

Results of the Rumphius Biohistorical Expedition to Ambon (1990)



Part 15. The suborder Doridina (Mollusca, Gastropoda, Opisthobranchia, Nudibranchia)

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At least 45 species belonging to the suborder Doridina are present in the 1990 Rumphius Biohistorical Expedition (RBE) collections, in addition to the 22 species of Chromodorididae and Hexabranchidae previously described by the author in 2001. In this paper, a total of 33 species belonging to 15 genera are identified and described from Ambon and nearby localities, comprising nearly 100 specimens. Three species are new to science but more material is needed, and eight species are recorded from Indonesian waters for the first time. As this is a paper identifying a major collection, brief descriptions are given for the species which are already well known, highlighting significant features and characters differentiating them from similar species, with figures where appropriate. A number of less well known species are described and figured in more detail. All species except *Phyllidiopsis burni* are illustrated with colour figures of living specimens.

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Introduction

The Doridina form approximately half of the large collection of opisthobranchs made by the Rumphius Biohistorical Expedition (RBE) from Ambon, Indonesia, during November and December 1990, details of which are available in Strack (1993, 1998). An introduction to the nudibranch material present in these collections is given in the first paper describing the Chromodorididae and Hexabranthidae (Yonow, 2001), and is not repeated here. The RBE nudibranchs are supplemented by specimens collected by H. Debelius from Bali and Sulawesi in November 1990, by H. Strack from Ceram during November and December 1997, and by J. Hinterkircher from East Borneo in September 2003. A further few specimens from the Philippines (collected by J. Hinterkircher) and Australia (collected by Prof. R. Cattaneo-Vietti, C. Bryce, and H. Debelius) are also included since they have been reliably recorded from Indonesia: *Gymnodorids aurita*, *G. impudica*, *Analogium* spec.

nov. 1, and *Phyllidia elegans*. Thirty-three species are recorded; eight species were not previously recorded from Indonesia and three species appear to be new to science.

The cryptobranch dorids contain a vast number of species worldwide, with numerous old as well as recently described names (Valdés & Gosliner, 1999b; Dorgan *et al.*, 2002). While the species themselves are often recognizable and identifiable, their generic placement is sometimes more difficult (Dayrat, 2010). The species included in the paper all belong to the family Discodorididae and are listed alphabetically by genus, implying no phylogenetic affinities what so ever. Recently, taxonomic work has lead to the synonymy of many genera [e.g. *Miamira* and *Orodoris* with *Ceratosoma* (Valdés & Gosliner, 1999a), *Fryeria* with *Phyllidia* (Valdés & Gosliner, 1999b), and *Trippa* with *Atagemia* (Valdés & Gosliner, 2001)]. In some cases, this has proved a useful exercise, but in others it makes the classification of the species more difficult, ignoring previously widely accepted distinctions between these genera, and necessitating new names for well-known species (e.g. *Notodoris* with *Aegires*, but both have a well-known species named *citrinus*; Fahey & Gosliner, 2004). Higher systematic studies are certainly important for establishing evolutionary relationships, but knowing the identities of the individual species is essential for zoogeographical, phylogenetic, as well as natural products studies.

Materials & Methods

Collection methods have been described elsewhere (Strack, 1993, 1998; Yonow, 2001). The synonymy includes references from Indonesia, references omitted from previous publications, and recent reviews. In the 'Material' section, **specimen** refers to a preserved animal lodged in the Netherlands Centre for Biodiversity Naturalis, formerly Rijksmuseum van Natuurlijke Historie Leiden, the Netherlands (RMNH), while **individual** refers to a photographed animal, possibly measured but not collected or preserved. The notes in quotation marks are translations of the Dutch notes written on the RBE field labels. Both Ambonese "specimens" and "individuals" are listed as 'Material', as are additional specimens and individuals from Indonesia while non-Indonesian material is listed separately. Some specimens collected from the Philippines and Australia are included in this work and lodged in RMNH Leiden; however, many phyllidiid specimens are from the Natural History Museum (London), the Muséum National d'Histoire Naturelle (Paris), and the Western Australian Museum (Perth) and were examined. The phyllidiid material from Papua New Guinea was examined, sent to Marta Domínguez (Domínguez *et al.*, 2007), and is lodged in the Royal Belgian Institute of Natural Sciences (Brussels).

All radular preparations and colour slides for specimens and individuals included in this paper (as well as those in Yonow, 2001) are deposited in RMNH, Leiden.

Taxonomic Report

Family Polyceridae
Nembrotha cristata Bergh, 1877
 (pl. 1 fig. 1)

Trevelyana cristata Bergh, 1874: pl. 33, fig. 6.

Nembrotha cristata Bergh, 1877a: 458; Bergh, 1905: 194, pl. 18, figs 4-8; Yonow, 1994: 108, figs 6E, 8D; Pola *et al.*, 2008: 153, figs 1G, 4B, 6.

Material.— RMNH.MOL.131697, RBE Stn 44, Latuhalat, Leitimur, 9 m depth “lowest littoral,” 12.xii.1990, leg. W. Kolvoort, 17 × 7 × 9 mm pres., photos M. Lavaleye 51-31/33, 303-4, and W. Kolvoort; Bunaken, Manado, North Sulawesi, < 15 m depth, xi.1990, one individual, photos only H. Debelius; Derawan, East Borneo, iv.1997, one individual, photos only J. Hinterkircher.

Non-Indonesian material.— Bohol, Philippines, ix.2003, photos of one individual, J. Hinterkircher.

Remarks.— *Nembrotha cristata* resembles *N. kubaryana* (see below) by its velvety black dorsum and green pustules on the sides. The rhinophore sheaths, gill rachides and leaflets, anal papilla, and the edge of the foot were all green (pl. 1 fig. 1), differing from *N. kubaryana* by lacking any orange pigmentation. It also differs from the green and black *N. milleri* (p. 910) in having a black ground colour instead of green. Bergh described and illustrated this species from a single specimen collected in the Philippines. The species is essentially West Pacific in distribution, but two individual records exist from the east (Western Australia, Wells & Bryce, 1993) and west (Maldives, Yonow, 1994) sides of the Indian Ocean.

Nembrotha kubaryana Bergh, 1877
(pl. 1 figs 2, 3)

Trevelyana nigerrima Bergh, 1874: pl. 33, fig. 5.

Nembrotha kubaryana Bergh, 1877a: 454; Bergh, 1881a: pl. G, fig. 16; Bergh, 1881b: 659; Bergh, 1905: 197, pl. 5, fig. 13; Yonow & Hayward, 1991: 11, figs 7E, 12C; Gosliner *et al.*, 2008: 112.

Nembrotha nigerrima Bergh, 1877a: 451; Bergh, 1905: 196, pl. 18, figs 13, 14; Pola *et al.*, 2008: 147, figs 1A-F, 2, 3, 4A, 5.

Material.— RMNH.MOL.131687, RBE Stn 17, 2 km SE of Pombo, Ambon, 16.xi.1990, “lowest littoral,” leg. A.F. de Jong, 15 × 10 mm pres., photos M. Lavaleye 14/33-34; RMNH.MOL.131686, Manado, N. Sulawesi, 8-15 m depth, x.1990, leg. H. Debelius, 31 × 10 × 16 mm pres.; Derawan, East Borneo, iv.1997, one individual 25 mm in length, photos only J. Hinterkircher; RMNH.MOL.131688, Nusa Ela, Pulau Tiga, < 4 m depth, 25.xi.1997, leg. H. Strack, 20 × 10 mm pres.; Indonesia, one individual, photos only J. Hinterkircher.

Non-Indonesian material.— Bohol, Philippines, ix.2003, photos of one individual, J. Hinterkircher.

Description.— *Nembrotha kubaryana* is recognized by its velvety black dorsum and sides covered in green pustules, which may be separate or may coalesce into longitudinal rows. The rhinophores, rhinophore sheaths, oral tentacles, the tip of the foot and the foot margin were all bright orange (pl. 1 fig. 2). In some individuals the rhinophore sheath can be green (pl. 1 fig. 3). The gills are usually green but may be suffused with orange pigment in some specimens.

Remarks.— This species has a West Pacific distribution, and has been recorded as far east as Western Australia (Wells & Bryce, 1993: 83, fig. 92). There is one published record from Mauritius in the western Indian Ocean (Yonow & Hayward, 1991) but NudiPixel and SeaSlugForum have several photographs from Mauritius and East Africa. Yonow & Hayward (1991: 12) realised that *N. kubaryana* Bergh, 1877, and *N. nigerrima* Bergh, 1877, constituted the same species and selected *Nembrotha kubaryana* as the valid name. In this choice, Yonow & Hayward (1991) deliberately acted as First Reviser in the sense of Article 24.2.2 of the International Code of Zoological Nomenclature (ICZN, 1999; not 2000 as in Pola *et al.*, 2008). Although both names were first formally published in the same work

(Bergh, 1877a), *kubaryana* was selected because it is the better known and most frequently used name in the current literature; in fact, Pola *et al.* (2008) use Bergh's illustration of *kubaryana* (1905, pl. V fig. 13) as the original drawing for *nigerrima*. Pola *et al.* (*op. cit.*) agreed with the synonymy but then attempted to justify *nigerrima* as a *nomen protectum* under Article 23.9.1 of the Code. In doing so, they overlooked the previous actions by Yonow & Hayward (*op. cit.*); Article 23.9.1 of the code does not apply because both names have been in use since 1899 and are therefore available. It is now generally accepted that *N. kubaryana* is the correct name for this species (Gosliner, 2008).

Nembrotha lineolata Bergh, 1905
(fig. 1, pl. 1 figs 4, 5)

Nembrotha lineolata Bergh, 1905: 199, pl. 2 figs 10, 11, pl. 18 figs 15-18; Eales, 1938: 95, figs 13-16; Marshall & Willan, 1999: 52, fig. 79; Yonow *et al.*, 2002: 838, figs 2e, 4a, 5, 6A; Pola *et al.*, 2008: 155, figs 4C, 7, 8. *Nembrotha* cf. *lineolata* Yonow *et al.*, 2002: 841, figs 4b, 6B.

Material. — RMNH.MOL.131685, RBE Stn 16, W side of Pombo, Ambon, 5 m depth, 15-17.xi.1990, "on rubble reef," leg. A. Fortuin, 10 × 6 mm pres., photos M. Lavaleye 22/21-22; RMNH.MOL.131683, RBE Stn 27, Hutumuri, Leitimur, 15 m depth, 26-27.xi.1990, leg. K. van Egmond, 20 × 7 mm pres., photos M. Lavaleye 34/4-7 (retains brown bands); RMNH.MOL.131684, RBE Stn 39, S Larike, Hitu, 8-9.xii.1990, leg. W. Kolvoort, 18 × 5 mm pres., photos M. Lavaleye 49/32-35 and W. Kolvoort (retains brown bands, gills and rhinophores extended).

Non-Indonesian material. — Bohol, Philippines, ix.2003, photos of one individual, J. Hinterkircher; Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher.

Description. — All Ambonese specimens were cream with numerous narrow longitudinal brown lines and a brown band on the front of the head (pl. 1 fig. 4); in the third specimen these lines were almost black (pl. 1 fig. 5). There was a purple band (shading to brown in two specimens) on the edge of the rhinophoral sheaths, gill bases, and tip of the foot; this band was followed by a yellow band on the gills and the rhinophoral sheaths. The foot margin was blue with a distinct submarginal yellow line. The three large gills and the rhinophores were reddish-brown in two specimens and reddish in the third. The radula of the largest specimen was examined, and its formula is > 21 × 7.1.1.1.8. It is regular (fig. 1) and the rachidian is almost square, barely wider than long, and broadest in the middle, narrowing towards the base. The rachidian bears five denticles, the 3rd and 4th of which are joined at their bases.



Fig. 1. *Nembrotha lineolata*. Radular teeth of 20 mm specimen. Scale bar 50 μ m.

Remarks. — This species appears to be one of the most variably coloured species of *Nembrotha* throughout its range in the tropical Indo-West Pacific, as evidenced by the literature, and specimens and photographs studied here. The brown lines may be thick or thin, but there is always a dual-tone banding on the margins of the foot, rhinophores, and gills. Bergh (1905) described this species from Selayer, Indonesia, and it has been photographed from many locations in Indonesia (e.g. Debelius & Kuitert, 2007; Gosliner *et al.*, 2008; NudiPixel; SeaSlugForum). *Nembrotha lineolata* has been rarely recorded from the Indian Ocean, and *Nembrotha* cf. *lineolata* from Chagos (Yonow *et al.*, 2002) is here assigned to this species, on the basis that the radula is frequently deformed and irregular in the species. The radula of Eales' specimen (1938) has many fewer rows than in other descriptions but the shapes of the teeth are similar in all illustrations listed above. Eales' specimen measured 22 mm in length and had a radula formula of $14 \times 7.1.1.1.7$, shorter than that of the 20 mm specimen from Leitimur. The largest Chagos specimen (65 mm) had a formula $36 \times 5.1.1.1.6$; the rather irregular radulae of the Chagos specimens clearly demonstrate that the teeth are just as variable intra-specifically in shape as is the external colour pattern, although the joining of the bases of the 3rd and 4th denticles appears to be a constant feature.

Nembrotha milleri Gosliner & Behrens, 1997
(pl. 1 fig. 6)

Nembrotha milleri Gosliner & Behrens, 1997: 296, figs 7-9; Pola *et al.*, 2008: 172, figs 14G, 16C, 18.

Material. — Derawan, East Borneo, iv.1997, one individual 60 mm in length, photo only J. Hinterkircher. Non-Indonesian material. — Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher.

Remarks. — These records of *N. milleri* are unfortunately based only on photographs: they were dark velvety green with longitudinal black creases along the body which also ran up the gill bases. The rhinophore sheaths and gills were green basally, but with green-edged black lamellae. A *Periclimenes* sp. shrimp was noted living within the gills (pl. 1 fig. 6). Tonozuka (2003) also provides a photo taken south of Sulawesi showing two *Periclimenes* sp. on *N. milleri*. No other species is similar: *N. cristata* (p. 907) is also green and black but the ground colour is black, not green as in *N. milleri*. *Nembrotha kubaryana* (p. 908), which can have a green linear pattern on black but is more usually spotted, has brighter green markings and additional bright orange margins.

Nembrotha spec. nov.
(fig. 2, pl. 2 figs 1, 2)

Nembrotha rutilans Debelius & Kuitert, 2007: 62, lowest left photo only (non *rutilans* Pruvot-Fol, 1931).

Nembrotha chamberlaini Gosliner *et al.*, 2008: 116, right photo only (non *chamberlaini* Gosliner & Behrens, 1997).

Material. — RMNH.MOL.131696, Bunaken, Manado, North Sulawesi, 5-15 m depth, xi.1990, 20 × 10 mm pres.; leg. and photos H. Debelius.

Description. — The single specimen is well preserved, and the brown patches remain on the dorsum. The photographs depict two large patches of chocolate brown in front of and behind the gills (pl. 2 fig. 1), extending the length and breadth of the body and meeting on either side of the gills; there was no gold line surrounding the brown dorsal patches. The body colour was opaque white, with a faint yellow line only along the violet margin of the foot. The three large gills were red distally and white proximally: the common basal stump had an ochre patch extending onto the notum. Other ochre patches were also present at the base of the rhinophores and near the tip of the tail. None of these had a gold border although they had golden flecks within. The rhinophores had dark reddish-brown lamellae, a white tip, and a paler stalk. Ventrally, the foot corners, head, oral tentacles, and tip of the tail were violet (pl. 2 fig. 2).

In the preserved specimen, the blue line on the head and oral tentacles is still present as a dense band and internally, there is a blue band remaining on the oral tube. The radula was examined and has the formula $> 13 \times 1.1.1.1.7-8$. It is deformed, missing all but one marginal tooth on the left side. The rachidian bears five regular denticles on the cusp and is broadest below these, tapering to the slightly rounded base (fig. 2). Unlike those of *Nembrotha lineolata* (p. 909), the denticles are approximately equal in size and are not joined at their bases. The rachidian teeth are broader than they are high. The first lateral is typical for the genus, very large with a broad base and hooked cusp; the marginal teeth are small rectilinear plates decreasing in size along the row.

Remarks. — The most similar species is *Nembrotha chamberlaini* Gosliner & Behrens, 1997, originally described and subsequently recorded only from the Philippines (Pola *et al.*, 2008); two individuals were photographed in Bohol, Philippines (pl. 2 fig. 3; pers. comm. J. Hinterkircher, ix.2003 and iii.2004). There are slight variations in the tone of colours but the pattern remains very constant: *N. chamberlaini* has uniformly red gills and rhinophores with a contiguous intense red patch at the base of each, and a red patch is also present at the end of the tail; these red patches often have a yellow ring around them. The large chocolate brown dorsal patch is also surrounded by a golden yellow line. In the new species described here (and many other photographs available on NudiPixel and SeaSlugForum) the red patches are replaced by ochre and the gills and rhinophores are bicoloured red and white, not uniformly deep red. The large brown dorsal patch of *N. chamberlaini* is edged in yellow in the original description and



Fig. 2. *Nembrotha* spec. nov. Radular teeth of 20 mm specimen. Scale bar 50 μ m.

other photographs but not in this species. The radula of *N. chamberlaini* is similar, perhaps longer, and the rachidian of a 62 mm preserved specimen was more asymmetrical than in this small 20 mm preserved specimen.

