA, unpubl. data). A coral-dwelling species, living lodged amongst lower *Acropora* branches (Woolacott, 1952: fig. 3, in situ) and usually prefers calmer waters or lagoons.

Remarks. — Although the present specimens from the Philippines are variable in shape and many are deformed as a result of its habitat among coral branches, other characters are identical to those of the type material of *C. madreporarum*.

Hemipecten A. Adams & Reeve, 1849

Hemipecten Adams & Reeve, 1849: 133; Adams & Reeve, 1850: 72 [diagnosis]. Type species (by monotypy): *Hemipecten forbesianus* A. Adams & Reeve, 1849. Living, Sulu Archipelago, Philippine Islands.

Hemipecten [Reeve in] Forbes & Hanley, 1849: 323 [nomen nudum].

Semipecten Fischer, (1880-87) 1886: 945 (invalid name: unjustified emendation of *Hemipecten*).

Diagnosis. — *Hemipectinae* [sic] Habe (1977: 88) [in Japanese]: "Shell medium in size, attached to substrate with right valve, looks like *Anomia chinensis*. Shape of the shell irregular and thin, right valve with anterior auricle only, deep byssal notch, pectinated in anterior edge, left valve with well developed anterior auricle (only anterior auricle is developed well)" [translation of original diagnosis]. An unevenly shaped (*Anomia*-like), inaequivalve pectinid; antimarginal microsculpture fine; slightly auriculated posteriorly; hinge edentulous; resilium high, narrow (*Spondylus*-like); resilial teeth of right valve towards resilium; hinge plate broad with weak transverse grooves; byssal notch deep, ctenolium prominent.

Distribution. — Pliocene to Recent, Indo-West Pacific (Hayami, 1989: 15), living intertidally to sublittorally.

Remarks. — Hertlein (1969: N354) placed *Hemipecten* in the *Eburneopecten* group, together with the extant genera *Cyclopecten* Verrill, 1897 (with subgenera *Chlamydella* Iredale, 1929 and *Pectinella* Verrill, 1897), *Palliolium* Monterosato, 1884 (with subgenera *Delectopecten* Stewart, 1930, *Hyalopecten* Verrill, 1897 and *Lissochlamis* Sacco, 1897) and *Pseudamussium* Mörch, 1853. *Cyclopecten* and *Chlamydella* (a junior synonym of *Cyclochlamys* Finlay, 1926) are now considered to be genera of Propeamussiidae. *Palliolium* and *Pseudamussium* were placed by Waller (1991: 35; 1993: 198) in Palliolini, a tribe of Pectininae. *Delectopecten* is now the only extant genus of Camptonectinae Habe, 1977 (see Waller & Marincovich, 1992: 219). *Hyalopecten* has no *Camptonectes*-like (antimarginal) microsculpture and is closely related to the radially sculptured ancestor *Praechlamys* Allasinaz, 1972 (see Waller & Marincovich, 1992: 219). The remaining genus *Lissochlamis* has simple antimarginal microsculpture without radial macrosculpture and perhaps therefore could be placed in Camptonectinae. Yonge (1981) stated that *H. forbesianus* has a homorhabdic gill, unlike all other Pectinidae, but Beninger & Decottignies (2008) demonstrated that this species actually has the same heterorhabdic gill as all other pectinids, removing concerns about its taxonomic position. Habe (1977: 88) placed *Hemipecten* in a new subfamily Hemipectininae, but T.R. Waller (USNM, pers. comm.) stated that it is most closely related to *Laevichlamys* and should be placed in Chlamydini.

***Hemipecten forbesianus* A. Adams & Reeve, 1849**

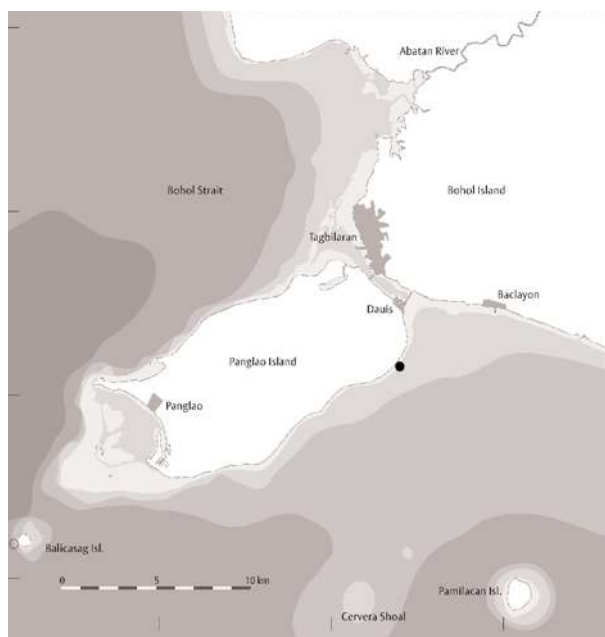
Pl. 16 figs 2a-d

Hemipecten forbesianus Adams & Reeve, 1849: 133, pl. 1 fig. 2; Reeve, 1849: sp. 1, pl. 1 figs 1a-c, 2a-d; Adams & Reeve, 1850: 72, pl. 20 figs 1a-c, 2a-d; Pelseneer, 1911: 16, 31, pl. 12 fig. 13 (anatomy); Kuroda, 1931: 82, figs 96-96a; Hertlein, 1969: N354, figs C76.5a-b; Waller, 1972: 256; Higo, 1973: 323; Habe, 1977: 88; Yonge, 1981: 29, figs 2e, 3-5; Koyama et al., 1981: 69; Dance, 1990: 78, pl. 27 fig. 580; Dijkstra, 1990a: 5, pl. 2 figs 11-12; 1991: 24, fig.; Dijkstra et al., 1990: 3, fig.; Dijkstra, 1991 (in 1983-94): 18, figs; Lamprell & Whitehead, 1992: [18], pl. 7 fig. 36; Higo & Goto, 1993: 577; Bernard et al., 1993: 51; Goto & Poppe, 1996: 909; Dijkstra & Marshall, 1997: 89, pl. 7 figs 1-6; Kilias, 1997: 137; Slack-Smith, 1998: 277, fig. 6.18E, F; Higo et al., 1999: 447; Wells, Slack-Smith & Bryce, 2000: 42; Higo, Callomon & Goto, 2001: 157, fig. B490 (lectotype); Slack-Smith & Bryce, 2004: 237; Taylor & Glover, 2004: 262; Dufour, Steiner & Beninger, 2006: 35; Raines & Poppe, 2006: 68, 71, upper figs; pl. 4 fig. 10; Petit, 2007: 99-101; Beninger & Decottignies, 2008: 137-141, figs 1A-h, 2A-F [anatomy] (nomen protectum); Raines, 2010: 594, pl. 988 fig. 4 (determined as *Palliolium minutulum* Dijkstra & Southgate, 2000).

Pecten difformis Odhner, 1917: 15, pl. 1 figs 4-5.

Type data. — *Hemipecten forbesianus* Adams & Reeve: Lectotype (H 29 mm, pv) designated by Dijkstra & Marshall (1997: 89) BMNH 1874.12.11.376, figured in Adams & Reeve (1849: pl. 1 fig. 2; 1850: pl. 20 figs 2a-d); paralectotype (pv) (Adams & Reeve, 1850: pl. 20, figs 1a-c) not in type lot and not traced. Type locality: Philippine Islands, Sulu Sea, c. 26 m.

Pecten difformis Odhner: Syntypes (6 pv) SMNH 1555. Type locality: Western Australia, off Cape Jaubert, Pearl Bank.



Material examined. — **Philippines:** PMBP 2004, Stn B3, 8 m, 1 pv (A); Stn B12, 24-27 m, 2 pv (A); Stn B20, 2-8 m, 2 pv (A), 3 v; Stn B39, 17-25 m, 1 pv (A); Stn M1, 0-1 m, 1 pv (A); Stn R10, 2-10 m, 1 pv (A); Stn S13, 8-15 m, 2 v; Stn S21, 4-12 m, 3 v; Stn S25, 21 m, 1 v.

Description. — Shell up to c. 40 mm high, most specimens smaller, up to 20 mm; semi-transparent or opaque, milky white or cream to reddish brown, fragile, flattened; left valve slightly convex, right valve flat; highly irregular in shape (almost circular to obliquely oblong), inequivalve, inequilateral; auricles unequal in size and shape. Both valves with very delicate antimarginal scratches (*Camptonectes*-like microsculpture) throughout, macrosculpture lacking. Anterior auricle of right valve somewhat declined, separated from disc by suture, bearing weak radial riblets; other auricles not differentiated from disc. Byssal notch extremely deep, curving towards umbo, byssal fasciole small; ctenolium present throughout ontogeny, with 8-12 well developed teeth; outer ligament rather broad, stationary; resilium narrow.

Distribution. — Tropical Indo-West Pacific, from southern Japan southwards to northern Australia, westwards into the Indian Ocean to Réunion, and eastwards into the Pacific to New Caledonia (ZMA, unpublished data; Raines & Poppe, 2006: 70). Present specimen from the Philippines alive at 4-30 m. Bathymetric range of live-taken specimens is 9-56 m (ZMA, unpubl. data). Living attached to the scleractinian coral *Turbinaria* (Yonge, 1981: 29), forming large lettuce leaf-like formations amongst rubble and weed on sand intertidally to sublittorally. Usually found in groups of 5-20 specimens, covered with epiphytic growths on the left valve.

Remarks. — The present specimens are very variable in shape (circular to oblong and oblique), probably caused by their constricted living position on the scleractinian coral *Turbinaria* (Yonge, 1981: 29).

The shell characters of the immature type specimens of *Pecten difformis* from Western Australia are identical to those of *H. forbesianus* at the same size.

For descriptions of soft parts of this species see Yonge (1981) and, for the gills, Beninger & Decottignies (2008).

***Laevichlamys* Waller, 1993**

Laevichlamys Waller, 1993: 204. Type species (by original designation): *Pecten multisquamatus* Dunker, 1864; Recent, tropical western Atlantic.

Diagnosis. — Non-cemented or embedded Chlamydingi with weak radial costae or riblets (unevenly or evenly spaced), shagreen microsculpture secondarily absent from most specimens, intercalated antimarginal striae, commarginal ridges absent, byssal notch deep, ctenolium well-developed, hinge teeth weak.

Distribution. — Upper Miocene to Recent (Waller, 1993: 204). Western Atlantic and Indo-West Pacific; living sublittorally to sublittorally.

Remarks. — Waller (1993: 204) created a new genus for

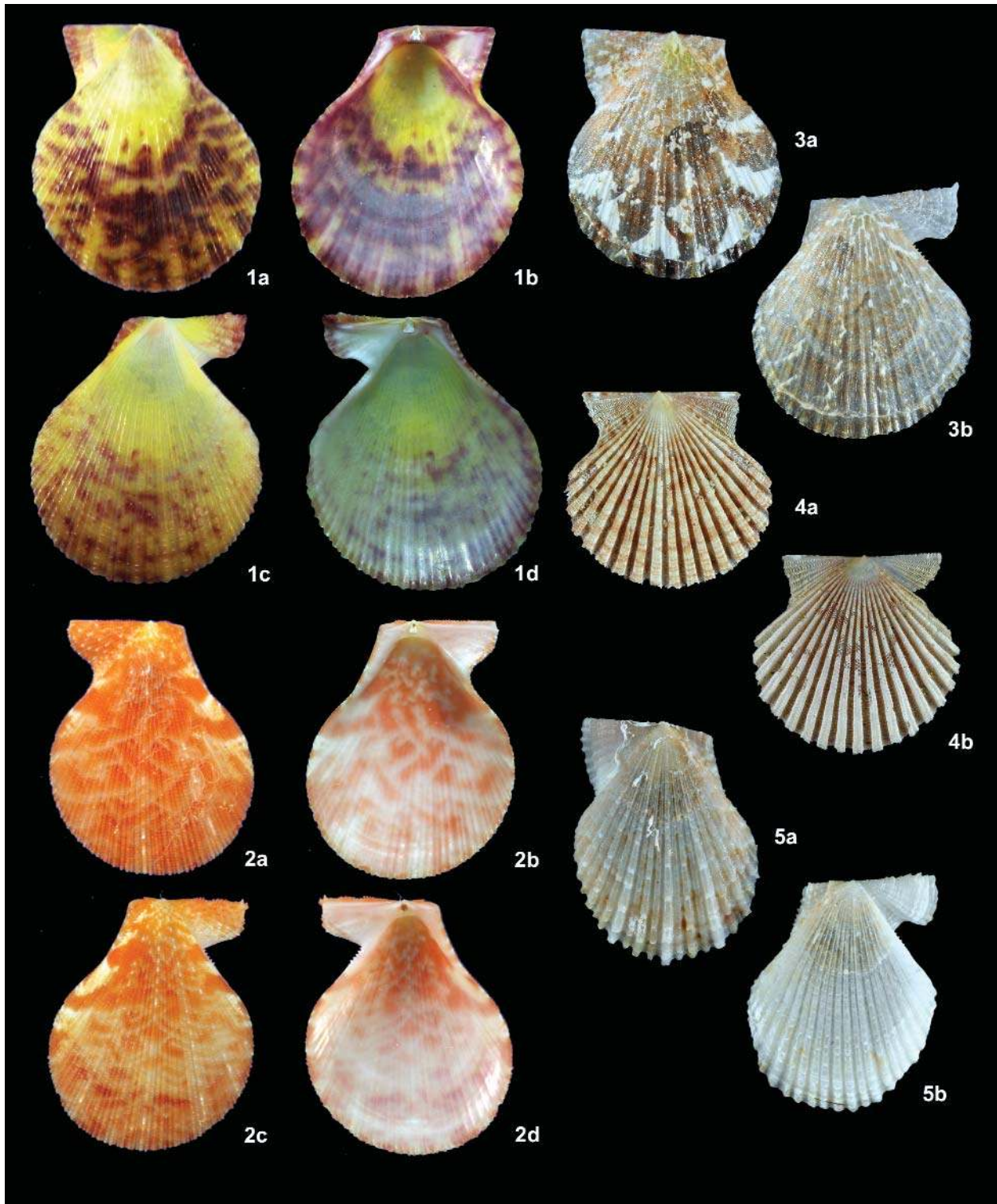


PLATE 17

Figs 1a-d. *Laevichlamys cuneata* (Reeve, 1853), PMBP 2004 Stn B5, pv, H 25.2 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Laevichlamys deliciosa* (Iredale, 1939), PMBP 2004 Stn L76, pv, H 14.2 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-b.** *Laevichlamys cuneata* (Reeve, 1853), PMBP 2004 Stn B3, pv (juvenile), H 7.1 mm. **3a.** lv exterior. **3b.** rv exterior. **Figs 4a-b.** *Serratovola rubicunda* (Récluz in Chenu, 1843), PMBP 2004 Stn T28, pv (juvenile), H 10.2 mm. **4a.** lv exterior. **4b.** rv exterior. **Figs 5a-b.** *Scaechlamys squamea* Dijkstra & Maestrati, 2009, Sulu Archipelago, Jolo Island, 6°01'N, 121°06'E, 50-60 m, live, amongst coral rubble on sand, 1986, pv (juvenile), H 13.9 mm (ZMA Moll. 143723). **5a.** lv exterior. **5b.** rv exterior.

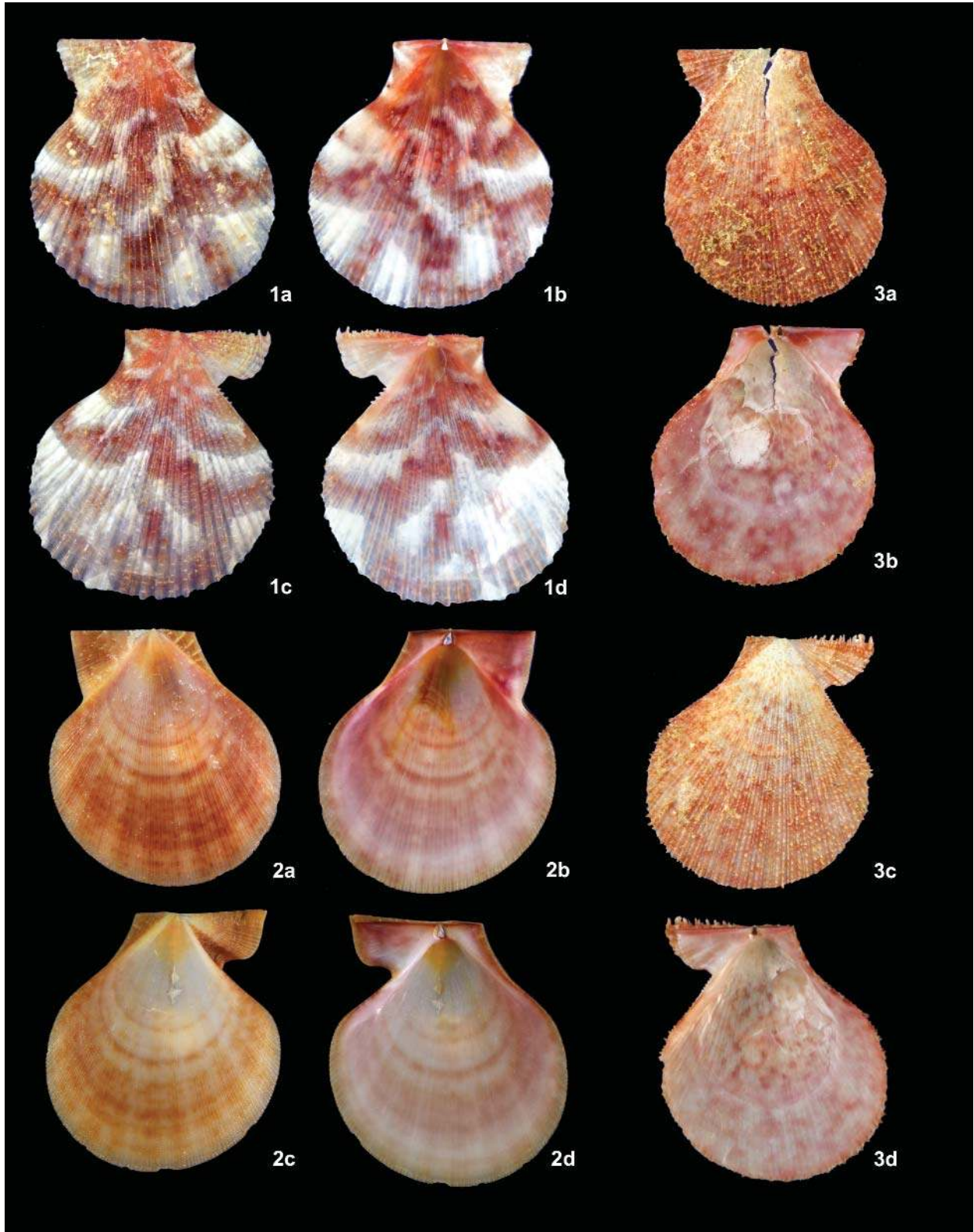


PLATE 18

Figs 1a-d. *Laevichlamys gladysiae* (Melvill, 1888), PMBP 2004 Stn L76, pv, H 16 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Laevichlamys mollita* (Reeve, 1853), PMBP 2004 Stn R19, pv, H 38.2 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Laevichlamys multisqualida* Dijkstra, 1994, PMBP 2004 Stn P1, pv, H 27.8 mm. **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.

the chlamydoid taxa with almost smooth macrosculpture. Most of the representative extant species live in the Indo-West Pacific, the exception being the type species (see above).

***Laevichlamys aliae* (Dijkstra, 1988)**

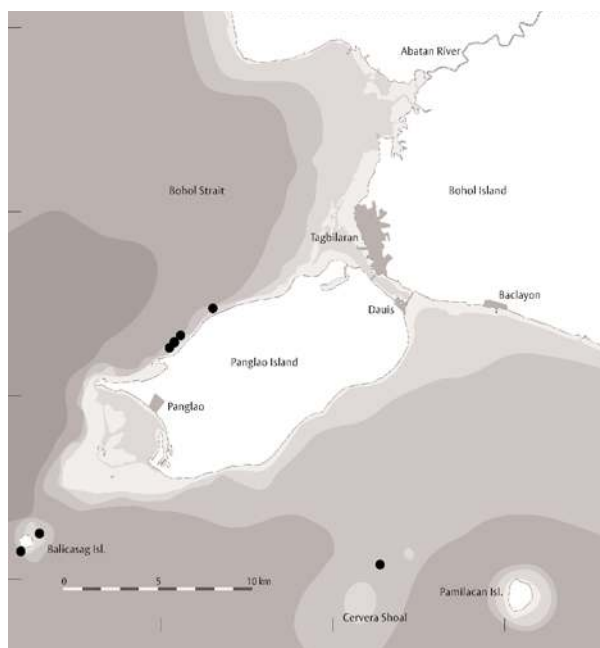
Pl. 16 figs 3a-d, Pl. 28 figs 2a-b

Chlamys aliae Dijkstra, 1988b: 17-18, figs.; 1990: 7. 9; Rombouts, 1991: 90.

Laevichlamys aliae (Dijkstra); Dijkstra & Kastoro, 1997: 266, figs 132-133; Raines & Poppe, 2006: 194, pl. 140 figs 3, 5, 7, pl. 146 fig. 1, pl. 147 figs 2-4; Raines, 2010: 620, pl. 1001 figs 4-5.

Type data. — Holotype (H 26 mm, pv) ZMA Moll. 388046, paratypes (6 pv) 1 MNHN, 1 USNM, 4 ZMA. Type locality: Philippines, Cebu, Mactan Island, Magellan Bay, off Punta Engaño, 60 fathoms [= 110 m], alive, in tangle nets, leg. local fishermen, don. F.G. Dayrit, i. 1987.

Material examined. — **Philippines**: PMBP 2004, Stn L40, 100-120 m, 2 pv (A); Stn L69-73, 90-98 m, 1 pv (A); Stn L76, c. 80 m, 1 pv (A); Stn L77, c. 120 m, 1 pv (A); Stn L79, c. 50 m, 1 pv (A); Stn P3, c. 100 m, 1 pv (A), 1 v; Stn P4, 80-120 m, 2 pv (A); Stn T41, 110-112 m, 1 pv (A).



Description. — Shell up to c. 35 mm high, in general smaller (25-30 mm in height), higher than wide, equally inflated, nearly equivalve and equilateral, auricles rather small and unequal in shape and size, umbonal angle about 90°, colour creamy-brown with milky white spots or radial streaks, sometime uniformly coloured with radial dark and bright brown lines. Both valves sculpture with numerous closely spaced radial scaly riblets (over 100 near the ventral margin). Auricles also similar sculptured with about 12 radial riblets and microscopic intercostal lamellae on anterior auricle. Inner

surface glossy. Byssal notch moderately deep, byssal fasciole narrow. Resilial insertion triangular. Active ctenolium with 4-6 teeth.

Distribution. — Tropical Indo-West Pacific, from the Philippines southwards to the Indonesian Archipelago (Raines & Poppe, 2006: 194). Present specimen from the Philippines alive at 50-110 m. Living amongst coral rubble or gravel on a sandy bottom.

Remarks. — The present specimens are morphologically identical to the type material. Juveniles could be easily mixed with *Laevichlamys mollita* (Reeve, 1853). The latter species has less spiny and weaker radial ribs, is more circular in shape and has larger anterior auricles. Both species occur in deeper water with a similar habitat.

Another somewhat similar-looking species is *Laevichlamys deliciosa* (Iredale 1939), which is smaller in size (up to c. 15 mm in height), more elongate in shape and more brightly coloured.

***Laevichlamys cuneata* (Reeve, 1853)**

Pl. 17 figs 1a-d, 3a-b, Pl. 28 figs 3a-b

Pecten irregularis G.B. Sowerby 2nd, 1842: 69, pl. 13 figs 51, 52; Reeve, 1852 (in 1852-53): sp. 19, pl. 4 fig. 19a (junior primary homonym of *Pecten irregularis* Schlotheim, 1813). *Pecten cuneatus* Reeve, 1853 (in 1852-53): sp. 94, pl. 24 figs 94a, 95.

Pecten (Chlamys) irregularis Sowerby; Dautzenberg & Bavay, 1912: 13.

Chlamys cookei Dall et al., 1938: 90, pl. 24 figs 1-4.

Chlamys irregularis (Sowerby); Kira, 1962: 139, pl. 50 fig. 3; Masuda, 1962: 171, pl. 24 figs 2, 3; Kay, 1979: 525, figs 168B, C; Wagner, 1982: 86; Dijkstra, 1991: 31; Dharma, 1992: 84-85, pl. 20 figs 5, 5a; Bernard et al., 1993: 48; Dijkstra, 1993 (in 1983-94): 8, figs 1-3; Hu & Tao, 1995: 170, pl. 92 fig. 1; Xu, 1997: 68; Wang, 2002: 177, pl. 4 fig. 5; Dharma, 2005: 248, pl. 99 figs 4a, b; Xu & Zhang, 2008: 81, fig. 223.

Chlamys sp. cf. *irregularis* (Sowerby); Waller, 1972: 238, 239, pl. 2 figs 34-35, fig. 3.

Chlamys (Coralichlamys) irregularis (Sowerby); Wang, 1983c: 48, 54, pl. 1 fig. 2; Higo & Goto, 1993: 573.

Chlamys (Chlamys) irregularis (Sowerby); Dijkstra, 1990a: 9, 11; Lamprell & Whitehead, 1992: [20], 174, pl. 8 fig. 41.

Chlamys (Scaechlamys) irregularis (Sowerby); Rombouts, 1991: 33, pl. 12 fig. 8; Higo et al., 1999: 442.

Laevichlamys irregularis (Sowerby); Waller, 1993: 202, 204; Dijkstra, 1997: 320, figs 5-8; Dijkstra, 1998a: 32, pl. 5 figs 1-4.

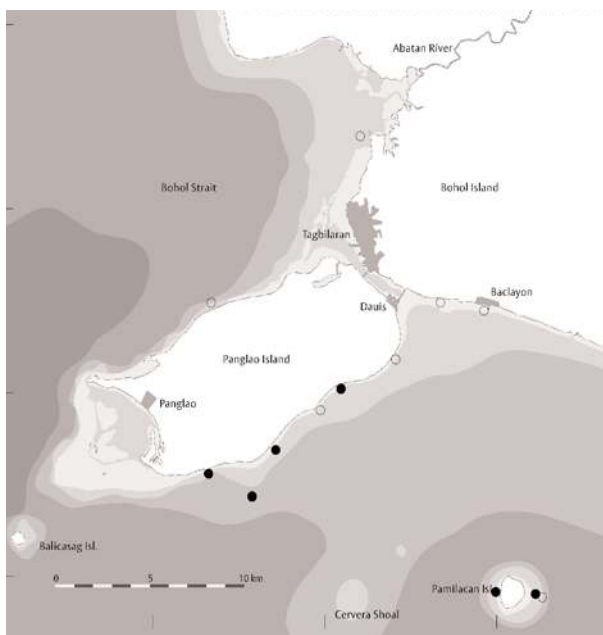
Chlamys (Laevichlamys) irregularis (Sowerby); Hayami, 2000: 899, pl. 447 fig. 10.

Laevichlamys cuneata (Reeve); Raines & Poppe, 2006: 198, 199, pl. 142 figs 1, 5, 6; pl. 151 fig. 4; Dijkstra & Moolenbeek, 2008: 19; Raines, 2010: 622, pl. 1002 fig. 3.

Type data. — *Pecten irregularis* Sowerby: Syntype (H 36.8 mm, pv) BMNH 1950.11.14.39, figured by Sowerby (1842: fig. 51). Type locality: not indicated. Examined typical specimens are from the Philippine Islands (AMS, MNHN, ZMA).

Pecten cuneatus Reeve: 3 syntypes (pv) BMNH 20010485/1-2, two specimens figured by Reeve (pl. 24 figs 94a, 95), one unfigured syntype (pv) BMNH 20010485/3. Type locality: Moluccas, Indonesia.

Chlamys cookei Dall, Bartsch & Rehder: Holotype (H 34.3 mm, pv) USNM 484166. Type locality: Hawaiian Islands, off the entrance to Honolulu Harbor, Oahu, 11 fathoms [= 20 m].



Material examined. — **Philippines:** PMBP 2004, Stn B2, 5 m, 2 pv (A); Stn B3, 8 m, 3 pv (A); Stn B4, 24 m, 1 pv (A), 1 v; Stn B5, 4 m, 2 pv (A); Stn B7, 4-30 m, 1 v; Stn B11, 2-4 m, 1 pv (A), 2 v; Stn B24, 38 m, 1 v; Stn B30, 25 m, 4 v; Stn R6, 5-12 m, 1 v; Stn S1, 5 m, 5 v; Stn S2, 4-5 m, 1 v; Stn S12, 6-8 m, 2 v; Stn S14, 5-12 m, 1 pv (A); Stn S16, 15-18 m, 1 v; Stn S17, 6 m, 1 v; Stn S21, 4-12 m, 3 v.