Photographs of this species on the internet are now filed under *Nembrotha purpureolineata* O'Donoghue, 1924, because most were originally recognised as different and assigned to *N. rutilans* (Pruvot-Fol, 1931). When *N. rutilans* was synonymised with *N. purpureolineata* by Pola *et al.* (2008), the photos were simply reassigned despite the differences evidenced by their original designations. (The synonymy of *rutilans* with *livingstonei* Allan, 1933, in Gosliner *et al.* (2008) is erroneous. However, this error serves the point that these forms can be separated, and have been so in the past.) *Nembrotha purpureolineata* is indeed similar but never has red patches on the dorsum at the bases of the gills and rhinophores nor on the tip of the tail; additionally, it is only found in Australia. Its brown lines may merge to form smaller and more striped patches. If anything, *purpureolineata* is most easily confused with *N. lineolata* (p. 909), which has brown lines on the dorsum almost identical to the thin-lined forms of *N. purpureolineata*. However, despite the lack of external and internal differences, Pola *et al.* (2008) maintain these two as distinct species. This specimen from Sulawesi is identified as *Nembrotha* spec. nov. because of its pattern of ochre patches on the mantle at the bases of the bicoloured gills and rhinophores and on the tail, not surrounded by a gold line. This is a constant feature, as evidenced by many photographs from Indonesia on NudiPixel, MedSlugs, and the SeaSlugForum depicting animals identical in colour pattern to *Nembrotha* spec. nov.; the species shows no variation in colour pattern towards either *chamberlaini* or *purpureolineata*. Significantly, all individuals appear to have been photographed only in Indonesian waters.

Both *chamberlaini* and *purpureolineata* are confused, but if the presence or absence of the three red patches is used to distinguish them, they separate neatly into three species. *Nembrotha purpureolineata* has a streakier pattern with pale bases to the bicoloured gills and rhinophores, and is recorded only from northern Australia. *Nembrotha chamberlaini* has large brown patches surrounded by gold, uniformly red gills and rhinophores, red dorsal patches at the bases of the gills and rhinophores, and is recorded from the Philippines, Indonesia, and Malaysia. *Nembrotha* spec. nov. is ochre with bicoloured rhinophores and gills, no red patches, and recorded only from Indonesia. It is more prudent at this stage to retain the three clearly distinguishable species, based on external colouration and geographical distribution, than to combine them into one widely distributed and highly variable species (with four forms since we must also include *N. lineolata*). It has been stated by most authors that the only consistent feature separating species of *Nembrotha* is colour pattern; if this gold patterned species is assigned to *N. chamberlaini*, then all species will have to be re-assessed with the same criteria: the end result would be very few species with many colour forms.

Roboastra gracilis (Bergh, 1877)
(pl. 2 figs 4, 5)

Nembrotha gracilis Bergh, 1877a: 458, pl. 56, figs 11-17.

Nembrotha rubropapulosa Bergh, 1905: 198, pl. 5 fig. 14 (Selayer, Indonesia).

Nembrotha ? rubroocellata Bergh, 1905: 201, pl. 4 fig. 14 (Timor, Indonesia) *syn. nov.*

Roboastra gracilis Hamatani & Baba, 1976: 136, figs 1A, 2A-C; Yonow, 1994: 109, fig. 6F; Marshall & Wilan, 1999: 55, fig. 85; Pola *et al.*, 2005: 168, figs 1-4a; Gosliner *et al.*, 2008: 112.

Material. — RMNH.MOL.131720, Bunaken, Manado, North Sulawesi, 5–15 m depth, xi.1990, 9 × 3 mm pres., leg and photos H. Debelius (also in Debelius & Kuitert, 2007: 65, middle lower photo).

Non-Indonesian material. — Bohol, Philippines, xi.2005, photos of one individual, J. Hinterkircher.

Remarks. — This species is recognized by its small size combined with a black body having few longitudinal orange stripes, and watery blue or green gills and rhinophores (pl. 2 fig. 4). The Pacific form differs slightly from the Indian Ocean one: the orange stripes are consistently wider in the Pacific Ocean specimens, and there is more colour variation, as evidenced by the three names Bergh gave it (see synonymy above). Bergh (1905) recorded *N. ? rubroocellata* from Timor, Indonesia, with darker rhinophores, gills and oral tentacles; an individual virtually identical to this painting was photographed in the Philippines (pers. comm. J. Hinterkircher, see pl. 2 fig. 5). Another black species with orange stripes, *Roboastra luteolineata* (Baba, 1936), occurs in Japan and Australia but has not been recorded this far west. It is much larger, growing up to 70 mm, has many more yellow lines, and five bipinnate (Hamatani & Baba, 1976) or tripinnate (Pola *et al.*, 2005) gills.

Family Gymnodorididae
Analogium spec. nov. 1
 (fig. 3a-c, pl. 2 fig. 6, pl. 3 fig. 1)

Gymnodoris sp. 14 Debelius & Kuitert, 2007: 88 (Indonesia).

Gymnodoris sp. 21 Gosliner *et al.*, 2008: 154 (Indonesia).

Analogium sp. Hervé, 2010: 169 (New Caledonia).

Non-Indonesian material. — RMNH.MOL.131667, Sangat Island, N of Busango Island, Philippines, < 5 meters depth, v.2009, one specimen 30 mm (26 × 18 mm pres. well relaxed), leg. J. Hinterkircher.

Description. — This new species of *Analogium* is distinctive: this specimen was orange in life, with the dark gut showing through in the centre of the animal (pl. 3 fig. 1). Colour appears to vary with flash: the close-up photographs are more yellow (pl. 2 fig. 6), and the colour of individuals in the synonymy and on NudiPixel are also variable. The body is shaped like those of *A. striatum* and *A. amakusanum*, broad anteriorly and tapering from the level of the gills to the tail. The fourteen gills are present as an nearly straight band across the dorsum, located in the posterior half of the animal beyond the midline. They are simply pinnate branches which arch posteriorly; the gonopore is closer to the rhinophores than the gills. The broadly pointed tail appears keeled, but this may be due to the wrinkles on the mantle which extend to the tip. Between the rhinophores and the gills the (seven) wrinkles are symmetrical and almost parallel. The thick coloured mantle edge extends from in front of the rhinophores to the tail. The bulbous rhinophores were orange with 9–10 lamellae which were darker at the edges. The gills were white with only the main axes pigmented orange. The foot was very broad, extending far beyond the mantle edge in all directions, with a wide band of pigment along its edge. It was elliptical in shape, and slightly broader anteriorly than posteriorly.

The preserved specimen is cream in colour, with the seven dorsal wrinkles opaque cream. The anterior portion of the animal and the fourteen gill leaflets are extended

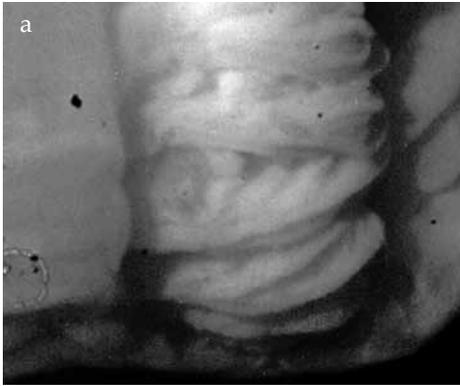
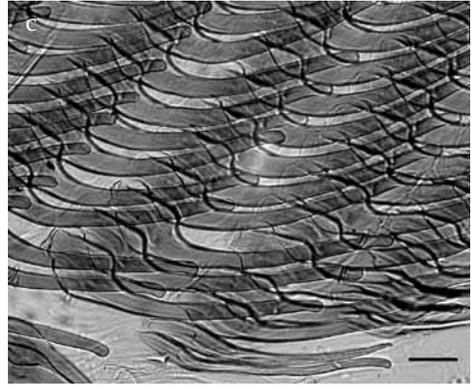
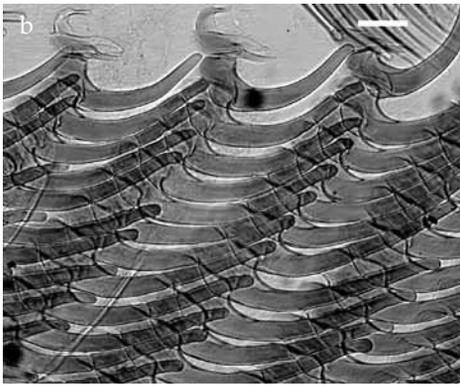


Fig. 3. *Analogium* spec. nov. 1. a, Five gills viewed from left side of specimen (anterior is to the right of the photograph); b, radular teeth from three old rows, showing the first lateral (upper middle of photograph) and next 10-12 teeth; and next 10-12 teeth; c, teeth from same old rows showing last dozen teeth, although the last two reduced teeth are only visible in one row (lower middle of photograph). Scale bars 100 μ m.



(fig. 3a), but the posterior portion of the body is contracted. The foot and the mantle are squared anteriorly; the wide foot margin is contracted to a thick rope. There was a small white parasitic copepod egg case on the gills, but it fell off before it could be photographed. The tiny radula has a formula of 11-12 \times 21.1.0.1.21. The teeth are typical of the genus *Analogium* in having short bases with very long hooks; the small first lateral has a relatively large base with a hooked cusp (fig. 3b, c).

Remarks. — The photographs in the books listed in the synonymy and on NudiPixel clearly depict this species, ranging in colour from greenish yellow through brownish yellow to orange, all with yellow wrinkles. Eight of these are recorded from Indonesia, five from the Philippines, two from Thailand, and one from New Caledonia; the species appears to have a distribution limited to the western Pacific and eastern Indian oceans. At present only two species of *Analogium* are formally named and described, both with orange or yellow ridges. A fourth species is described below and differs in that it is covered in pustules, not ridges. However, the radulae of these four species of *Analogium* are virtually identical. Of the two named species of *Analogium*, *A. striatum* is recorded from the Indo-West Pacific (Jensen, 1998; Marshall & Willan, 1999, and P. Bidgrain, pers. comm.,) but more commonly from the Red Sea (Yonow, 1990, 2008) whereas *A. amakusanum* Baba, 1996, appears to be limited to the western Pacific Ocean (Rudman & Darvell, 1990; Baba, 1996; Cobb & Willan, 2006).

Analogium spec. nov. 2
(fig. 4a-c, pl. 3 fig. 2)

? *Gymnodoris* sp. Wells & Bryce, 1993: 89, sp. no. 102.

? *Gymnodoris* sp. 1 Debelius & Kuitert, 2007: 83 (Bali).

Material.— RMNH.MOL.131666, RBE Str 30, Suli, Ambon, 5-7 m depth, 29.xi.1990, leg. A. Fortuin, "small orange active nudibranch in sand," 5 × 2 mm pres., photos M. Lavaleye 35-3/4.

Description.— The body was white with large slightly raised yellow-orange pustules and a continuous single row of elongated pustules along the pallial line, head, and top of the tail; an additional row of pustules was present along both sides. Sixteen pustules on the dorsum were loosely arranged in longitudinal series in front of the gills but in no definite pattern beyond the gills (pl. 3 fig. 2). No pustules or colour marked the margins of the foot. The genital aperture was located on the right side close to the rhinophore, approximately one-third of the distance between the rhinophores and the gills. The rhinophores were retracted in the photographs, but appear to have been white without orange tips. Thirteen gills are arranged in a transverse row, touched with yellow-orange on their frontal surfaces.

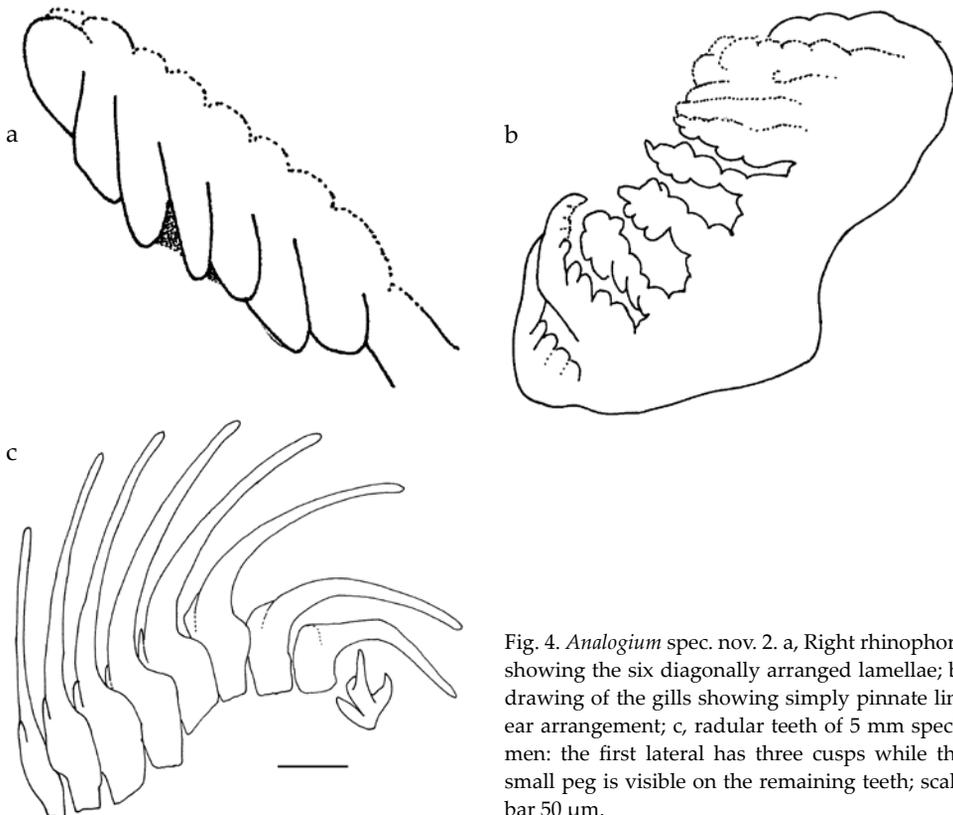


Fig. 4. *Analogium* spec. nov. 2. a, Right rhinophore showing the six diagonally arranged lamellae; b, drawing of the gills showing simply pinnate linear arrangement; c, radular teeth of 5 mm specimen: the first lateral has three cusps while the small peg is visible on the remaining teeth; scale bar 50 μ m.

The preserved specimen is minute and appears to have partially dried out at some point. The buccal bulb projects out of the mouth (also visible in pl. 3 fig. 2), and the conical genital papilla is located below and behind the right rhinophore. The elongated rhinophores have six overlapping diagonal lamellae and a round terminal knob (fig. 4a). The gills are all united basally and each branch is simply pinnate (fig. 4b). The radula is missing but some pieces and a few teeth were obtained from the storage vial, appearing form a complete half row of 8-9 teeth (fig. 4c). The first lateral differs from the remainder, small with three spikes on the end; the larger second tooth is bent in the middle, nearly 90°; the remaining teeth straighten along the row and have a small square base with a long cusp. The second and remaining laterals have a small peg at the base where the cusp meets the base; this becomes smaller near the end of the row.

Remarks.— Despite the lack of recent literature on the genera *Gymnodoris* and *Analogium* and the very small size of this specimen, this species is distinct from the named species of *Analogium* as well as from the new species described above. The genus was first introduced by Risbec (1928) and resurrected by Hamatani (1995) to distinguish those gymnodorids with a transverse band of plate-like gills, but this is not accepted by some authors (Rudman & Darvell, 1990; Gosliner *et al.*, 2008). There are several illustrations of spotted species of *Analogium* from the western Pacific (e.g. Wells & Bryce, 1993; Gosliner *et al.*, 2008; all as *Gymnodoris*) so it is more prudent to await more material. Externally, *Analogium* spec. nov. 2 differs from known species in having raised pustules instead of ridges although consideration must be given to its small size: the 22–24 mm specimens of *A. striatum* illustrated by Hamatani (1995) show the dorsal ridges broken up into pustules, although the pallial margin is a continuous ridge. The radulae of all four species are extremely similar, as illustrated by Vayssière (1912), Baba (1937, 1996), Hamatani (1995), and in this work. It is probable that the rows available for this specimen are complete half rows; in comparison, there were 6-18 teeth in the rows of the radula of a 25 mm specimen of *A. striatum* (Hamatani, 1995).

Gymnodoris aurita (Gould, 1852)
(fig. 5, pl. 3 fig. 3)

Doris aurita Gould, 1852: 299, pl. 23, figs 394.

Gymnodoris aurita Gosliner & Behrens, 1997: 287, figs 1A, 2A-D, 3A-D; Gosliner *et al.*, 2008: 146.

Material.— Bali, Indonesia, photos of one individual, 26.xi.2005, E. Kodiat.

Non-Indonesian material.— RMNH.MOL.131664, Anilao, Batangas, Philippines, night dive 8 m depth, v.1996, two specimens 25 mm and 35 mm long both pres. (totally flat), leg. and photos H. Debelius.

Description.— Both specimens were bright orange with scattered raised yellow pustules and a large open circlet of red and yellow gills, spreading beyond the width of the animal (pl. 3 fig. 3). The foot and unusual tubular oral tentacles were bordered by yellow, and the small rhinophores were also yellow. The radula of the 35 mm specimen is incomplete, but it has at least 14 rows with a maximum of 33 teeth per half row. The first lateral is small in comparison to the remainder, approximately 1/3 the size (fig. 5). It has a broad base with a large flattened cusp. The remainder have a thin and elongated cusp, and the last three teeth in each row have reduced bases.

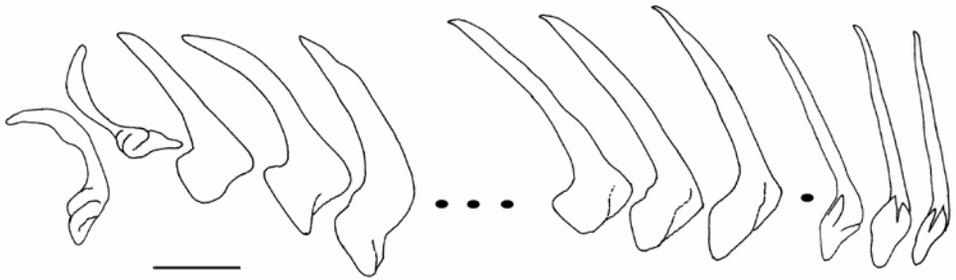


Fig. 5. *Gymnodoris aurita*. Selected radular teeth of 35 mm specimen: left and right first lateral, laterals 2-4, 25-27, and 31-33, photographed from near the new edge. Scale bar 50 μ m.