Description. — Shell up to 40 mm high, most specimens under 30 mm; subcircular to prosocline, inequivalve, inequilateral, left and right valves almost equally inflated, auricles highly unequal in shape and size, umbonal angle c. 80-85°; colour highly variable, cream, yellow, orange, red, purple, brown to almost black; uniform or a variable pattern of dots and/or streaks. Interior glossy, coloured as exterior. Both valves sculptured with c. 40-50 unevenly spaced minutely squamose rounded radial riblets of variable prominence. Intercalated microscopic antimarginal scratches laterally, more prominent on anterior end of right valve. Anterior auricles much larger than posterior, with delicate scaly riblets (c. 10 on left valve, c. 5 coarser ones on right valve), anterior auricle of right valve somewhat declined dorsally. Byssal notch deep, byssal fasciole broad. Functional ctenolium well-developed, with c. 6-8 teeth.

Distribution. — Tropical Indo-West to the central Pacific, from southern Japan southwards to northern Australia, west-

wards into the Indian Ocean to Sri Lanka, and eastwards into the Pacific to French Polynesia (ZMA, unpublished data; Raines & Poppe, 2006: 198). Present specimen from the Philippines alive at 4-24 m. Living byssally attached to underside of coral slabs, amongst rubble and live coral on sandy bottoms.

Remarks. — The present specimens from the Philippines are similar to the type material. Waller (1972: 238) listed a scallop, *Chlamys* sp. cf. *irregularis* (Sowerby), from “Cocos-Keeling, Caroline, Marshall, Gilbert, and Phoenix Islands”, which closely resembles the present one and in fact is conspecific, with identical characters to the type material of *L. cuneata*.

The Hawaiian morph, *Chlamys cookei* Dall, Bartsch & Rehder, 1938, differs slightly from *L. cuneata* in having a more circular shape (*L. cuneata* is more obliquely oblong), by its finer radial sculpture, and by its brighter coloration (dark colours as in typical specimens from the western Pacific are not observed). It is possible that *Chlamys midwayensis* Habe & Okutani, 1968 from Midway Island (in the Hawaiian chain) is conspecific with the Hawaiian morph, although it has somewhat coarser radial sculpture and probably occurs in deeper waters.

Laevichlamys deliciosa (Iredale, 1939)

Pl. 17 figs 2a-d, Pl. 28 figs 4a-b

Mimachlamys deliciosa Iredale, 1939: 350, pl. 5 figs 22-22a.

Chlamys (*Chlamys*) *princessae* Kuroda & Habe in Kuroda et al., 1971: 364, pl. 79 fig. 16, 17; Higo et al., 2001: 156, fig. B445 (paratype, not holotype as indicated).

Chlamys (*Chlamys*) *deliciosa* (Iredale); Dijkstra, 1990a: 8; Lamprell & Whitehead, 1992: [20], 172, pl. 8 fig. 43.

Mimachlamys deliciosa Iredale; Dijkstra, 1990 (in 1983-94): 5, figs.

Chlamys deliciosa (Iredale); Dijkstra, 1991: 30; Dharma, 2005: 248, pl. 99 figs 9a, b.

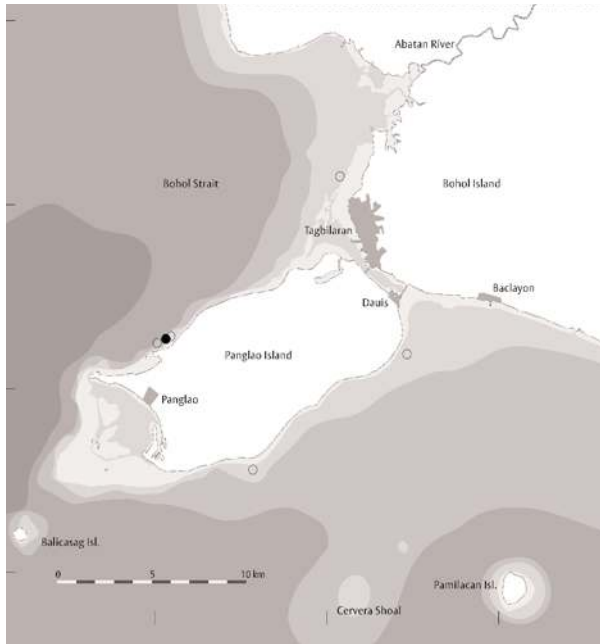
Chlamys (*Chlamys*) *princessae* Kuroda & Habe; Rombouts, 1991: 17, pl. 24 fig. 6.

Chlamys (*Mimachlamys*) *deliciosa* (Iredale); Rombouts, 1991: 28.

Laevichlamys deliciosa (Iredale); Dijkstra & Kastoro, 1997: 268, fig. 134; Dijkstra & Kilburn, 2001: 288, figs 23-24; Raines & Poppe, 2006: 200, 201, upper figs; pl. 142 figs 2, 3; Dijkstra & Maestrati, 2008: 105, figs 44, 45; Raines, 2010: 622, pl. 1002 fig. 2.

Type data. — *Mimachlamys deliciosa* Iredale: Syntype (H 17 mm, pv) AMS C.89669, figured by Iredale (1939: figs 22, 22a), syntypes (4 pv) AMS C.212823. Type locality: Australia, northern Queensland, 0.5 mile south-east of Lizard Island, Low Isles, 14°41'S, 145°29'E, 35 m (Great Barrier Reef Expedition stn 14).

Chlamys (*Chlamys*) *princessae* Kuroda & Habe: Holotype (H 17.5 mm, pv) NSMT-Mo R18503, figured in Higo et al., 2001: 156, fig. B445, refigured in Showa Memorial Institute (ed.), 2002: 60. Type locality: Japan, Sagami Bay.



Material examined. — **Philippines:** PMBP 2004, Stn D15, 53-83 m, 1 v; Stn L49, 90 m, 1 v; Stn L76, c. 80 m, 2 pv (A); Stn P1, 90-200 m, 1 v; Stn P4, 80-120 m, 1 v; Stn T5, 84-87 m, 1 v; Stn T13, 90-100 m, 1 v.

Description. — Shell up to 25 mm high, most specimens under 20 mm; a few specimens subcircular, most oblong, somewhat prosocline, right valve slightly more inflated than left, almost equivalve and equilateral, auricles very unequal in shape and size, umbonal angle c. 80-85°; uniform cream, orange (most specimens), yellow, pink or purple, some specimens patterned with darker rays or blotches. Both valves sculptured with numerous fine, unevenly spaced, spinous radial riblets, increasing to c. 45-50 by intercalating riblets towards ventral margin in adult stage. Radial interspaces bearing granulate or reticulate microsculpture in early radial stage, smooth in late radial stage near ventral margin. Anterior auricles long, bearing 9-14 delicate radial riblets, posterior auricles very short with fewer (6-10) still more delicate riblets. Anterior auricle of left valve somewhat declined near disc flank. Postero-dorsal margin of hinge line somewhat declivous. Byssal notch very weak, byssal fasciole narrow. Functional ctenolium well-developed, with c. 4-6 teeth.

Distribution. — Subtropical-tropical Indo-West Pacific, from southern Japan southwards to northern Australia, westward into the Indian Ocean to Mozambique and South Africa (not recorded from the Red Sea, Arabian Sea and Persian Gulf), and eastwards into the Pacific to the Fiji Islands (Raines & Poppe, 2006: 200). Present specimen from the Philippines alive at c. 80 m. Living amongst coral rubble on sandy or muddy sand bottoms. Shell surface often encrusted with sponges.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material. Typical specimens are strongly oblong, but the shape (subcircular to elongate) and convexity (strongly inflated to more flattened) of this species are rather variable.

***Laevichlamys gladysiae* (Melvill, 1888)**

Pl. 18 figs 1a-d, Pl. 20 figs 2a-b, Pl. 29 figs 1a-b

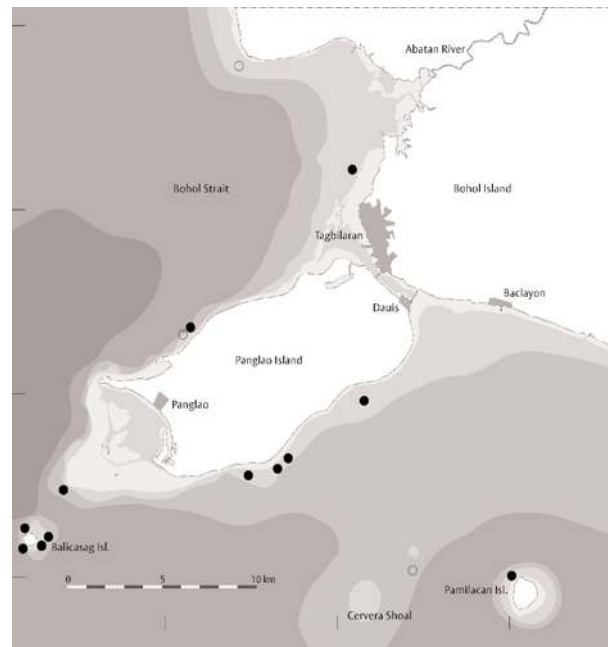
Pecten gladysiae Melvill, 1888: 279, pl. 2 fig. 5.

Chlamys elsae Wagner, 1888: 37, figs 1-6.

Chlamys gladysiae (Melvill); Dijkstra, 1991: 31.

Laevichlamys gladysiae (Melvill); Raines & Poppe, 2006: 200, pl. 143 figs 1-7, pl. 144 figs 4, 6; Raines, 2010: 626, pl. 1004 figs 3-7.

Type data. — *Pecten gladysiae* Melvill: Holotype (H 26.9 mm, pv) NMW 1955.158.10. Type locality: Unknown. *Chlamys elsae* Wagner: Holotype (H 23.8 mm, pv) ZMA Moll. 388030, paratypes (5 pv) collection H.P. Wagner (1313). Type locality: Philippines, Bohol, Panglao, 80-150 m, alive, in tangle nets, 1985.



Material examined. — **Philippines:** PMBP 2004, Stn L42, 80-90 m, 2 pv (A); L46, 90-110 m, 98 pv (A), 7 v; Stn L49, 90 m, 6 v; Stn L65-68, 55-81 m, 49 pv (A), 46 v; Stn L69-73, 90-98 m, 67 pv (A), 16 v; Stn L74-75, 120-139 m, 46 pv (A); Stn L 76, c. 80 m, 4 pv (A), 18 v; Stn P3, c. 100 m, 2 pv (A); Stn P4, 80-120 m, 2 pv (A); Stn T1, 83-102 m, 28 pv (A), 16 v; Stn T4, 82 m, 2 pv (A), 7 v; Stn T11, 78-95 m, 1 pv (A), 2 v; Stn T29, 77-84 m, 2 pv (A); Stn T36, 95-128 m, 1 v; Stn T38, 80-140 m, 5 pv (A); Stn T44, 83-86 m, 1 pv (A). PANGLAO 2005, Stn CP 2407, 256-268 m, 1 v.

Description. — Shell thin, up to c. 30 mm high, most specimen smaller, subcircular to oblique, somewhat higher than wide, weakly inflated, right valve slightly more convex than left valve, inequivalve, inequilateral, auricles strongly unequal, umbonal angle 95°, brightly creamy, yellowish orange or pink coloured with spots, blotches and/or v-shaped streaks, sometimes uniformly coloured, right valve paler. Left valve sculptured with 26-30 somewhat irregularly spaced, weak squamous radial lirae, of which 6 more prominent. Anterior auricle with about 10 radial riblets, posterior 4. Right valve with about 30 radial ribs, more equally of prominence.



PLATE 19

Figs 1a-d. *Laevichlamys squamosa* (Gmelin, 1791), PMBP 2004 Stn R16, pv, H 39.1 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Laevichlamys wilhelminae* (Bavay, 1904), PMBP 2004 Stn R8, pv, H 15.2 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Paschinnites coruscans coruscans* (Hinds, 1845), PMBP 2004 Stn B8, pv, H 7.5 mm. **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** *Mimachlamys albolineata* (G.B. Sowerby II, 1842), PMBP 2004 Stn M40, pv, H 20.9 mm. **4a.** lv exterior. **4b.** rv exterior. **Figs 5a-b.** *Mimachlamys lentiginosa* (Reeve, 1853), PMBP 2004 Stn B6, pv (juvenile), H 4.6 mm. **5a.** lv exterior. **5b.** rv exterior. **Figs 6a-d.** *Pedum spondyloideum* (Gmelin, 1791), PMBP 2004 Stn R14, pv, H 44 mm. **6a.** lv exterior. **6b.** lv interior. **6c.** rv exterior. **6d.** rv interior.

Anterior and posterior auricles with 5 radial riblets each. Byssal notch rather broad. Active ctenolium with 5-6 teeth.

Distribution. — Tropical Indo-West Pacific from the Philippines and Indonesia, westwards into the Indian Ocean to Thailand, and eastwards into the Pacific to the Fiji Islands (ZMA, unpubl. data; Raines & Poppe, 2006: 200). Present specimen from the Philippines alive at 80-120 m (minimum depth range). Living amongst coral rubble or gravel on sandy bottoms.

Remarks. — The present specimens from the Philippines are morphologically similar to the type specimen.

***Laevichlamys mollita* (Reeve, 1853)**

Pl. 18 figs 2a-d, Pl. 20 figs 3a-b, Pl. 29 figs 2a-b

Pecten mollitus Reeve, 1853 (in 1852-53): sp. 100, pl. 25 fig. 100.

Chlamys mollita (Reeve); Kira, 1959: 121 pl. 18 fig. 8; Masuda, 1962: 179, pl. 21 fig. 7, pl. 23 figs 6-8; Dijkstra, 1983 (in 1983-89): 5, figs; Matsukuma et al., 1991: 137, pl. 135 fig. 5.

Chlamys (Chlamys) mollita (Reeve); Rombouts, 1991: 16, pl. 6 fig. 8; Lamprell & Whitehead, 1992: [20], no 40, pl. 8 fig. 40; Higo et al., 1999: 442.

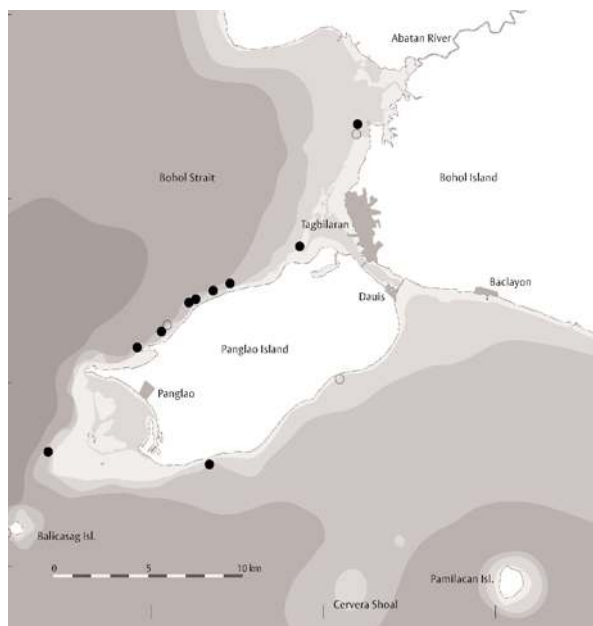
Laevichlamys mollita (Reeve); Waller, 1993: 204; Dijkstra, 1997: 321, figs 9-12; Dijkstra, 1998a: 28, pl. 5 figs 5-8; Raines & Poppe, 2006: 204, 205, lower figs; pl. 146 figs 2-6; Raines, 2010: 620, pl. 1001 figs 6-8.

Type data. — Two syntypes (pv) BMNH 1995081. Type locality: Japan.

Remarks. — The largest specimen in the type lot does not belong to the type series. Reeve (1853) described *Pecten mollita* from Japan. However, the type lot has three labels, on two of which is written "Celebes" (Sulawesi, Indonesia). This again suggests confusion by Cuming over the true locality for these shells. The smallest syntype of *L. mollita* was refigured by Higo et al. (2001: 156, fig. B438).

Material examined. — **Philippines:** PMBP 2004, Stn B2, 5 m, 1 pv (A); Stn B15, 2-4 m, 2 pv (A); Stn B16, 20 m, 3 pv (A); Stn B38, 17-18 m, 1 v; Stn B39, 17-25 m, 1 pv (A); Stn P4, 80-120 m, 1 v; Stn R19, 2-54 m, 2 pv (A); Stn R25, 2-32 m, 1 pv (A); Stn R34, 1-12 m, 1 pv (A); Stn R54, 8-10 m, 1 pv (A); Stn S1, 5 m, 1 v; Stn S8, 28-32 m, 1 pv (A), 5 v; Stn S21, 4-12 m, 3 v; Stn S28, 28-32 m, 1 pv (A), 4 v.

Description. — Shell thin, up to c. 50 mm high, circular, weakly inflated, almost equally inflated, somewhat inequivalve, equilateral, auricles unequal in shape and size, umbonal angle c. 100°; colour highly variable, yellow, orange, red, pink, purple or brown, mottled, with c. 8 paler radial streaks. Both valves sculptured with numerous, evenly spaced, weak, delicate, squamous, round-crested radial riblets (c. 10 per cm in adult stage near ventral margin). Antimarginal microsculpture in radial interspaces in early radial stage and on posterolateral area of disc. Anterior auricles much larger than posterior ones, with squamous radial riblets (c. 12 on lv, 6-8 on rv); c. 4-6 weaker riblets on posterior auricles. Byssal notch rela-



tively deep, byssal fasciole broad. Functional ctenolium well-developed, with 6-9 teeth.

Distribution. — Indo-West Pacific, from southern Japan, Philippine Islands, Malaysia, Indonesia, Papua New Guinea, Solomon Islands to northeastern Australia (Raines & Poppe, 2006: 204). Present specimens from the Philippines alive at 4-28 m (minimum depth range). Living byssally attached under coral boulders or amongst coral rubble on sandy bottoms.

Remarks. — The present specimens of *L. mollita* from the Philippines are indistinguishable from the type material. Juveniles could easily be confused with other small specimens of congeneric multiradial species such as *L. cuneata* and *L. squamosa*.

***Laevichlamys multisqualida* Dijkstra, 1994**

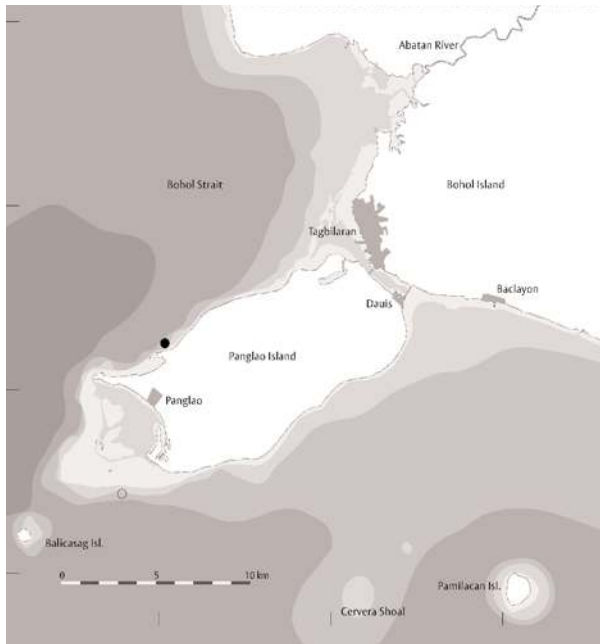
Pl. 18 figs 3a-d, Pl. 29 figs 3a-b

Laevichlamys multisqualida Dijkstra, 1994b: 29-32, figs 1-6 (holotype); Raines & Poppe, 2006: 206, pl. 140 fig. 10, pl. 147 figs 1, 5; Raines, 2010: 620, pl. 1001 figs 1-3.

Type data. — Holotype (H 33 mm, pv) ZMA Moll. 395001, paratypes (7 pv) (1 AMS, 1 MNHN, 1 NSMT, 1 USNM, 3 ZMA). Type locality: Philippines, Bohol, Balicanag Island, 120-150 m, alive, tangle net fishing, 1992.

Material examined. — **Philippines:** PMBP 2004, Stn P1, 90-200 m, 2 pv (A). PANGLAO 2005, Stn DW 2339, 164-176 m, 1 v.

Description. — Shell thin and semi-transparent, up to c. 35 mm high, most specimens smaller, weakly inflated, higher than wide, nearly equivalve and equilateral, auricles strongly unequal in shape and size, umbonal angle c. 90°, colour basically creamy-red with milky white and dark brown spots, right valve paler, innerside nacreous. Both valves and auricles sculptured with numerous scaly, closely spaced, radial riblets, increasing in number to c. 120 to the ventral margin. Hinge



line of anterior auricle straight, of posterior somewhat declined, with prominent squamae on right valve. Byssal notch moderately deep, byssal fasciole narrow. Active ctenolium with 6-7 teeth.

Distribution. — So far only known from the Philippines (Raines & Poppe, 2006: 206). Present specimens from the Philippines alive at 90 m (minimum depth range). Living amongst gravel or coral rubble on a sandy bottom.

Remarks. — The present specimens are morphologically similar to the type material. Juveniles of *L. multisqualida* could be easily mixed with *L. aliae*. The latter species is more inflated and has less prominent scales on the riblets, which are also closer spaced.

Laevichlamys squamosa (Gmelin, 1791)

Pl. 19 figs 1a-d, Pl. 20 figs 4a-b

Ostrea squamosa Gmelin, 1791: 3319, no. 17.

Ostrea anonyma Gmelin, 1791: 3329, no. 73.

Pecten squamosus (Gmelin); G.B. Sowerby 2nd, 1842: 69, pl. 13 figs 48-50; Reeve, 1853 (in 1852-53): sp. 65, pl. 18 figs 65a-b.

Pecten serratus G.B. Sowerby 2nd; Reeve, 1853 (in 1852-53): sp. 46, pl. 12 figs 46a-b (not of G.B. Sowerby 2nd, 1842; junior primary homonym of *Pecten serratus* Nilsson, 1827).

Pecten dissimilis Fischer, 1858: 341 (in part) (junior primary homonym of *Pecten dissimilis* Fleming, 1828).

Pecten (Chlamys) squamosa [sic] (Gmelin); Dautzenberg & Bavay, 1912: 14; Adam & Leloup, 1939: 58; Wilkins, 1953: 14-15, pl. 5 figs 16-18.

Mimachlamys grossiana Iredale, 1939: 352, pl. 5 figs 23-23a.

Chlamys squamosa (Gmelin); Waller, 1972: 237, fig. 3, pl. 3 figs 38-41; Abbott & Dance, 1982: 312, fig; Dijkstra, 1984 (in 1983-94): 16, figs; Wells & Bryce, 1988: 158, pl. 60 fig. 584; Dijkstra et al., 1989: 24; Dijkstra et al., 1990: 4, 5,

figs; Dharma, 1992: 84, pl. 20 fig. 4; Bernard et al., 1993: 49; Wells, Slack-Smith & Bryce, 2000: 42; Dharma, 2005: 248, pl. 99 figs 3a-c; Xu & Zhang, 2008: 83, fig. 228.

Chlamys (Mimachlamys) squamosa (Gmelin); Rombouts, 1991: 30, pl. 12 fig. 2.

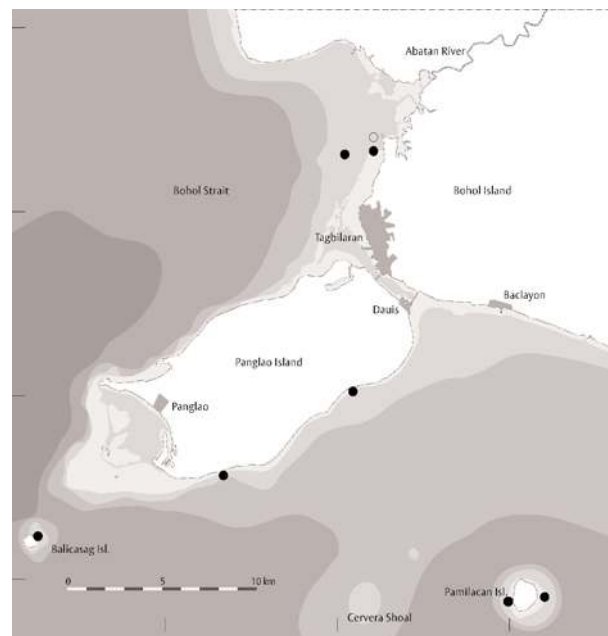
Chlamys (Chlamys) squamosa (Gmelin); Springsteen & Leobrera, 1986: 329, pl. 93 fig. 16; Dijkstra, 1990a: 11; Lamprell & Whitehead, 1992: [18], pl. 7 fig. 39; Subba Rao & Dey, 2000: 222.

Laevichlamys squamosa (Gmelin); Waller, 1993: 203, 204; Dijkstra, 1997: 322, figs 13-17; Dijkstra, 1998a: 33, pl. 6 figs 1-4; Slack-Smith & Bryce, 2004: 237; Raines & Poppe, 2006: 208, 211, upper figs; pl. 151 figs 1-3, 5-6; pl. 152 figs 1-7; pl. 296 fig. 2; Dijkstra & Moolenbeek, 2008: 19; Raines, 2010: 624, pl. 1003 figs 1-7.

Chlamys (Laevichlamys) squamosa (Gmelin); Hayami, 2000: 899, pl. 447 fig. 11.

Type data. — *Ostrea squamosa* Gmelin: Gmelin (1791) referred only to Lister (1687: pl. 184 fig. 21) for both nominal species *Ostrea squamosa* and *O. anonyma*, which are thus objective synonyms. The lectotype of *O. squamosa* (H 35 mm, lv) BMNH (Sloane collection), refigured by Wilkins (1953: pl. 5, figs 16-18), designated by Dijkstra (1991: 32), is thus also the lectotype of *O. anonyma*. Type locality: Unknown. Designated as Queensland, Australia by Dijkstra (1998a: 33).

Mimachlamys grossiana Iredale: Holotype (H 44 mm, pv) AMS C.19177. Type locality: Australia, Queensland, Moreton Bay, Stradbroke Island.



Material examined. — **Philippines**: PMBP 2004, Stn B2, 5 m, 1 pv (A); Stn B20, 2-8 m, 3 pv (A); Stn B24, 38 m, 1 pv (A); Stn R1, 5-7 m, 1 pv (A); Stn R11, 4 m, 1 pv (A); Stn R16, 6-22 m, 1 pv (A); Stn R40, 8-33 m, 1 pv (A); Stn R43, 3-41 m, 1 pv (A); Stn S1, 5 m, 4 v; Stn S5, 2-4 m, 1 v; Stn S25, 21 m, 3 v.

Description. — Shell up to 65 mm high, most specimens under 45 mm; thin, flattened, subcircular to oblong, right valve slightly more inflated than left, inequivalve, almost

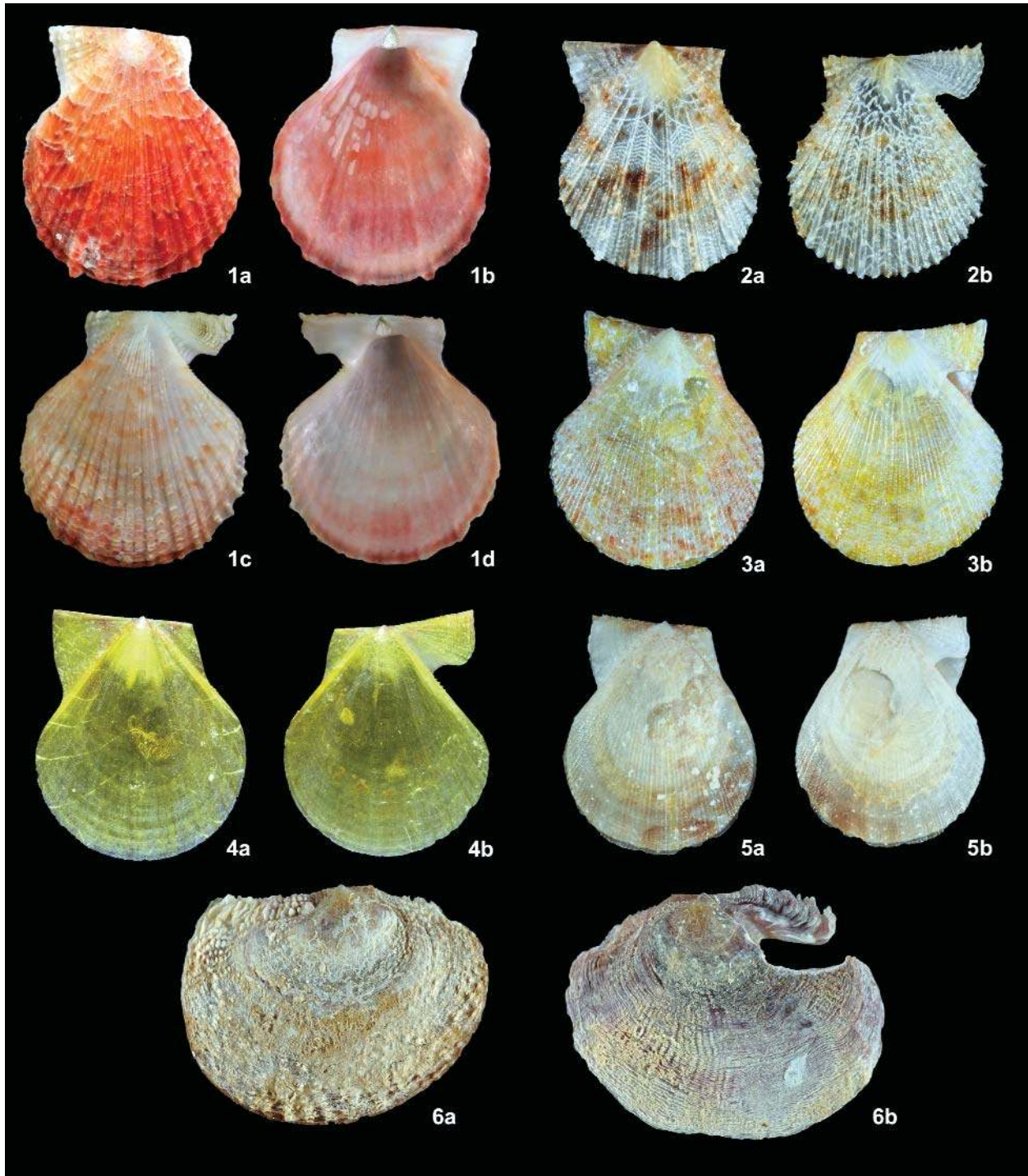


PLATE 20

Figs 1a-d. *Scaechlamys squamea* Dijkstra & Maestrati, 2009, Balicasag Island, 9°31'N, 123°41'E, 30 m, live, amongst coral rubble on sand, dive, 2003, pv, H 36 mm (ZMA Moll. 148248). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-b.** *Laevichlamys gladysiae* (Melvill, 1888), PMBP 2004 Stn L65-68, pv (juvenile), H 5 mm. **2a.** lv exterior. **2b.** rv exterior. **Figs 3a-b.** *Laevichlamys mollita* (Reeve, 1853), PMBP 2004 Stn B15, pv (juvenile), H 8.6 mm. **3a.** lv exterior. **3b.** rv exterior. **Figs 4a-b.** *Laevichlamys squamosa* (Gmelin, 1791), PMBP 2004 Stn B2, pv (juvenile), H 3.9 mm. **4a.** lv. exterior. **4b.** rv exterior. **Figs 5a-b.** *Laevichlamys wilhelminae* (Bavay, 1904), PMBP 2004 Stn B4, pv (juvenile), H 8.9 mm. **5a.** lv exterior. **5b.** rv exterior. **Figs 6a-b.** *Pedum spondyloideum* (Gmelin, 1791), PMBP 2004 Stn R51, pv (juvenile), H 10.9 mm. **6a.** lv exterior. **6b.** rv exterior.

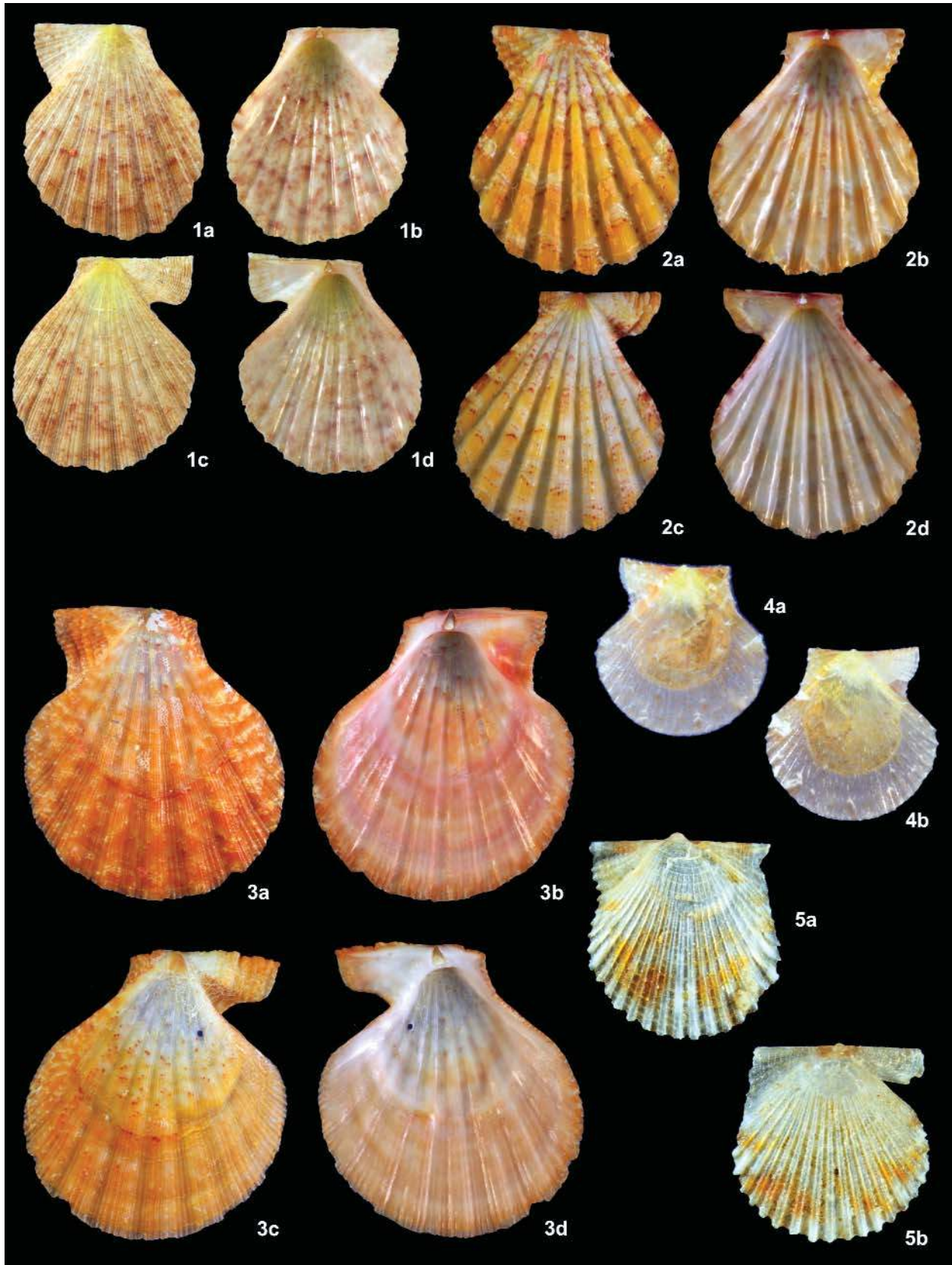


PLATE 21

Figs 1a-d. *Semipallium barnetti* Dijkstra, 1988, Balicasag Island, 9°30'N, 123°41'E, 90-150 m, live, tangle-net, 2006, pv, H 19.9 mm (ZMA Moll. 147036). **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Semipallium diana* (Crandall, 1979), Bohol, offshore, 9°50'N, 124°10'E, 90-180 m, live, tangle-net, 1991, pv, H 25 mm (ZMA Moll. 144182). **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Semipallium dringi* (Reeve, 1853), Bohol, Panglao Island, 9°35'N, 123°49'E, 20-30 m, live, amongst coral rubble on sand, dive, 2004, pv, H 37 mm (ZMA Moll. 142593). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior. **Figs 4a-b.** "*Mimachlamys*" *kauaiensis* (Dall, Bartsch & Rehder, 1938), PMBP 2004 Stn L41, pv, H 6.5 mm. **4a.** lv exterior. **4b.** rv exterior. **Figs 5a-b.** *Haumea rehderi* (Grau, 1960), PMBP 2004 Stn T26, pv (juvenile), H 2.9 mm. **5a.** lv exterior. **5b.** rv exterior.

equilateral, auricles highly unequal in size and shape, umbonal angle c. 90°; colour variable, found in almost all colours, with zigzag pattern, paler radial streaks, and/or blotched, a few specimens uniform in colour. Radial sculpture of left valve irregular in prominence and unevenly spaced, with 9-12 low, coarsely scaly radial riblets; 1-5 weak squamous secondary riblets intercalated in each radial interspace; some specimens with almost smooth interspaces. Sculpture on right valve of more even prominence, with c. 25-35 closely spaced, narrow, squamous radial riblets. Antimarginal microsculpture in interspaces in early growth stage, shagreen microsculpture lacking. Anterior auricles much larger than posterior ones, bearing c. 6 scaly radial riblets, almost smooth on left valve, more prominent on right valve. Posterior auricles smooth or weakly sculptured with a few commarginal lamellae. Byssal notch relatively deep, byssal fasciole broad. Functional ctenidium well-developed, with 5-8 teeth.

Distribution. — Tropical Indo-West Pacific, from southern Japan southwards to northern Australia, westwards into the Indian Ocean to Kenya and Mauritius (not recorded from the Arabian Sea and the Red Sea), eastwards into the central Pacific to Tonga (not known from the Hawaiian Islands or French Polynesia) (Raines & Poppe, 2006: 210). Present specimens from the Philippines alive at 4-38 m (minimum depth range). Bathymetric range of live-taken specimens is intertidal to 80 m (ZMA, unpubl. data). Common in shallow water. Living byssally attached to undersides of rock or coral boulders or amongst coral rubble on soft sediment (muddy sand or sand).

Remarks. — The present specimens from the Philippines are identical to the type specimen.

This species has often been attributed incorrectly to different nominal taxa in the past (see Iredale, 1939: 353) from outside Australia. Therefore Iredale (1939: 352) considered the Queensland specimens to be distinct. However, Sloane's specimen (lv), preserved in the Natural History Museum (formerly BMNH) at London, is morphologically indistinguishable.

Laevichlamys wilhelminae (Bavay, 1904)

Pl. 19 figs 2a-d, Pl. 20 figs 5a-b

Chlamys wilhelminae Bavay, 1904: 200, pl. 6 figs 13-14.

Chlamys wilhelminae var. *maculata* Bavay, 1904: 201, pl. 6 figs 3-4.

Pecten (*Chlamys*) *wilhelminae* (Bavay); Dautzenberg & Bavay, 1912: 17.

Chlamys wilhelminae Bavay; Dautzenberg & Bouge, 1933: 428; Dijkstra, 1987 (in 1983-94): 3, figs; Dijkstra, 1989: 14, 18, figs.

Chlamys marshallensis Waller, 1972: 236, pl. 2 figs 26-33, 36, 37, text figs 3, 16, table 4.

Chlamys (*Chlamys*) *wilhelminae* Bavay; Dijkstra et al., 1989: 24; Dijkstra, 1990: 6, 7, figs; Dijkstra, 1990a: 9; Rombouts, 1991: 21, pl. 24 fig. 9; Lamprell & Healy, 1998: 238, fig. 709.

Laevichlamys wilhelminae (Bavay); Waller, 1993: 204; Dijkstra, 1997: 323; Raines & Poppe, 2006: 212, 213, lower figs; pl. 154 figs 1-7; Dijkstra & Moolenbeek, 2008: 20; Raines, 2010: 622, pl. 1002 figs 4-6.

Remarks. — *Chlamys wilhelminae* var. *maculata* is only a colour variant of *C. wilhelminae* (see description).

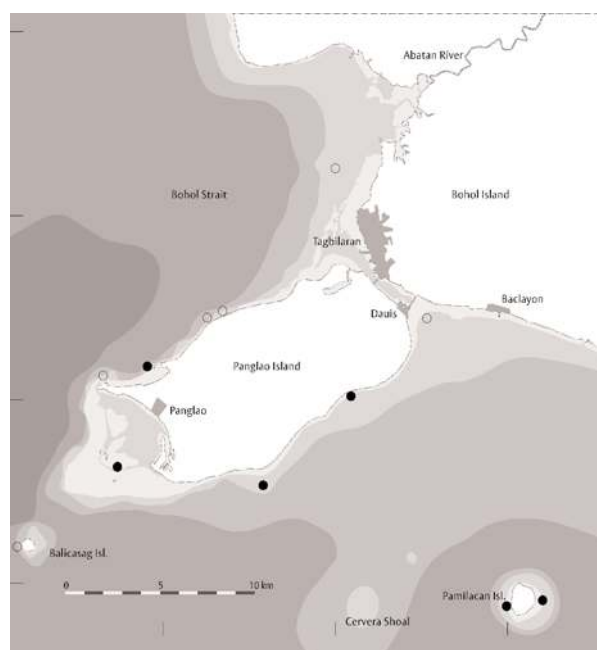
Waller (1972: 237) discussed *Chlamys marshallensis* with the closely related congeneric species *Laevichlamys squamosa* (Gmelin, 1791) and *L. irregularis* (G.B. Sowerby 2nd, 1842), but overlooked *L. wilhelminae*, which is morphologically identical to *C. marshallensis* (see also Waller 1993: 202).

Type data. — *Chlamys wilhelminae* Bavay: Holotype (H 25.9 mm, pv) ZMA Moll. 304003, paratypes (7 pv): 2 MNHN Moll 21204-5, 2 NMW 1955.158.01309, 3 ZMA Moll. 304004. Type locality: "Moluques" [Maluku, Indonesia].

Chlamys wilhelminae var. *maculata* Bavay: Syntypes (2 pv) NMW 1955.158.596, ZMA Moll. 304005. Type locality: Not mentioned explicitly, herein Loyalty Islands (see Bavay, 1904: 201).

Chlamys marshallensis Waller: Holotype (H 13.5 mm, pv) USNM 701200, paratypes (3 pv + 2 v): 1+1 v USNM 701196 (stn EMBL 6), 1 v USNM 701197 (stn EMBL-20), 1 USNM 701198 (stn EMBL 21), 1 USNM 701199 (stn EMBL 12). Type locality: Marshall Islands, Eniwetok Atoll, lagoon, 11°24'12"N, 162°22'E, stn EMBL 21, 65 ft [= 20 m], living deep within a crevice in a head of *Porites*, scuba, leg. T. Waller, 27.09.1969.

Material examined. — **Philippines:** PMBP 2004, Stn B4, 24 m, 1 pv (A); Stn B5, 4 m, 1 pv (A), 1 v; Stn B11, 2-4 m, 1 pv (A); Stn B12, 24-27 m, 1 v; Stn B17, 3-21 m, 1 v; Stn B21, 20-21 m, 1 v; Stn B22, 15-20 m, 1 pv (A); Stn B24, 38 m, 2 v; Stn B29, 26 m, 2 v; Stn B36, 24 m, 1 pv (A); Stn B39, 17-25 m, 1 pv (A); Stn B41, 17-19 m, 1 v; Stn R8, 4-24 m, 1 pv (A); Stn R40, 8-33 m, 1 pv (A); Stn S1, 5 m, 1 v; Stn S13, 8-15 m, 1 v; Stn S15, 4-6 m, 1 v; Stn S28, 28-32 m, 1 v.



Description. — Shell thin, up to 35 mm high, most specimens 20–25 mm, semitransparent to opaque, oblong, somewhat prosocline, moderately inflated, right valve slightly more convex than left, to equally convex, almost equivalve, inequilateral, auricles highly unequal, umbonal angle c. 85–90°; colour variable, whitish or cream with pink radial streaks or radially arranged maculations (visible on the interior); some specimens uniform yellow, orange or pink; interior white, glossy.

Both valves sculptured with numerous (c. 60–70) weak, low, rounded, squamous riblets, uneven in spacing and prominence. Antimarginal microsculpture commences in radial interspaces in early radial stage and spreads laterally; lacking on central disc. Anterior auricles much larger and differing in shape from posterior ones, bearing 6–8 radial riblets on left valve and 5 more prominent ones on right valve. Posterior auricles strongly declined dorsally, bearing 2–3 weak radial riblets. Byssal notch relatively deep, byssal fasciole rather broad. Functional ctenolium well-developed, with 4–6 teeth. Resilial insertion narrow and oblong.

Distribution. — Tropical Indo-West Pacific, from the Philippine Islands southwards to northern Australia, Coral Sea, Marshall Islands, New Caledonia, and eastwards to the Society Islands (French Polynesia) (MNHN, ZMA, unpubl. data; Raines & Poppe, 2006: 212). Present specimens from the Philippines alive at 4–50 m (minimum depth range). Common in shallow water, rarely in deep water to upper bathyal depths. Living byssally attached to rocks or *Acropora* corals, or amongst coral rubble on soft sediments (mainly sand) (see also Waller 1972: 238).

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material.

Juveniles of *L. wilhelminae* could easily be confused with small specimens of *L. cuneata*. The two species have almost identical sculpture, but differ in shape and colour (*L. wilhelminae* is more inflated with more strongly declined posterior auricles, slightly weaker in sculpture, and more transparent and brightly coloured than *L. cuneata*).

Paschinnites Dijkstra & Raines, 1999

Paschinnites Dijkstra & Raines, 1999: 200. Type species (by original designation): *Pecten* (*Chalmys*) [*sic*] *pasca* Dall, 1908; Recent, Easter Island.

Diagnosis. — Small subcircular chlamydoid shells up to c. 20 mm high. Some species (including the type species) byssate in juvenile stage and cemented to hard substrates after a height of c. 9–11 and growing irregularly thereafter; others living byssally attached to hard substrates, without cementation. External prismatic layer lacking from early right dissoconch; antimarginal microsculpture in early preradial stage; shagreen microsculpture and radial macrosculpture present throughout; commarginal sculpture lacking. Byssal notch and functional ctenolium prominent in juvenile stage, absent in cemented adults.

Distribution. — Recent. Tropical and temperate Indo-West Pacific; Kermadec Islands and Easter Island; living in lower shallow waters.

Remarks. — The style of radial sculpture, with each pair of high, narrowly rounded costae separated by a single relatively wide secondary costa, the presence of shagreen microsculpture, the lack of a preradial external calcitic layer in the right valve, and the relatively wide, acline shape of *Paschinnites* confirm separation from the dorsoventrally elongate, prosocline *Semipallium*. Dijkstra & Raines (1999: 200) attributed this present genus to Chlamydiini.

Paschinnites coruscans coruscans (Hinds, 1845)

Pl. 19 figs 3a–d

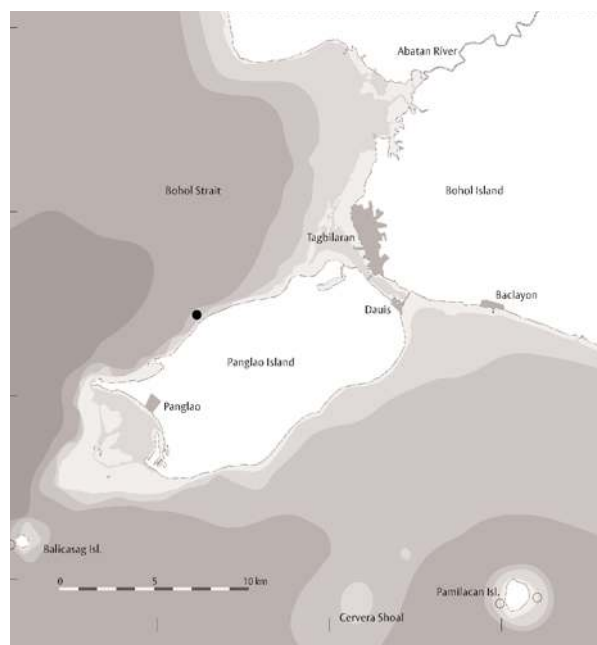
Pecten coruscans Hinds, 1845: 61, pl. 17, fig. 3.

Chlamys coruscans coruscans (Hinds); Waller, 1972: 231, pl. 1 figs 1–19.

Semipallium coruscans coruscans (Hinds); Dijkstra & Kilburn, 2001: 294, figs 31–32; Raines & Poppe, 2006: 236, pl. 186 figs 1, 4–6, 8–9;

Paschinnites coruscans coruscans (Hinds); Paulay, 2003: Appendix 1, Note 39; Dijkstra & Marshall, 2008: 51, figs 35, 48A, D; Raines, 2010: 630, pl. 1006 figs 1–2.

Type data. — Lectotype (H 16.4 mm, pv) BMNH 19709, designated by Waller (1972: 231). Type locality: Marquesas Islands, Nukuhiva, 13 m.



Material examined. — Philippines: PMBP 2004, Stn B8, 3 m, 1 pv (A), 2 v; Stn B11, 2–4 m, 1 v; Stn B38, 17–18 m, 1 v; Stn S14, 5–12 m, 1 v.

Description. — Shell up to 22 mm high, most specimens 10–15 mm in height, subcircular to more elongate, almost equivalve, equilateral (juvenile) to more prosocline (mature), right valve somewhat more convex than left, auricles unequal,

umbonal angle c. 90°; colour highly variable, most specimens whitish, cream or tawny, with opaque white, red or brown maculations; a few specimens uniform bright yellow, purplish or orange. Both valves sculptured with 14-15 primary radial plicae, commencing in early growth stage (c. 0.5 mm), with 50-70 (most specimens with c. 60) squamose secondary radial riblets on and between plicae, giving plicae a tripartite or fasciculate appearance towards ventral margin. Antimarginal microsculpture in preradial stage, replaced by intercostal shagreen microsculpture in radial stage on disc and auricles. Anterior auricles much larger than posterior, with 5-8 prominent, unevenly developed radial riblets; riblets narrower and weaker on posterior auricles. Postero-dorsal margin of hinge line somewhat declined. Byssal fasciole broad, byssal notch shallow. Functional ctenolium with 4-6 teeth. Resilium triangularly elongate. Hinge with weak resilial teeth and more prominent dorsal teeth. Interior plicate.

Distribution. — Tropical Pacific, from southern Japan southwards to Australia, westwards into the Indian Ocean to eastern South Africa (not into the Red Sea), and eastwards into the Pacific to French Polynesia. Eastern South Africa, Zanzibar, Mauritius, Maldives Islands, Cocos-Keeling Islands, southern Japan, southern China, Philippines, eastern Australia, New Caledonia, Loyalty Islands, New Hebrides, Lord Howe Island, Norfolk Island, Kermadec Islands, Mariana Islands, Caroline Islands, Marshall Islands, Gilbert Islands, Fiji Islands, Wallis and Futuna, Samoa, Tonga, Cook Islands, Line Islands, Society Islands, Tuamotu Archipelago, Marquesas Islands, Austral Islands and Pitcairn Island (Waller 1972: 234; Dijkstra & Marshall 1997: 101; Dijkstra & Marshall, 2008: 51; Raines & Poppe, 2006: 236). Present specimen from the Philippines alive at 3 m. Bathymetric range of live-taken specimens is intertidal to 50 m (ZMA, unpubl. data). Living byssally attached to coral or amongst coral rubble or gravel on sandy bottoms.

The subspecies *Paschinnites coruscans hawaiiensis* (Dall, Bartsch & Rehder, 1938) is living around the Hawaiian Islands.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material from the Marquesas Islands.

Paschinnites coruscans s.l. was formerly placed in *Chlamys* and *Semipallium*, but actually assigned to *Paschinnites*, based on the lack of an external prismatic layer in the early right dissoconch stage (Paulay 2003).

***Pedum* Bruguière, 1792**

Pedum Bruguière, 1792: pl. 178 figs 1-4 (available under ICZN art. 12.2.7; P. Bouchet, MNHN, pers. comm.). Type species (subsequent monotypy by Lamarck (1799: 88)): *Ostrea spondyloidea* Lamarck, 1799 [= *Ostrea spondyloidea* Gmelin, 1791]; Recent, tropical Indo-West Pacific.

Diagnosis. — Coral-embedded, dorso-ventrally elongate Chlamydingini with a flattened left valve and weakly convex

right valve; microsculpture of numerous scabrous radial riblets and closely arranged commarginal lamellae; anterior auricle strongly curved in late ontogeny, posterior auricle almost absent; hinge teeth lacking, resilial insertions high and narrow, ligament migrating strongly in postero-ventral direction; byssal fasciole broad, byssal gape very wide; ctenolium present early in ontogeny, absent late in ontogeny.

Distribution. — Recent. Tropical Indo-West Pacific; living littorally.

Remarks. — Hertlein (1969: N364) placed *Pedum* in the suprageneric *Hinnites* group, Vaught (1989: 119) in Hinnitini. Habe (1977: 92) established a new subfamily Peduminae [sic, emended to Pedinae] of Pectinidae. Waller (1993: 200) attributed *Pedum* to Chlamydingini, and reduced Pedinae to a junior synonym.

***Pedum spondyloideum* (Gmelin, 1791)**

Pl. 19 figs 6a-d, Pl. 20 figs 6a-b, Pl. 32 figs 2a-b

Ostrea spondyloidea Gmelin, 1791: 3335, no. 109; Dillwyn, 1817: 280.

Ostrea pedum Röding, 1798: 170.

Pedum spondyloidea [sic] (Gmelin); Lamarck, 1799: 88.

Pedum spondyloideum (Gmelin); Lamarck, 1819: 154; Reeve, 1841 (in 1841-42): 154, pl. 111 figs 1-5; Reeve, 1860: 61, pl. 28 fig. 164, pl. N, fig. 3; Sowerby 2nd, 1842: 438, pl. 91 figs 1-4; Chenu, 1843 (in 1842-45): 1, pl. 1 figs 1-3; Yonge, 1967: 311, figs 1-8; Hertlein, 1969: N364, figs C86.1a-b; Habe, 1964b: 174, pl. 53 fig. 15; Waller, 1972: 226, 230, 254, pl. 8 figs 136-143, figs 21B, 22; Abbott & Dance, 1982: 315, fig; Nielsen, 1986: 8, figs 3A-B (holotype); Dijkstra, 1987 (in 1983-94): 9, figs; Dijkstra et al., 1989: 24; Dijkstra et al., 1990: 4; Dijkstra, 1991: 40; Lamprell & Whitehead, 1992: [34], pl. 15, fig. 86; Oliver, 1992: 69, 78, text-fig. 1, pl. 14 figs 5a-c; Bernard, Cai & Morton, 1993: 53; Dijkstra, 1997: 332, fig. 41; Dijkstra, 1998a: 34; Dijkstra & Knudsen, 1998: 79, pl. 5 figs 23-24; Savazzi, 1998: 413-421, figs 1-5; Hayami, 2000: 911, pl. 453 fig. 64; Dijkstra & Kilburn, 2001: 293, figs 29-30, Wang, 2002: 247, text-fig. 103; Dharma, 2005: 250, pl. 100 figs 15a, b; Raines & Poppe, 2006: 224, 225, pl. 171 figs 1-5; pl. 296, fig. 1; Xu & Zhang, 2008: 93, fig. 263; Raines, 2010: 626, pl. 1004 figs 1-2.

Pedum pedum intensum Iredale, 1939: 340.

Pedum pedum (Röding); Roberts et al., 1982: 116, pl. 34 figs 7-7a.

Type data. - *Ostrea spondyloidea* Gmelin: Holotype [sensu Nielsen, 1986: 8, figs 3A-B; Dijkstra & Knudsen, 1998: 79; Dijkstra & Kilburn, 2001: 294 = lectotype under Art. 74.6] (H 78.5 mm, pv), the specimen in the Moltke collection illustrated by Chemnitz, ZMUC BIV-57. Type locality: India.

Ostrea pedum Röding: Type material lost. Type locality: Unknown.

Pedum pedum intensum Iredale: Holotype (H 55 mm, pv) AMS C.90353. Type locality: Australia, N Queensland, Great Barrier Reef, Low Isles, anchorage, in *Porites*.