Remarks. — The photographs of external morphology and the radula of the specimens described here compare favourably with those given by Gosliner & Behrens (1997). Originally described from Fiji and more recently from the Philippines, the species has been reliably photographed from Indonesia (Tonozuka, 2003; E. Kodiat, pers. comm.; numerous photographs on NudiPixel). *Gymnodoris aurita* is limited to the central and western Pacific where it grows to 100 mm.

Gymnodoris impudica (Rüppell & Leuckart, 1828)
(fig. 6a, b, pl. 3 fig. 4)

Doris impudica Rüppell & Leuckart, 1828: 33, pl. 10 figs a-c.

Trevelyana rubropapulosa Bergh, 1905: 191, pl. 4 fig.15, pl. 17 figs 27-31, pl. 18 figs 1-3 (Selayar, Indonesia).

Gymnodoris impudica White, 1951: 242; Yonow, 2008: 135.

Gymnodoris ceylonica Baba, 1989: 192–194, fig. 1 [non *G. ceylonica* (Kelaart, 1858)].

Gymnodoris rubropapulosa Rudman & Darvell, 1990: 50.

Non-Indonesian material. — RMNH.MOL.131663, Ningaloo Reef, West Australia Bay, NW Australia, 2 m depth, xi.1989, leg. H. Debelius, two specimens 24 \times 15 mm and 25 \times 15 mm pres.; N of Busango, Philippines, v.2009, photos of one individual 32 mm, J. Hinterkircher.

Description. — *Gymnodoris impudica* is easily recognized by its large white body covered in large and small soft orange pustules: these are slightly raised and often darker around their edges. The gills and rhinophores are also orange (pl. 3 fig. 4). The 9-11 gills are arranged in a circle around the anal papillae. No colour or raised spots remain on the preserved specimens. The radular formula is 25 \times 45-55.0.55-45: the innermost lateral has a duck-bill-shaped base and a short straight cusp with a swollen tip (fig. 6a). The subsequent laterals have smaller bases and longer thinner cusps. The tip is slightly bent on the last few teeth (fig. 6b).

Remarks. — Bergh (1905) described a specimen (65 mm) from Indonesia with 11 gills arranged around the anal papilla, and a radular formula of 40 \times 33.0.33. White's (1951) 45 mm preserved specimen from the Red Sea had a radular formula of 28 \times 41.0.41.

This large species is widely distributed from the Red Sea through the Indian Ocean as far south as South Africa, across to Indonesia and the Philippines to Japan. *Gymnodoris impudica* was only recently identified with its older name in a work investigating the

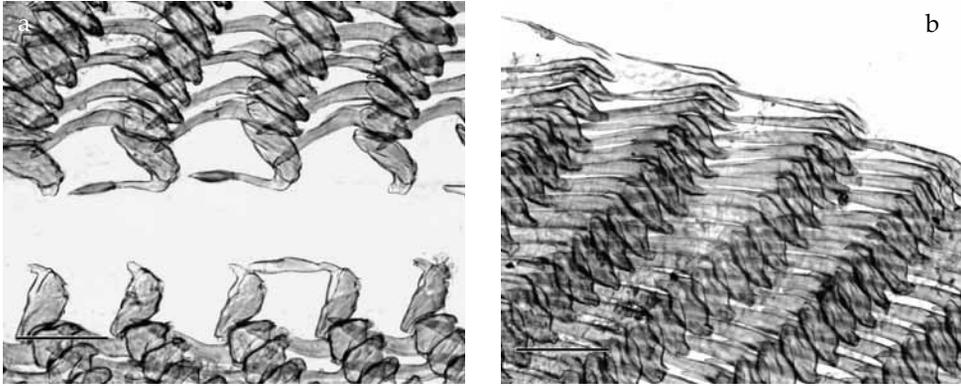


Fig. 6. *Gymnodoris impudica*. Selected radular teeth of 24 mm specimen, scale bars 100 μ m. a, midline showing inversely-pointed first lateral; b, teeth towards the end of rows near the new end of the radula, showing reduction in both cusp and base of the last tooth.

Red Sea fauna (Yonow, 2008): Bergh described and illustrated *Trevelyana rubropapulosa* from Selayar in 1905 but Rüppell & Leuckart had already described and illustrated *Doris impudica* from the Red Sea in 1828. This name is chosen in accordance with Article 24.2.2 (ICZN, 1999) for First Reviser, chosen because Rüppell & Leuckart's endeavours were clear and unambiguous, and most of their species are recognisable today.

Gymnodoris subflava Baba, 1949
(fig. 7a, b, pl. 3 fig. 5)

Gymnodoris subflava Baba, 1949: 135, pl. 12 fig. 44, text fig. 38; Rudman & Darvell, 1990: 50.
Trevelyana ? Bergh, 1905: pl. 5 fig. 15 (no accompanying text) syn. nov.

Material. — RMNH.MOL.131662, RBE Stn 34, Ruhmatiga, Hitu, 3 m depth, 3.xii.1990, leg. K. van Egmond, two very contracted specimens 6 mm and 7 mm and two more extended specimens 10 \times 6 mm and 10 \times 5 mm, photos M. Lavaleye 39-20/24.

Description. — When alive, the body colour was uniformly deep yellow with small slightly darker yellow pustules (pl. 3 fig. 5). The >20 gills are located in the last third of the dorsum and are the same colour as the body. They are arranged in a horseshoe-shape in both the preserved specimens and the photographs, as simple upstanding lamellae. The rhinophores were a darker yellow-orange, and the genital papilla is located just behind and below the right rhinophore. The rhinophores are very bulbous in the preserved material, with eight thick diagonal widely-spaced lamellae and a rounded terminal knob (fig. 7a). The foot appears to have a darker yellow-orange margin in the photographs.

The larger specimen was dissected to extract the radula; the visceral casement is black. The radula is small and compact with the formula 14 (+2-3) \times 11.1.0.1.12, and the teeth are minute in comparison to those of *G. aurita* and *G. impudica*. The first lateral is not so different from the marginals, with a weaker base and shorter cusp; however, in all rows on both sides, the base of the first tooth is rotated 180° from the outside to the

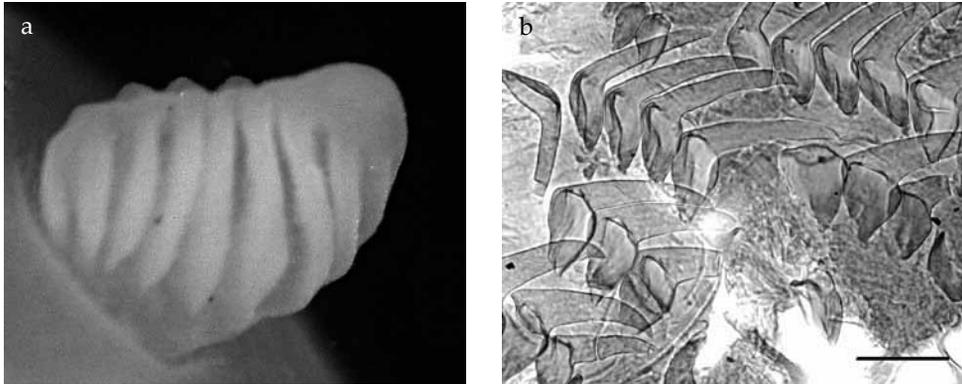


Fig. 7. *Gymnodoris subflava*. a, Left rhinophore of 10 mm specimen; b, radular teeth near old end, left half of radula, showing one rotated 1st lateral (left of photo), 7 mm specimen; scale bar 50 µm.

centre of the radula. The cusp still points anteriorly, but is connected to the base along the central line of the radula. The remaining teeth have a strong oval to angular base with a long curved cusp set at almost right angles (fig. 7b).

Remarks.— The gymnodorids are notoriously difficult to identify, and there is no recent taxonomic work reviewing this group. *Gymnodoris subflava* was described from Japan, and recorded from Hong Kong; this appears to be the second record since the original description, apart from few photographs posted on various internet sites. The black visceral casement, visible through the skin in the living specimens, is diagnostic, as is the open horse-shoe shape of the gill insertions. Bergh's illustration (1905, pl. 5, fig. 15) of "*Trevelyana?*" is probably this species, and shows the black visceral casement clearly; the gills in the tiny painting are arranged in an elongated oval. Baba's (1940) original description is not very detailed, and the radula is different in both formula (27 × 13-16.1.0.1.13-16) and in the shape of the first lateral, which he states is much larger and has a short acutely pointed cusp. His illustration of the rhinophores is like those of this specimen, but that of the gills is not. These specimens are best placed in *G. subflava* despite radular differences, until further collections with radular diagnoses from other localities provide more information. Currently *G. subflava* is recorded from Japan, Hong Kong, and now Indonesia.

Family Discodorididae

Asteronotus cespitosus (van Hasselt, 1824)

(fig. 8, pl. 3 fig. 6)

Doris cespitosa van Hasselt, 1824: 238.

Asteronotus cespitosus Bergh, 1890: 918, pl. 86 figs 7, 8 (Edam, Indonesia); Bergh, 1905: 141, pl. 1 fig. 5; Marshall & Willan, 1999: 71, figs 119, 120; Valdés & Gosliner, 2001: 105, figs 1a, 2a, 3, 4, 5b, e; Gosliner *et al.*, 2008: 173.

Material.— RMNH.MOL.170512, RBE Stn 37, W side Laha, Hitu, 2 m depth, "large red nudibranch under basalt rock," 6.xii.1990, 110 × 60 mm pres., leg. and photos M. Lavaleye 46-25/29 (specimen 1: brick red); RMNH.MOL.131682, RBE Stn 30, Suli, Hitu, 2 m depth, "large green nudibranch under coral block,"

29.xii.1990, 80 × 45 mm pres., leg. and photos M. Lavaleye 35-30/31 (specimen 2: piece missing left side); RMNH.MOL.131681, RBE Stn 17, SE of Pombo Island, Ambon, littoral, "very large *Doris*," 6.xii.1990, leg. F. de Jong, 65 × 40 mm pres., photo M. Lavaleye 46-23/24 (specimen 3: normal colouration); Indonesia, photos of two individuals, one with red colouration measured at 150 mm, J. Hinterkircher.

Description. — Preserved specimen 1 is black dorsally and charcoal grey ventrally with the brownish gills, rhinophores, and buccal mass extended. The tubercles are no longer visible but the skirt still retains its wrinkles. Specimens 2 (pl. 3 fig. 6) and 3 are pale grey with charcoal grey tubercles, creamy rhinophores and gills, and grey rhinophoral and branchial pockets; ventrally, both the foot and buccal mass are cream. The edge of the hyponotum is cream or grey with an irregular creamy band, followed by a maroon band with a dark grey line on either side; nearer the foot is another cream band (fig. 8).

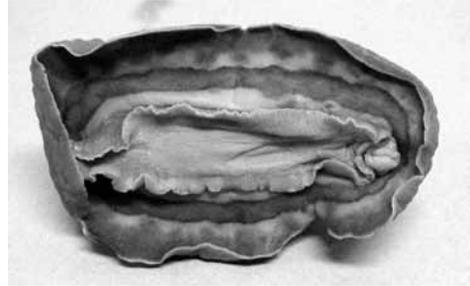


Fig. 8. *Asteronotus cespitosus*, RBE stn 30, 80 mm preserved, ventral view.

Remarks. — Originally described from nearby Java, this large species is well known in the tropical Indo-Pacific and Red Sea (Marshall & Willan, 1999; Yonow, 1990, 2008).

Discodoris boholiensis Bergh, 1877
(pl. 4 fig. 1, 2, 3)

Discodoris boholiensis Bergh, 1877b: 519, pl. 60 fig. 23, pl. 61 figs 6-12; Bergh, 1890: 897, pl. 87 figs 28-31 (Edam, Indonesia); Bergh, 1905: 99, pl. 1 fig. 9 and others (Ambon, Indonesia); Lim & Chou, 1970: 88, fig. 7E; Valdés, 2002: 565, figs 4d, 15, 16; Dayrat, 2010: 44, figs 3-11.

Material. — RMNH.MOL.131659, RBE Stn 1, W side Hunut, Hitu, 4 m depth "on wooden plank," 11.xi.1990, 38 × 23 mm pres., leg. and photos W. Kolvoort (specimen 1: complicated dorsal pattern, hyponotum and foot creamy yellow with dark brown edging); RMNH.MOL.131657, RBE Stn 1, W side Hunut, Hitu, 5 m depth, 11.xii.1990, leg. K. van Egmond, 40 × 25 mm pres., photos M. Lavaleye 51-10/16, 56-20 (specimen 2: very soft, thin mantle margin, brown with very dark brown ridge and edge, ventral side as 1); RMNH.MOL.131660, RBE Stn 1, W side Hunut, Hitu, 3 m depth, "on pole among various organisms," 10.xi.1990, leg. W. Kolvoort, 48 × 30 mm pres., photos M. Lavaleye 7-24/25 (specimen 3: very soft, damaged mantle margins, missing piece bottom right); RMNH.MOL.131661, RBE Stn 1, W side Hunut, Hitu, 3-5 m depth, 7-8.xi.1990, leg. W. Kolvoort, 10 × 7 mm pres. & curled, photos M. Lavaleye 12-25/26 (specimen 4: soft, missing piece upper left); RMNH.MOL.131658, Hatuhuran, Piru Bay, Ceram, 2 m depth, 28-30.xi.1997, 25 × 15 mm pres., leg. & photo H. Strack (specimen 5: folded over, soft, but more or less intact).

Non-Indonesian material. — CASIZ 173750, Bohol, Philippines, ix.2003, 35 mm specimen, leg. & photos J. Hinterkircher.

Description. — These specimens are all recognizable as *Discodoris boholiensis* but show individual variation, to be expected of such a complicated colour pattern. The oval body has an irregular outline and is extremely flat with a short and narrow prominent central ridge. The basic colour was reddish brown, patchily distributed, with the tips of the smallest pustules dark brown, red, and white. There was a zigzag white line

along the central ridge, and the edge of the mantle was white (pl. 4 fig. 1). The gills and rhinophores were red with white lines up the central axes and speckles on the lamellae, and the tips of the rhinophores were white (pl. 4 fig. 2). The sole of the foot and the hyponotum of the preserved specimens are creamy yellow with brown pigmentation along their edges. The oral tentacles are very long with brown pigment intensifying distally (pl. 4 fig. 3).

Remarks. — It is noteworthy that all the RBE specimens were found at the same station, on different dates, and not at any other station. This station comprised a wooden jetty covered in encrusting invertebrates, clearly an ideal habitat for *D. boholiensis*. Bergh described *D. boholiensis* from Ambon (1905) and Edam (1890). There are few records of this species further west than Indonesia and the Philippines (where it is common) but it has been recorded from the western Indian Ocean (see Dayrat, 2010, for summary).

Sebadoris fragilis (Alder & Hancock, 1864)
(pl. 4 figs 4, 5)

Doris fragilis Alder & Hancock, 1864: 118, pl. 28 figs 7, 8.

Discodoris morphaea Bergh, 1877b: 536, pl. 60, figs 18-22, pl. 61, figs 1-5.

Discodoris fragilis Yonow & Hayward, 1991: 17, figs 10a, b; Marshall & Willan, 1999: 72, fig. 123; Yonow, 2008: 150.

Discodoris lilacina (Gould); Gosliner *et al.*, 2008: 162.

Sebadoris fragilis Dayrat, 2010: 139, figs 154-188.

Material. — RMNH.MOL.131680, RBE Stn 37, W side of Laha, Hitu, littoral, 6.xii.1990, approx. 60 × 35 mm if uncurled & 40 × 22 mm, both pres., leg. & photos M. Lavaleye 46-21/22.

Description. — These specimens agree well with the descriptions and illustrations given in the literature listed in the synonymy. The living animals were shades of brown with symmetry about the visceral hump (pl. 4 fig. 4). The ventral surface is also coloured: the sole of the foot bears brown spots and patches, lacking around the margin but concentrated at the middle of the foot. The hyponotum bears a concentration of solid brown pigment concentrated towards the foot (pl. 4 fig. 5).

Remarks. — *Sebadoris fragilis* is found throughout the Indo-Pacific region, including the Red Sea (Yonow, 2008; Dayrat, 2010) but is more common in the Indian Ocean. A thorough review by Dayrat (*op. cit.*) discusses this problematic species at length, previously known as *Discodoris lilacina* (Gould, 1892) and *Discodoris concinna* Alder & Hancock, 1864.

Halgerda albocristata Gosliner & Fahey, 1998
(fig. 9a-c, pl. 4 fig. 6)

Halgerda albocristata Gosliner & Fahey, 1998: 352, figs 1B, 7, 8; Marshall & Willan 1999: 77, fig. 132; Gosliner *et al.*, 2008: 180.

Material. — Hatuhuran, Piru Bay, Ceram, 2 m depth, 28-30.xi.1997, under coral rubble, two specimens 10 × 6 mm (RMNH.MOL.131699) and 5 × 2 mm (lost), both pres., leg. and photos H. Strack.