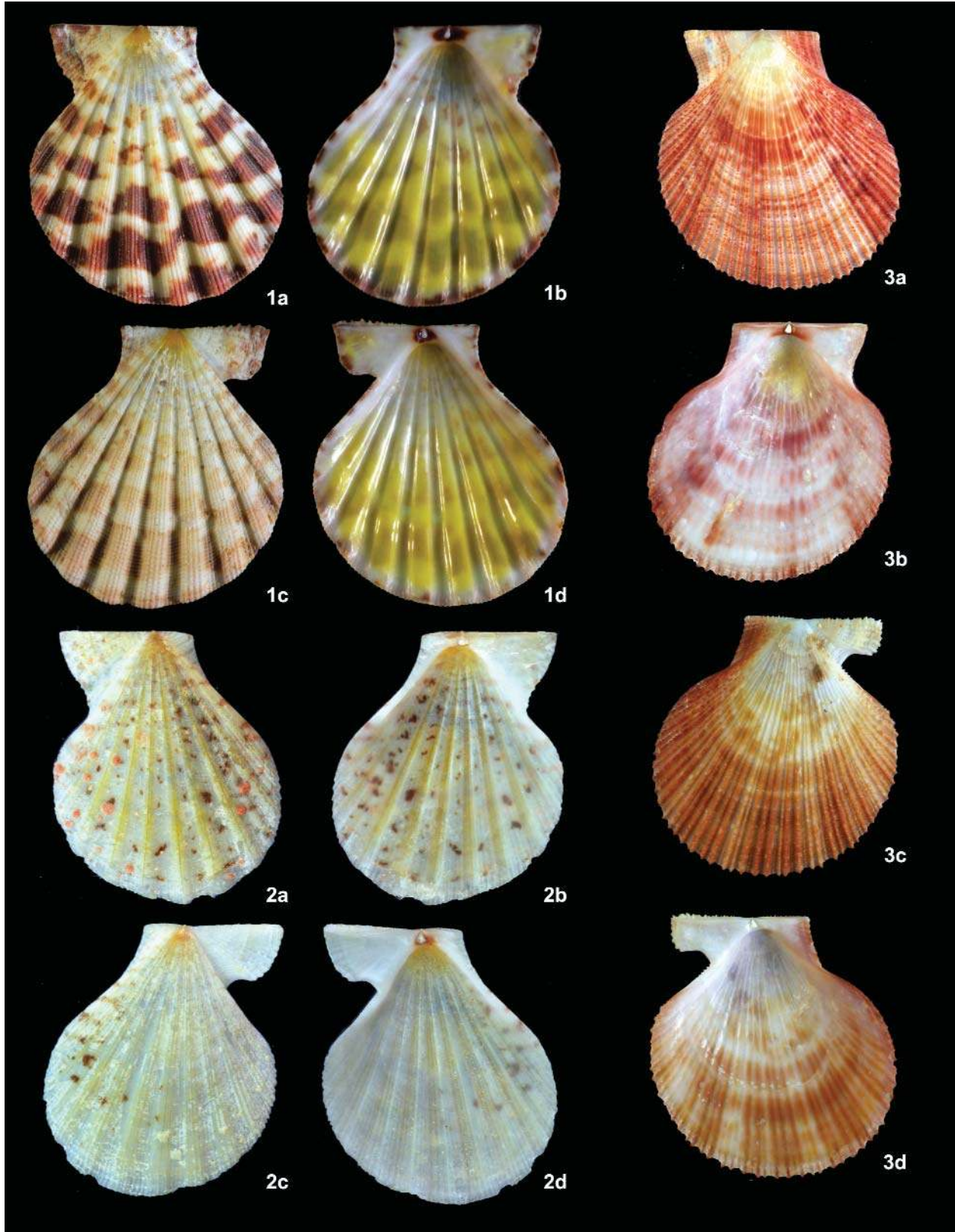
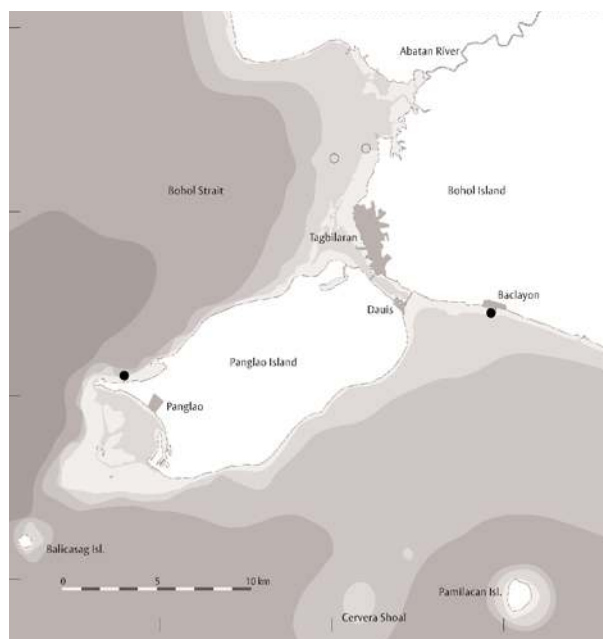


PLATE 22

Figs 1a-d. *Semipallium flavicans* (Linnaeus, 1758), PMBP 2004 Stn R51, pv, H 28.3 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Semipallium fulvicostatum* (A. Adams & Reeve, 1850), Bohol, Panglao Island, 9°35'N, 123°49'E, 20-30 m, live, amongst coral rubble on sand, dive, 2004, pv, H 27.9 mm (ZMA Moll. 148343). **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Veprichlamys deynzerorum* Dijkstra, 2004, Bohol, Calituban Island, 10°15'N, 124°25'E, 30-40 m, live, amongst reef rubble, dive, v. 2003, pv (paratype), H 38.5 mm (ZMA Moll. 101054). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.

Material examined. — **Philippines**: PMBP 2004, Stn R14, 6-8 m, 2 pv (A); Stn R43, 3-41 m, 2 pv; Stn R51, 2-52 m, 2 pv (A); Stn S25, 21 m, 1 v.



Description. — Shell solid, up to 100 mm high, most specimens 50-70 mm, shape rendered extremely variable by mode of life, transversely oblong in juvenile stage, dorsoventrally elongate in mature stage, left valve flattened, right valve weakly inflated, laterally curved; strongly inequivalve and inequilateral, auricles of left valve not clearly differentiated, of right valve more distinct and unequal than in left valve; whitish or cream, with lateral and umbonal purple spots on right valve, left valve with purple or brown patches or streaks. Left valve sculptured with numerous delicate, unevenly spaced, scabrous radial riblets, very weak or lacking near ventral margin in mature stage. Right valve with microscopic, closely spaced scabrous radial riblets in early growth stage and closely spaced commarginal lamellae laterally, more prominent near antero-marginal area. Dorsal margin of anterior auricle strongly declined. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium lacking. Outer ligament strongly developed in ventral direction. Resilial insertion elongate, narrow and deflecting. Hinge teeth lacking.

Distribution. — Throughout the tropical Indo-West Pacific, from southern Japan southwards to northern Australia, westwards into the Indian Ocean into the Red Sea and southwards to South Africa, eastwards into the central Pacific to French Polynesia (not recorded from the Hawaiian Islands) (Raines & Poppe, 2006: 224). Present specimens from the Philippines alive in 6-8 m (minimum depth range). Bathymetric range of live-taken specimens intertidally to 26 m (ZMA, unpubl. data). Living embedded in massive heads of scleractinian corals.

Remarks. — The present specimens from the Philippines are morphologically identical to the type material. This coral dwelling species is highly variable in shape, due to xenomorphic development in fissures of massive heads of the coral *Porites*.

For information on the functional morphology and ecology of *Pedum* see Yonge (1967), Waller (1972), Nielsen (1986), Kleemann (1990, 2001), and Savazzi (1998).

Scaeoclamys Iredale, 1929

Scaeoclamys Iredale, 1929: 162. Type species (by original designation): *Pecten lividus* Lamarck, 1819; Recent, southwestern, southern and southeastern Australia.

Diagnosis. — Chlamydini attached by byssus, prosocline or prosogyrate in form, right valve flattened (distorted in most specimens), left valve convex; macrosculpture of unevenly spaced, strongly scaly, primary radial costae and secondary interstitial riblets at least in early ontogeny; prominent interstitial shagreen microsculpture on anterior auricle of left valve and on disc at least in early ontogeny; byssal notch deep, ctenolium well-developed. Hinge with prominent resilial and dorsal teeth. Interior plicate.

Distribution. — Recent. (Sub)tropical Indo-West Pacific to temperate waters of the NW and SW Pacific; living subtidally to sublittorally.

Remarks. — Hertlein (1969: N355) treated *Scaeoclamys* as a junior synonym of *Chlamys* Röding, 1798, placed in the suprageneric *Chlamys* group. Vaught (1989: 118) followed Hertlein.

Waller (1993: 203) attributed this genus to Chlamydini.

Scaeoclamys squamea Dijkstra & Maestrati, 2009

Pl. 17 figs 5a-b, Pl. 20 figs 1a-d, Pl. 29 figs 4a-b

Chlamys lemniscata (Reeve); Abbott & Dance, 1982: 312, fig.; Rombouts, 1991: 15, pl. 6 fig. 2; Xu & Zhang, 2008: 81, fig. 225 (not *Pecten lemniscatus* Reeve, 1853 (in 1852-53)).

Chlamys (*Azumapecten*) *squamata* (Gmelin); Springsteen & Leobrera, 1986: 328, pl. 93 fig. 11 (not *Ostrea squamata* Gmelin, 1791).

Scaeoclamys livida Lamarck; Dijkstra, 1991: 35; Raines & Poppe, 2009: 230[in pars], pl. 179 fig. 1 (not *Pecten lividus* Lamarck, 1819).

Chlamys (*Laevichlamys*) *lemniscata* (Reeve); Hayami, 2000: 899, pl. 447 fig. 9 (not *Pecten lemniscatus* Reeve, 1853).

Coralichlamys lemniscata (Reeve); Wang, 2002: 183, pl. 5 fig. 5 (not *Pecten lemniscatus* Reeve, 1853).

Scaeoclamys sp.; Slack-Smith & Bryce, 2004: 237.

Scaeoclamys squamea Dijkstra & Maestrati, 2009: 45, pl. 4 figs 32-36.

Scaeoclamys squamata (Gmelin); Raines & Poppe, 2006: 230 (in part), pl. 145 figs 6-7, pl. 180 figs 1-10, pl. 181 figs 1-2, 7, pl. 182 figs 1-2, 6, pl. 183 figs 2-4; Raines, 2010: 628, pl. 1005 figs 1-5 (not *Ostrea squamata* Gmelin, 1791).

Scaeoclamys livida (Lamarck); Raines, 2010: 628, pl. 1005 figs 6-7 (not *Pecten lividus* Lamarck, 1819).

Type data. — Holotype (H 22.5 mm, pv) NMNS-5904-001, paratypes (23 v): 20 MNHN Moll 21268, 1 NMNS-5904-013, 2 ZMA Moll. 409007. Type locality: Taiwan, 24°56.5'N, 122°01.5'E, 115-170 m, beam trawl, leg. Bouchet, Richer & Chan, 07.05.2001 (TAIWAN 2001 stn CP 76).

Material examined. — **Philippines:** PMBP 2004, none. Additional material examined. — Off Zamboanga, 24-30 m, alive amongst rubble, 10 pv (ZMA Moll. 140449); Recodo, 5 m, alive, 5 pv (ZMA Moll. 141352); Basilan, off Pilas Island, 22-30 m, alive amongst coral, 8 pv (ZMA Moll. 142531); Sulu Archipelago, Jolo Island, 50 m, alive amongst rubble on sand, 4 pv (ZMA Moll. 143723).

Description. — Shell up to c. 60 mm high, most specimens under 40 mm, weakly inflated, almost equally convex to prosogyrate, elongate, inequivalve, inequilateral, auricles highly unequal in shape and size, umbonal angle c. 85-90°; colour highly variable, in almost all intergradations and patterns of white, orange, red, yellow, pink, purple and brown. Left valve sculptured with c. 24-30 unevenly spaced, scaly radial costae, varying strongly in prominence; 8-9 costae more prominent than others, commencing with c. 8 at 1 mm shell height, increasing by intercostal intercalation and extending to ventral margin. Shagreen microsculpture present in radial interspaces in early growth stage; antimarginal microsculpture present in early radial stage and on posterior area of disc. Anterior auricle much larger and longer than posterior, bearing 6-10 weak, squamous radial riblets and shagreen microsculpture, posterior auricle almost smooth. Right valve with c. 30-36 unevenly spaced scaly radial costae, varying less in prominence than on left valve. Anterior auricle with 4 weak radial costae, with commarginal lamellae continuous over costae, lamellae prominent dorsally. Posterior auricle almost smooth. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium well-developed, with 5-7 teeth. Hinge with moderately weak resilial and dorsal teeth. Interior somewhat plicate.

Distribution. — Tropical Indo-West Pacific from southern Japan southwards to northern Australia (ZMA, unpubl. data). Bathymetric range of live-taken specimens in 5-50 m (ZMA, unpubl. data). Specimens are often deformed, caused by its coral dwelling niches.

Remarks. — This species was attributed to *Pecten lemniscatus* Reeve, 1853 (in 1852-53), by Abbott & Dance (1982: 312), but *P. lemniscatus* is known only from the south-western Indian Ocean and is currently placed in *Laevichlamys* (Waller, 1993: 204). The two species can be distinguished by the following characters: *S. squamea* has coarser radial macrosculpture on the right valve with fewer radial riblets (30-36) than *L. lemniscata* (up to 50) and lacks antimarginal microsculpture on the right valve. Moreover, *S. squamea* has persistent shagreen microsculpture on the left valve, but shagreen microsculpture is lacking in *L. lemniscata*, as in all other species of *Laevichlamys*.

A closely similar congeneric species is *Scaeoichlamys squamata* (Gmelin, 1791), known from the western Pacific. *Scaeoichlamys squamata* differs from *S. squamea* in having fewer prominent radial costae (5-6) on the left valve (*S. squa-*

mea has 8-9), in having weaker early radial sculpture on the right valve, and a few more radial costae (6-7) on the anterior auricle of the right valve (*S. squamea* has 4) and shagreen microsculpture throughout on both valves (*S. squamea* only on the left valve early in ontogeny). Other characters such as the opisthogyrate form and antimarginal microsculpture are identical.

Semipallium Jousseume in Lamy, 1928

Semipallium Jousseume in Lamy, 1928: 169. Type species (by monotypy): *Pecten tigris* Lamarck, 1819 (= *Ostrea flavicans* Linnaeus, 1758); Recent, Indo-West Pacific.

Belchlamys Iredale, 1929: 164. Type species (by original designation): *Pecten aktinos* Petterd, 1886; Pleistocene and Recent, southern Australia.

Diagnosis. — A byssate genus of Chlamyдини with a prosocline disc, evenly or unevenly spaced strong to weak primary radial costae, delicate secondary radial riblets in late ontogeny of many species; shagreen microsculpture throughout ontogeny; auricles very unequal in size; inner surface plicated with carinate riblets near margin; byssal notch deep, ctenolium well-developed. Hinge with moderately weak resilial and dorsal teeth.

Distribution. — Miocene to Recent. Tropical Indo-West Pacific and temperate Australia; living littorally to sublittorally.

Remarks. — Hertlein (1969: N365) treated *Semipallium* as an extant Indo-West Pacific genus, placed in the *Decatopecten* group. Waller (1993: 202) considered it to be a genus of Chlamyдини, and discussed the close morphological relationship to *Manupecten* Monterosato, 1872 (Waller, 1991: 24-25).

The identical characters of *Semipallium* and *Belchlamys* were discussed for the first time by Beu & Darragh (2001: 67).

Semipallium barnetti Dijkstra, 1988

Pl. 21 figs 1a-d, Pl. 25 figs 6a-b, Pl. 30 figs 1a-b

Semipallium barnetti Dijkstra, 1988b: 16-18, figs; Raines & Poppe, 2006: 234, pl. 170 figs 5-9, pl. 185 fig. 2; Raines, 2010: 630, pl. 1006 figs 3-7.

Type data. — Holotype (H 26 mm, pv) ZMA Moll. 388044, paratypes (18 pv) distributed to MNHN, NHM, RMNH, USNM, and ZMA Moll. 388045. Type locality: Philippines, Cebu, Mactan Island, Magellan Bay, off Punta Engaño, 60 fathoms [= 110 m], alive, in tangle nets, 1987.

Material examined. — **Philippines:** PMBP 2004, Stn L76, c. 80 m, 3 pv (A), 20 v; Stn L78, 100-160 m, 1 pv (A).

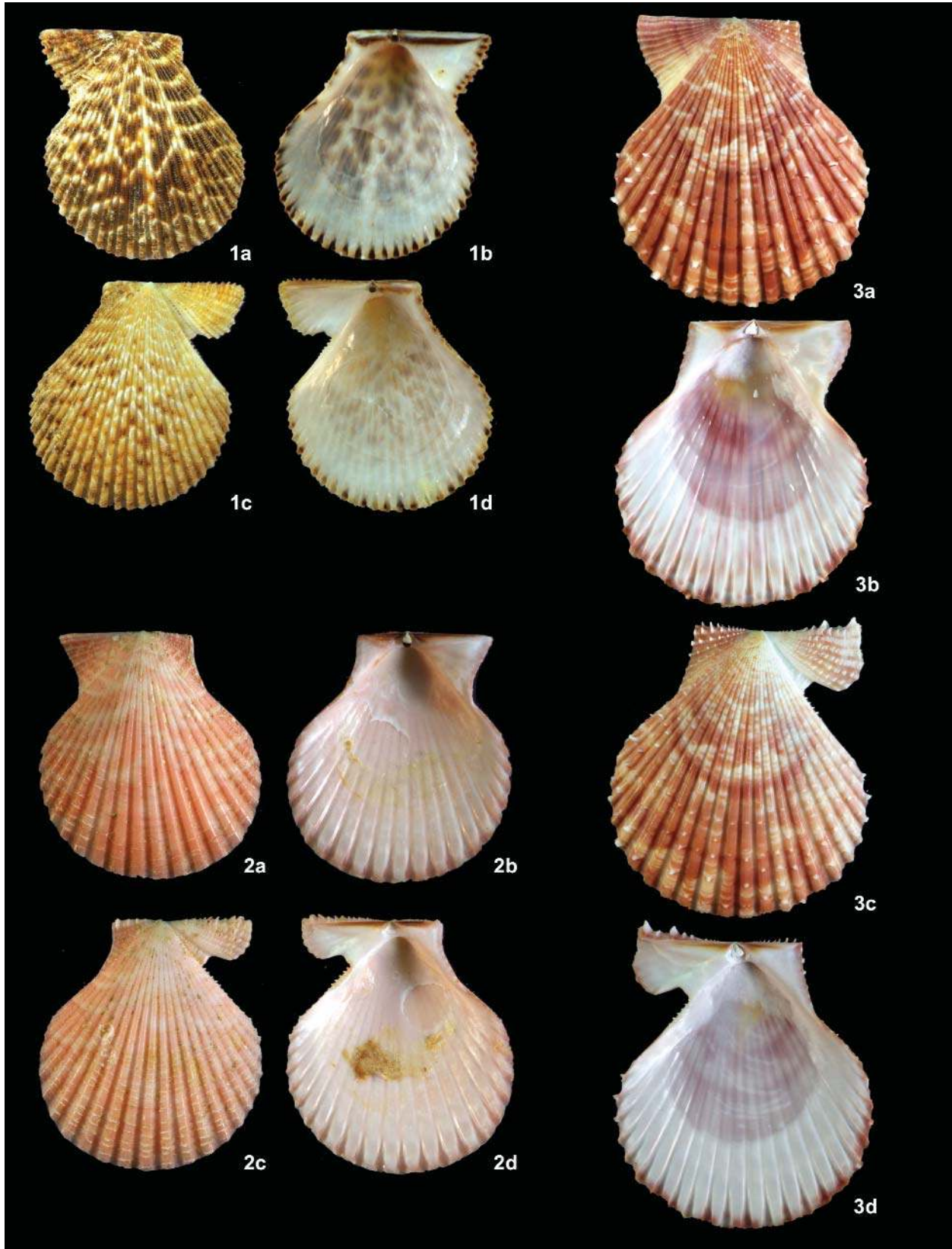


PLATE 23

Figs 1a-d. *Mimachlamys albolineata* (G.B. Sowerby II, 1842), PMBP 2004 Stn M40, pv, H 20.9 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Mimachlamys cloacata* (Reeve, 1853), PMBP 2004 Stn L61-64, pv, H 30.8 mm. **2a.** lv exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Mimachlamys gloriosa* (Reeve, 1853), Mindanao, Talikud Island, 6°56'N, 125°41'E, 20-28 m, live, dredged, 1993, pv, H 34 mm (ZMA Moll. 146665). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.

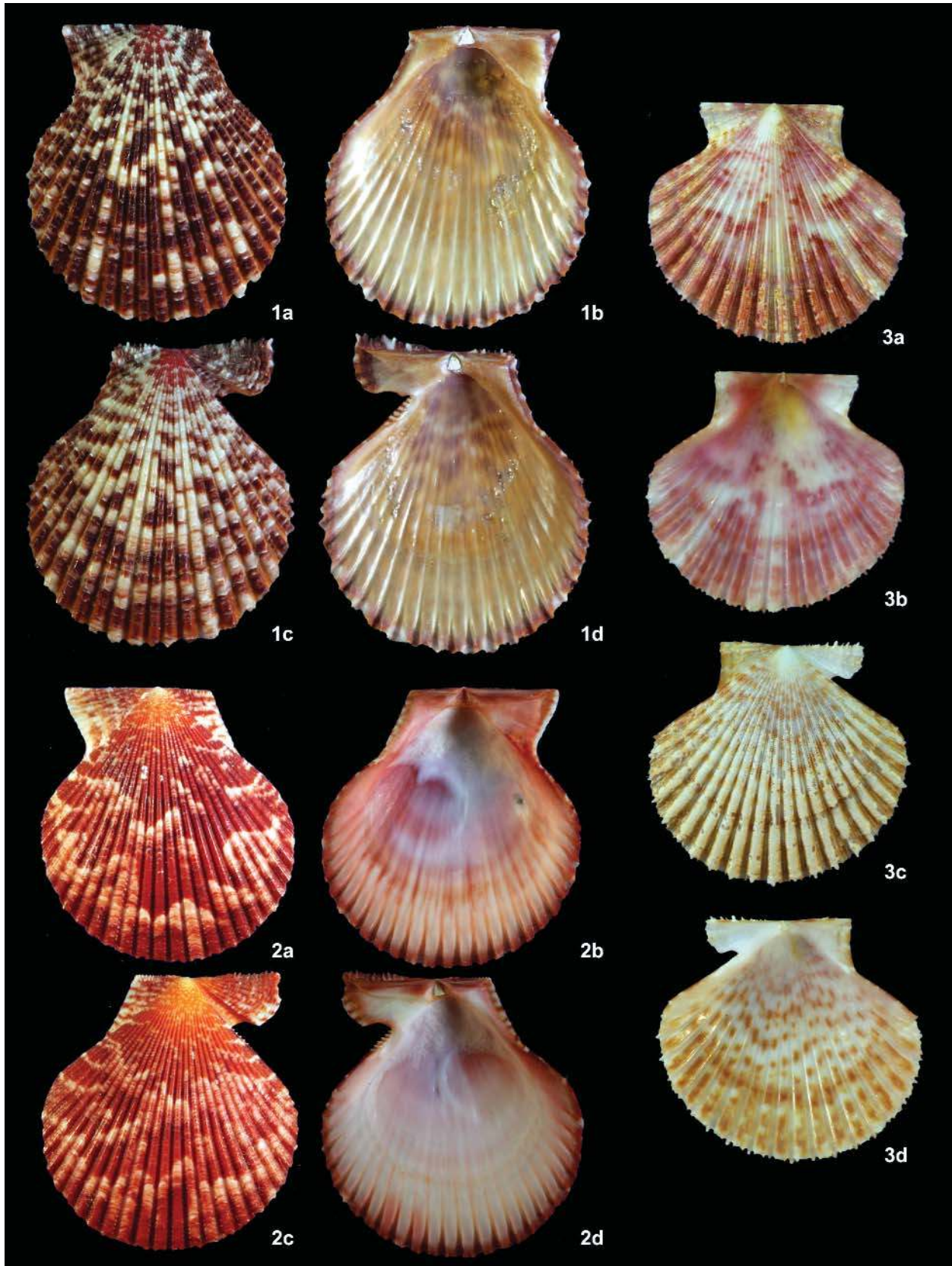
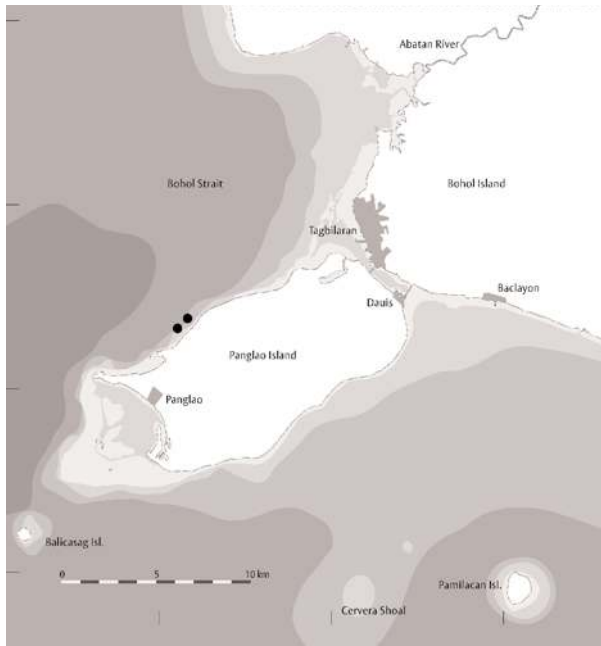


PLATE 24

Figs 1a-d. *Mimachlamys lentiginosa* (Reeve, 1853), PMBP 2004 Stn B14, pv, H 30.8 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-d.** *Mimachlamys sanguinea* (Linnaeus, 1758), Bohol, off Panglao, 9°35'N, 124°01'E, 20-25 m, live, dredged, 2002, pv, H 40.5 mm (ZMA Moll. 148851). **2a.** lv. exterior. **2b.** lv interior. **2c.** rv exterior. **2d.** rv interior. **Figs 3a-d.** *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912), Balicasag Island, 9°31'N, 123°42'E, 90-120 m, live, tangle-net, 1997, pv, H 21.9 mm (ZMA Moll. 139796). **3a.** lv exterior. **3b.** lv interior. **3c.** rv exterior. **3d.** rv interior.



Description. — Shell up to c. 25 mm high, most specimens smaller, inflated, left valve slightly more convex than right valve, higher than wide, nearly equivalve and equilateral, umbonal angle c. 80°. Basic colour is creamy-orange or yellowish with creamy, orange or reddish spots on both valves, rarely uniform purplish, right valve paler. Both valves sculptured with 7-9 primary radial plicae and closely spaced secondary radial riblets throughout with delicate scales, slightly more prominent on right valve. Intercostal shagreen microsculpture throughout the disc, lacking on the anterior auricle of the right valve. Anterior auricle of left valve with 9-11 radial riblets. Hinge line straight. Byssal notch moderately deep, byssal fasciole broad. Active ctenolium with 6 denticles.

Distribution. — Tropical Indo-West Pacific from southern Japan southwards to Indonesia, and eastwards to the Solomon Islands (Raines & Poppe, 2006: 234). Present specimens from the Philippines alive at 80-100 m (minimum depth range). Living sublittorally to bathyally.

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material. Juveniles of *S. barnetti* could be easily mixed with juveniles of the congener *S. fulvicostatum* (Adams & Reeve, 1850). Both species are living in similar habitat, although *S. barnetti* prefers deeper water. Similar sized juveniles of both species could be distinguished by the radial sculpture (*S. barnetti* has secondary radial riblets throughout growth stages, *S. fulvicostatum* lacks this sculpture and is only present in late ontogeny). Moreover, *S. barnetti* is smaller in size, somewhat more inflated and more brightly coloured.

***Semipallium diana* (Crandall, 1979)**

Pl. 21 figs 2a-d, Pl. 25 figs 5a-b, Pl. 30 figs 2a-b

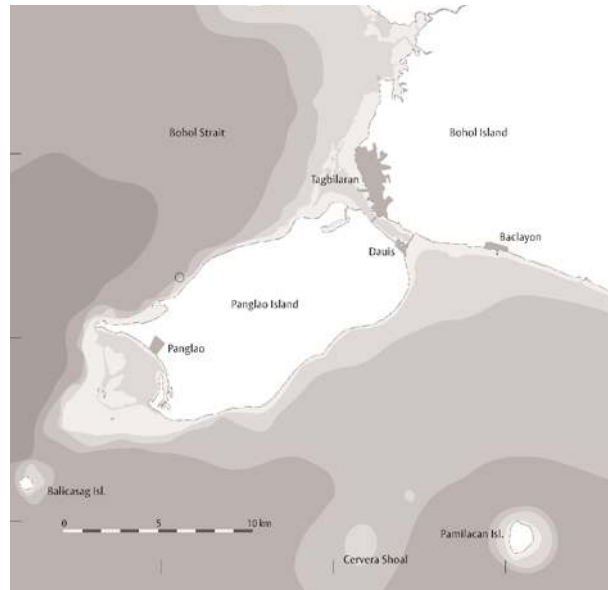
Chlamys diana Crandall, 1979: 114, figs 3-8; Matsukuma et al., 1991: 137, 185, pl. 135 fig. 9; Lan, 1993: 161, 219, fig.

Semipallium diana (Crandall); Dijkstra, 1991: 38; Rombouts, 1991: 59, pl. 5 figs 3-3b; Dijkstra & Kastoro, 1997: 270, figs 135-137; Dijkstra, 1998a: 36, pl. 6 figs 5-8; Hayami, 2000: 901, pl. 448, fig. 19; Raines & Poppe, 2006: 238, 239, lower figs; pl. 188 figs 1-6; Raines, 2010: 632, pl. 1007 figs 1-6.

Type data. — Holotype (H 43.5 mm, pv) TMMT 7911, paratypes (3 pv): 1 P.R. Crandall collection, 2 T.C. Lan collection. Type locality: Japan, Ryukyu Islands, c. 30 m, alive.

Material examined. — **Philippines:** PMBP 2004, Stn P4, 80-120 m, 1 v. Additional material examined. — Off Masbate, 30-50 m, alive, 2 pv (ZMA Moll. 146637); Off Batayan, 20-30 m, alive, 1 pv (ZMA Moll. 144196).

Description. — Shell up to c. 50 mm high, most speci-



mens under 35 mm, elongate, weakly inflated, left valve slightly more convex than right, equivalve, subequilateral, auricles very unequal in size, umbonal angle 80°-90°; colour highly variable, brown, orange, red, purple or yellow, many specimens creamy-yellowish with brown and milky white dots and streaks. Both valves with 8-10 (most specimens with 9) evenly spaced radial costae, covered with shagreen microsculpture. Delicate radial riblets developed near ventral margin, more prominent on right valve. Anterior auricle with 5-6 radial riblets, posterior with 2-4. Hinge line straight on anterior, somewhat declined on posterior auricle. Inner surface plicate, striated near ventral margin of some specimens. Resilifer triangularly oblong, elongate. Byssal notch relatively deep, byssal fasciole broad. Functional ctenolium well-developed, with 5-7 teeth. Internal plicae with carinate riblets near margin. Hinge with weak resilial and dorsal teeth.

Distribution. — Western and southwestern Pacific, from southern Japan southwards to the Philippine Islands, Indonesia and northwestern Australia, and eastwards to the Solomon Islands and Vanuatu (ZMA, unpubl. data; Raines & Poppe, 2006: 238). Present specimen from the Philippines dead in 80-120 m. Bathymetric range of live-taken specimens is 10-30 m (ZMA, unpubl. data). Living byssally attached under-

sides of coral or amongst coral rubble on sandy bottoms.

Remarks. — The present specimens from the Philippines are indistinguishable in all characters from the type material. The closest resembling congeneric species is *S. crouchi* (E.A. Smith, 1892), known from the western Indian Ocean. *Semipallium crouchi* differs from *S. diana*e in having narrower, more prominent radial costae and in its colour (brownish-purple maculated, *S. diana*e brightly polychrome).

***Semipallium dringi* (Reeve, 1853)**

Pl. 21 figs 3a-d, Pl. 30 figs 3a-b

Chlamys dringi Reeve, 1853 (in 1852-53): sp. 152, pl. 33 fig. 152b.

Semipallium kengaluorum Dijkstra, 1986: 24, figs.

Semipallium dringi (Reeve); Dijkstra, 1991: 39; Raines & Poppe, 2006: 240, 241, upper figs; pl. 191 figs 1-7; Dijkstra & Moolenbeek, 2008: 20; Raines, 2010: 634, pl. 1008 figs 1-7.

Chlamys (Complicachlamys) dringi (Reeve); Wells, Slack-Smith & Bryce, 2000: 42.

Complicachlamys dringi (Reeve); Dharma, 2005: 250, pl. 100 figs 11a-d.

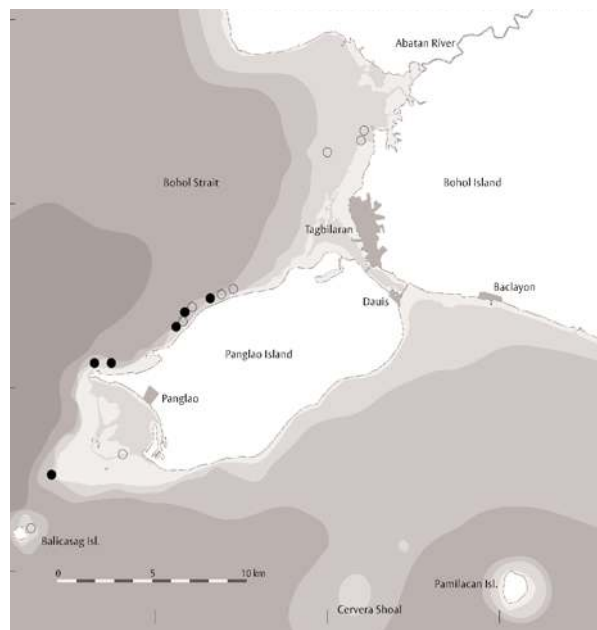
Type data. — *Pecten dringi* Reeve, 1853: Lectotype (H 31.6 mm, pv) BMNH 1950.11.14.28, designated by Wagner (1989b: 114, fig. 5); paralectotypes (2 pv) BMNH 1950.11.14.29-30 (= *Complicachlamys wardiana* Iredale, 1939). Type locality: Australia, Northern Territory, Bathurst Island.

Semipallium kengaluorum Dijkstra: Holotype (H 22.5 mm, pv) ZMA Moll. 386024, paratypes (8 pv): BMNH 1987056, 1 MNHN Moll 21273, 1 NNM.MOL.55994, 1 USNM 859393, 4 ZMA Moll. 386025 (2), 386026 (2). Type locality: Solomon Islands, Russell Island, 35 m, alive, byssally attached to cliff face, scuba, leg. J. Kengalu, xii.1982.

Remarks. — For information on type material of *Semipallium dringi* and comparison with *S. kengaluorum* see Dijkstra (1991: 39).

Material examined. — **Philippines:** PMBP 2004, Stn B9, 8-10 m, 1 v; Stn B10, 3-14 m, 1 v; Stn B12, 24-27 m, 1 pv (A); Stn B16, 20 m, 2 v; Stn B17, 3-21 m, 2 pv (A), 2 v; Stn B20, 2-8 m, 1 pv; Stn B39, 17-25 m, 1 pv (A), 1 v; Stn B42, 30-33 m, 1 pv, 1 v; Stn L76, c. 80 m, 2 pv (A), 1 v; Stn P3, c. 100 m, 1 v; Stn P4, 80-120 m, 1 pv (A), 11 v; Stn R50, 3-7 m, 1 pv (A); Stn R51, 2-52 m, 1 v; Stn R54, 8-10 m, 1 pv; Stn S8, 28-32 m, 7 v; Stn S15, 4-6 m, 1 v; Stn S28, 28-32 m, 12 v.

Description. — Shell up to c. 35 mm high, weakly inflated, left valve slightly more convex than right, subcircular, somewhat higher than wide, almost equivalve and equilateral,



auricles highly unequal in shape and size, umbonal angle c. 90°; colour variable, creamy-orange with purple, yellow or pale cream blotches, right valve paler and with yellow blotch near umbo. Both valves sculptured with 9 evenly spaced primary radial costae; costae each bear 5 prominent secondary radial riblets; 3-4 weaker secondary riblets in intercostal spaces near ventral margin. Secondary riblets on right valve bear delicate, closely spaced lamellae. Shagreen microsculpture present in radial interspaces. Anterior auricles larger and longer than posterior, bearing 8-10 radial costae on left valve and 5-6 on right; posterior auricles almost smooth. Byssal notch moderately deep, byssal fasciole broad. Functional ctenolium well-developed, with 5-7 teeth. Internal plicae with carinate riblets. Hinge with weak resilial and dorsal teeth.

Distribution. — Tropical Indo-West Pacific, from the Philippine Islands southwards to northern Australia and eastwards into the central Pacific to the Marshall and Fiji Islands (Raines & Poppe, 2006: 240). Present specimens from the Philippines alive in 7-80 m (minimum depth range). Living byssally attached to undersides of coral slabs or boulders or amongst coral rubble on clean sandy bottoms.

Remarks. — This species has been determined under different names by several previous authors, before Wagner (1989b) designated a lectotype of *Pecten dringi*. The type lot represents two nominal taxa: *S. dringi* and *Complicachlamys wardiana* Iredale, 1939. *Semipallium dringi* was also synonymized with *S. fulvicostatum* (A. Adams & Reeve, 1850) by Wagner (1989b), but *S. fulvicostatum* differs from *S. dringi* by having a more strongly prosocline shape (*S. dringi* is subcircular), coarser and more prominent shagreen microsculpture throughout (intercostal only in *S. dringi*), antimarginal microsculpture laterally (lacking in *S. dringi*), and in its coloration (*S. dringi* is more polychrome).



PLATE 25

Figs 1a-d. *Cryptoptecten nux* (Reeve, 1853), PMBP 2004 Stn L46, pv, H 13.1 mm. **1a.** lv exterior. **1b.** lv interior. **1c.** rv exterior. **1d.** rv interior. **Figs 2a-b.** *Cryptoptecten bullatus* (Dautzenberg & Bavay, 1912), PMBP 2004 Stn T4, pv (juvenile), H 8.5 mm. **2a.** lv exterior. **2b.** rv exterior. **Figs 3a-b.** *Cryptoptecten nux* (Reeve, 1853), Balicasag Island, 9°30'N, 123°41'E, 90-150 m, live, tangle-net, 2006, pv (juvenile), H 4.8 mm (ZMA Moll. 147017). **3a.** lv exterior. **3b.** rv exterior. **Figs 4a-d.** *Haumea rehderi* (Grau, 1960), PMBP 2004 Stn S52, lv H 5.6 mm, rv H 5.7 mm. **4a.** lv exterior. **4b.** lv interior. **4c.** rv exterior. **4d.** rv interior. **Figs 5a-b.** *Semipallium diana* (Crandall, 1979), Cebu, off Sogod, 10°45'N, 123°59'E, 120-180 m, live, tangle-net, 1988, pv (juvenile), H 14 mm (ZMA Moll. 144553). **5a.** lv exterior. **5b.** rv exterior. **Figs 6a-b.** *Semipallium barnetti* Dijkstra, 1988, Balicasag Island, 9°30'N, 123°41'E, 90-150 m, live, tangle-net, 2006, pv (juvenile), H 9.5 mm (ZMA Moll. 147036). **6a.** lv exterior. **6b.** rv exterior. **Figs 7a-b.** *Semipallium fulvicostatum* (A. Adams & Reeve, 1850), Cebu, offshore, 10°24'N, 124°02'E, 5-20 m, dead, dive, v.2007, pv (juvenile), H 11.2 mm (ZMA Moll. 147188). **7a.** lv exterior. **7b.** rv exterior.

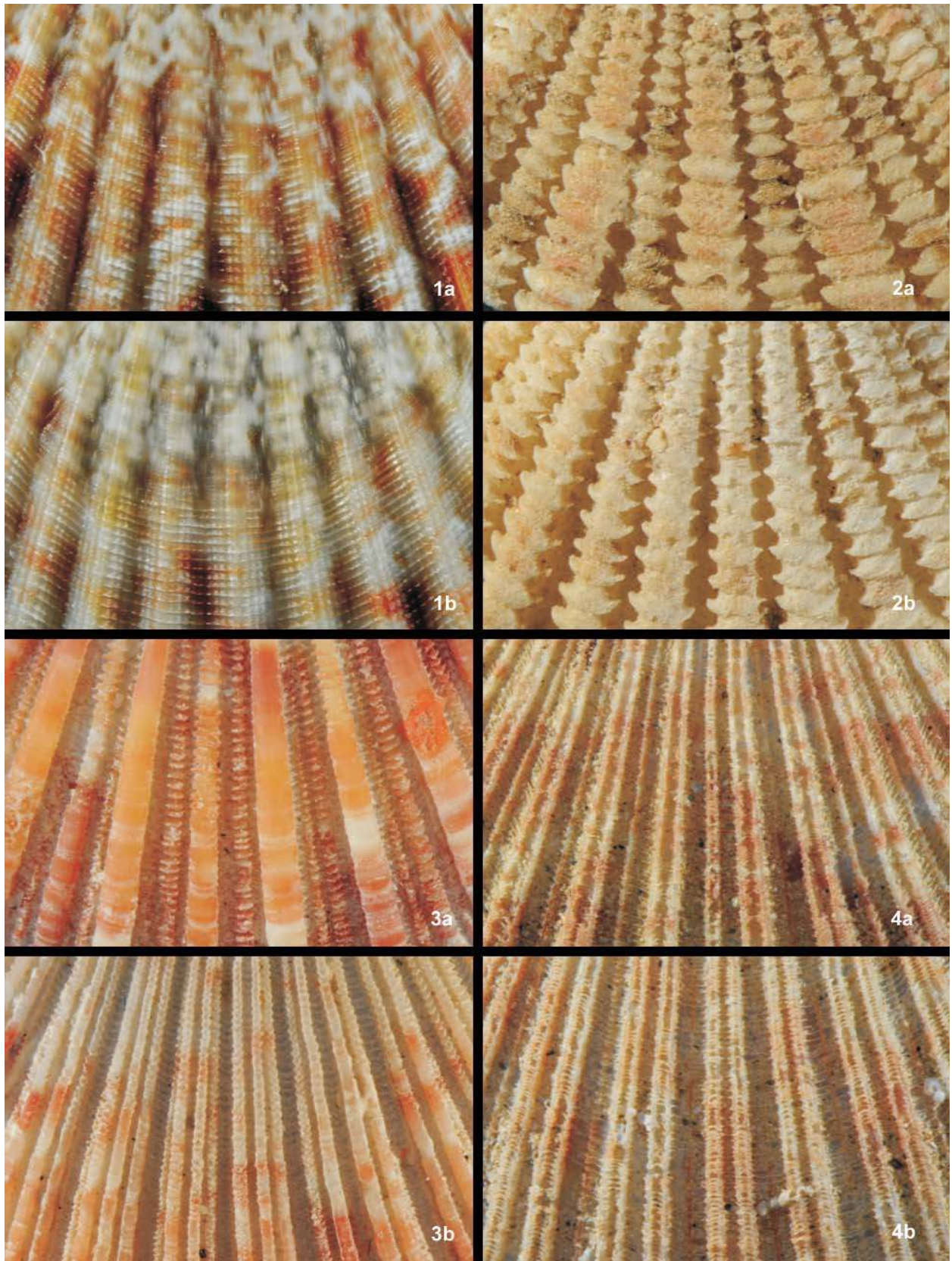


PLATE 26

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Anguipecten picturatus* Dijkstra, 1995, PMBP 2004 Stn P4, lv and rv. **2a-b.** *Excellichlamys spectabilis* (Reeve, 1853), PMBP 2004 Stn B41, lv and rv. **3a-b.** *Glorichlamys elegantissima* (Deshayes in Maillard, 1863), Off Masbate, 12°22'N, 123°27'E, 30-50 m, lv and rv (ZMA Moll. 146644). **4a-b.** *Glorichlamys quadrilirata* (Lischke, 1870), Mindanao, off Davao, 7°05'N, 125°38'E, 25-30 m, lv and rv (ZMA Moll. 147818).

***Semipallium flavicans* (Linnaeus, 1758)**

Pl. 22 figs 1a-d, Pl. 30 figs 4a-b

Ostrea flavicans Linnaeus, 1758: 698, no. 173; Dijkstra, 1999: 425, figs 9C, D (lectotype).

Pecten tigris Lamarck, 1819: 171, no. 30; Dijkstra, 1994a: 482, pl. 17 figs 70-73 (lectotype).

Complicachlamys tigris (Lamarck); Habe, 1964b: 174, pl. 53 fig. 14.

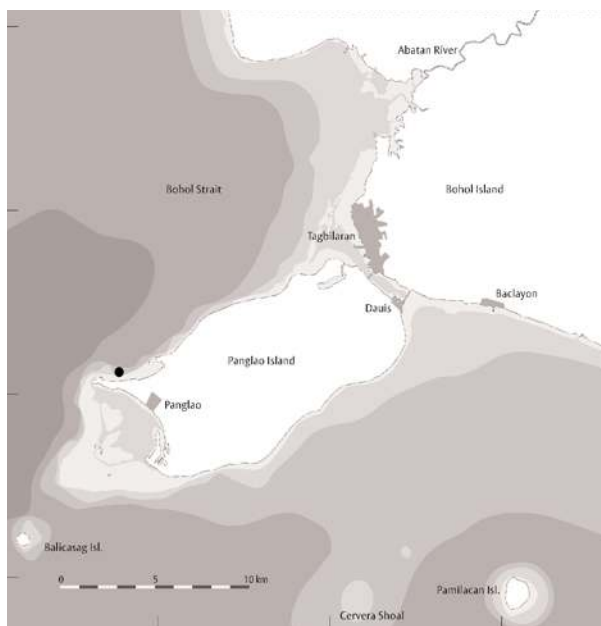
Semipallium (*Semipallium*) *tigris* (Lamarck); Hertlein, 1969: N365, figs C87.3a-b; Wang, 1985: 502, fig. 1.

Semipallium tigris (Lamarck); Abbott & Dance, 1982: 308, fig; Dijkstra, 1991: 40; Rombouts, 1991: 59, pl. 22 figs 1, 1a; Dharma, 1992: 84, pl. 20 figs 13, 13a; Lamprell & Whitehead, 1992: [28], pl. 12 fig. 69; Bernard, Cai & Morton, 1993: 49; Dijkstra, 1997: 334, figs 46-49; Dijkstra, 1998a: 38, pl. 7 figs 6-9; Hayami, 2000: 901, pl. 448 fig. 20; Dharma, 2005: 250, pl. 100 figs 10a-c; Xu & Zhang, 2008: 87, fig. 246.

Semipallium flavicans (Linnaeus); Dijkstra, 1999: 426; Raines & Poppe, 2006: 240, 241, lower figs; pl. 192 figs 1-5; Raines, 2010: 636, pl. 1009 figs 4-7.

Type data. — *Ostrea flavicans* Linnaeus: Lectotype (H 49 mm, pv) UUZM [not registered], designated by Dijkstra (1999: 426, figs 9C, D), possible paralectotypes (lv + rv) UUZM [not registered]. Type locality: “O. australiore” [Indo-West Pacific].

Pecten tigris Lamarck: Lectotype (H 43 mm, pv) MNHN Moll 21194, designated by Dijkstra (1994a: 483, figs 70-73), paralectotype (pv) MNHN Moll 21195. Type locality: “l’Océan indien” [Indian Ocean].



Material examined. — **Philippines**: PMBP 2004, Stn R51, 2-52 m, 1 pv (A). Additional material examined. — Off Zamboanga, 4-10 m, alive, 2 pv (ZMA Moll. 140478); Coron, 12 m, alive, 4 pv (ZMA Moll. 141198); Jolo Island, 16 m, alive, 1 pv (ZMA Moll. 141348); Balabac Island, 24 m, alive, 1 pv (ZMA Moll. 147303); Panglao Island, 20-30 m, alive, 1 pv (ZMA Moll. 148284).

Description. — Shell up to c. 60 mm high, rather inflated, right valve more convex than left, subtriangularly ovate, prosocline, inequivalve, inequilateral, auricles very unequal in size, umbonal angle c. 80°; cream with dark brown or reddish brown maculations or bands, yellowish near umbo; right valve paler, interior yellowish, dark brown near resilial pit; red spot on anterior auricle. Both valves with 8-10 evenly spaced radial plicae; scaly secondary radial riblets on and between primary plicae; covered with shagreen microsculpture; microsculpture of commarginal lamellae in early growth stage. Hinge line straight, somewhat declined on posterior side of auricle. Byssal notch deep, ctenolium well-developed. Internal plicae with carinate riblets near margin. Hinge with weak resilial and dorsal teeth.

Distribution. — Tropical Indo-West Pacific, from southern Japan southwards to northern Australia and westwards into the Indian Ocean to Mozambique and South Africa (not recorded from the northwestern Indian Ocean), and eastwards into the central Pacific to Samoa (ZMA, unpubl. data; Raines & Poppe, 2006: 240). Present specimen from the Philippines alive in 2-52 m. Bathymetric range of live-taken specimens is 10-25 m (minimum depth range) (ZMA, unpubl. data). Living byssally attached to undersides of coral slabs or boulders or amongst coral rubble on clean sandy bottoms.

Remarks. — The present specimen from the Philippines is morphologically indistinguishable from the type material. *Semipallium flavicans* is closest to the congener *S. marybellae* Raines, 1996, recorded from Guam, which could be a local morph of the present species. Similar sized, shaped and coloured specimens are also observed of *S. flavicans* from other localities in the Indo-Pacific (MNHN, ZMA, unpubl. data).

***Semipallium fulvicostatum* (A. Adams & Reeve, 1850)**

Pl. 22 figs 2a-d, Pl. 25 figs 7a-b, Pl. 31 figs 1a-b

Pecten fulvicostatus Adams & Reeve, 1850: 74, pl. 21 fig. 11; Reeve, 1853 (in 1852-53): sp. 123, pl. 28 fig. 123.

Pecten luculentus Reeve, 1853 (in 1852-53): sp. 59, pl. 16 fig. 59.

Complicachlamys fulvicostata (Adams & Reeve); Iredale, 1939: 363.

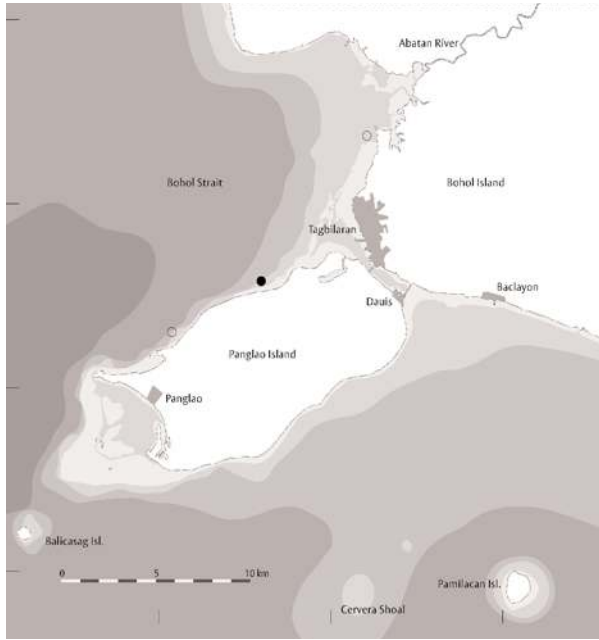
Complicachlamys luculenta (Reeve); Iredale, 1939: 363.

Semipallium fulvicostatus [sic] (Adams & Reeve); Dijkstra, 1989: 16, figs; Dijkstra, 1990a: 9, 12; Dijkstra, 1991: 38; Rombouts, 1991: 59, pl. 20, fig. 13; Dijkstra, 1998a: 38, pl. 7 figs 2-5.

Semipallium fulvicostatum (Adams & Reeve); Raines & Poppe, 2006: 242, 243, upper figs; pl. 194 figs 1-3, 5, 6, 8, 9; Dijkstra & Moolenbeek, 2008: 21; Raines, 2010: 636, pl. 1009 figs 1-3.

Type data. — *Pecten fulvicostatus* Adams & Reeve: Holotype (H 24.5 mm, pv) BMNH 1950.11.14.31 (see Wagner, 1989b: 112, fig. 1). Type locality: “Sooloo Archipelago” [Philippine Islands, Sulu Archipelago].

Pecten luculentus Reeve: Lectotype (H 41 mm, pv) BMNH 1984046/1 (see Wagner, 1989b: 112, fig. 2). Type locality: Australia, Northern Territory, Bathurst Island.



Material examined. — **Philippines**: PMBP 2004, Stn L51-60, 43-62 m, 1 pv (A); Stn S8, 28-32 m, 1 v; Stn S21, 4-12 m, 19 v. Additional material examined. — Tawi-Tawi Island, 26-30 m, alive, 2 pv (ZMA Moll. 144544); N of Jolo Island, Bangas Island, 12-15 m, alive, 5 pv (ZMA Moll. 144546); Off Pilas Island, 20-30 m, alive, 24 pv (ZMA Moll. 144547); Olango Island, Ziczac Point, 15 m, alive, 1 pv (ZMA Moll. 146791); Balicasag Island, 25-30 m, alive, 2 pv (ZMA Moll. 147217); Panglao Island, 20-30 m, alive, 1 pv (ZMA Moll. 148343).

Description. — Shell up to c. 35 mm high, weakly inflated, left valve slightly more convex than right, elongate and prosocline, inequivalve and inequilateral, auricles highly unequal in shape and size, umbonal angle c. 85°; cream with yellowish costae and darker maculations on left valve, right valve paler, with yellow blotch near umbo. Both valves sculptured with 9 evenly spaced primary radial costae; 5 prominent secondary radial riblets on costae; 3-4 weaker riblets in intercostal spaces near ventral margin. Secondary riblets on right valve bear delicate closely spaced lamellae. Shagreen microsculpture throughout. Anterior auricles larger and longer than posterior ones, bearing 8-10 radial riblets on left valve and 5-6 on right; posterior auricles almost smooth. Byssal notch moderately deep, byssal fasciole broad. Functional ctenolium well-developed, with 5-7 teeth. Internal plicae with carinate riblets near margin. Hinge with weak resilial and dorsal teeth.

Distribution. — Tropical Indo-West Pacific, from southern Japan southwards to northern Australia, and eastwards into the central Pacific to the Tuamotu Archipelago. Not recorded from the Indian Ocean (Raines & Poppe, 2006: 242). Present specimen from the Philippines alive in 43-62 m. Bathymetric range of live-taken specimens is 15-40 m (minimum depth range) (ZMA, unpubl. data). Living byssally attached to undersides of coral slabs or boulders or amongst coral rubble on clean sandy bottoms.

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material.

Veprichlamys Iredale, 1929

Veprichlamys Iredale, 1929: 164 (proposed as a subgenus of *Mimachlamys*). Type species (by original designation): *Chlamys perillustris* Iredale, 1925; Recent, off Victoria, Australia.

Diagnosis. — Small to medium-sized byssate Chlamyдини of strongly prosocline shape, with narrow umbonal angle, auricles highly unequal; preradial antimarginal microsculpture; squamous primary radial costae, secondary costae intercalated near ventral margin (late in ontogeny on most specimens); interstitial antimarginal microsculpture present, with a few long, straight ridgelets in centre of central radial interspaces (shagreen present in few species); internal plicae present, rib carinae lacking; byssal notch deep, ctenolium well-developed. Hinge with moderately prominent resilial and dorsal teeth.

Distribution. — Miocene to Recent. Southwestern Pacific, southern Australia and New Zealand, and the Galapagos Islands; living sublittorally to bathyally.

Remarks. — Iredale (1929: 164) proposed *Veprichlamys* as a subgenus of *Mimachlamys*. Hertlein (1969: N355) treated *Veprichlamys* as a junior synonym of *Chlamys*, placed in the suprageneric *Chlamys* group. Waller (1993: 236; 2007: 942) considered the present Indo-West Pacific genus *Veprichlamys* to be a representative extant genus of Chlamyдини, based on “its pre-radial microsculpture and lack of internal rib carinae”.

Veprichlamys deynzerorum Dijkstra, 2004

Pl. 22 figs 3a-d, Pl. 31 figs 2a-b

Veprichlamys deynzerorum Dijkstra, 2004: 128, figs 1-4 (holotype), 5-6 (paratype).

Type data. — Holotype (H 43 mm, pv) ZMA Moll. 403022, paratype (pv) ZMA Moll. 403023. Type locality: Philippines, Bohol, Calituban Islets, 30-40 m, alive, amongst reef rubble, scuba, v.2003.

Material examined. — **Philippines**: PANGLAO 2005, Stn CP 2409, 220-257 m, 3 v.