Description. — The centre of the dorsum bears three large polygonal areas surrounded by ridges which were marked with short white lines aligned in various directions but

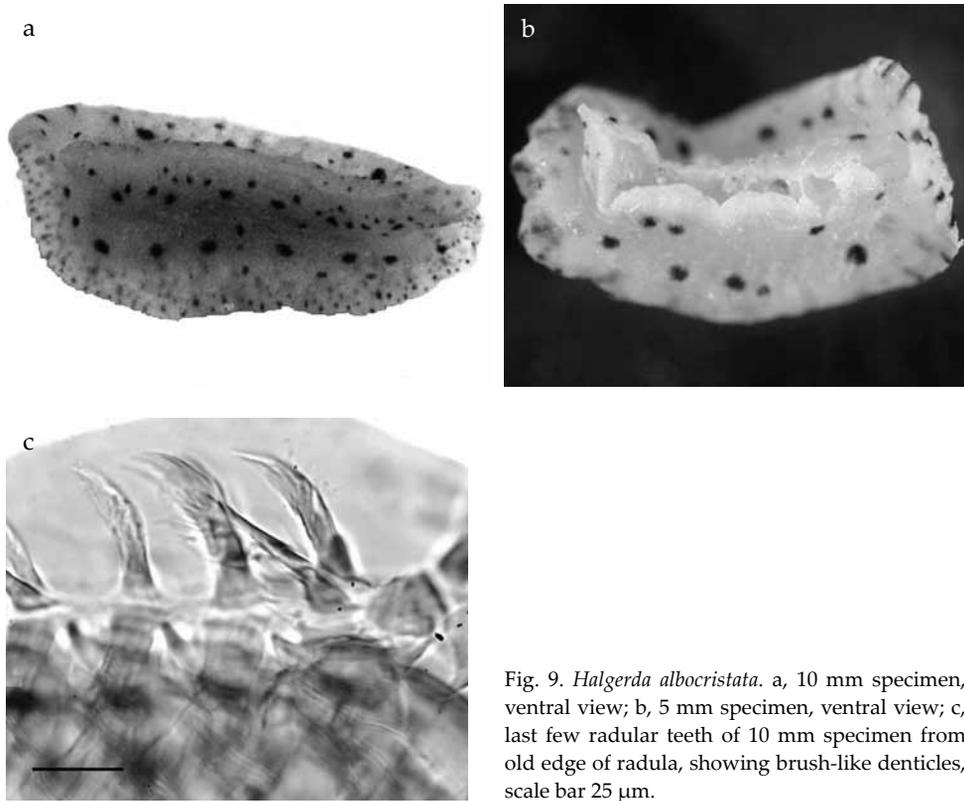


Fig. 9. *Halgerda albocristata*. a, 10 mm specimen, ventral view; b, 5 mm specimen, ventral view; c, last few radular teeth of 10 mm specimen from old edge of radula, showing brush-like denticles, scale bar 25 μ m.

not crossing the polygons (pl. 4 fig. 6). Outside the three polygonal areas was a ring of yellow-orange tubercles, also with white lines. The band of mantle surrounding the tubercles was translucent white with many black brown spots and dashes. The foot projected beyond the mantle posteriorly and was translucent white with brown dots and dashes. The upright rhinophores had a translucent stalk and terminal knob, but the lamellae were brown-black. The six simply pinnate gills were translucent, but the anterior two had brown-black pigment for much of their lengths which was absent from the tips.

The preserved specimens are both relaxed, although the gills and rhinophores are retracted into their pockets: the three central polygons are clearly visible, and the skin is translucent enough that the orange and brown gut is visible. The area outside the polygons still bears its dots and dashes of brown but not the tubercles. Ventrally the hyponotum of each specimen is marked with a ring of large brown spots and several smaller randomly scattered spots and tiny dots around its margin; the dorsal pigment is visible through the hyponotum in both specimens. The upper surface of the foot in both is covered in small dots of brown pigment but the sole is unmarked (fig. 9a, b).

Dissection of the radula showed the oral tube of the larger specimen to bear 22 brown spots on its dorsal surface. The radular formula is $60 \times$ approx. 35.0.35, with hooked laterals and the innermost teeth arranged in a deep V-shape. The innermost

teeth are small with a short sharp cusp; the mid-lateral teeth are hamate with a curved cusp longer than the broad base; the outermost teeth are small, hooked, and fimbriate, with approximately twelve long brush-like denticles (fig. 9c).

Remarks. — *Halgerda albocristata* was described and illustrated by Marshall & Willan (1999) from the Great Barrier Reef, similar to the original description; the rhinophores are similar to those of these Ambon specimens, with a translucent stalk and black clavus. Marshall & Willan (*op. cit.*) also describe the spots on the foot and hyponotum, which was not mentioned in the original description but is present in these specimens. This is the only pale species of *Halgerda* with white markings on the ridges (*H. dalanghita* Fahey & Gosliner, 1999, is orange with a crystalline pattern of white on the ridges and *H. xishaensis* Lin, 1975, is brown with white ridges) but all other descriptions and illustrations of *H. albocristata* differ in having single white lines along the ridges and meeting at the ridge intersections, short black lines at right angles around the mantle margin, and translucent gills and rhinophores with a black band near the tips. These specimens differ in several respects: the white markings are multiple and irregularly arranged, there are no perpendicular brown lines around the margin, and tubercles are present on the mantle skirt.

The radula in species of *Halgerda* is not particularly characteristic, but when taken into account with other features such as body, gill, and rhinophore morphology and colour pattern, they are useful. The shapes of the laterals in the Ambon material are similar to those described for *H. albocristata*, “3-4 outer laterals modified with a series of fimbriate denticles;” however, the illustration of the type shows a hand-like tooth with five or six short denticles.

Halgerda batangas Carlson & Hoff, 2000
(pl. 5 fig. 1)

Halgerda aff. *carlsoni* Marshall & Willan, 1999: 76, fig. 131.

Halgerda batangas Carlson & Hoff, 2000: 157, figs 6-11.

Material. — RMNH.MOL.131715, Hatuhuran, Piru Bay, Ceram, 5 m depth, 28-30.xi.1997, 25 × 17 mm pres., leg. and photos H. Strack.

Non-Indonesian material. — Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher.

Description. — The specimen agrees well with the two previous descriptions: the firm body was translucent white with a network of orange lines, and tubercles (pl. 5 fig. 1). The tubercles were tipped in orange-red, each with an opaque white base. These tubercles were also present in a band around the margin; the reticulations stopped short of this band. The rhinophores and gills were translucent with brown spots. The foot was translucent white with an orange margin. The preserved specimen is translucent pink, the ridges still visible as are the dark speckled gills, but the rhinophores are completely retracted.

Remarks. — This species is recorded in the scientific literature for only the third time. Carlson & Hoff (2000) recorded several specimens from the Philippines, and Marshall & Willan (1999) recorded several more from the Great Barrier Reef, Australia. It has been photographed from Indonesia previously from Bali (Tonozuka, 2003) and the Lembeh Strait (Gosliner *et al.*, 2008).

Jorunna funebris (Kelaart, 1858)
(pl. 5 fig. 2)

Doris funebris Kelaart, 1858: 94 and figure.

Kentrodorid annuligera Bergh, 1890: 922, pl. 85 fig. 8 (Edam, Indonesia).

Discodorid sp. and *Discodorid annuligera* Lim & Chou, 1970: 99 & 104 (addendum), figs 1F, 3L, 4L, 7A, B.

Jorunna funebris Marshall & Willan, 1999: 78, figs 135, 136; Camacho-Garcia & Gosliner, 2008: 148, figs 1C, D, 4, 5, tab. 2; Gosliner *et al.*, 2008: 189.

Material. — RMNH.MOL.131345, RBE Stn 1, W side Hunut, Hitu, 10 m depth, large group, 11.xii.1990. leg. C. Fransen & K. van Egmond, six specimens pres., smallest 35 × 12 mm and largest 75 × 30 mm, photos W. Kolvoort and M. Lavaley 51-17/19 & 51-31/33; RMNH.MOL.131347, RBE Stn 27, Hutumuri, Leitimur, littoral, "nudibranch with black ends," 26.xi.1990, 10 × 7 mm curled, leg. & photos M. Lavaley 32-7/10.

Remarks. — *Jorunna funebris* is a well known but poorly documented species, only recently coming under review (Camacho-Garcia & Gosliner, 2008). The group found together at RBE station 1 are well preserved. The patches of black vary in size and intensity, as usual for the species. *Jorunna funebris* is widely distributed in the Indo-West Pacific and Red Sea, and was recorded from Indonesia previously by Bergh (1890) and Tonzuka (2003).

The record from Singapore (Lim & Chou, *op. cit.*) was omitted from the 2008 review, possibly because Marcus (1976) had assigned it to *Discodorid ? maculosa* (no authority) based on the description of the jaws. However, not only do Lim & Chou identify their specimens as *Discodorid annuligera* in the addendum of the same publication, but their description and figures match published records. There are two species of *D. maculosa*: that of Cuvier, 1804, designated a *nomen dubium* by Dayrat (2010), and that of Bergh, 1884, synonymised with *Tayuva lilacina* (Gould, 1852), also by Dayrat (*op. cit.*). Since the latter is a Mediterranean and European Atlantic species, presumably Marcus was referring to Cuvier's species, which is deemed unidentifiable. There is a dilemma in that Lim & Chou described pointed jaw rodlets from one of their specimens, which is not a character of *Jorunna*, and the item which caused Marcus to think it was a species of *Discodorid*.

Jorunna rubescens (Bergh, 1876)
(pl. 5 fig. 3)

Kentrodorid rubescens Bergh, 1876: 413, pl. 33 fig. 8, pl. 49 figs 14-19, pl. 50 figs 1-8; Yonow, 1984: 221, fig. 4.

Jorunna rubescens Valdés & Gosliner, 2001: 127, figs 5d, 16-18; Camacho-Garcia & Gosliner, 2008: 151, figs 1E, 6, 7, tab. 2.

Material. — RMNH.MOL.131349, RBE Stn 5, Tg. Beteng, Leitimur, 25 m depth, "large nudibranch," 2.xii.1990, leg. K. van Egmond, 95 × 23 mm pres., photos M. Lavaley 29-10/17; RMNH.MOL.131348, RBE Stn 37, W side Laha, Hitu, 1.5-2 m depth, 6.xii.1990, leg. J.C. den Hartog, 65 × 20 mm pres.; RMNH.MOL.131346, RBE Stn 39, S side Larike, Hitu, 2 m depth, "body with variegated brown lines," 9.xii.1990, leg. M. Lavaley, 53 × 18 mm pres.

Remarks. — *Jorunna rubescens* is widespread in the tropical Indo-West Pacific and although it has been recorded in the scientific literature from Indonesia only recently

(Camacho-Garcia & Gosliner, 2008), it has been photographed from this locality previously by Anderson (2000), Tonzuka (2003), and there are many photographs on NudiPixel.

Platydorid cinereobranchiata Dorgan, Valdés, & Gosliner, 2002
(fig. 10a-c, pl. 5 figs 4, 5)

Platydorid cinereobranchiata Dorgan, Valdés, & Gosliner, 2002: 306, figs 2Q, 20G, 40.

Platydorid cinereobranchiata Gosliner *et al.*, 2008: 194 (misspelling).

Material. — RMNH.MOL.131655, RBE Stn 23, Kaitetu, Hitu, 8 m depth, "sturdy red nudibranch that loses its border," 22.xi.1990, leg. A. Fortuin, 60 × 33 mm pres., photos M. Lavaleye 28-33/34.

Description. — The stiff flat body has a prominent visceral hump running from the rhinophores to the gills. The opaque white ground colour was overlain with brown dots and reticulations covering all the dorsum, except the cream-coloured edges of the mantle and of the branchial and rhinophoral pockets (pl. 5 fig. 4). The translucent rhinophores had brown edges to the 31 lamellae and white tips. The six tripinnate gills were very open and well separated, the lamellae white with brown edging but no dark lines along the rachides (as do those of *P. cruenta* p. 927 and *P. scabra*, p. 929). The gill pocket

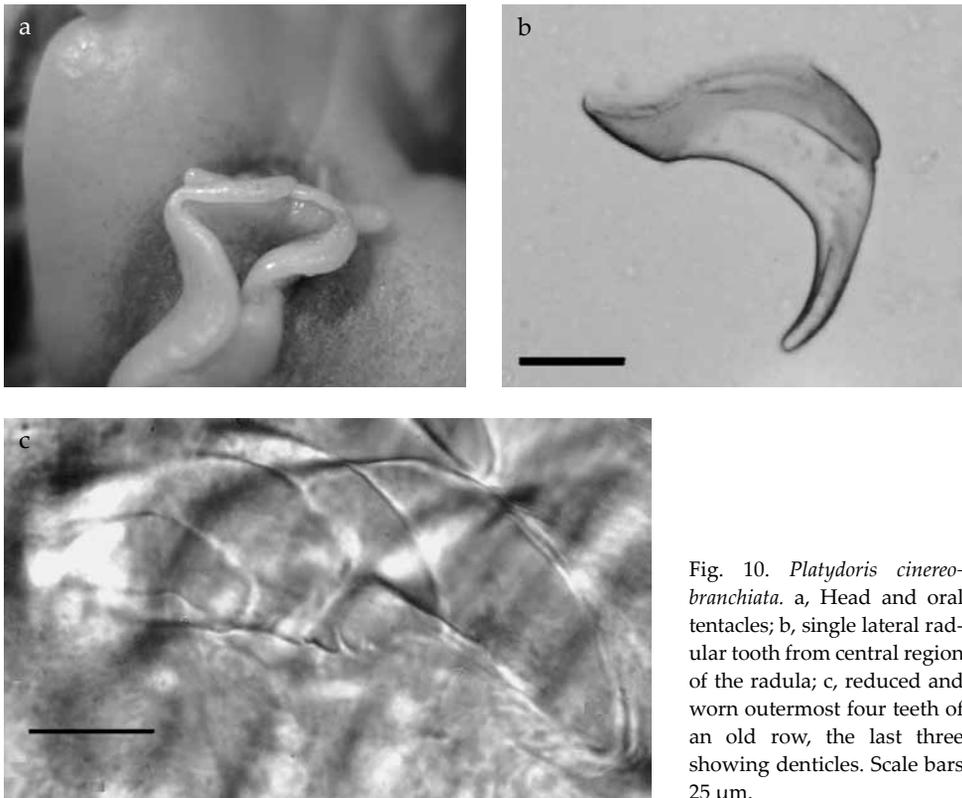


Fig. 10. *Platydorid cinereobranchiata*. a, Head and oral tentacles; b, single lateral radular tooth from central region of the radula; c, reduced and worn outermost four teeth of an old row, the last three showing denticles. Scale bars 25 μ m.

has damage to the anterior side: lack of colour on the midline is possibly also due to damage, and a large portion of the right side is missing; the foot was white, with brown dots and red patches in life (pl. 5 fig. 4, arrowed). The hyponotum had red patches in life (pl. 5 fig. 4, arrowed).

No red remains in the preserved specimen, either ventrally or dorsally: the dorsum is very finely tuberculate, and the areas between these tubercles are brown, creating the brown reticulate pattern in life. Ventrally, the specimen is speckled brown along a central band on the sole and top of the foot, densest in the crevice between the foot and the mantle and decreasing rapidly towards the mantle edge (pl. 5 fig. 5). A band both dorsally and ventrally on the margin of the foot is devoid of brown spots and has no dark line (as that of *P. sanguinea*, see pl. 6 fig. 1). The anterior margin of the foot is bilaminar, and the upper lamina is notched in the centre. The head is rounded, densely speckled, and the oral tentacles are relatively large and have fewer speckles towards the tips (fig. 10a). The radula was dissected out and has a formula of $44(+4) \times 90.0.90$. There is no rachidian and only a few innermost laterals are much smaller than the remaining laterals, which have a large pointed cusp approximately the same size as the base (fig. 10b). The last four teeth in each row are very reduced and much smaller than the other laterals. They are flattened plates, curved and semicircular, with an uneven inner edge in most; denticles are just visible in some teeth (fig. 10c).

Remarks.— The only species of *Platydoris* with similar brown and red markings in this collection is *P. cruenta* (see below), in which the dorsum and ventral surfaces have short thin wavy brown lines (see pl. 6 fig. 1). Although Dorgan *et al.* (2002) clearly state “there is no other species of the genus with this colouration” in their discussion of *P. cruenta*, they continue to describe several red and brown species: *Platydoris formosa* (Alder & Hancock, 1864) which has striking red patches on the hyponotum and bright red rhinophores. *Platydoris sanguinea* (p. 928) is dark red with fairly symmetrical ‘patches of coral sand’ arranged dorsally. They describe *P. cinereobranchiata* as “tan with very small black spots and large orange-red blotches; the gills and rhinophores are dark purple-brown.” The name is said to refer to the ash-grey colour of the gills, which Gosliner *et al.* (2008) describe as dark bluish grey; i.e., the colour is variable. The two species, *P. formosa* and *P. cinereobranchiata*, are very similar indeed and have been confused in the literature: many of the individuals identified as *formosa* illustrated by Cobb & Willan (2006), Debelius & Kuitert (2007) and Hervé (2010) are in fact *cinereobranchiata*. *Platydoris formosa* has very distinctive and striking rhinophoral and branchial pockets which are bright white marked with large black spots around the rims. The rhinophores are uniformly deep red (rarely pale pink) and have 37 lamellae. The gills are cream with a beige or brown line on the rachis, like those of *cruenta* (see below) and *scabra* (p. 929). These characters are very different in *cinereobranchiata*: the rhinophores are variably coloured in shades of grey-brown with white tips, and have 31 lamellae. The pockets are marked by an absence of pigment, which is very noticeable in dark specimens such as that illustrated by Dorgan *et al.* (2002, fig. 20C). The gills are creamy with brown pigment on the edges of the lamellae without a coloured line on the rachis. Using these criteria, one is then able to identify photographs of the dorsal view of both species. The original description of *cinereobranchiata* made no mention of the red patches found ventrally, but this is visible in the ventral view illustrated by Cobb & Willan (2006) and in this specimen (pl. 5 fig. 4, arrowed), but is lost in preservative.

Radular teeth are surprisingly consistent amongst species of *Platydoris*, and external dorsal and ventral colour pattern is important in distinguishing between species. However, in this case, the last few teeth of *cinereobranchiata* and *formosa* differ in both form and size: those of *cinereobranchiata* are much reduced and bear irregular (denticulate) edges on the cusps while those of *formosa* decrease regularly in size and have smooth cusps. The last teeth of *formosa* measure 75µm while those of *cinereobranchiata* are much smaller, 30µm (this specimen and from Dorgan *et al.*, 2002). This is a new record for Indonesia.

Platydoris cruenta (Quoy & Gaimard, 1832)
(fig. 11, pl. 5 fig. 6, pl 6 fig. 1)

Doris cruenta Quoy & Gaimard, 1832: 260, pl. 18, figs 5-7.

Platydoris arrogans (Bergh): Bergh, 1890: 912, pl. 86, fig. 6 (Ambon, Indonesia).

Platydoris cruenta Bergh, 1905: 136, pl. 1 fig. 3; Marshall & Willan, 1999: 80, fig. 141; Dorgan *et al.*, 2002: 80, figs 2f, 6b, 9, 10.

Material. — RMNH.MOL.131656, RBE Stn 27, Hutumuri, Leitimur, 2 m depth "nudibranch with spicules, between corals," 17.xi.1990, two specimens 75 × 45 mm and 52 × 37 mm pres., leg. and photos M. Lavaleye 33-32/34; Derawan, East Borneo, iv.1997, photos of one individual J. Hinterkircher.

Non-Indonesian material. — Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher; Bohol, Philippines, xi.2005, photos of one individual 60 mm, J. Hinterkircher.

Description. — *Platydoris cruenta* is characterized by a very oval dorsum covered with thin short wavy brown lines and bright red blotches (pl. 5 fig. 6). The rhinophores and gills are creamy white with brown axes; the rhinophores have 37-39 lamellae. The specimens, stiff and rough to the touch, are well preserved: the dorsum is identical to the photographs but only lacking the red blotches. Ventrally, the top of the foot is covered in fine wavy brown lines which extend partly onto both the hyponotum and the sole (pl. 6 fig. 1) where they are arranged more or less longitudinally; those on the top of the foot are arranged at right angles to the margin. The head and oral tentacles also have brown lines (fig. 11).

Remarks. — *Platydoris cruenta* is not common but it is an easily recognized species widely distributed in the tropical Pacific; it was previously recorded from Ambon by Bergh (1890). I disagree with Dorgan *et al.* (2002) that *P. striata* Kelaart (1858) is a synonym: it lacks the red blotches on the dorsum and there are probably internal differences, but it appears these were not compared. Additionally, their geographical distributions do not overlap: currently, *P. striata* is found only in the western Indian Ocean and Red Sea (Yonow, 2008) whilst *P. cruenta* is found only in the western Pacific. One does not see a gradual clinal change in morphology



Fig. 11. *Platydoris cruenta*. View of head and oral tentacles of 60 mm specimen.

from east to west as in some species (e.g. *Peltodoris atromaculata* (Bergh) in the Mediterranean), nor do we see an overlapping of distributions of different colour patterns (e.g. *Thuridilla gracilis* (Risbec) across the Indo-West Pacific, as *ratna* (Marcus) and *bayeri* (Marcus)). As stated previously (Yonow *et al.*, 2002), taxonomy is a tool for identifying and classifying animals: higher systematics is in a constant state of flux as a result, but combining species which clearly differ in geographical and/or morphological criteria is not helpful at this stage.

Platydoris sanguinea Bergh, 1905
(fig. 12, pl 6 figs 2, 3)

Platydoris formosa Eliot, 1903: 376; Eliot, 1906a: 646 [non *P. formosa* (Alder & Hancock, 1864)].

Platydoris sanguinea Bergh, 1905: 139, pl. 2 fig. 9, pl. 16 figs 4, 5; Dorgan *et al.*, 2002: 293, figs 2n, 20b, 24-26.

Platydoris sp. 2 Marshall & Willan, 1999: 82, fig. 145.

Material. — RMNH.MOL.131653, RBE Stn 21, Mamala, Hitu, 10 m depth, 21.xi.1990, leg. A. Fortuin, 17 × 6 mm pres., photos M. Lavaleye 26-19/20.

Description. — The body is oval with an irregular wavy edge (pl. 6 fig. 2), very flat with a prominent visceral hump extending from behind the rhinophores to the gills. The opaque colour was deep orange-red with pale areas where the pigment was less dense or even absent. There were two paired patches of white or grey speckling on the edge of the visceral hump, the same speckled colouration on the gills, rhinophores, and edge of the mantle. The rhinophores had a red stalk and the clavus was deep red with white speckles, the speckling increasing towards the tip; there are 19 lamellae on the clavus. The six tripinnate gills were speckled and the anal papilla was red.

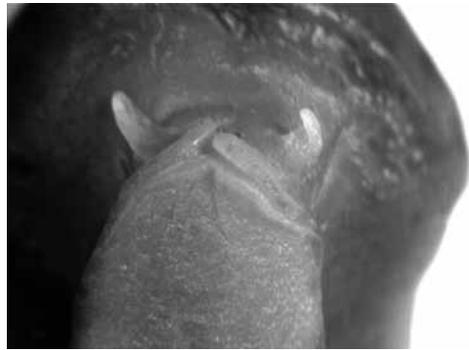


Fig. 12. *Platydoris sanguinea*. View of head and oral tentacles of 75 mm specimen.

The preserved specimen is relaxed but very stiff, and the speckled gills and the rhinophores are well extended. The margins of the rhinophore openings are scalloped, and there are six distinct lobes around the gills. The sand-like markings are no longer visible on the dorsum, which is finely granulated. Ventrally the hyponotum is beige brown. The foot sole is neither orange nor yellow, but was certainly coloured in life; there is a dense brown line along the edges of both the upper and the lower surfaces of the opaque creamy foot (pl. 6 fig. 3). The head is bilaminate with a divided upper lamina, and the oral tentacles are long and digitiform (fig. 12).

Remarks. — This species appears to be rarely recorded, and only one specimen is present in this thorough collection; it has been previously recorded from Indonesia and the Philippines (Bergh, 1905; Dorgan *et al.*, 2002), but there are also records from East Africa, southern India, and Sri Lanka (Eliot, 1903, 1906a as *P. formosa*) which were omitted from the review (Dorgan *et al.*, 2002). These considerably extend the range

westwards to the western Indian Ocean, although it has not been recorded in the Red Sea (Yonow, 2008). Marshall & Willan (1999) described and illustrated this species from the Great Barrier Reef and they also observed that the dorsum looks as if sand has been scattered on it. The accretions lacking in the preserved material may not be problematic, as Eliot stated that they were lacking in his smaller preserved specimens (1906a: 646); this Ambonese specimen was only 17 mm in preservative while the species grows to 45 mm.

Platydoridiscus scabra (Cuvier, 1804)
(fig. 13, pl. 6 figs 4, 5)

Doris scabra Cuvier, 1804: 466 (Timor, Indonesia).

Platydoridiscus eurychlamys Bergh, 1877b: 510, pl. 59 figs 11-18, pl. 60 figs 1, 2; Bergh, 1890: 914 (Ambon and Edam, Indonesia); Bergh, 1905: 137 (Kwandang Bay, Indonesia).

Discodoridiscus ? sibogae Bergh, 1905: 104, pl. 1 fig. 8 (Binonka, Indonesia).

Platydoridiscus scabra Edmunds, 1971: 354, figs 4f, g, 7; Yonow, 1984: 221, fig. 5; Yonow, 1990: 294, pl. 15; Marshall & Willan, 1999: 81, fig. 143; Dorgan *et al.*, 2002: 271, figs 2L, 6A, 7, 8.

Material. — RMNH.MOL.131654, RBE Stn 30, Suli, Hitu, 1.5 m depth, "nudibranch, sturdy," 29.xi.1990, leg. J.C. den Hartog, pres. specimen would be approx. 60 × 40 mm uncurled, photos M. Lavaleye 35-13/14.

Remarks. — This species is well known throughout the tropical Indo-Pacific, recorded from Indonesia by Cuvier (1804), Bergh (1877b, 1905), and Dorgan *et al.* (2002). This specimen is identical in coloration to the photographs provided in Yonow (1990), Marshall & Willan (1999), and Dorgan *et al.* (2002). The preserved specimen is very stiff, and spiculate to the touch. The dense chocolate brown patches are generally symmetrical about the midline. The yellow-orange or orange line on the mantle margin and rhinophoral and branchial pockets is very characteristic (pl. 6 fig. 4), but is no longer visible in the preserved material. The branchial pocket is raised and produced into six lobes. Ventrally, only the top of the foot bears brown speckles: the remainder is creamy white (pl. 6 fig. 5). The head is bent in preservative but the visible left oral tentacle is triangular (fig. 13).



Fig. 13. *Platydoridiscus scabra*. View of head and oral tentacles of 17 mm specimen.

Family Phyllidiidae
Phyllidia (*Fryeria*) *picta* Pruvot-Fol, 1957
(pl. 6 fig. 6)

Phyllidia picta Pruvot-Fol, 1957: 110, figs 5-12; Domínguez *et al.*, 2007: 97, fig. 6.

Fryeria menindie Brunckhorst, 1993: 47, fig. 26b, pl. 4h, 5a.

Fryeria picta Yonow, 1996: 511, figs 14a-k, table 3; Fahrner & Beck, 2000: 190, 199, 203, fig. 8 (32), pl. 3 figs 7, 8.

Material.— NHMUK acc. no. 2350, Bay of Tulamben, Bali, 3-20 m depth, xi.1990, leg. and photos H. Debelius, 24 × 13 m pres.

Remarks. — *Phyllidia (Fryeria) picta* is easily recognized in the tropical west Pacific by its blue colour bearing isolated yellow-orange tubercles, a central black area with black rays extending to the margin, and a ventral anus (pl. 6 fig. 6). There are three dorsal ridges of tubercles. The head and tentacles are illustrated in Yonow (1996: fig. 14B, C), and the anus is visible posteriorly between the foot and the hyponotum. This species could only be confused with the dark forms of *Phyllidia coelestis* and *Phyllidia varicosa*, which also have small tubercles in the blue or white marginal area but a dorsal anus (see below). Surprisingly, *P. (F.) picta* was not collected by the R.B. Expedition, although one specimen was collected in nearby Bali. It has been recorded from Indonesia by Fahrner & Beck (2000) and there are photographs in Tonozuka (2003) and on NudiPixel.

Phyllidia coelestis Bergh, 1905
(fig. 14a-f, fig. 15a-c, pl. 7 figs 1, 2)

Phyllidia coelestis Bergh, 1905: 182, pl. 3 fig. 16 (Selayar, Indonesia); Lin, 1983: 152, pl. 1 fig. 5; Fahrner & Beck, 2000: 199, 202, pl 3 fig. 1; Yonow *et al.*, 2002: 862, fig. 16b; Domínguez *et al.*, 2007: 93, figs 1D, 4.

Phyllidia honloni Risbec, 1956: part of syntype series (although description and figures are of *P. varicosa* (see below in Non-Indonesian material, typical form).

Phyllidia varicosa Risbec, 1956: part of specimens (see below in Non-Indonesian material, typical form) (non *varicosa* Lamarck).

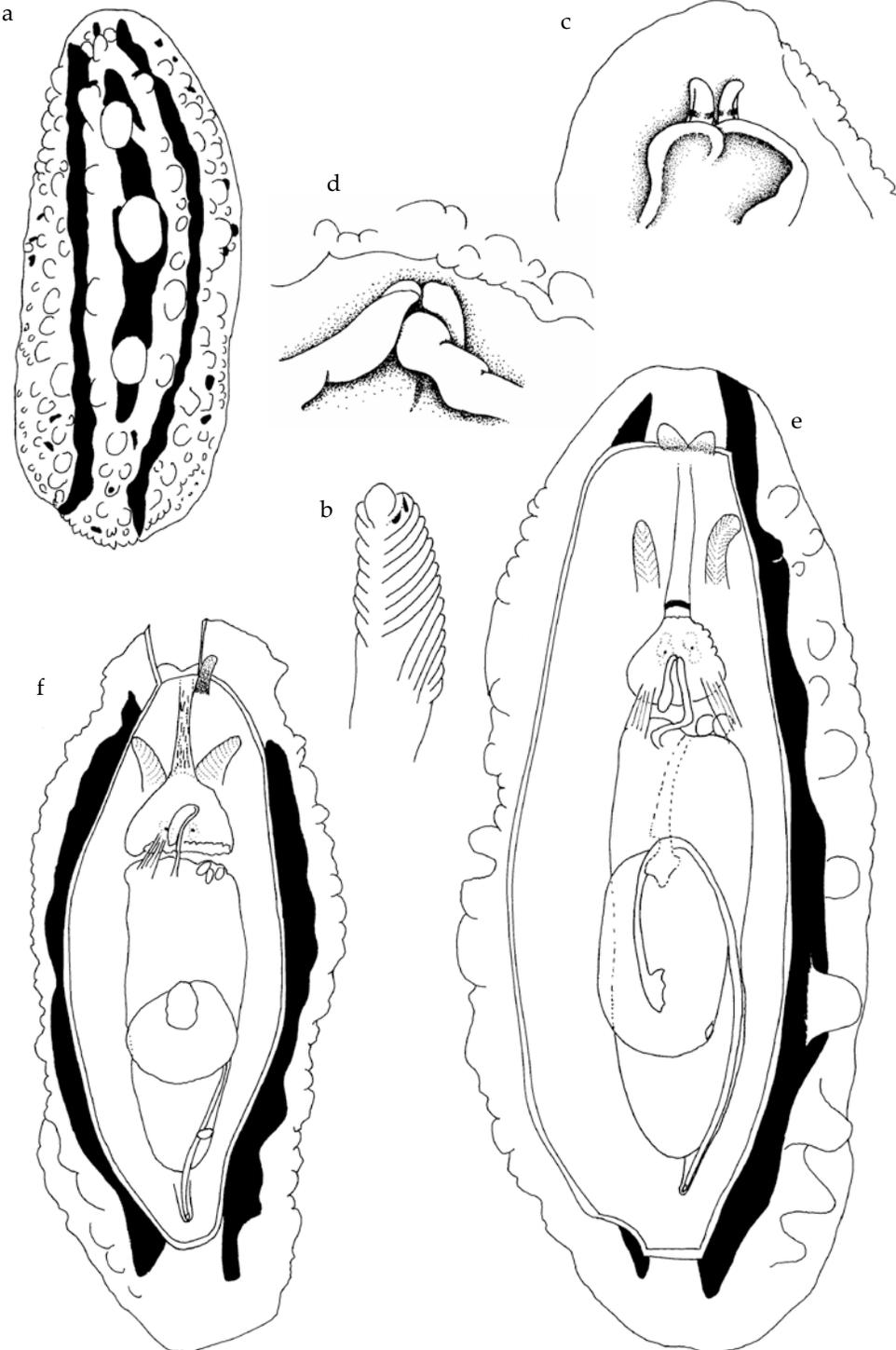
Phyllidia alia Yonow, 1984: 224, figs 6D, E, 7A, 8F, G.

Material.— typical form — RMNH.MOL.130163, Hatuhuran, Piru Bay, Ceram, 2-3 m depth, 28-30. xi.1997, 30 × 14 mm pres., leg. & photo H. Strack.

Non-Indonesian material.— typical form— RMNH.MOL.130158, NW of Orpheus Island, GBR, Australia, 8 m depth, 8.xi.1986, 35 × 15 mm pres., leg. & photo R. Cattaneo-Vietti (RC-V#17); Zoological Museum University Copenhagen, Kata Beach, Phuket, Thailand, 17.ii.1982, 24 × 10 mm pres.; WAM 64/89, Horsburgh Is., Cocos Keeling, 20.ii.1989, leg. C. Bryce, 25 × 7 mm; Negros Island, Philippines, 3. iii.1983, photos of two individuals, B. Picton (BEP PH/17 and BEP/54; 41 mm and 27 mm specimens AM C142660, 20 m depth); RMNH.MOL.130160, Panglao Island, S of Bohol, Philippines, x.2008, 18 × 7 m pres., leg. & photos J. Hinterkircher; Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher; MNHN 16066 and MNHN 34206, Viet-Nam, Risbec, 1956 as *P. varicosa*; MNHN 1491.E34201 and MNHN 1502.E.34888, Viet-Nam, Risbec, 1956 as *P. honloni* syntypes.

Non-Indonesian material.— dark form — RMNH.MOL.130162, in *Tridacna* tank, Orpheus Island, GBR, Australia, 6.xi.1986, 60 × 30 mm (47 × 16 mm pres.), leg. & photo R. Cattaneo-Vietti (RC-V#03); WAM 1048-85, 4.5 km S of Vlaming Head Lighthouse, North West Cape, Western Australia, Stn. 3, 28.v.1981, leg. & photo Slack-Smith & C. Bryce, two specimens 35 × 16 mm pres. and 25 × 12 mm pres., curled; WAM 210-88, Robray Reef, Kimberley, Western Australia, 15.vii.1988, leg. & photo F. Wells & C. Bryce, two specimens 30 × 14 and 17 × 9 mm pres.