Description. — Shell thin, up to 43 mm high, weakly inflated, nearly circular and slightly posteriorly oblique, somewhat higher than wide, valves equally convex, nearly equivalve and equilateral, auricles strongly unequal in shape and size, umbonal angle c. 90°. Colour basically cream-brownish, with small dark and pale brown radials and maculations umbonally, also visible from the inner side. Both valves sculptured with numerous (c. 30 on central part of disc, increasing to c. 50 ventrally), irregularly spaced, squamous radial costae. Interspaces with microscopic radial striae on

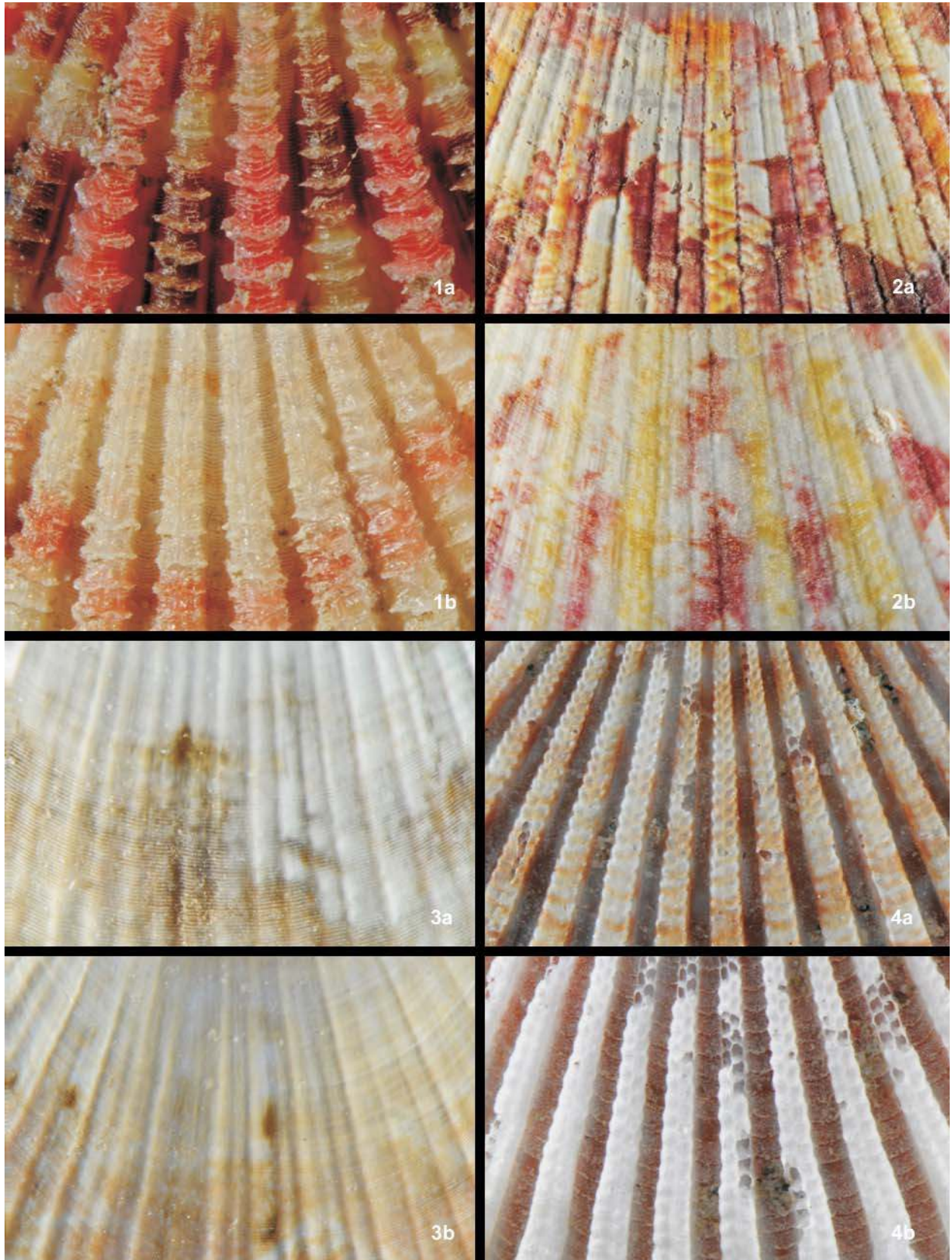


PLATE 27

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Gloripallium pallium* (Linnaeus, 1758), PMBP 2004 Stn R51, lv and rv. **2a-b.** *Juxtamusium coudeini* (Bavay, 1903), Bohol, Calituban Island, 10°15'N, 124°18'E, 20-25 m, lv and rv (ZMA Moll. 139895). **3a-b.** *Juxtamusium maldivense* (E.A. Smith, 1903), PMBP 2004 Stn L46, lv and rv. **4a-b.** *Serratovola rubicunda* (Récluz in Chenu, 1843), Bohol, offshore, 9°32'N, 123°54'E, 100-120 m, lv and rv (ZMA Moll. 142737).

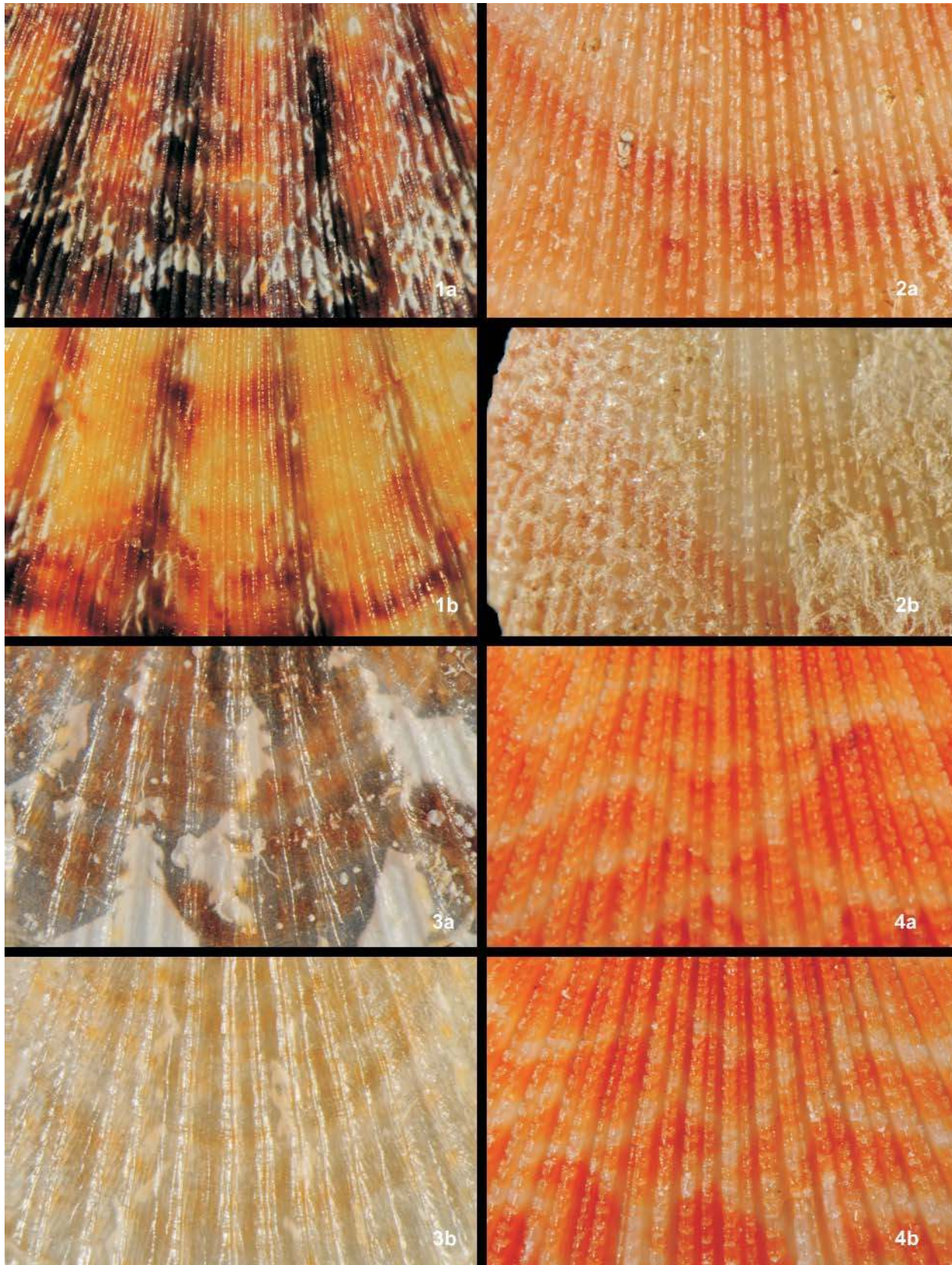
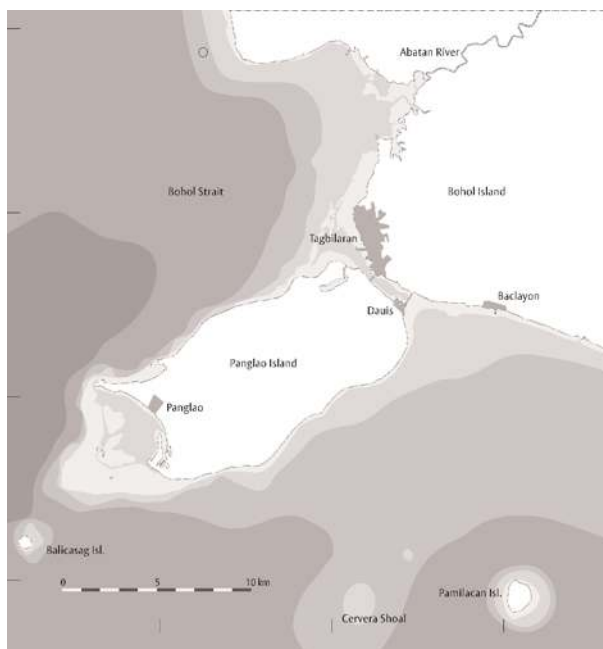


PLATE 28

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Complicachlamys wardiana* Iredale, 1939, Balicasag Island, 9°31'N, 123°41'E, 120-130 m, lv and rv (ZMA Moll. 139558). **2a-b.** *Laevichlamys aliae* (Dijkstra, 1988), PMBP 2004 Stn L79, lv and rv. **3a-b.** *Laevichlamys cuneata* (Reeve, 1853), PMBP 2004 Stn B5, lv and rv. **4a-b.** *Laevichlamys deliciosa* (Iredale, 1939), PMBP 2004 Stn L76, lv and rv.



central part, more antimarginal laterally, early growth stage nearly smooth or weakly reticulated. Anterior auricle of left valve with 8-10 fine squamous radial riblets, posterior with 5, right valve with 5 radial riblets each. Hinge line straight. Byssal notch moderately deep, byssal fasciole broad. Functional ctenolium with 6 denticles. Inner surface of both valves somewhat plicate near periphery.

Distribution. — So far only known from the Philippines. Present specimens dead in 220-257 m. The bathymetric range of live-taken specimens is 30-205 m (minimum depth range) (MNHN, ZMA, unpubl. data; Raines & Poppe, 2006: 249, pl. 197 fig. 1).

Remarks. — The present specimens are morphologically similar to the type material. A close congener is *Veprichlamys versipellis* Dijkstra & Kastoro, 1997, known from Indonesia, which is more oblique of shape and has a more prominent intercostal reticulate microsculpture. Waller (2010, pers. comm.) suggested, that both species are representatives of *Chlamys* rather than of *Veprichlamys*, mainly based on the presence of shagreen microsculpture. However, this microsculpture is not constant and also lacking and the intercostal radial and antimarginal microsculpture together with the simple radial ribbing are more characters of *Veprichlamys*.

MIMACHLAMYDINI Waller, 1993

Diagnosis. — Chlamydinæ with chlamydoid shape, simple primary radial sculpture of solid costae with secondary and tertiary flanking costellae; microsculpture of simple, smooth, oval pits in preradial stage, antimarginal or divaricated (herringbone-like) interstitial microsculpture on remainder of shell, shagreen microsculpture never present; internal rib

carinae near ventral margin of most taxa; hinge with prominent resilial and dorsal teeth; deep byssal notch and prominent active ctenolium in late ontogeny of almost all taxa.

Remarks. — Genera included in Mimachlamyidini are *Mimachlamys* Iredale, 1929, *Dimarzipecten* Ward, 1992 (fossil), *Spathochlamys* Waller, 1993, and *Interchlamys* Waller, 2011 (fossil).

Mimachlamys Iredale, 1929

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

Diagnosis. — Medium-sized to large, byssate Mimachlamyidini with chlamydoid shape, auricles highly unequal; a primitive hinge type with prominent resilial and dorsal teeth; macrosculpture of evenly spaced, solid radial costae in most species, bearing spines, flanked with secondary costellae; byssal notch deep, ctenolium well-developed.

Distribution. — Eocene to Recent (Waller, 1991: 32). Indo-West Pacific and eastern Atlantic; living intertidally to sublittorally.

Remarks. — Hertlein (1969: N355) placed *Mimachlamys* in the synonymy of *Chlamys* Röding, 1798, as did Vaught (1989: 118). Waller (1991: 31; 1993: 200) established the morphological differences between *Mimachlamys* and *Chlamys*, and placed the former genus in Mimachlamyidini.

Mimachlamys albolineata (G.B. Sowerby 2nd, 1842)

Pl. 19 figs 4a-b, Pl. 23 figs 1a-d, Pl. 31 figs 3a-b

Mimachlamys albolineatus G.B. Sowerby 2nd, 1842: 73, pl. 14 figs 69, 70; Reeve, 1853 (in 1852-53): sp. 95, pl. 24 fig. 94b.

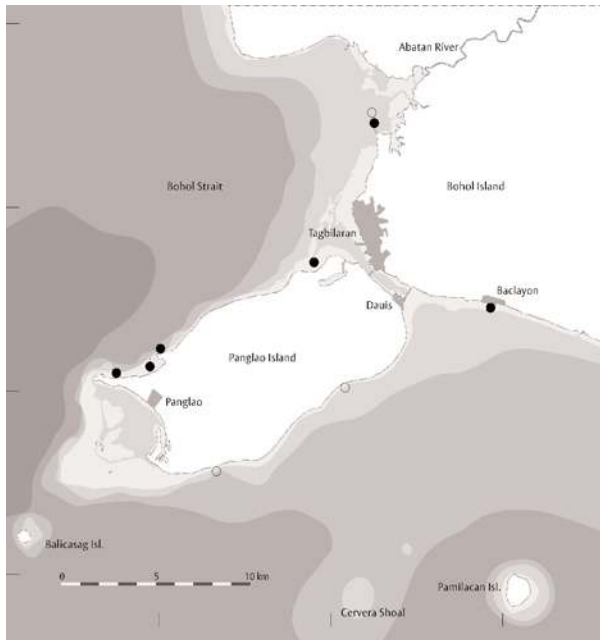
Pecten (Chlamys) albolineatus Sowerby; Dautzenberg & Bavay, 1912: 10.

Chlamys albolineata (Sowerby); Abbott & Dance, 1982: 314, fig.; Dharma, 1992: 84, pl. 20 figs 6, 6a; Bernard et al., 1993: 48; Dharma, 2005: 248, pl. 99 figs 5a, b.

Chlamys (Mimachlamys) albolineata (Sowerby); Wang, 1983c: 51, pl. 1 fig. 4; Higo & Goto, 1993: 574; Higo et al., 1999: 443.

Chlamys (Chlamys) albolineata (Sowerby); Dijkstra, 1990a: 9; Rombouts, 1991: 9, pl. 6 fig. 4.

Mimachlamys albolineata (Sowerby); Dijkstra, 1991: 33; Dijkstra, 1997: 324; Dijkstra, 1998a: 39, pl. 8, figs 1-3; Hayami, 2000: 901, pl. 448 fig. 23; Wang, 2002: 191, pl. 5 fig. 13; Raines & Poppe, 2006: 266, 269, upper figs; pl. 211 figs 1-7; Xu & Zhang, 2008: 83, fig. 232; Raines, 2010: 638, pl. 1010 figs 1-4.



Type material. — Syntypes (5 pv) BMNH 1994163, possible syntypes (3 pv) ZMB Moll. 114.614, labelled “*Pecten albolineatus*, Sw./Philippinen/H. Cuming”, “*P. albolineatus*, Sow. Thes. Conch. p. 73. pl. 14 f. 69” (Dijkstra & Köhler 2008: 32, fig. 2a). Type locality: Philippine Islands, Guimaras Island.

Material examined. — **Philippines**: PMBP 2004, Stn M1, 0-1 m, 1 pv; Stn M5, 0-2 m, 1 pv (A); Stn M7, 0-3 m, 3 pv (A), 1 v; Stn M11, 0-3 m, 2 pv (A); Stn M24, 0-1 m, 1 pv (A); Stn M40, 0-3 m, 1 pv (A); Stn R14, 6-8 m, 1 pv (A); Stn S1, 5 m, 1 v; Stn S53, 2 m, 2 v.

Description. — Shell up to c. 30 mm high, weakly inflated, almost equally convex, elongate, equivalve, slightly inequilateral, anterior auricles much larger and longer than posterior ones, umbonal angle c. 85-90°; right valve whitish with black and white streaks on costae; four costae paler, forming widely spaced pale rays; left valve darker than right. Both valves sculptured with c. 30 evenly spaced, narrow, raised, serrated radial costae, subdivided in late ontogeny in a few specimens. Intercostal spaces with narrow commarginal lamellae near ventral margin. Antimarginal microsculpture very weak or even lacking. Anterior auricles with 6-7 prominent squamous radial riblets, posterior ones with 5 narrow squamous radial riblets. Byssal notch moderately deep, byssal fasciole rather broad. Functional ctenolium well-developed, with 5-6 teeth. Weak internal rib carinae near margin. Moderate resilial and dorsal teeth.

Distribution. — Tropical Indo-West Pacific, from southern Japan southwards to Australia, westwards into the Indian Ocean in the Bay of Bengal, and eastwards into the Pacific to the Fiji Islands (Raines & Poppe, 2006: 268). Present specimens from the Philippines alive intertidally to 6 m (minimum depth range). Bathymetric range of live-taken specimens is intertidally to 40 m (minimum depth range) (ZMA, unpubl. data). Living byssally attached to rocks or coral or amongst coral rubble, most specimens on sandy bottoms.

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material.

***Mimachlamys cloacata* (Reeve, 1853)**

Pl. 23 figs 2a-d, Pl. 31 figs 4a-b

Pecten rugosus Sowerby 2nd, 1842: 66, pl. 19 fig. 226 (junior primary homonym of *Pecten rugosus* Lamarck, 1819).

Pecten cloacatus Reeve, 1853 (in 1852-53): sp. 166, pl. 34 fig. 166.

Pecten valdecostatus Melvill, 1888: 281, pl. 2 fig. 10.

Pecten (Chlamys) pelseneeri Dautzenberg & Bavay, 1912: 8 (replacement name for *P. rugosus* Sowerby, 1842).

Mimachlamys curtisiana Iredale, 1939: 351, pl. 5 figs 19-19a.

Chlamys asperulata pelseneeri (Dautzenberg & Bavay); Kira, 1962: 137, pl. 49 fig. 11.

Chlamys asperulata (Adams & Reeve); Abbott & Dance, 1982: 313, fig (not of Adams & Reeve, 1850).

Chlamys (Mimachlamys) valdecostatus [sic] (Melvill); Wang, 1983c: 50, pl. 1 fig. 7.

Chlamys (Mimachlamys) asperulata (Adams & Reeve); Wang, 1983c: 51, pl. 1 fig. 3.

Chlamys (Chlamys) cloacata (Reeve); Dijkstra, 1990a: 10; Rombouts, 1991: 10, pl. 4 fig. 4; Higo et al., 1999: 442.

Chlamys cloacata (Reeve); Dijkstra, 1991: 29; Wang, 2002: 179, pl. 5, fig. 6; Dharma, 2005: 248, pl. 99 figs 6a-m.

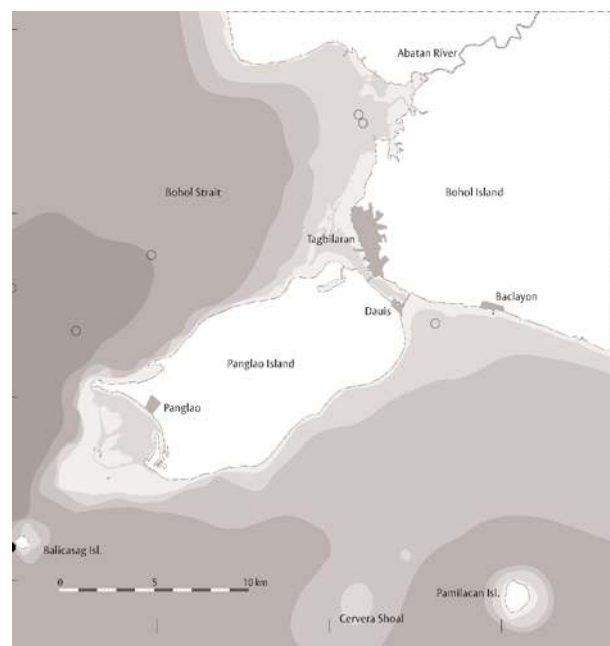
Chlamys (Chlamys) curtisiana (Iredale); Lamprell & Whitehead, 1992: [20], pl. 8 fig. 42.

Chlamys pelseneeri (Dautzenberg & Bavay); Bernard et al., 1993: 49.

Chlamys valdecostata (Melvill); Bernard et al., 1993: 49.

Mimachlamys cloacata (Reeve); Dijkstra, 1998a: 41, pl. 8 figs 4-5; Dijkstra, 1998b: 254; Raines & Poppe, 2006: 268, 269, upper figs; pl. 214 figs 3, 5, 6, 8, 9; Raines, 2010: 638, pl. 1010 figs 5-8.

Mimachlamys asperulata (Adams & Reeve); Hayami, 2000: 901, pl. 448 fig. 22.



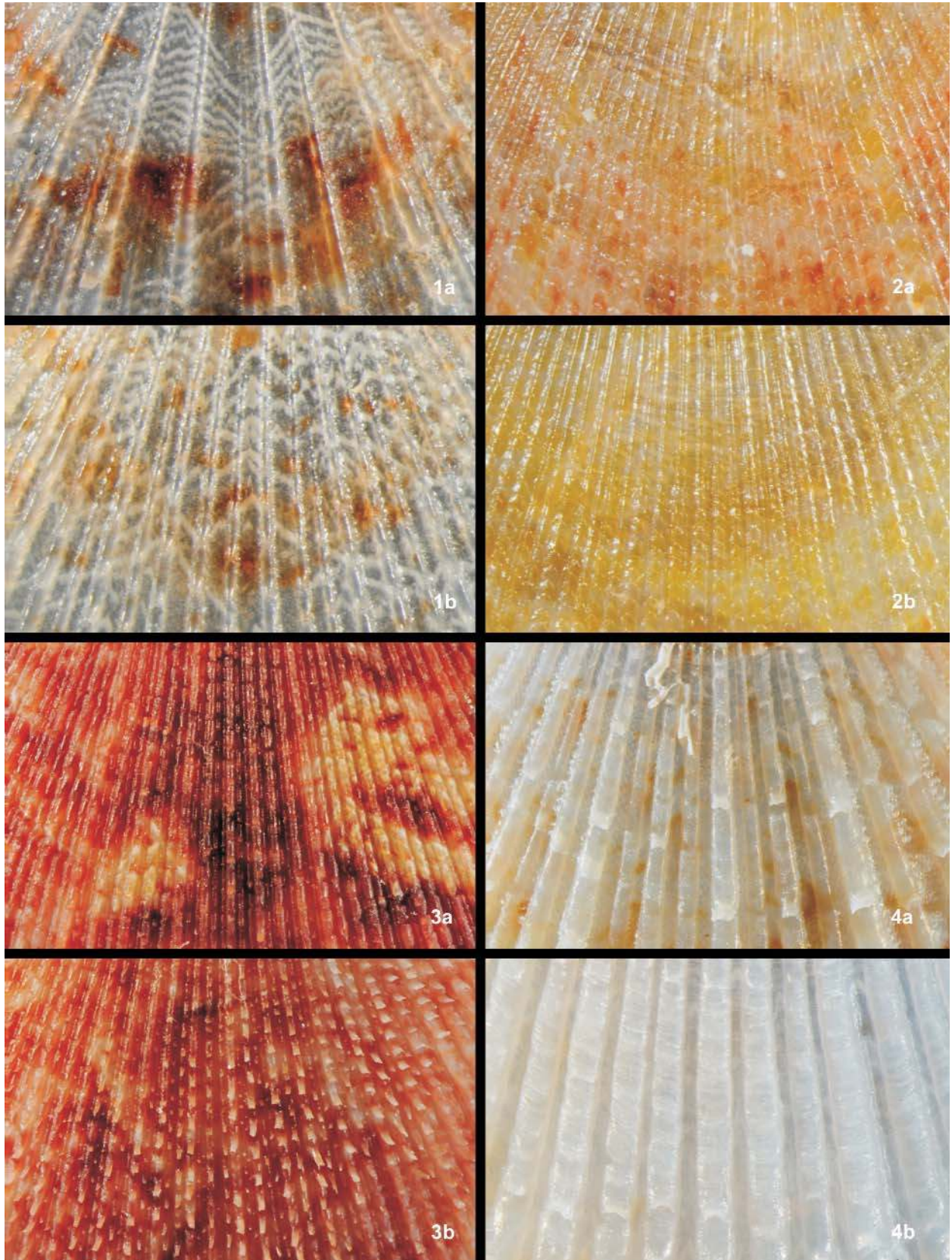


PLATE 29

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Laevichlamys gladysiae* (Melvill, 1888), PMBP 2004 Stn L76, lv and rv. **2a-b.** *Laevichlamys mollita* (Reeve, 1853), PMBP 2004 Stn R19, lv and rv. **3a-b.** *Laevichlamys multisqualida* Dijkstra, 1994, PMBP 2004 Stn P1, lv and rv. **4a-b.** *Scaechlamys squamea* Dijkstra & Maestrati, 2009, Balicasag Island, 9°31'N, 123°41'E, 30 m, lv and rv (ZMA Moll. 148248).

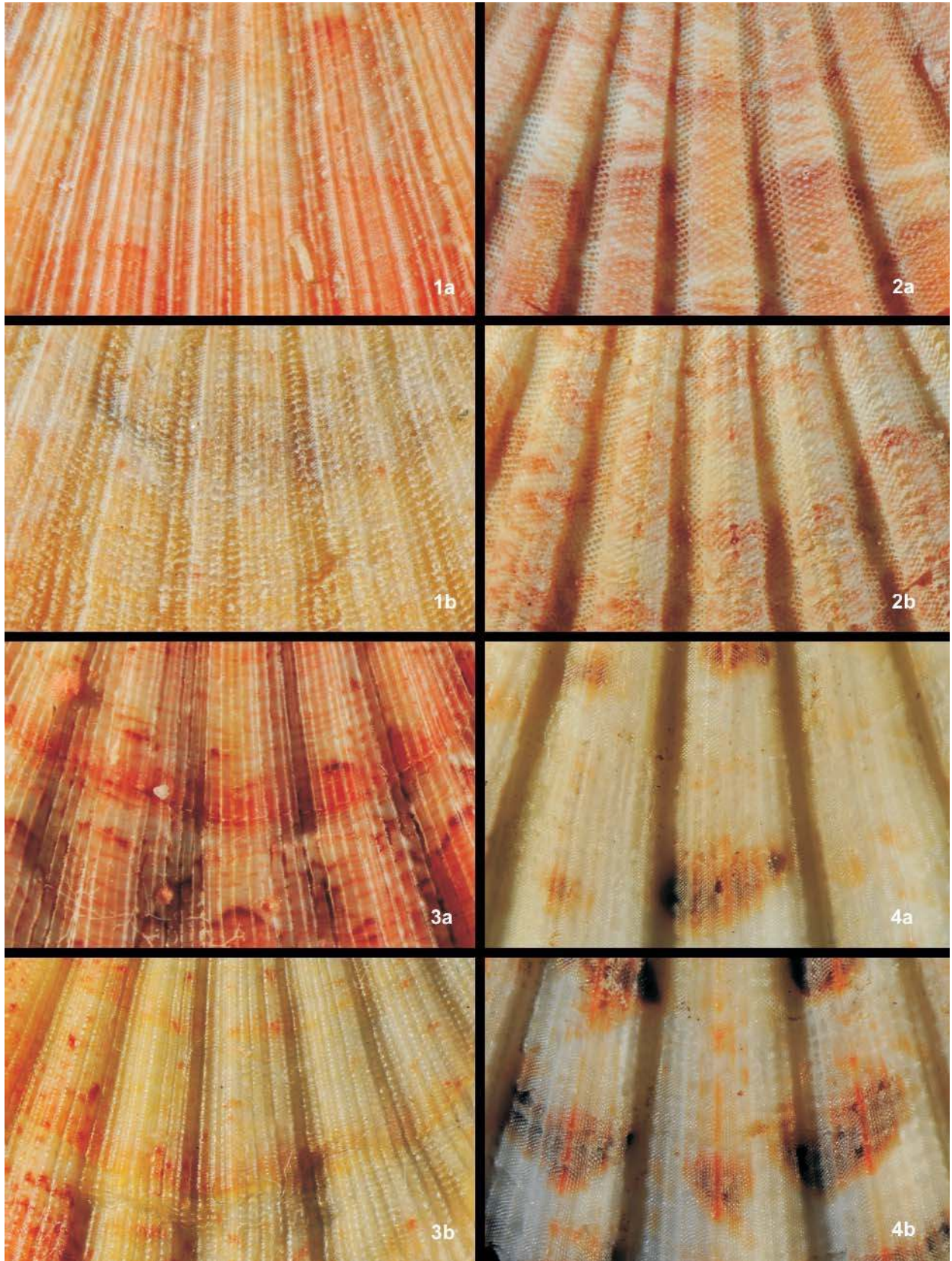


PLATE 30

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Semipallium barnetti* Dijkstra, 1988, Balicasag Island, 9°30'N, 123°41'E, 90-150 m, lv and rv (ZMA Moll. 147036). **2a-b.** *Semipallium diana* (Crandall, 1979), Bohol, offshore, 9°50'N, 124°10'E, 90-180 m, lv and rv (ZMA Moll. 144182). **3a-b.** *Semipallium dringi* (Reeve, 1853), Bohol, Panglao Island, 9°35'N, 123°49'E, 20-30 m, lv and rv (ZMA Moll. 142593). **4a-b.** *Semipallium flavicans* (Linnaeus, 1758), PMBP 2004 Stn R51, lv and rv.

Type data. — *Pecten rugosus* Sowerby: Possible syntypes (2 pv) BMNH 1996438. Type locality: Philippine Islands, Bureas [Burias] Island.

Pecten cloacatus Reeve: Lectotype (H 27 mm, pv) BMNH 1995158.1, paralectotype (pv) BMNH 1995158.2, designated by Dijkstra (1998a: 41). Type locality: Philippine Islands.

Pecten valdecostatus Melvill: Holotype (H 25 mm, pv) NMW 1955.158.5. Type locality: Hong Kong.