Fig. 14. *Phyllidia coelestis* (typical). a, dorsal view of 24 mm, Phuket; b, rhinophore of 35 mm, Orpheus Island (RC-V#17); c, head and oral tentacles of 24 mm, Phuket; d, head and oral tentacles of 30 mm, Ceram; e, dissected specimen 35 mm, Orpheus Island (RC-V#17); f, dissected specimen 25 mm, Cocos Keeling (WAM 64/89). ▶



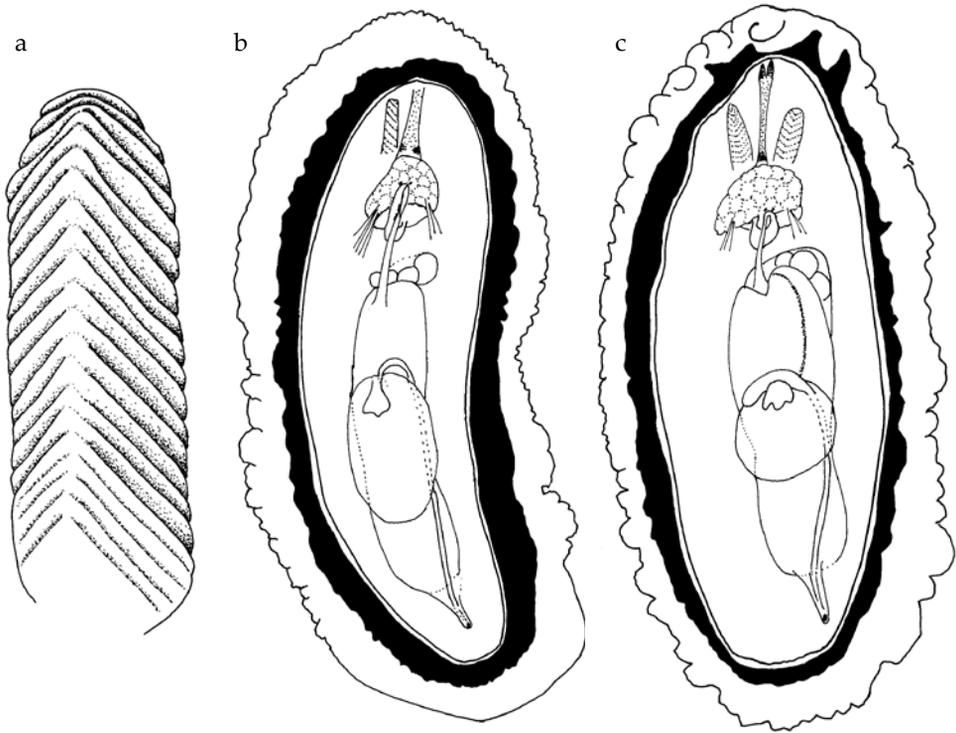


Fig. 15. *Phyllidia coelestis* (dark). a, right rhinophore of 60 mm specimen (RC-V#03); b, dissected 60 mm specimen (RC-V#03); c, dissected 35 mm specimen (WAM 1048-85).

Description.— Typical colour form: the ground colour was blue white with two continuous black lines, a central interrupted black line, and a black U-shaped mark in front of the rhinophores (pl. 7 fig. 1) which may be incomplete as illustrated in fig. 14a. The tubercles were orange-tipped, and the remainder of the mantle skirt had scattered small tubercles and few black flecks. The orange rhinophores are curved and bear up to 19 lamellae (fig. 14b). The anus is located on the last or penultimate midline tubercle. Ventrally the anterior margin of the foot is deeply notched or concave, and the head has long oral tentacles which are grooved laterally and bear black pigment basally on their dorsal surfaces (fig. 14c-f).

The dark form is represented by several specimens with a central oval black region surrounded by a broad blue white border. The central region bears three rows of yellow tubercles with white bases (pl. 7 fig. 2). The edges of the central black area undulate and may form short rays extending into the blue white band bearing scattered pustules, some of the larger with yellow on their tips, and small black spots and patches. The yellow-orange rhinophores are squared with 20 tightly layered lamellae (fig. 15a). The anus is located on a posterior midline tubercle. Ventrally the foot is deeply concave anteriorly and can appear notched. The long oral tentacles have their dorsal surfaces pigmented with black (see fig. 15c) extending ventrally at the base of the tentacles.

Anatomically, the two forms also differ slightly: one noticeable feature is that there is more black pigment internally and on the oral tentacles and along the oral tube in the specimens with more black dorsally. *Camera lucida* figures of individual dissections are presented of both forms for comparison (fig. 14e, f and fig. 15b, c). In the typical form, the long oral tube bears a continuous black band posteriorly and/or spots and streaks along its length; in the dark form it is black with a concentrated band at the base. The pharyngeal bulb is approximately symmetrical and relatively smooth, less so in the darker specimens, and there are two large retractor muscles on either side, attached posteriorly and dorsally. In all specimens, the pharynx is thick and swollen, inserted posteriorly and centrally on the slightly flattened area of the bulb, and loops up, narrowing abruptly through the nerve ring, and then down to enter the digestive gland dorsally. The pericardium is located just below the centre of the digestive gland and the intestine originates beneath it; it can be traced for most of its length, disappearing beneath the digestive gland for part of its length.

Remarks.— This widely distributed and common Indo-West Pacific species is well known and has been recorded previously from Indonesia by Bergh (1905), Fahrner & Beck (2000), Tonozuka (2003), and Debelius & Kuitert (2007), all as the typical form.

Phyllidia elegans Bergh, 1869
(fig. 16a, b, pl. 7 fig. 3)

Phyllidia elegans Bergh, 1869: 439-455, 506-508, pls. 18B, 19; Fahrner & Beck, 2000: 199, 202, pl. 3 figs 7, 8;

Dominguez *et al.*, 2007: 93, figs 1B-C, 3; Gosliner *et al.*, 2008: 285.

Phyllidiella sp. Gosliner *et al.*, 2008: 295.

Non-Indonesian material.— RMNH.MOL.129995, Phantom Channel, Orpheus Island, GBR, Australia, 8 m depth, 6.xi.1986, leg. & photo R. Cattaneo-Vietti, 35 × 15 mm pres. (RC-V#02); RMNH.MOL.129994, Wheeler Reef, GBR, Australia, 10 m depth, 17.xi.1986, leg. & photo R. Cattaneo-Vietti, 33 × 13 mm pres. (RC-V#34) (included in Brunckhorst 1993: 33); WAM 216-88, Long Reef, Kimberly, Western Australia, vii.1988, leg. & photo C. Bryce; WAM 216-84, NE of North Lagoon, Scott Reef, Western Australia, ix.1984, leg. & photo C. Bryce; WAM 2420-84, W side of North Lagoon, Scott Reef, Western Australia, leg. & photo C. Bryce; WAM 2422-84 southern reef flat, Seringapatam, Western Australia, leg. & photo C. Bryce; NHMUK presented by W.E. Barnett 1957, CSIRO, Cronulla, NSW, Australia, 1957, leg. Miss B. Dews, one specimen 43 × 17 mm pres.; WAM 605-86, Christmas Island, eastern Indian Ocean, leg. F. Wells, photo C. Bryce; Mactan Island, off Cebu City, Cebu, Philippines, 1983, photo of two individuals, B.E. Picton (BEP PH/41 and BEP PH/66, specimens in Australian Museum, Sydney?).

Description.— Both GBR specimens are typical *elegans*, with a large elongated oval body. The central region is separated by a black line meeting at an acute angle behind the anus and in an X-shape around and in front of the rhinophores, crossed by a transverse black line behind the rhinophores. Within this central area are three rows of orange-tipped tubercles, with faint black lines between them. The anus is located on the last midline tubercle within the black oval. Outside the black oval, the individual tubercles are scattered around the marginal band: this area is subdivided by 7-10 black lines extending to the margin at right angles, interspersed with short black lines, spots, and flecks (pl. 7 fig. 3). The other specimens vary slightly in having more black pigmentation. Ventrally the foot sole is pale, angular anteriorly and pointed posteriorly, with a dense black line along the midline (fig. 16a). The head and triangular oral tentacles are large (fig. 16b).

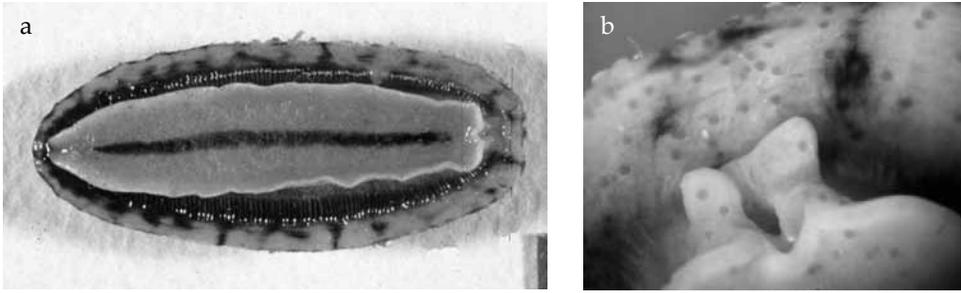


Fig. 16. *Phyllidia elegans*. a, ventral surface of 33 mm specimen (RC-V#34), photo R. Cattaneo-Vietti; b, head and oral tentacles of same.

Remarks. — This species is well known from the western Pacific and eastern Indian oceans, and is relatively common. There are no records from the western Indian Ocean: Eliot (1906b) recorded *P. elegans* from the Maldives but the description is more applicable to *P. alyta* Yonow, 1994. A similar species, *Phyllidia multifaria* Yonow, 1986, exists in the Red Sea: this species has been synonymised with *P. elegans* by some authors (e.g. Brunckhorst, 1983) and not by others (e.g. Domínguez *et al.*, 2007); the discontinuous distribution indicates that the two are probably different species, but certainly closely related.

Phyllidia ocellata Cuvier, 1804 complex
(fig. 17a-c, pl. 7 figs 4, 5)

Phyllidia ocellata Cuvier, 1804: 267, fig. 7; Lim & Chou, 1970: pl. 16C; Yonow, 1996: 485, figs 1A-G, 4A; Fahrner & Beck, 2000: 199, 202, pl. 3 figs 2, 3; Domínguez *et al.*, 2007: 95, fig. 5; Tonzuka, 2003: 117, main photo [all *ocellata* form].

Phyllidia japonica Baba, 1937: 310 (*nom. nov.* for *P. tuberculata* Baba, 1930, non *P. tuberculata* Risbec, 1928); Yonow, 1996: 493, figs 6A-F; Tonzuka, 2003: 117, lower right photo [all *japonica* form].

Material. — *ocellata* form – RMNH.MOL.129998, RBE Stn 18, Laha, Hitu, 15 m depth, 24.xi.1990, leg. A. Fortuin, 31 × 20 mm pres., photo M. Lavaley 31-35; RMNH.MOL.130001, RBE Stn 18, Laha, Hitu, 6 m depth, 24.xi.1990, leg. A. Fortuin, 9 × 5 mm pres., photo M. Lavaley 21B-29/30; RMNH.MOL.170528, RBE Stn 18, Laha, Hitu, 4 m depth, 19.xi.1990, leg. K. van Egmond, 28 × 20 mm pres., photos M. Lavaley 23-35; RMNH.MOL.129996, Hatuhuran, Piru Bay, Ceram, 3 m depth, 28-30.xi.1997, 20 × 11 mm pres., leg. and photos H.L. Strack; NHMUK acc. no. 2350, Bay of Tulamben, Bali, 3-20 m depth, xi.1990, leg. H. Debelius, 27 × 24 mm pres., curled; NHMUK acc. no. 2350, Bay of Tulamben, Bali, 3-20 m depth, xi.1990, leg. H. Debelius, 33 × 23 mm pres., curled; NHMUK acc. no. 2350, Bay of Tulamben, Bali, 3-20 m depth, xi.1990, leg. H. Debelius, 30 × 18 mm pres., curled; Bay of Tulamben, Bali, 3-20 m depth, xi.1990, photos of two individuals H. Debelius.

Non-Indonesian material. — *ocellata* form – Bohol, Philippines, ix.2003, photos of 24 mm individual, J. Hinterkircher.

Material. — *japonica* form – RMNH.MOL.130003, RBE Stn 27, Hutumuri, Leitimur, 3 m depth, 27.xi.1990, leg. H. L. Strack & K. van Egmond, 32 × 16 mm pres.

Non-Indonesian material. — *japonica* form – Mactan Island, off Cebu City, Cebu, Philippines, 1983, photo of 26 mm individual, B.E. Picton (BEP PH/18, specimen in Australian Museum, Sydney?).

Description. — All but one specimens collected by the RBE were identical to the type of *Phyllidia ocellata* as described and illustrated by Cuvier (1804). Their shape is broadly

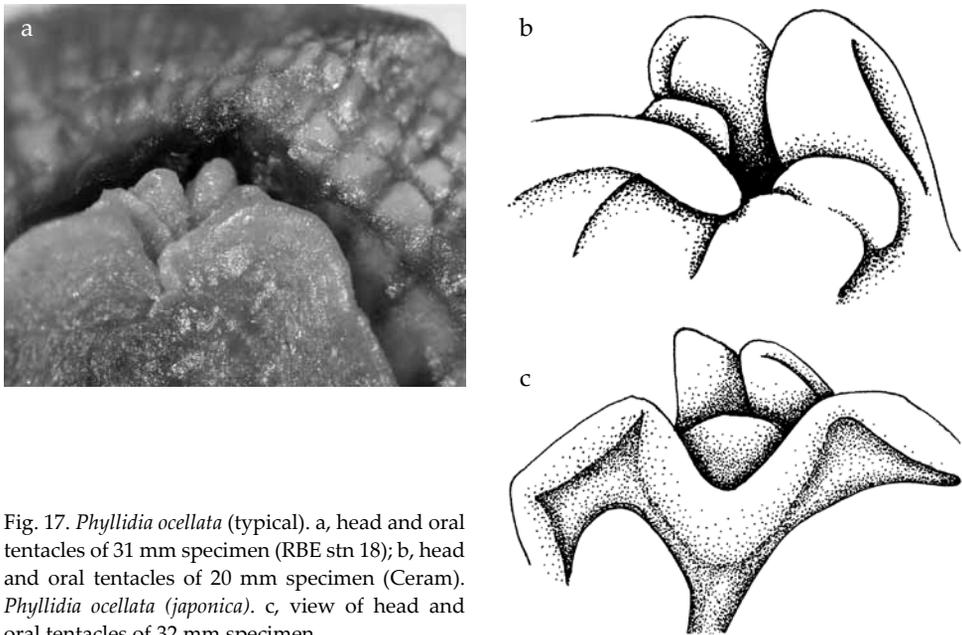


Fig. 17. *Phyllidia ocellata* (typical). a, head and oral tentacles of 31 mm specimen (RBE stn 18); b, head and oral tentacles of 20 mm specimen (Ceram). *Phyllidia ocellata* (*japonica*). c, view of head and oral tentacles of 32 mm specimen.

oval, and they were bright orange in life, although some were more yellow-orange (pl. 7 fig. 4). They have a central crest of mushroom-shaped orange and white tubercles extending from behind the rhinophores to the anus, located on a tubercle. There is a black ring edged in white surrounding a tubercle in front of the rhinophores. Along the sides, two pairs of black rings edged in white each surround a large orange and white tubercle. There are smaller white tubercles arranged along the midline and scattered on the dorsum, decreasing in size towards the margin. The long straight rhinophores were orange. Ventrally, the oral tentacles are grooved on their external sides and the head and mouth are usually visible (fig. 17a, b; see also Yonow, 1996: fig. 1).

Only one specimen of the *japonica* colour form was present in these collections: it is consistently longer and thinner than the other specimens in the collection, and has four or five pairs of black patches edged with white and containing a large orange tubercle centrally (pl. 7 fig. 5). The ground colour was yellow and the tubercles on the median crest are confluent. The tubercles are rather irregular in shape. Ventrally, the anterior margin of the foot is deeply concave and the conical oral tentacles are fissured on the outer sides (fig. 17c; Yonow, 1996: fig. 6C). The head is not bipartite as in the typical form.

Remarks.— *Phyllidia ocellata* is common in the tropical West Pacific Ocean with many colour patterns, considered by most authors as variants of a single species. Only these two forms were collected by the R.B. Expedition, supported by the illustrations of Indonesian animals in Tonozuka (2003), Debelius & Kuitert (2007), and Gosliner *et al.* (2008). I suspect that if all the other forms are indeed a single species, the same criteria will need to be applied to the whole family, which would then be reduced to only a few

highly variable species. These two forms of *Phyllidia ocellata* are found in the tropical Pacific and rarely in the Indian Ocean, where it is replaced by *Phyllidia multituberculata* Boettger, 1918, which has a consistently different dorsal pattern and a segmented asymmetrical pharyngeal bulb (Yonow, 1996; Yonow, in press).

Phyllidia varicosa Lamarck, 1801
(pl. 7 fig. 6)

Phyllidia varicosa Lamarck, 1801: 66; Bergh, 1890: pl. 86 fig. 11; Lim & Chou, 1970: pl. 16B; Yonow *et al.*, 2002: 863; Tonozuka, 2003: 118; Domínguez *et al.*, 2007: 90, figs 1A, 2.

Phyllidia arabica Ehrenberg, 1831: pages unnumbered; Yonow, 1986: 1403, figs 10A-C (incl. detailed synonymy).

Phyllidia honloni Risbec, 1956: 22, figs 71-75, 79-81; Lim & Chou, 1970: pl. 17B; Lin, 1983: 152, pl. 1 fig. 6.

Material. — RMNH.MOL.130100, RBE Stn 5, Tg. Beteng, Leitimur, < 10 m depth, 10.xi.1990, leg. K. van Egmond & A. Fortuin, two specimens 47 × 20 mm and 60 × 28 mm pres., photos M. Lavaleye 6-9/10; RMNH.MOL.130154, RBE Stn 11, Nusaniwa, Leitimur, 3 m depth, 12.xi.1990, leg. A. Fortuin, 41 × 22 mm pres.; RMNH.MOL.130103, RBE Stn 18, E of Laha, Hitu, 19.xi.1990, approx. 60 × 33 mm pres.; RMNH.MOL.130155, RBE Stn 20, Hitu, littoral, 20.xi.1990, leg. M. Lavaleye, 53 × 26 mm pres.; RMNH.MOL.130152, RBE Stn 23, Kaitetu, Hitu, 1 m depth, 23.xi.1990, leg. A. Fransen, 36 × 20 mm pres.; RMNH.MOL.130156, RBE Stn 37, W Laha, Hitu, 1 m depth, 6.xii.1990, leg. A. Fortuin, two specimens 62 × 30 mm and 65 × 35 mm, both pres., photos M. Lavaleye 47-3/5; RMNH.MOL.130102, Bay of Tulamben, NE Bali, < 15 m depth, xi.1990, two specimens 18 × 11 mm & 5 × 3 mm pres., leg. and photos H. Debelius; RMNH.MOL.130099, Batu Hitam (3 km W of Said), Hitu, 2 m depth, 23.xi.1997, leg. H.L. Strack, 47 × 22 mm pres. (bent); RMNH.MOL.130171, Hatuhuran, Piru Bay, Ceram, 1 m depth, 28-30.xi.1997, two specimens 47 × 20 mm and 43 × 21 mm pres., leg. and photos H.L. Strack; RMNH.MOL.131665, Sawai, N coast Ceram, 1 m depth, 4-8.xii.1997, leg. H.L. Strack, 42 × 26 mm pres.

Non-Indonesian material. — NHMUK (no registration numbers), three large specimens from Funafuti, Tuvalu (west central Pacific); NHMUK 1914.xi.6.149, Porto Galero, Mindoro, Philippines, 55 × 20 mm pres., leg. E.L. Griffin, det. A. Pruvot-Fol, 1956; MNHN 1481.33486, Risbec, 1956, one specimen from Nhatrang, Viet-Nam, 58 × 40 mm pres.; WAM 2206-84, South Sandy Island, Scott Reef, Western Australia, ix.1986, leg. & photo C. Bryce; WAM 411-86, Ashmore Reef, Kimberley, Western Australia, leg. & photo C. Bryce; Mactan Island, Philippines, 1983, photos of 25 mm individual, B.E. Picton (BEP PH/42, specimen in Australian Museum, Sydney?); “central zone” GBR, xi.1986, photo of one individual A. Ghisotti, c/o R. Cattaneo-Viatti.

Remarks. — *Phyllidia varicosa* is a very common species in the tropical Indo-Pacific, and shows no significant variation throughout its range (unlike *Phyllidia ocellata* complex, see above). Note the black anal papilla in pl. 7 fig. 6, which was also visible in numerous specimens. The oral tentacles still bear black pigment on the tips in most preserved specimens.

Phyllidiella nigra (van Hasselt, 1824)
(fig. 18a-d, pl. 8 fig. 1)

Phyllidia nigra van Hasselt, 1824: 244.

Phyllidiella pustulosa Bergh, 1869: 455, pl. 24 fig. 7; Lin, 1983: pl. 1 fig.3 (non *P. pustulosa* Cuvier, 1804).

Phyllidia serenei Risbec, 1956: 24, figs 82-84, 86-89; Lim & Chou, 1970: pl. 16D; Lin, 1983: 150, pl. 1 fig. 8.

Phyllidiella nigra Brunckhorst, 1993: 55, pl. 6B, fig. 28D-E; Fahrner & Beck, 2000: 190, 201, pl. 2 fig. 2;

Gosliner *et al.*, 2008: 293.

Material. — RMNH.MOL.130043, RBE Stn 1, W side of Hunut, Hitu, 11.xii.1990, 45 × 17 mm pres. (had dried out); RMNH.MOL.130023, RBE Stn 1, W side of Hunut, Hitu, 8 m depth, 4.xi.1990 or 13.xii.1990, leg. K. van Egmond, 34 × 15 mm pres., photos W. Kolvoort; RMNH.MOL.130190, RBE Stn 27, Hutumuri, Leitumur, 1-3 m depth, 27.xi.1990, leg. H.L. Strack & K. van Egmond, 28 × 12 mm pres., photos M. Laval-eye 23/36-37; Derawan, East Borneo, iv.1997, one individual, photos only J. Hinterkircher.

Non-Indonesian material. — WAM 402-86, Stn. 2, West Island, Ashmore Reef, Kimberley, Western Australia, 11.ix.1986, leg. F. Wells & photo C. Bryce, 28 mm, 44 mm, & 44 mm; Bohol, Philippines, iii.2004, photos of one individual, J. Hinterkircher.

Description. — The living specimens were velvety black with single, simple, rounded, isolated or vaguely grouped tubercles which were almost red in colour (pl. 8 fig. 1). The body shape is rather long, more oval at each end than *P. pustulosa* (p. 938), especially when preserved. The tubercles are arranged in a band around the mantle margin (i.e. not a single row) and are smaller than dorsal tubercles. The edge of the mantle, anal papilla, and rhinophores (fig. 18a) are black. Both the anus and the rhinophores are located on smooth black areas of the notum, and not on tubercles. Ventrally, the foot sole is almost the same size as the mantle, flat and oval in the relaxed specimens (fig. 18b and also clearly illustrated by Lin, 1983). There is a black line along the edges of both foot and hyponotum (fig. 18b). Otherwise, the foot sole is uniformly dark grey; the head and oral tentacles are illustrated in fig. 18c. They are contracted and the foot appears notched anteriorly in one specimen (fig. 18d) but this is a misleading artefact of preservation. In both specimens, the large oral tentacles are elongated and rounded at the ends, tipped with black.

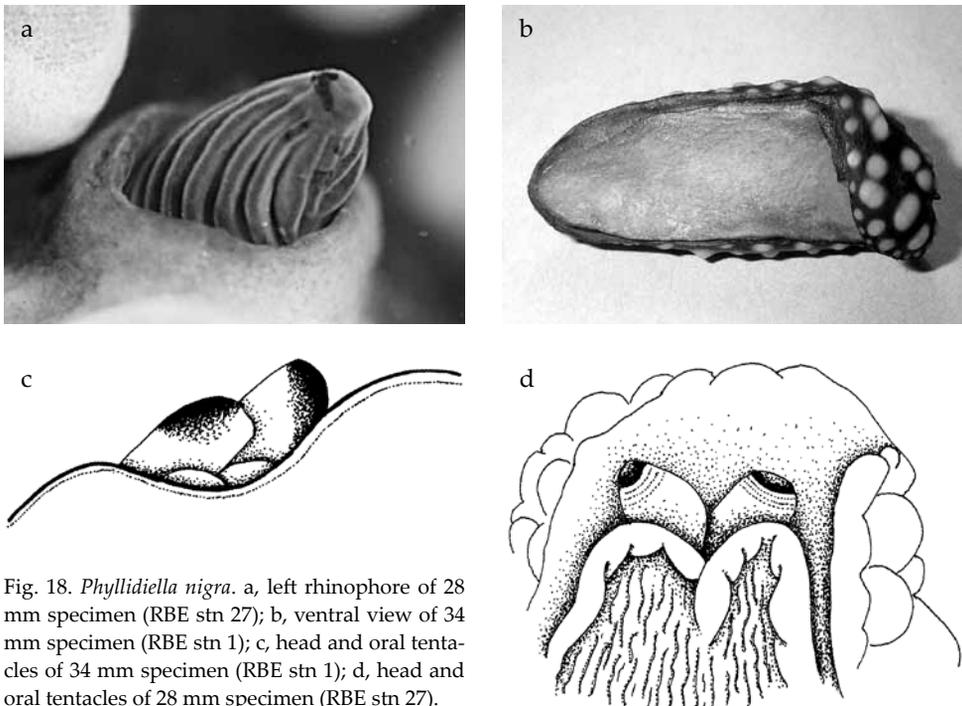


Fig. 18. *Phyllidiella nigra*. a, left rhinophore of 28 mm specimen (RBE stn 27); b, ventral view of 34 mm specimen (RBE stn 1); c, head and oral tentacles of 34 mm specimen (RBE stn 1); d, head and oral tentacles of 28 mm specimen (RBE stn 27).

Remarks. — *Phyllidiella nigra* is recorded from the eastern Indian Ocean to the West Pacific; Bergh (1905) recorded it from Borneo. I have doubts about the single Red Sea specimen reported by Brunckhorst (1993: 56), which is most probably *P. pustulosa* (see below), a very common species in the Red Sea, variable in pattern, which may appear rather red (e.g. Yonow, 2008: 220, lower right photograph).

Phyllidiella pustulosa (Cuvier, 1804)
(fig. 19, pl. 8 fig. 2)

Phyllidia pustulosa Cuvier, 1804: 267, fig. 8; Lim & Chou, 1970: pl. 16A.

Fryeria pustulosa Gray, 1857: pl. 312, fig. 1.

Phyllidiella nobilis Bergh, 1869: 485, pl. 24b; Bergh, 1890: pl. 85, fig. 4.

Phyllidia spectabilis Collingwood, 1881: 136, pl. 10 figs 19-23.

Fryeria variabilis Collingwood, 1881: 187, pl. 10 figs 24-28; Risbec, 1956: 24, no fig.; Marcus & Marcus, 1970: 173, figs 50-52.

Phyllidia nobilis var. *rotunda* Eliot, 1904: 282; Lim & Chou, 1970: pl. 17A.

Phyllidia nobilis Risbec, 1928: 58, pl. 2, fig. 5; Risbec, 1953: 12 ("syn. *P. spectabilis* Collingwood, 1878 [sic.]"); Pruvot-Fol, 1957: figs 24-26 only (very confusing, as she included this species in the discussion of *P. meandrina* although she stated clearly she had only one specimen! However, only figs 22 and 23 are of *P. meandrina*).

Phyllidiella pustulosa Fahrner & Beck, 2000: 190, 201, pl. 2 fig. 3; Domínguez *et al.*, 2007: 103, figs 1G-I, 11.

Material. — NHMUK 1858.6.25.49, Amboina (Ambon), Mr. Franks coll. as '*varicosa*'; NHMUK 1858.6.25.49, Amboina (Ambon), Mr. Franks coll. as '*pustulosa*', 25 × 12 mm pres.; RMNH.MOL.130094, RBE Stn 15, W of Tial, Baguala Bay, Hitu, 4 m depth, 4.xi.1990, two specimens 21 × 12 mm and 23 × 11 mm pres., photos M. Lavaleye 14/4-5; RMNH.MOL.130106, RBE Stn 18, E of Laha, Hitu, 15.xi.1990, approx. 25 × 12 mm pres. (very curled); RMNH.MOL.130056, RBE Stn 26, 3 km w of Kaitetu, Hitu, "littoral under stones," 23.xi.1990, four specimens 21 × 12 mm, 25 × 15 mm, 22 × 12 mm, approx. 20 × 11 mm pres. (all curled), photos M. Lavaleye 30-14/15; RMNH.MOL.130096, RBE Stn 30, Suli, Hitu, 1-3 m depth, 29.xi.1990, 20 × 11 mm pres., leg. H.L. Strack; RMNH.MOL.130098, RBE Stn 39, S Larike, Hitu, 5 m depth, 9.xi.1990, 32 × 14 mm pres., leg. K. van Egmond; RMNH.MOL.130063, Tulamben Bay, NE Bali, 3-20 m depth, xi.1990, four specimens all pres., 37 × 15 mm, 18 × 6 mm, 30 × 17 mm, 30 × 27 mm, leg. H. Debelius and photos of numerous individuals; RMNH.MOL.131678, Bunaken, Manado, N Sulawesi, < 15 m depth, xi.1990, two specimens 32 × 14 mm & 17 × 10 mm pres., leg. H. Debelius and photos of numerous individuals; RMNH.MOL.130093, Nusa Ela, Pulau Tiga, 2-4 m depth, 25.xi.1997, 30 × 10 mm pres., leg. and photos H.L. Strack; RMNH.MOL.130066, Piru Bay, Hatuhuran, Ceram, 2 m depth, 28-30.xi.1997, two specimens 40 × 17 mm and 33 × 12 mm pres., leg. and photos H.L. Strack; Derawan, E Borneo, iv.1997, photos only, numerous individuals, J. Hinterkircher.

Non-Indonesian material. — NHMUK 1952.1.29.787 (det. A. Pruvot-Fol), IR16 Low Isles, GBR expedition 1928-1929 as '*nobilis*'; NHMUK 1952.1.29.788, GBR expedition 1928-1929, 35 × 19 mm pres.; NHMUK 1952.1.29.789, IR16 Low Isles, GBR expedition 1928-1929 as '*nobilis*', 20 × 19 mm pres.; NHMUK, Heron Island Australia, leg. L. Harris 1968, T.E. Thompson coll., 17 × 10 mm pres.; NHMUK 90.12.28.101-102, Canton Island, shore of lagoon, J.J. Lister coll., 22 × 10 mm and 18 × 8 mm both pres.; MNHN 1457.E.33217 (Risbec, 1956, Viet Nam) labelled as '*variabilis*'; 1496.E.34598 and 1496.E.34597 (Risbec, 1965, Viet-Nam) labelled as '*nobilis*'; RMNH.MOL.130090, John Brewer Reef, GBR, Australia, 12 m depth, 10.xi.1986, 30 × 12 mm pres. (RC-V#22), leg. & photos R. Cattaneo-Vietti; RMNH.MOL.130067, Davies Reef, GBR, Australia, 8 m depth, 11.xi.1986, two specimens both pres. 27 × 12 mm and 24 × 9 mm (RC-V#24), leg. & photos R. Cattaneo-Vietti; RMNH.MOL.130073, Bowl Reef, GBR, Australia, 10 m depth, 18.xi.1986, two specimens pres. 21 × 8 and 17 × 7 mm (RC-V#43a); RMNH.MOL.130071, Davies Reef, GBR, Australia, 1.xi.1986, 13 × 5 mm pres. (RC-V#25), leg. & photos R. Cattaneo-Vietti; RMNH.MOL.130189, Ningaloo Reef, West Australia Bay, Western Australia, 15 m depth,

xi.1982, 35 × 11 mm pres, leg. H. Debelius; WAM 780-83, Mistaken Island, Albany, Western Australia, iii.1983, leg. and photo C. Bryce; WAM 1068-85, 13 miles S of Coral Bay, Western Australia, 5.vi.1981, leg. S. Slack-Smith and photo C. Bryce; WAM 636-86, WAM 2203-84, WAM 2429-84, WAM 455-86, Dampier Archipelago, Pilbara, Western Australia, photos of four individuals, C. Bryce; Mactan Island, off Cebu City, Cebu, Philippines, 1983, photos of two individuals, B.E. Picton (BEP PH/84 and BEP PH/19, specimens in Australian Museum, Sydney?); Taiwan, 1983, photo of one individual, B.E. Picton (BEP TA/11, specimens in Australian Museum, Sydney?).

Remarks. — One of the most commonly occurring and widespread Indo-Pacific phyllidiids, *P. pustulosa* is one species which readily emits a noxious fluid when disturbed (pl. 8 fig. 2). It is characterised by a black notum with quadrangular clusters of pink compound tubercles and a thin pink mantle margin. The clusters form a series of loose polygonal shapes on the dorsum in the central series as well as around the edge of the animal. The rhinophores are black. Ventrally, the head is bilaminate, the mouth often open, and the digital oral tentacles dusted in black (fig. 19). The species could only be confused with *Phyllidiopsis burni* Brunckhorst (see below), which has a black dorsum spattered with clusters of small dark pink pointed tubercles, a marginal ring of smaller single tubercles, and also a pale mantle edge. *Phyllidiella nigra* (van Hasselt) (above) is also similar, but has a black margin and reddish, individual, isolated tubercles which are smaller, rounded and not arranged in quadrangular groups. Lim & Chou (1970) key out and illustrate *P. pustulosa* twice: once as *pustulosa*, having a black margin (but the mantle edge is curled in their figure) and a second time as *rotunda*, having a pale margin. The arrangement of tubercles in both is similar and well within the variation observed for *P. pustulosa*.



Fig. 19. *Phyllidiella pustulosa*. View of head and oral tentacles of 30 mm specimen (Nusa Ela).

Phyllidiopsis burni Brunckhorst, 1993
(fig. 20a-c, pl. 8 fig. 3)

Phyllidiopsis burni Brunckhorst, 1993: 74, fig. 30C, D, pl. 9B; Willan & Marshall, 1999: 127, fig. 229.

Material. — RMNH.MOL.130174, RBE Stn 37, W Laha, Hitu, 1 m depth, 6.xii.1990, 35 × 12 mm pres.

Description. — The preserved animal is black with pale multiple, high, pointed tubercles (pl. 8 fig. 3). The body is elongated, and more tapered anteriorly and posteriorly than in other species, similar to Collingwood's figure of '*variabilis*' (1881: 137, pl. 10 figs 24-28, a synonym of *Phyllidiella pustulosa*). The tubercles are larger in the centre of the dorsum and smaller in the lateral band with a single row along the edge. The margin is thin and pink in colour, although some black may extend to the edge. The black rhinophores bear fewer lamellae than those of *P. pustulosa*, only 15 lamellae in the 35 mm specimen (fig. 20a). The anus consists of a very large rim located at the end of the last central tubercular group. Ventrally the foot is cream with grey speckles in

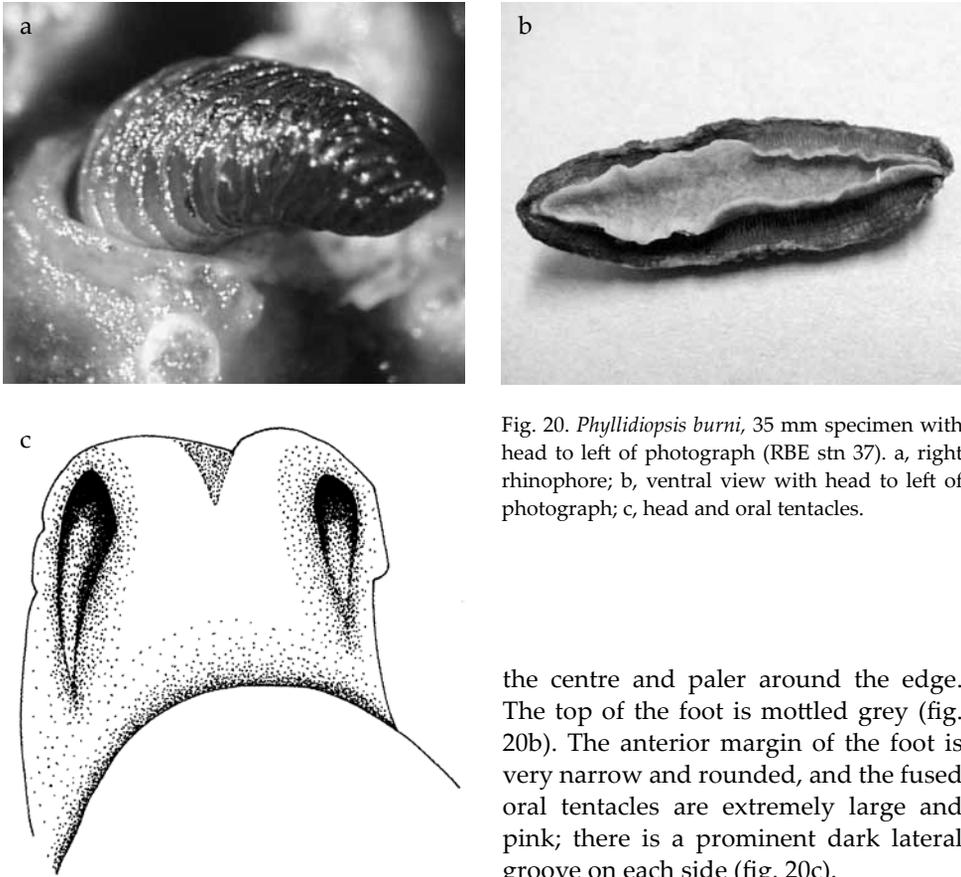


Fig. 20. *Phyllidiopsis burni*, 35 mm specimen with head to left of photograph (RBE stn 37). a, right rhinophore; b, ventral view with head to left of photograph; c, head and oral tentacles.

the centre and paler around the edge. The top of the foot is mottled grey (fig. 20b). The anterior margin of the foot is very narrow and rounded, and the fused oral tentacles are extremely large and pink; there is a prominent dark lateral groove on each side (fig. 20c).