Mimachlamys curtisiana Iredale: Holotype (H 28 mm, pv) AMS C.89670. Type locality: Australia, Queensland, Gladstone, Port Curtis.

Material examined. — **Philippines**: PMBP 2004, Stn D2, 41-46 m, 1 v; Stn D10, 15-22 m, 1 v; Stn L61-64, 87-111 m, 1 pv (A); Stn T19, 10-26 m, 1 v. PANGLAO 2005, Stn CP 2333, 584-596 m, 1 v; Stn CP 2334, 606-631, 8 v; Stn CP 2396, 609-673 m, 1 v.

Description. — Shell up to c. 35 mm high, rather solid, moderately inflated, almost equally convex, triangularly ovate, equivalve, slightly inequilateral, anterior auricles much larger and longer than posterior ones, umbonal angle c. 75-85°; colour polychromatic. Both valves sculptured with c. 16-18 evenly spaced, narrowly rounded, lamellate, primary radial costae, in a few specimens flanked by secondary riblets in late growth stage. Commarginal lamellae on costae of most specimens, widely to more closely spaced, present in radial interspaces of some specimens. Intercostal “herringbone” microsculpture on disc, in late growth stage transformed into antimarginal microsculpture. Anterior auricle of left valve with 6-7 prominent radial costae with closely spaced intercostal commarginal lamellae; posterior auricle with c. 5 weak, squamous radial riblets and intercostal granular or antimarginal microsculpture, or with closely spaced irregular commarginal lamellae. Anterior auricle of right valve with c. 5 prominent squamous radial costae, weaker and narrower on posterior auricle. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium well-developed, with c. 5-7 teeth. Internal rib carinae weak. Resilial and dorsal teeth prominent.

Distribution. — Tropical Indo-West Pacific, from southern Japan, southwards to northern Australia, westwards into the Indian Ocean to the Gulf of Bengal, and eastwards to New Caledonia (Raines & Poppe, 2006: 270). Present specimen from the Philippines alive in 87-111 m. Living byssally attached to undersides of rocks or coral boulders, or amongst coral rubble on sandy bottoms. Specimens often encrusted with sponge.

Remarks. — The present specimens from the Philippines are morphologically similar to the type material. This species has a polymorphic microsculpture (see description) and also varies in convexity (moderately to rather strongly inflated) and macrosculpture (prominence of the radial sculpture and development of the lamellae).

Mimachlamys gloriosa (Reeve, 1853)

Pl. 23 figs 3a-d, Pl. 32 figs 1a-b

Pecten gloriosus Reeve, 1853 (in 1852-53): sp. 134, pl. 30 figs 134a, b (see Reeve, 1853 (in 1852-53): errata).

Pecten similis Baird in Brechley, 1874: 453, pl. 42 fig. 7.

Mimachlamys subgloriosa Iredale, 1939: 350, pl. 5 figs 21, 21a.

Mimachlamys gloriosa (Reeve); Lamprell & Whitehead, 1992: [22], pl. 9 fig. 52; Raines & Poppe, 2006: 272, 273, lower figs; pl. 218 figs 1-3; pl. 219 figs 1-6.

Chlamys gloriosa (Reeve); Dijkstra, 1983 (in 1983-94): 19, figs; Dharma, 1992: 84, pl. 20 figs 2-2d.

Chlamys (*Mimachlamys*) *gloriosa* (Reeve); Rombouts, 1991: 29, pl. 11 figs 4-4c; Dharma, 2005: 248, pl. 99 figs 1a-m.

Type data. — *Pecten rugosus* Reeve: Figured syntype (H 87 mm, pv) (Reeve 1853: pl. 30 fig. 134a) BMNH 1950.11.14.35, syntypes (pv) BMNH 1950.11.14.36-38. Type locality: Australia, Queensland, Moreton Bay.

Pecten similis Baird: Possible holotype (H 42 mm, pv) BMNH [not registered]. Type locality: “Tongatabu, Friendly group” [Tongatapu, Tongatapu Group, Tonga].

Mimachlamys subgloriosa Iredale: Holotype (H 43 mm, pv) AMS C.89668. Type locality: Australia, Queensland, GBR, Low Isles, 9-12 fathoms [= 16-22 m].

Material examined. — **Philippines**: PMBP 2004, none.

Additional material examined. — Samal Island, Matanos, 30 m, alive, 30 pv (ZMA Moll. 145525); Off Zamboanga, 20 m, alive, 3 pv (ZMA Moll. 146572); Off Masbate, 20-30 m, alive, 3 pv (ZMA Moll. 146653); Davao Gulf, off Talikud Island, 20-28 m, alive, 33 pv (ZMA Moll. 146665).

Description. — Shell up to c. 120 mm high, most specimens smaller, inflated, juvenile elongate, adult subcircular, equivalve, equilateral, left valve slightly more convex than right, auricles highly unequal, umbonal angle c. 80°-85°; most specimens dark brick red with paler maculations. Both valves sculptured with 22-23 evenly spaced primary radial costae bearing widely set scales, with secondary squamose interstitial riblets near ventral margin (absent in juveniles). Interstitial microsculpture of irregular antimarginal scratches, weakly developed on central part of disc, more prominent near posterior margin. Anterior auricle of left valve with c. 8 scaly radial riblets; of right valve with 5-6 more prominent riblets. Posterior auricle of left valve with similar sculpture to anterior, although weaker and with fewer riblets. Hinge line straight. Resilium triangularly oblong. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium well-developed, with c. 5 teeth. Internal rib carinae prominent marginally, commencing in early growth stage. Resilial and dorsal teeth prominent.

Distribution. — Tropical western Pacific, from southern Japan, southwards to the Philippines, Indonesia and northwestern, northern and northeastern Australia, westwards into the Indian Ocean to Thailand, eastwards into the Pacific to Tonga (Raines & Poppe, 2006: 272). Bathymetric range of live-taken specimens intertidally to 60 m (ZMA, unpubl).

data). Living byssally attached to rocks or coral, or amongst coral rubble on soft sediments (sand and/or mud).

Remarks. — The present specimens from the Philippines is morphologically similar to the type material.

Juveniles of *M. gloriosa* and *M. sanguinea* could be easily mixed. Both species are similar brightly coloured, but *M. gloriosa* is weaker inflated, more higher than wide, and more coarsely sculptured with more widely spaced scales on the radial lirae.

Mimachlamys gloriosa also closely resembles *M. crassicosata* (G.B. Sowerby 2nd, 1842), from northern Chinese and Japanese waters. The present species can be distinguished from *M. crassicosata* by its smaller size (*M. gloriosa* up to c. 120 mm in height, *M. crassicosata* up to c. 140 mm), its different sculpture (*M. gloriosa* c. 22 costae with secondary riblets in late growth stage; *M. crassicosata* c. 24 costae lacking intercostal secondary sculpture), and its colour (*M. crassicosata* is more brightly coloured).

“*Mimachlamys*” *kauaiensis* (Dall, Bartsch & Rehder, 1938)

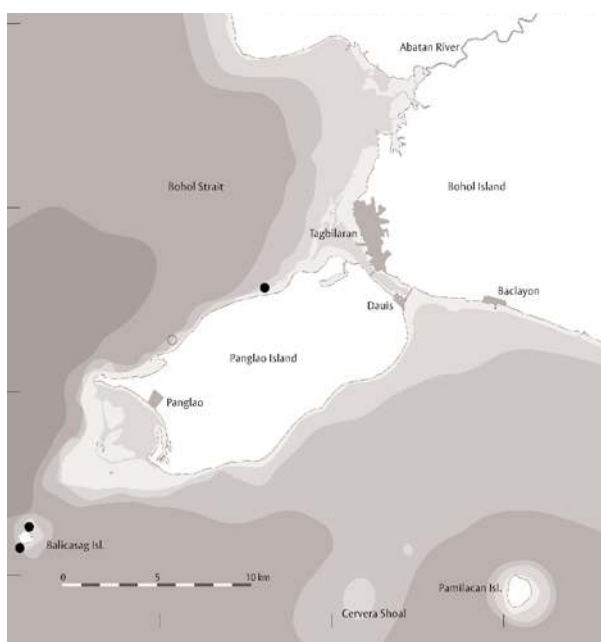
Pl. 21 figs 4a-b

Chlamys kauaiensis Dall, Bartsch & Rehder, 1938: 92, pl. 22 figs 9-10 (holotype); Kay, 1979: 525, figs 168F-G.

Laevichlamys kauaiensis (Dall, Bartsch & Rehder); Dijkstra, 1995: 57, figs 121-122; Raines & Poppe, 2006: 202, pl. 144 fig. 1; Dijkstra & Maestrati, 2008: 106.

Mimachlamys kauaiensis (Dall, Bartsch & Rehder); Dijkstra & Maestrati, 2010: 350.

Type data. — Holotype (H. 6.2 mm, rv) USNM 335674. Type locality: Hawaii Islands, near Kauai, off Hanamaulu warehouse, 257-312 fathoms [= 470-571 m], dead, fine grey sand and mud bottom, trawl, 1.viii.1902 (Albatross stn 4132).



Material examined. — **Philippines:** PMBP 2004, Stn L41, 90-100 m, 1 pv (A); Stn L51-60, 43-62 m, 1 pv (A); Stn L69-73, 90-98 m, 4 v; Stn L74-75, 120-139 m, 3 pv (A), 7 v; Stn L76, c. 80 m, 1 v.

Description. — Shell fragile, up to c. 6 mm high, nearly circular, weakly inflated, right valve slightly more convex than left valve, equivalve, anterior and posterior auricles unequal in size, umbonal angle c. 90-95°. Prodissonch c. 240 µm in height. Colour creamy, whitish, yellowish, orange or reddish, sometimes with small white spots. Both valves sculptured with 24-28 regularly spaced, delicate scaly radial riblets, Microsculpture of granular, antimarginal and commarginal intercostal scratches. Auricles with 3-6 scaly radial riblets, crossed by commarginal riblets on anterior auricle of left valve. Antero-dorsal margin of anterior auricle of right valve strongly denticulated. Hinge line straight. Byssal notch moderately deep, byssal fasciole rather broad. Functional ctenolium with 4-6 denticles. Internal plicae from central part to ventral margin.

Distribution. — Hawaiian Islands, Coral Sea, New Caledonia, Loyalty Islands, Fiji and Tonga (Raines & Poppe, 2006: 202; Dijkstra & Maestrati, 2008: 107). Present specimen from the Philippines alive in 62-120 m (minimum depth range). Living amongst coral rubble or gravel on sandy or muddy sand bottoms.

Remarks. — The present specimens are morphologically indistinguishable from the type specimen. A closely looking species is “*Laevichlamys*” *alloyenti* (Dijkstra, 1988) known from the southwestern region of the Indian Ocean. Recently Dijkstra & Maestrati (2010: 348) described another closely looking species, provisionally placed in *Mimachlamys*, from the Austral Islands, *M. erycina*, which also belongs in this group.

Shell characters (reticular sculpture on anterior auricle of left valve, vesicles or hollow sections on both sides of the radial ribs on the left valve, granular and commarginal intercostal microsculpture) of the present species do not justify placement in *Chlamys*, *Laevichlamys* or *Mimachlamys*. Perhaps this group of species could be more appropriately placed in *Cryptopecten* and is currently under study.

This species is a **new record** for the Philippines.

***Mimachlamys lentiginosa* (Reeve, 1853)**

Pl. 19 figs 5a-b, Pl. 24 figs 1a-d

Pecten lentiginosus Reeve, 1853 (in 1852-53): sp. 76, pl. 20 fig. 76.

Chlamys (*Mimachlamys*) *lentiginosa* (Reeve); Habe, 1964b: 174, pl. 53 fig. 13; Springsteen & Leobrera, 1986: 326, pl. 93 fig. 5; Rombouts, 1991: 29, pl. 11 figs 1, 1a.

Mimachlamys lentiginosa (Reeve); Dijkstra, 1991: 33; Lamprell & Whitehead, 1992: [24], pl. 10 fig. 58; Dijkstra, 1998a: 41, pl. 8 figs 6-7; Hayami, 2000: 903, pl. 449 fig. 26; Wang, 2002: 190; Raines & Poppe, 2006: 272, 275, upper figs; pl. 220 figs 1-7; pl. 297 fig. 1; Xu & Zhang, 2008: 83, fig. 231; Raines, 2010: 644, pl. 1013 figs 2-5.

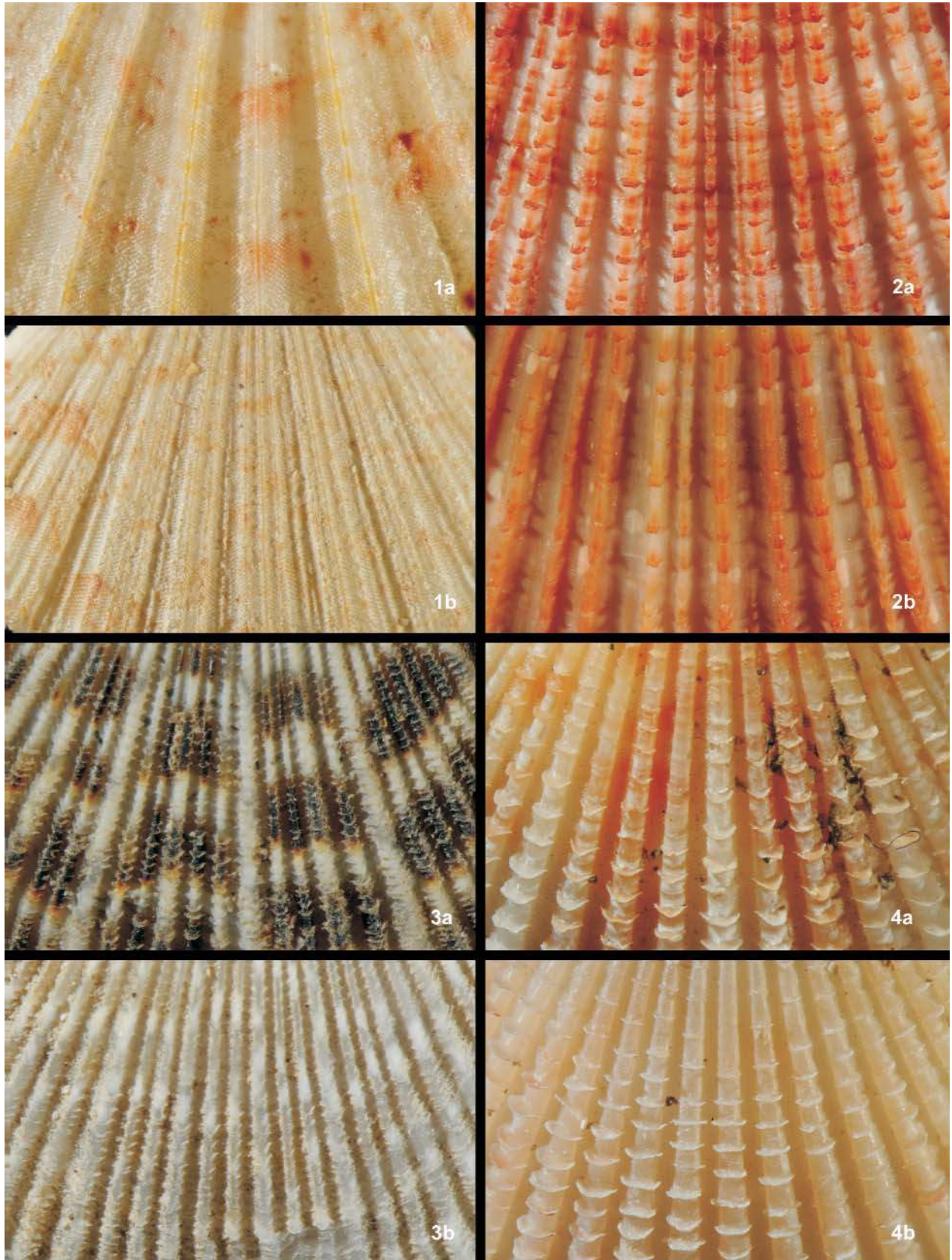


PLATE 31

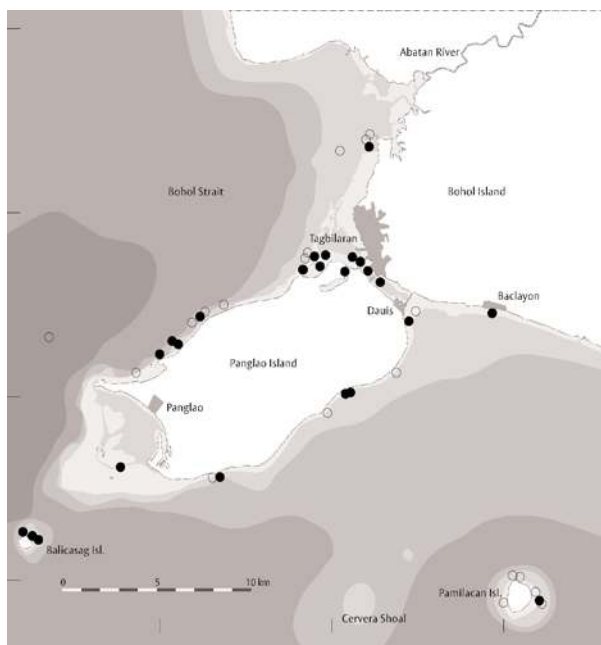
Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Semipallium fulvicostatum* (A. Adams & Reeve, 1850), Bohol, Panglao Island, 9°35'N, 123°49'E, 20-30 m, lv and rv (ZMA Moll. 148343). **2a-b.** *Veprichlamys deynzerorum* Dijkstra, 2004, Bohol, Calituban Island, 10°15'N, 124°25'E, 30-40 m, lv and rv (ZMA Moll. 101054, paratype). **3a-b.** *Mimachlamys albolineata* (G.B. Sowerby II, 1842), PMBP 2004 Stn M40, lv and rv. **4a-b.** *Mimachlamys cloacata* (Reeve, 1853), PMBP 2004 Stn L61-64, lv and rv.



PLATE 32

Figs 1-4. Close-ups (x15) of macro- and microsculpture on central part of shell disc of left and right valve of articulated specimens. **1a-b.** *Mimachlamys gloriosa* (Reeve, 1853), Mindanao, Talikud Island, 6°56'N, 125°41'E, 20-28 m, lv and rv (ZMA Moll. 146665). **2a-b.** *Pedum spondyloideum* (Gmelin, 1791), PMBP 2004 Stn R51, juvenile, lv and rv. **3a-b.** *Gloripallium speciosum* (Reeve, 1853), Mactan, 10°17'N, 124°02'E, 25 m, lv and rv (ZMA Moll. 140475). **4a-b.** *Mimachlamys sanguinea* (Linnaeus, 1758), Bohol, off Panglao, 9°35'N, 124°01'E, 20-25 m, lv and rv (ZMA Moll. 148851).

Type data. — Syntypes (3 pv) BMNH 1950.11.14.40-42, largest syntype figured by Reeve (1853: pl. 20, fig. 76). Type locality: Philippine Islands, Ticao Island, under stones at low water.



Material examined. — **Philippines:** PMBP 2004, Stn B2, 5 m, 1 pv (A); Stn B5, 4 m, 1 pv (A), 4 v; Stn B6, 12-14 m, 1 pv (A), 1 v; Stn B7, 4-30 m, 1 v; Stn B11, 2-4 m, 1 pv (A); Stn B14, 2-4 m, 4 pv (A); Stn B18, 3-5 m, 1 pv (A); Stn B19, 17 m, 1 v; Stn B20, 2-8 m, 1 pv (A), 4 v; Stn B22, 15-20 m, 1 pv (A); Stn B23, 20-25 m, 1 pv (A); Stn B30, 25 m, 1 v; Stn D9, 2-4 m, 2 v; Stn D12, 2-4 m, 1 pv (A), 1 v; Stn D14, 2-4 m, 2 pv (A), 1 v; Stn L49, 90 m, 1 pv (A); Stn M1, 0-1 m, 1 v; Stn M11, 0-3 m, 2 pv (A); Stn M51, 0 m, 2 pv (A); Stn R8, 4-24 m, 1 pv (A); Stn R10, 2-10 m, 3 pv (A); Stn R11, 4 m, 1 pv (A); Stn R14, 6-8 m, 1 pv (A); Stn R19, 2-54 m, 1 pv (A); Stn R20, 7-48 m, 1 pv (A); Stn R26, 1-5 m, 1 pv (A); Stn R31, 10-41 m, 1 pv (A), 1 v; Stn R37, 28-32 m, 1 pv (A); Stn R43, 3-41 m, 1 pv; Stn R47, 4-25 m, 1 pv; Stn R65, 1-2 m, 2 pv (A); Stn R66, 1-3 m, 1 pv (A); Stn R67, 3-3.5 m, 3 pv (A); Stn R68, 3-3.5 m, 1 pv (A); Stn R69, 2-4 m, 1 pv (A); Stn S3, 6 m, 1 v; Stn S5, 2-4 m, 2 v; Stn S6, 1-4 m, 1 v; Stn S7, 1-4 m, 1 v; Stn S8, 28-32 m, 1 v; Stn S10, 6-14 m, 2 v; Stn S13, 8-15 m, 3 v; Stn S14, 5-12 m, 1 v; Stn S15, 4-6 m, 1 v; Stn S16, 15-18 m, 3 v; Stn S17, 6 m, 2 v; Stn S21, 4-12 m, 3 v; Stn S22, 15-20 m, 8 v; Stn S24, 2-4 m, 1 pv (A); Stn S25, 21 m, 5 v; Stn S28, 28-32 m, 1 v; Stn S32, 2-3 m, 1 v; Stn S34, 2 m, 2 v; Stn S39, 3-4 m, 1 v; Stn S42, 15-20 m, 2 v. PANGLAO 2005, Stn CP 2396, 609-673 m, 1 v.

Description. — Shell up to c. 70 mm high, most specimens smaller, to c. 40 mm, elongate, weakly inflated, almost equally convex, equivalve, almost aequilateral, anterior auricles much larger and longer than posterior ones, umbonal angle c. 85-90°; most specimens pale to dark brown with white or cream maculations, interior brownish. Both valves sculptured with c. 20-24 evenly spaced, squamose radial costae; each costa flanked by a secondary riblet on each side, commencing in late growth stage, almost lacking from some specimens. Anterior auricle of left valve with 6-10 squamose radial riblets, 4-6 weaker ones on posterior one; anterior auricle on right valve with 4-5 prominent radial riblets, much weaker on posterior. Hinge line somewhat declined on posterior auricle. Byssal notch deep, byssal fasciole rather broad. Functional ctenolium well-developed, with 4-6 teeth. Internal rib carinae prominent marginally, commencing in early growth stage. Resilial and dorsal teeth prominent.

Distribution. — Tropical western Pacific, from southern Japan southwards to the Philippine Islands, Indonesia and northwestern to northeastern Australia, and eastwards to the Solomon Islands (Raines & Poppe, 2006: 274). Present specimen from the Philippines alive intertidally to 90 m (minimum depth range). Living byssally attached to undersides of coral slabs or amongst rocky boulders with weed on sandy bottoms.

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material.

Mimachlamys sanguinea (Linnaeus, 1758)

Pl. 24 figs 2a-d, Pl. 32 figs 4a-b

Ostrea sanguinea Linnaeus, 1758: 698, no. 167; Dijkstra, 1999: 413, figs 4A-B (lectotype).

Ostrea senatoria Gmelin, 1791: 3327, no. 61 (based on Chemnitz, 1784: 320, pl. 65 fig. 617).

Ostrea porphyrea Gmelin, 1791: 3328, no. 65 (based on Chemnitz, 1784: 330, pl. 66 fig. 632).

Pecten aurantius Lamarck, 1819: 175, no. 45.

Pecten florens Lamarck, 1819: 175, no. 46.

Pecten indicus Deshayes, 1832: 410, pl. 3 fig. 5.

Pecten pseudolima G.B. Sowerby 2nd, 1842: 78, pl. 20 fig. 235.

Pecten layardi Reeve, 1853 (in 1852-53): sp. 80, pl. 21 figs 80a-b.

Pecten fricatus Reeve, 1853 (in 1852-53): sp. 161, pl. 34 fig. 161.

Pecten blandus Reeve, 1853 (in 1852-53): sp. 162, pl. 34 figs 162a-b.

Pecten raffrayi Jousseaume, 1886: 221, fig.

Mimachlamys ellochena Iredale, 1939: 349, pl. 5 fig. 24.

Chlamys (Mimachlamys) asperrimoides Powell, 1958: 70, pl. 11 figs 3-4, text-fig. 3.

Chlamys senatoria (Gmelin); Barnard, 1964: 430; Abbott & Dance, 1982: 309, fig; Dijkstra, 1990a: 9, 11; Dharma, 1992: 84, pl. 20 figs 3, 3a; Oliver, 1992: 74, pl. 13 figs 1a-b.

Chlamys (Mimachlamys) senatoria (Gmelin); Springsteen & Leobrer, 1986: 329, pl. 93 fig. 19; Rombouts, 1991: 30 (in part), pl. 11 figs 6, 6a; Dharma, 2005: 248, 364, pl. 99 figs 2a-d, pl. 147 fig. 2.

Mimachlamys senatoria (Gmelin); Dijkstra et al., 1989: 24; Dijkstra, 1990: 6, figs; Dijkstra, 1991: 34; Lamprell & Whitehead, 1992: [24], pl. 10 fig. 56; Dijkstra, 1993 (in 1983-94): 12, figs 1-5; Dijkstra & Marshall, 1997: 101, pl. 9 figs 1-4; Dijkstra & Knudsen, 1998: 83, pl. 4 fig. 16; Dijkstra, 1998a: 42; Hayami, 2000: 903, pl. 448 fig. 24; Wang, 2002: 188; Xu & Zhang, 2008: 83, fig. 230.

Mimachlamys asperrimoides (Powell); Lamprell & Whitehead, 1992: [24], pl. 10 fig. 57.

Mimachlamys sanguinea (Linnaeus); Dijkstra & Kilburn, 2001: 305, figs 44-45; Raines & Poppe, 2006: 274, 275, upper figs; pl. 221 figs 1-5; pl. 222 figs 1-5, pl. 223 figs 1-5, pl. 224 figs 1-8; Dijkstra & Marshall, 2008: 70, figs 55C, F, 58; Raines, 2010: 642, pl. 1012 figs 1-5.

Mimachlamys gloriosa (Reeve); Raines, 2010: 640, pl. 1011
figs 1-5 (not *Pecten gloriosus* Reeve, 1853).

Remarks. — Synonyms were established by Dijkstra & Marshall (1997: 101). For references cited by Linnaeus (1758: 698) see Dijkstra (1999: 413).

Type data. — *Ostrea sanguinea* Linnaeus: Lectotype (H 39 mm, lv) LSL designated by Dijkstra (1999: 414), paralectotypes (2 rv LSL, 1 lv MSNP). Type locality: "Habitat in *O. australiore*". Restricted by Dijkstra (1999: 414) to the Maluku Archipelago [Moluccas], Indonesia.

Ostrea senatoria Gmelin: Lectotype (H 69 mm, pv) ZMUC BIV-45, designated by Dijkstra & Marshall (1997: 102). Type locality: "Oceano indico" [Indian Ocean].

Ostrea porphyrea Gmelin: Lectotype (H 60 mm, lv) ZMUC BIV-46, designated by Dijkstra & Marshall (1997: 102). Type locality: "Mari rubro" [Red Sea].

Pecten aurantius Lamarck: Lectotype (H 56.5 mm, pv) MNHN Moll 21191, designated by Dijkstra (1994a: 489). Type locality: "l'Océan indien?" [Indian Ocean?].

Pecten florens Lamarck: Holotype (H 48 mm, pv) MHNG 1088/70. Type locality: "l'Océan indien?" [Indian Ocean?].

Pecten indicus Deshayes: Type material not seen (repository unknown).

Pecten pseudolima Sowerby: Syntypes (3 pv) BMNH 1950.11.14.54-56. Type locality: Philippine Islands, Bohol, Jacna.

Pecten layardi Reeve: Syntypes (6 pv) BMNH 1994.162. Type locality: "Ceylon" [Sri Lanka]; 3 syntypes (pv) ZMB Moll. 114.611 (1 pr), 114.612 (2 pr), labelled "Ceylon/H. Cuming" (Dijkstra & Köhler, 2008: 37, fig. 2f).

Pecten fricatus Reeve: Holotype (H 28 mm, pv) BMNH 1994.161. Type locality: Unknown.

Pecten blandus Reeve: Syntypes (5 pv) BMNH 1950.11.14.13-17. Type locality: Australia (Iredale & McMichael (1962, p. 11) stated that this was from "Port Jackson", but this locality was not stated by Reeve).

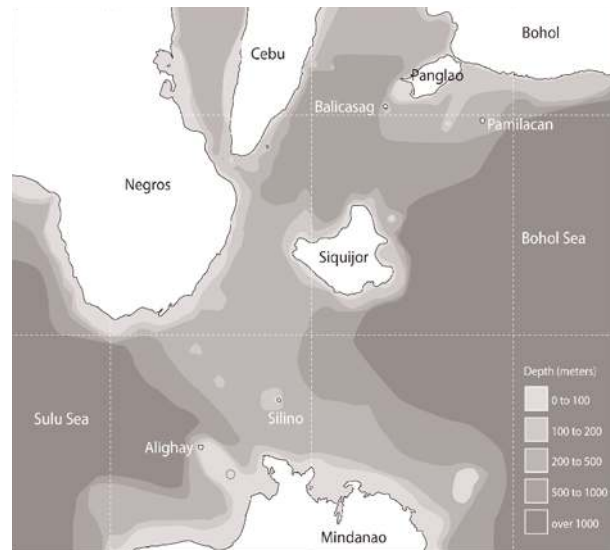
Pecten raffrayi Jousseaume: Holotype (39 mm, pv) MNHN Moll 21187. Type locality: Zanzibar.

Mimachlamys ellochena Iredale: Holotype (H 33 mm, rv) AMS C.119511. Type locality: Australia, Queensland, off Shaw Islands, Whitsunday Group, 37 m (Great Barrier Reef Expedition stn 17).

Chlamys (Mimachlamys) asperimoides Powell: Holotype (H 20.2 mm, pv) AIM TM.1235. Type locality: South of Norfolk Island (Australia), 82-91 m, from cable.

Material examined. — **Philippines**: PANGLAO 2005, Stn CP 2380, 150-163 m, 1 v.

Additional material examined. — Sulu Sea, off Zamboanga, 40-60 m, alive, 20 pv (ZMA Moll. 140446); Laminusa Island, 55 m, alive, 2 pv (ZMA Moll. 140211); Off Cuyo Island, 9 m, alive, 2 pv (ZMA Moll. 140659); Recodo, subtidal, alive, 19 pv (ZMA Moll. 141356); Off Bogo, 36-45 m, alive, 4 pv (ZMA Moll. 141538); Off Masbate Harbour, 20-40 m, alive, 30 pv (ZMA Moll. 141772); Off Bantayan, 20-30 m, alive, 4 pv (ZMA Moll. 144195); Davao Gulf, off Talikud Island, 20-28 m, alive, 16 pv (ZMA Moll. 144474); Off Panglao, 20-25 m, alive, 4 pv (ZMA Moll. 148851).



Description. — Shell up to c. 70 mm high, moderately inflated, left valve slightly more convex than right, circular to more dorsoventrally elongate, equivalve, almost equilateral, anterior auricles much larger and longer than posterior ones, umbonal angle c. 85-90°; colour polychromatic, cream, yellowish, orange, reddish, brown, purple to violet, with pale radial streaks and mottles. Both valves sculptured with 20-24 evenly spaced radial costae with small, somewhat tripartite scales, each costa flanked by a secondary spinous radial riblet on each side. Antimarginal microsculpture in interspaces. Auricles with c. 10 delicate scaly radial riblets, c. 6 coarser ones on anterior auricle of right valve. Hinge line straight. Byssal notch moderately deep, byssal fasciole rather broad. Functional ctenolium well-developed, with 5-7 teeth. Internal rib carinae prominent marginally, commencing in early growth stage. Resilial and dorsal teeth prominent.

Distribution. — Throughout the (sub)tropical Indo-West Pacific, from southern Japan southwards to northeastern Australia, Kermadec Islands (Dijkstra & Marshall, 2008: 70), westwards into the Indian Ocean to northern South Africa, and eastwards to the central Pacific (not recorded from the Hawaiian Islands or French Polynesia) (ZMA, unpubl. data; Raines & Poppe, 2006: 274). Present specimen from the Philippines dead in 150-163 m. Bathymetric range of live-taken specimens is 3-55 m (minimum depth range) (ZMA, unpubl. data). Living generally in shallow waters, byssally attached to corals or rocks or amongst coral rubble on soft bottom sediments (sand or muddy sand).

Remarks. — Many names have been used in the literature for this highly polymorphic and polychromatic, widely distributed Indo-West Pacific species, and it has often been confused with other superficially similar congeneric species (Dijkstra & Marshall, 1997: 101; Dijkstra & Kilburn, 2001: 307). Shells are often covered with different sponges (Dijkstra, 1993 (in 1983-94): 12).

AEQUIPECTININI Teppner, 1922

Diagnosis. — Chlamydinæ with most taxa of æquiptectinoid shape, with a complex sculpture of radial costae, evenly lamellose with a series of hollow sections or secondary interstitial commarginal lamellae; many taxa with commarginal ridges developing ventrally directed loops on flanks of radial costae; microsculpture of prominent, smooth pits in pre-radial stage; equilateral and with auricles becoming almost equal in late ontogeny; internal rib carinae prominent; hinge with enlarged resilial teeth.

***Cryptopecten* Dall, Bartsch & Rehder, 1938**

Cryptopecten Dall, Bartsch & Rehder, 1938: 93. Type species (by original designation): *Cryptopecten alli* Dall, Bartsch & Rehder, 1938; Recent; Hawaii, off south coast of Oahu, 435-461 m.

Corymbichlamys Iredale, 1939: 347, 367. Type species (by original designation): *Chlamys corymbiatus* [sic] Hedley, 1909; Recent; Queensland, off Hope Islands.

Diagnosis. — Small to medium-sized Aequiptectinini with valves highly variable in convexity, most species circular; laterally compressed; auricles almost equal; macrosculpture of 12-25 evenly lamellose radial costae, interspaces with delicate imbricated scales; auricles sculptured with a few radial riblets; byssal notch relatively deep, functional ctenolium well-developed; internal rib carinae prominent; hinge with prominent resilial and dorsal teeth.

Distribution. — Lower Miocene to Recent. Indo-West Pacific and western Atlantic; living littorally to bathyally (see also Hayami, 1984: 116).

Remarks. — Hertlein (1969: N357) treated *Cryptopecten* as a subgenus of *Chlamys* Röding, 1798, placed in the suprageneric *Chlamys* group. He also considered *Gloripallium* Iredale, 1939 to be a junior synonym of *Cryptopecten*.

Waller (1986: 40) elevated the extant Indo-West Pacific genus *Gloripallium*, and placed it in Decatoplectinini of Pectininae. *Cryptopecten*, however, has morphological characters strongly resembling those of *Aequiptecten*, and should be placed in the tribe Aequiptectinini of Chlamydinæ.

***Cryptopecten bullatus* (Dautzenberg & Bavay, 1912)**

Pl. 24 figs 3a-d, Pl. 25 figs 2a-b

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.

Chlamys alli (Dall, Bartsch & Rehder); Kay, 1979: 524, fig. 168A.

Cryptopecten complanus Wang, 1983a: 402, 405, figs 1.1-7.

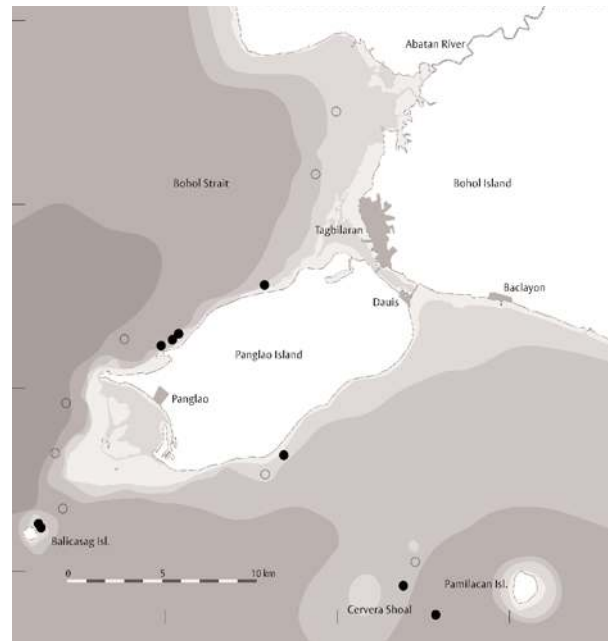
Cryptopecten bullatus (Dautzenberg & Bavay); Hayami, 1984: 96, pl. 1 figs 1-6, pl. 2 figs 1-3, pl. 9 fig 1, pl. 10 fig.

3, pl. 11 fig. 3; Wagner, 1989a: 60, figs 14-16; Dijkstra, 1991: 35; 1992: 26, figs 1-4; 1995: 60, figs 115-118; Raines & Poppe, 2006: 312, pl. 275 figs 1-7; Dijkstra & Marshall, 2008: 69, figs 55G-H, 57; Raines, 2010: 646, pl. 1014 figs 7-11..

Type data. — *Pecten* (*Chlamys*) *bullatus* Dautzenberg & Bavay: Holotype (H 13 mm, pv) ZMA Moll. 312006, paratypes (2 pv) ZMA Moll. 312007. Type locality: Philippines, Sulu Archipelago, 6°8'N, 121°19'E, 275 m, alive, coral bottom, dredge, 4.vii.1899 (Siboga stn 105).

Cryptopecten alli Dall, Bartsch & Rehder: Holotype (H 22.1 mm, pv) USNM 173194. Type locality: Hawaii Islands, off S-coast Oahu, 21°28'N, 157°58'W, 238-252 fathoms [= 435-461 m], alive, on coarse sand and rocky bottom, trawl, 27.iii.1902 (Albatross stn 3811).

Cryptopecten complanus Wang: Holotype (H 14 mm, pv) IOAS M11072, paratype (pv) IOAS M11073. Type locality: East China Sea, 31°5'N, 128°E, 147 m, alive, sand bottom, 30.v.1978.



Material examined. — Philippines: PMBP 2004, Stn L48, c. 100 m, 1 v; Stn L51-60, 43-62 m, 2 pv (A), 1 v; Stn L76, c. 80 m, 1 pv (A), 1 v; Stn L77, c. 120 m, 1 v; Stn P1, 90-200 m, 3 pv (A), 3 v; Stn P3, 100 m, 3 pv (A); Stn P4, 80-120 m, 1 pv (A), 1 v; Stn P6-7, 121-138 m, 1 pv (A), 1 v; Stn T2, 152 m, 4 v; Stn T4, 82 m, 1 pv (A); Stn T13, 90-100 m, 1 v; Stn T31, 100-140 m, 1 v; Stn T36, 95-128 m, 2 v; Stn T41, 110-112 m, 1 pv (A). PANGLAO 2005, Stn DW 2347, 198-233, 1 pv (A); Stn CP 2395, 382-434 m, 1 v; Stn CP 2397, 642-669 m, 1 v; Stn DW 2401, 397-410 m, 1 v.

Description. — Shell up to c. 30 mm high, most specimens smaller than 20 mm; thin, weakly inflated, right valve more convex than left, almost circular, weakly prosocline, inequilateral, auricles unequal in shape and size, umbonal angle c. 100-110°; colour polychromatic, most specimens reddish brown with pale oblique or zigzag stripes or blotches, a few specimens yellow or purple. Both valves sculptured with 17-20 squamose, bi-vesicular radial costae (18-19 on most specimens), interstices bearing commarginal lamellae (more

delicate on right valve). Anterior auricles slightly larger than posterior ones, anterior with 2 prominent radial riblets and 2-4 interstitial ones; posterior auricle with one prominent radial riblet and 3-5 narrower ones between prominent riblet and disc margin. Inner surface strongly plicate, internal rib carinae prominent and commencing in early growth stage. Hinge line straight. Byssal notch rather deep, byssal fasciole moderately narrow. Functional ctenolium well-developed, with 4-5 teeth. Resilial and dorsal teeth prominent.

Distribution. — Throughout (sub)tropical Indo-Pacific from southern Japan, southwards to Australia, westwards into the Indian Ocean to eastern South Africa, and eastwards into the Pacific to French Polynesia (Dijkstra & Marshall 1997: 106; Dijkstra 2001: 92; Raines & Poppe, 20076: 314; Dijkstra & Maestrati, 2008: 109). Present specimens from the Philippines alive in 62-198 m (minimum depth range). Living amongst gravel or coral rubble on soft bottom assemblages (sand or muddy sand).

Remarks. — The present specimens from the Philippines are morphologically indistinguishable from the type material of Indonesia.

For further discussion and comparison see Hayami (1984: 98), Wagner (1989a: 61), Dijkstra (1991: 36), and Dijkstra & Marshall (2008: 69).

Cryptopecten nux (Reeve, 1853)

Pl. 25 figs 1a-d, 3a-b

Pecten coruscans Hinds; Reeve, 1853 (in 1852-53): sp. 143, pl. 32 fig. 143 (not *Pecten coruscans* Hinds, 1845).

Pecten nux Reeve, 1853 (in 1852-53): errata.

Pecten guendolena Melvill, 1888: 279, pl. 2 fig. 6; Trew, 1987: 43.

Chlamys smithi G.B. Sowerby 3rd, 1908: 18, pl. 1 figs 6-7; Viader, 1937: 62.

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

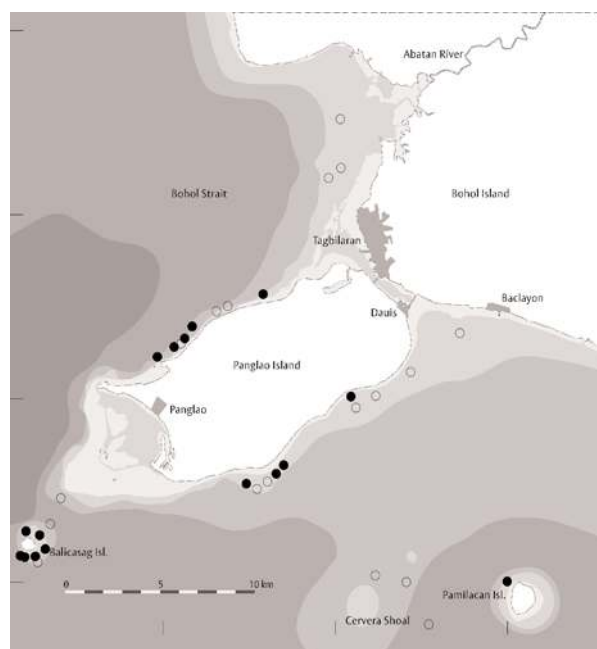
Cryptopecten nux (Reeve); Habe, 1951: 77; Habe, 1961: 118, pl. 53 fig. 9; Habe, 1964b: 174, pl. 53 fig. 9; Habe, 1977: 84; Kira, 1962: 174, pl. 53 fig. 9; Hayami, 1982: 235; Wang, 1983a: 403, figs. 1 (8-13); Hayami, 1984: 99, pl. 2 fig. 4, pl. 3 figs 1-2, pl. 9 figs 2-5, pl. 12 figs 1-2; Dijkstra, 1991: 36; Lamprell & Whitehead, 1992: [26], pl. 11 fig. 66; Bernard et al., 1993: 50; Dijkstra & Marshall, 1997: 107; Dijkstra, 1998a: 42; Dijkstra & Knudsen, 1998: 86, pl. 3 figs 12-13; Hayami, 2000: 905, pl. 450 fig. 40; Dijkstra, 2001: 92; Dijkstra & Kilburn, 2001: 310, figs 50-51; Wang, 2002: 211, fig. 91, textfig. 15; Taylor & Glover, 2004: 262; Raines & Poppe, 2006: 314, 315, lower fig; pl. 276 figs 1-8; Dijkstra & Moolenbeek, 2008: 22; Dijkstra & Maestrati, 2008: 109; Xu & Zhang, 2008: 87, fig. 244.

Type data. — *Pecten nux* Reeve: Lectotype (H 13.6 mm, pv) BMNH 1950.11.14.52, paralectotypes (2 pv) BMNH 1950.11.14.50-51, designated by Wagner (1989a: 58). Type locality: Philippine Islands, Bohol, Panglao, designated by Wagner (1989a: 58).

Pecten guendolena Melvill: Holotype (H 14.3 mm, pv) NMW 1955.158.02. Type locality: Mauritius.

Chlamys smithi Sowerby: Holotype (H 17 mm, pv) BMNH 1908.5.30.63. Type locality: Mauritius.

Chlamys corymbiatus Hedley: Syntypes (lv + rv) AMS C.27532. Type locality: Australia, N Queensland, Hope Islands, 5-10 fathoms [= 9-18 m].



Material examined. — **Philippines:** PMBP 2004, Stn D2, 41-46 m, 1 v; Stn D15, 53-83 m, 5 v; Stn L40, 100-120 m, 1 v; Stn L41, 90-100 m, 5 pv (A); Stn L42, 80-90 m, 1 pv (A), 3 v; Stn L44, 85-100 m, 1 pv (A); Stn L46, 90-110 m, 331 pv (A), 30 v; Stn L48, c. 100 m, 1 v; Stn L49, 90 m, 300 pv (A), 392 v; Stn L50, 120 m, 1 pv (A), 4 v; Stn L51-60, 43-62 m, 102 pv (A), 97 v; Stn L65-68, 55-81 m, 35 pv (A), 33 v; Stn L69-73, 90-98 m, 90 pv (A), 16 v; Stn L74-75, 120-139 m, 71 pv (A); Stn L76, c. 80 m, 9 pv (A), 68 v; Stn L77, c. 120 m, 2 pv (A), 2 v; Stn M60, 0-1 m, 1 v; Stn P1, 90-200 m, 1 pv (A), 1 v; Stn P3, c. 100 m, 15 pv (A), 2 v; Stn P4, 80-120 m, 100 pv (A), 246 v; Stn S1, 5 m, 1 pv (A); Stn S3, 6 m, 1 v; Stn S8, 28-32 m, 2 v; Stn T1, 83-102 m, 3 pv (A), 245 v; Stn T2, 152 m, 2 v; Stn T4, 82 m, 2 pv (A), 32 v; Stn T5, 84-87 m, 2 v; Stn T6, 34-82 m, 2 v; Stn T11, 78-95 m, 4 v; Stn T13, 90-100 m, 1 v; Stn T29, 77-84 m, 3 v; Stn T36, 95-128 m, 6 v; Stn T38, 80-140 m, 6 v; Stn T41, 110-112 m, 4 v; Stn T44, 83-86 m, 1 pv (A), 4 v. PANGLAO 2005, Stn DW 2347, 198-233 m, 2 v; Stn CP 2362, 679-740 m, 1 v; Stn DW 2370, 92-96 m, 4 v; Stn DW 2374, 105-109 m, 1 v; Stn DW 2400, 111-115 m, 90 v; Stn DW 2401, 397-410 m, 26 v; Stn DW 2402, 101-118 m, 18 v.

Description. — Shell solid, up to c. 20 mm high, most specimens to 10-15 mm, moderately to strongly inflated, right valve more convex than left, circular to subcircular, almost equivalve, equilateral to inequilateral, anterior auricles larger and longer than posterior ones, umbonal angle c. 90°; colour polychromatic, left valve more strongly pigmented; a few specimens monochrome yellow or purple. Both valves with 18-22 evenly spaced, vesicular-sculptured radial costae, when worn appearing more tripartite; intercostal spaces bearing commarginal lamellae. Auricles with 4-6 spinous radial riblets, most prominent on anterior auricle of right valve. Hinge line straight. Byssal notch deep, byssal fasciole moderately wide. Functional ctenolium well-developed, with 4-6 teeth. Resilifer triangular, slightly oblique. Internal rib carinae

prominent near margin, commencing in early growth stage. Resilial and dorsal teeth prominent.

Distribution. — Throughout the (sub)tropical Indo-Pacific, from southern Japan southwards to northern Australia, westwards into the Indian Ocean to South Africa and into the Red Sea, and eastwards into the Pacific (absent in the Hawaiian Islands) to French Polynesia (Raines & Poppe, 2006: 314). Present material from the Philippines alive in 5-120 m. Living amongst shell rubble on sandy and/or muddy bottom conditions.

Remarks. — The present specimens from the Philippines are indistinguishable from the type material of the Marquesas Islands.

This species is highly variable in outline, convexity, sculpture and colour (Hayami, 1984: 100; Dijkstra, 1991: 37). For further discussion see Dijkstra & Kilburn (2001: 312).

***Haumea* Dall, Bartsch & Rehder, 1938**

Haumea Dall, Bartsch & Rehder, 1938:86. Type species (by original designation): *Haumea juddi* Dall et al., 1938 (= *Pecten loxoides* Sowerby 2nd, 1882); Recent, Hawaiian Islands.

Diagnosis. — Small Aequipectinini of circular to prosocline shape, both valves convex, right valve the more convex in most specimens; macrosculpture of evenly spaced radial costae and delicate, closely spaced, commarginal lamellae throughout ontogeny of most specimens; auricles relatively narrow; internal rib carinae present; hinge teeth broad and prominent, anterior resilial tooth prominent, posterior weak; byssal notch deep, ctenolium well-developed.

Distribution. — Recent. Indo-West Pacific; living littorally to sublittorally.

Remarks. — Hertlein (1969: N357) treated *Haumea* as a junior synonym of *Argopecten* Monterosato, 1889 (as Vaught (1989: 118) did), a subgenus of *Chlamys*, placed in the supra-generic *Chlamys* group by Hertlein, and in the subfamily Chlamyidae by Vaught.

Haumea is considered here to be an extant Indo-Pacific genus, differing morphologically from the extant eastern Pacific and western Atlantic genus *Argopecten* in its more strongly prosocline shape (more elongate to circular in *Argopecten*), its smaller auricles, its more closely spaced interstitial commarginal lamellae, its very weak or lacking interstitial radial microsculpture (more prominent between the commarginal lamellae in *Argopecten*), its more prominent internal rib carinae, and its weaker dorsal teeth (very prominent in *Argopecten*). These morphological characters indicate that *Haumea* is related to *Aequipecten*, *Argopecten*, and *Cryptopecten*, which are also all placed in Aequipectinini (see also Waller, 1991; 1993).

***Haumea rehderi* (Grau, 1960)**

Pl. 21 figs 5a-b, Pl. 25 figs 4a-d

Pecten (Aequipecten) aequisulcatus Carpenter; Dautzenberg & Bavay, 1912: 19 (not *Pecten aequisulcatus* Carpenter, 1864).

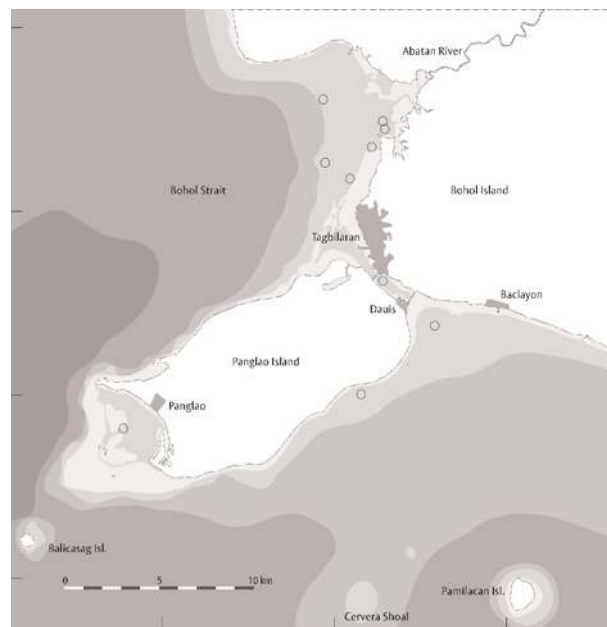
Chlamys (Argopecten) rehderi Grau, 1960: 15, pl. 2 figs 1-3.

Argopecten rehderi (Grau); Dijkstra, 1988 (in 1983-94): 3, figs; Dijkstra, 1989: 2, 12, figs; Dijkstra et al., 1989: 24; Dijkstra et al., 1990: 9, 10, figs; Rombouts, 1991: 8.

Chlamys (Argopecten) rehderi Grau; Dijkstra, 1990a: 11, pl. 2 figs 16-17.

Haumea rehderi (Grau); Dijkstra, 1997: 332, figs 39-40; Dijkstra, 1998a: 44, pl. 9 figs 1-4; Raines & Poppe, 2006: 318, 319, lower figs; pl. 274 fig. 2.

Type data. — Holotype (H 9.5 mm, pv) USNM 612201, paratypes (21 pv) USNM 612202. Type locality: French Polynesia, Society Islands, Leeward Group, Bora Bora Island, Tereia Point, alive, 13-16 fathoms [= 24-29 m].



Material examined. — **Philippines:** PMBP 2004, Stn G1, 100 m, 6 v; Stn S9, 3 m, 1 v; Stn S19, 3-4 m, 3 v; Stn S20, 10 m, 2 v; Stn S38, 3-4 m, 1 v; Stn S52, 2 m, 3 v; Stn T6, 34-82 m, 2 v; Stn T18, 80-100 m, 5 v; Stn T26, 123-135 m, 12 v; Stn T30, 59-65 m, 1 v.

Description. — Shell up to c. 10 mm high, most specimens smaller, to 6 mm; moderately inflated, equiconvex, sub-circular to circular, almost equivalve and equilateral, umbonal angle c. 95°; colour polychromatic, maculated with streaks and/or blotches, right valve paler. Both valves sculptured with 18-23 evenly spaced, massive high rounded radial costae bearing weak commarginal lamellae. Each intercostal space equal in width to one rib, bearing prominent commarginal lamellae. Anterior auricle of left valve bearing 5-7 imbricate radial riblets, more prominent than on posterior auricle (weaker and more lamellose). Anterior auricle of right valve with 4 strongly imbricate riblets. Byssal notch moderately deep, byssal fasciole narrow. Functional ctenolium well-developed,

with 5-6 teeth. Internal rib carinae prominent, commencing in early growth stage. Anterior resilial and dorsal teeth prominent, posterior teeth weak.

Distribution. — Tropical Indo-West Pacific, from Indonesia and northern Australia, westwards into the Indian Ocean to Sri Lanka, and eastwards into the Pacific to French Polynesia. Not recorded from the western region of the Indian Ocean, northwestern Pacific (Japan) or the Hawaiian Islands. Present material from the Philippines dead in 2-123 m (minimum depth range). Bathymetric range of live-taken specimens intertidally to 60 m (ZMA, unpubl. data). Living amongst coral rubble or shell grit on soft bottoms (sand and/or mud).

Remarks. —The present specimens are morphologically indistinguishable from the type material.

Haumea rehderi can easily be confused with juveniles of the equal-sized, congeneric species *H. minuta* (Linnaeus, 1758), more generally known as *H. inaequalvis* (G.B. Sowerby 2nd, 1842), known from the tropical Indo-West Pacific. The two species can be distinguished by the convexity of the left valve (*H. rehderi* moderately inflated, *H. minuta* almost flat), the size of the anterior auricle of the right valve (*H. rehderi* has a much larger auricle with a deeper byssal notch), the radial sculpture of the right valve (*H. rehderi* has narrower costae with wider intercostal spaces than *H. minuta*), and their colour (*H. rehderi* is much more polychromatic; most specimens of *H. minuta* are brown or maculated black on the left valve and white on the right valve).

This species is a **new record** for the Philippines.

DISCUSSION

Currently seventy species of Pectinidae are recorded literally to bathyally from the Philippine Archipelago (Dijkstra, unpubl. data), of which 63 are described and depicted in Raines & Poppe (2006) and 53 recently in Raines (2010). Fifty species are presently collected by PMBP 2004 and PANGLAO 2005 (71 %). This is the highest number of Pectinidae species in the tropical Indo-Pacific. This confirms the species richness of the southwestern Pacific centre of marine biodiversity. Hayami (2000) recorded c. 50 species from southern Japan and Xu & Zhang (2008) c. 45 species from the China seas. About 60 species are presently known from the tropical region of Australia and c. 40 species from New Caledonia (Dijkstra, unpubl. data). Westwards into the Indian Ocean and eastwards into the Pacific this species number is drastically reduced (18 species in the Red Sea, Dijkstra & Knudsen 1998; 29 species from South Africa and Mozambique, Dijkstra & Kilburn 2001; 25 species from French Polynesia, Dijkstra 1989, and Dijkstra & Maestrati 2010).

Sampling strategies and efforts heavily influence the number of collected species (Bouchet et al., 2002; Bouchet et al., 2009). Many new pectinid species and records from the Philippines are due to the use of lumun lumun and tangle net fishing during the last decades by local fishermen.

The bathyal (100-2000 m) propeamussiid specimens

obtained by PMBP 2004 and PANGLAO 2005 are represented by 11 species, out of a total of 16 species known from the Philippines. This is a relatively low number by comparison with the 23 species known from the Indonesian Archipelago and the 21 species from the New Caledonia region (Dijkstra, 1995: 67). Therefore, it is expected that more propeamussiid species will be discovered by forthcoming expeditions in the Philippines.

Recently several new small propeamussiid *Cyclopecten* and *Cyclochlamys* species have been found by using algae brushing and collecting the smallest sieved fractions (less than 2 mm) of shell grit, rubble or gravel from littoral depths (Hayami & Kase, 1993; Dijkstra & Marshall, 2008; Dijkstra, unpubl. data). It is most likely that representative propeamussiid species will also turn up in the Philippines by using these sampling techniques.

The new pectinoidean species and records of the AURO-RA 2007 to the northeastern region of the Philippines will be discussed elsewhere.

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