Remarks.— Brunckhorst (1993) described this species from material collected in Micronesia, the Great Barrier Reef, and Papua New Guinea. These new records from Indonesia confirm a western Pacific distribution. *Phyllidiopsis burni* is most similar externally to *Phyllidiella pustulosa*: the most obvious and invariable difference is the shape and colour of the fused oral tentacles. Tubercle colour, size, and arrangement can vary in both species, but those of *P. burni* are more pointed, multiple, and not arranged in quadrangular groups. The smooth black ground colour is more extensive in *Phyllidiopsis burni*, while in *Phyllidiella pustulosa*, there is a narrow black submarginal line inside the thin pink edge.

Phyllidiopsis pipeki Brunckhorst, 1993
(fig. 21a-c, pl. 8 fig. 4)

Phyllidiopsis pipeki Brunckhorst, 1993: 73, fig. 30B, pl. 9A; Marshall & Willan, 1999: 128, fig. 231; Fahrner & Beck, 2000: 190, 200, pl 1 fig. 3 (Lombok, Indonesia); Domínguez *et al.*, 2007: 101, fig. 10.

Material.— RMNH.MOL.130177, Bunaken, Manado, N Sulawesi, < 15 m depth, xi.1990, 30 × 13 mm pres., leg. H. Debelius; RMNH.MOL.131679, Tulamben Bay, NE Bali, < 20 m depth, xi.1990, 50 × 20 mm

pres. (slightly bent), leg. H. Debelius; Derawan, E Borneo, iv.1997, one individual, photos only, J. Hinterkircher.

Non-Indonesian material. — Papua New Guinea 1977.1.G.25.681, no. 142, Laing Island W side, 10-20 m depth, 19.v.1977, leg. J. van Goethem, 33 × 13 mm pres.; Mactan Island, off Cebu City, Cebu, Philippines, 18.iv.1983, 18 m depth, photograph of one individual, B.E. Picton (BEP PH/65, AM C138167).

Description.— *Phyllidiopsis pipeki* is oval and very high in profile. The dorsum was white, appearing almost translucent pale pink, with a dense speckling of superficial opaque white pigment. There is a central crest of compound tubercles which were whiter than the body (pl. 8 fig. 4). Compound tubercles are sparsely scattered on the dorsum, leaving many areas smooth; some are loosely arranged in a row behind each rhinophore. Around the edges, the tubercles may be single and much smaller. There are two longitudinal black lines outside the rhinophores which meet medially in front of them and continue to the margin. They extend as separate lines to the posterior margin in one specimen, but meet in the second. There are a few black lines extending from this black almond-shape to the margin along the sides. The large rhinophores are black apically and posteriorly, pinkish white anteriorly, with pinkish bases; this colour is more intense than that of the dorsum. The anus is a distinctly raised rim, not on a tubercle but at the end of the median crest of tubercles, within the black line. The anal papilla is obvious when the animal is alive.

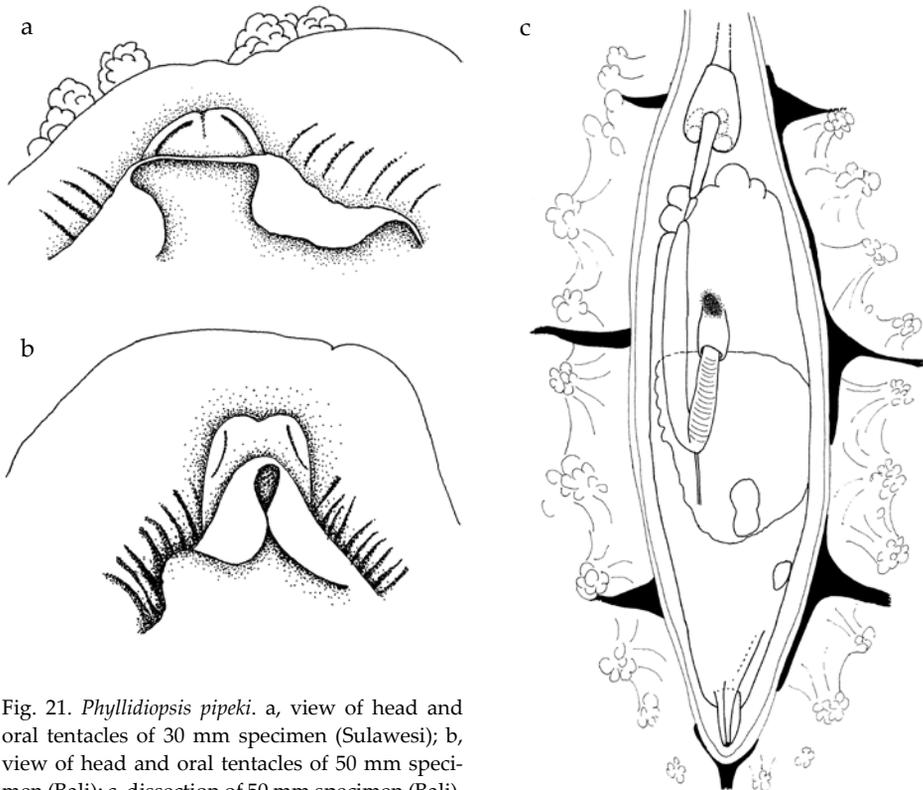


Fig. 21. *Phyllidiopsis pipeki*. a, view of head and oral tentacles of 30 mm specimen (Sulawesi); b, view of head and oral tentacles of 50 mm specimen (Bali); c, dissection of 50 mm specimen (Bali).

Ventrally, the foot is squared anteriorly (fig. 21a) but often folded in preservative (fig. 21b), and the pink oral tentacles are fused medially with rounded outer corners; the outer edge is grooved. The foot and hyponotum are the same colour as the dorsum, with a black line in the groove, and the gills are edged in black. The preserved Bali specimen is pale greenish white with two thinner black lines in the shape of an almond. The rhinophores are not extended, but are white with a black tip and black posterior line in the photograph. A dissection of this specimen confirms its identity (fig. 21c). The pharyngeal bulb is large and muscular; the pharynx extends from the centre to the top of the digestive gland mass where it twists and narrows before reaching the thick muscular segment. The muscular segment folds on itself to insert into the digestive gland lying below the ovotestis; this area is heavily pigmented with black.

Remarks.— This species superficially resembles *Phyllidiopsis shireenae* (see below), which has an oval central black line with only two pairs of black lines leading to the mantle margin in opposite directions. The black lines are thicker in *P. shireenae*, and the tubercles are confluent and present as high ridges. *Phyllidiopsis pipeki* differs from *P. krempfi* (Pruvot-Fol, 1957) in having a higher, more domed, profile produced by rows of tubercles, and an oval body shape when compared to the elongated and flatter one of *P. krempfi*. The compound tubercles of *krempfi* are more numerous and less regular, do not form crests, and have black pigment meandering between them. The black lines are usually thicker in *pipeki*, and black pigmentation is present ventrally in the groove between the foot and the hyponotum and on the gills. Additionally, the anus is located on a tubercular group in both *krempfi* and *shireenae*, but not in *pipeki*.

Phyllidiopsis pipeki is recorded only from the central and western Pacific Ocean, growing to 85 mm in length. This is the second record for Indonesia.

Phyllidiopsis shireenae Brunckhorst, 1990
(pl. 8 fig. 5)

Phyllidiopsis shireenae Brunckhorst, 1990: 557, figs 1-4; Brunckhorst, 1993: 66, pl. 8B, fig. 29F, G; Fahrner & Beck, 2000: 190, 200, pl. 1 fig. 3; Domínguez *et al.*, 2007: 99, fig. 7.

Material.— Bunaken, Manado, North Sulawesi, 5-15 m depth, xi.1990, photos only, H. Debelius (also in Debelius & Kuitert, 276, right photo).

Non-Indonesian material.— Papua New Guinea, Laing Island, 10-20 m depth, 1977, leg. J. van Goethem, ten pres. specimens ranging in size from 24 × 7.5 mm to 55 × 32 mm; Philippines, photo only of one individual, H. Debelius.

Description.— The body shape is elongate oval with a very high profile, semi-translucent white with a pink cast and a black line around the central region with four narrower lines extending at right angles to the margin: these secondary lines oppose each other. The median region bears a high crest of tubercles with a lower one on each side. The crests are composed of granular and pustular compound tubercles (pl. 8 fig. 5), opaque in comparison with the rest of the body. The rhinophores and anal papilla are included within the black oval; both issue from raised rims. The translucent pink-

white rhinophores have an opaque tip; the anal opening is conical and located on the last tubercle of the central crest. No notes or drawings were made of the ventral surface, but the specimens from Papua New Guinea are described and illustrated by Domínguez *et al.* (2007: 99). Four specimens from the Maldives were examined and match the illustrations in Domínguez *et al.* (2007) (Yonow, in press).

Remarks. — *Phyllidiopsis shireenae* is well distributed throughout the Indo-West Pacific and appears to be common where it occurs (e.g. Papua New Guinea, Maldives). It is remarkable that it was not found during the Rumphius B. Expedition. It was photographed from Indonesia by Fahrner & Beck (2000), Tonzuka (2003), Debelius & Kuitert (2007: right photo only), and on NudiPixel. It may be confused with *P. pipeki* (see above).

Reticulidia halgerda Brunckhorst & Burn in Brunckhorst, 1990
(fig. 22, pl. 8 fig. 6)

Reticulidia halgerda Brunckhorst & Burn in Brunckhorst, 1990: 567-576, figs 1, 2a-c, 3-7; Brunckhorst, 1993: 77, pl. 9G, figs 10D-F, 18-21, 31A-C; Marshall & Willan, 1999: 128, fig. 232; Fahrner & Beck, 2000: 190, 202, pl. 2 fig. 5.

Material. — RMNH.MOL.129993, RBE Stn 44, Latuhalat, Leitimur, 30 m depth, 12.xii.1990, leg. C. Franzen, 72 × 30 mm pres., photos M. Lavaleye 51-30, 53-10.

Description. — *Reticulidia halgerda* is a distinctive species recognised by its black body colour criss-crossed with high smooth orange ridges (pl. 8 fig. 6); three longitudinal ridges are intercepted by two transverse ridges. The transverse ridges continue to the mantle margin, with the addition of numerous shorter ridges in between. The crests of the ridges each had a thin white line. The mantle margin, the rim of the anus, the anal papilla, and the rhinophores were orange. Ventrally, there are large black spots and patches on the hyponotum; the foot is cream coloured with no markings on the sole nor on its upper surface. The head and oral tentacles are illustrated in fig. 22. The tentacles are more complicated in *Reticulidia* than in other phyllidiid genera: the lower lamina of the mouth is folded with the large head visible behind. The curved oral tentacles on each side are long and digitiform.

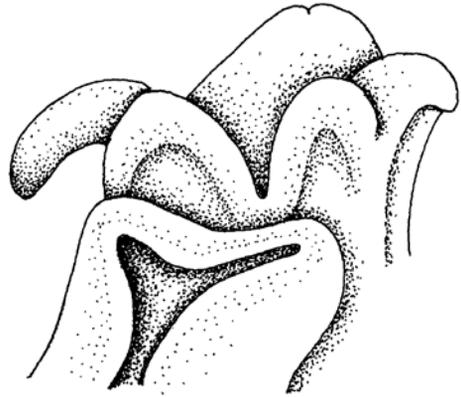


Fig. 22. *Reticulidia halgerda*. View of head and oral tentacles of 72 mm specimen.

Remarks. — This attractive species has been described several times in the literature since its original description; it is only known from the central and western Pacific, having been previously recorded from Indonesia by Fahrner & Beck (2000), Gosliner *et al.* (1996), Tonzuka (2003), Debelius & Kuitert (2007), Gosliner *et al.* (2008), and on NudiPixel.

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Plate 1

Fig. 1. *Nembrotha cristata* Bergh, 1877, East Borneo, photo J. Hinterkircher.

Fig. 2. *Nembrotha kubaryana* Bergh, 1877, Tulamben, Bali, 31 mm preserved, photo H. Debelius.

Fig. 3. *Nembrotha kubaryana* Bergh, 1877, East Borneo, 25 mm alive, photo J. Hinterkircher.

Fig. 4. *Nembrotha lineolata* Bergh, 1905, RBE stn 27, Leitimur, 20 mm preserved, photo M. Lavaleye.

Fig. 5. *Nembrotha lineolata* Bergh, 1905, RBE stn 39, Hitu, 18 mm preserved, photo W. Kolvoort.

Fig. 6. *Nembrotha milleri* Gosliner & Behrens, 1997, East Borneo, 60 mm alive, photo J. Hinterkircher.



Plate 2

Fig. 1. *Nembrotha* spec. nov., Sulawesi, 20 mm preserved, photo H. Debelius.

Fig. 2. *Nembrotha* spec. nov., Sulawesi, 20 mm preserved, ventral view, photo H. Debelius.

Fig. 3. *Nembrotha chamberlaini* Gosliner & Behrens, 1997, Bohol, Philippines, photo J. Hinterkircher.

Fig. 4. *Roboastra gracilis* (Bergh, 1877), Sulawesi, 9 mm preserved, photo H. Debelius.

Fig. 5. *Roboastra gracilis*, (Bergh, 1877), Bohol, Philippines, photo J. Hinterkircher.

Fig. 6. *Analogium* spec. nov. 1, Busango, Philippines, 26 mm preserved, photo J. Hinterkircher.



Plate 3

Fig. 1. *Analogium* spec. nov. 1, Busango, Philippines, 26 mm preserved, photo J. Hinterkircher.

Fig. 2. *Analogium* spec. nov. 2, RBE stn 30, Hitu, 5 mm preserved, photo M. Lavaleye.

Fig. 3. *Gymnodoris aurita* (Gould, 1852), Bali, Indonesia, photo E. Kodiat.

Fig. 4. *Gymnodoris impudica* (Rüppell & Leuckart, 1828), Ningaloo Reef, Western Australia, 24/25 mm pres., photo H. Debelius.

Fig. 5. *Gymnodoris subflava* Baba, 1949, RBE stn 34, Hitu, 7-10 mm preserved, photo M. Lavaleye.

Fig. 6. *Asteronotus cespitosus* (van Hasselt, 1824), RBE stn 30, 80 mm preserved, photo M. Lavaleye.



Plate 4

Fig. 1. *Discodoris boholiensis* Bergh, 1877, RBE stn 1, Hitu, 40 mm preserved, photo M. Lavaleye.

Fig. 2. *Discodoris boholiensis* Bergh, 1877, RBE stn 1, Hitu, 38 mm preserved, close-up of rhinophores, photo W. Kolvoort.

Fig. 3. *Discodoris boholiensis* Bergh, 1877, Cebu, Bohol, Philippines, 30 mm alive, ventral surface showing sole, hyponotum, head, and tentacles, photo J. Hinterkircher.

Fig. 4. *Sebadoris fragilis* (Alder & Hancock, 1864), RBE stn 37, Hitu, 40 mm preserved, photo M. Lavaleye.

Fig. 5. *Sebadoris fragilis* (Alder & Hancock, 1864), RBE stn 37, Hitu, 60 mm preserved, ventral view, photo N. Yonow.

Fig. 6. *Halgerda albocristata* Fahey & Gosliner, 2003, Ceram, 10 mm preserved, photo H. Strack.

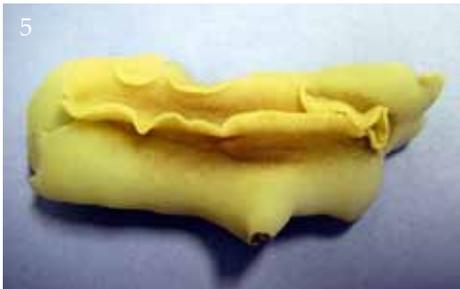


Plate 5

Fig. 1. *Halgerda batangas* Carlson & Hoff, 2000, Ceram, 25 mm preserved, photo H. Strack.

Fig. 2. *Jorunna funebris* (Kelaart, 1858), RBE stn 1, Hitu, 25-75 mm preserved, photo M. Lavaleye.

Fig. 3. *Jorunna rubescens* (Bergh, 1876), RBE stn 5, Leitimur, 95 mm preserved, photo M. Lavaleye.

Fig. 4. *Platydorid cinereobranchiata* Dorgan, Valdés, & Gosliner, 2002, RBE stn 23, Hitu, 60 mm preserved, photo M. Lavaleye. Black lines point to red areas of the foot and hyponotum.

Fig. 5. *Platydorid cinereobranchiata* Dorgan, Valdés, & Gosliner, 2002, RBE stn 23, Hitu, 60 mm preserved, ventral view, photo N. Yonow.

Fig. 6. *Platydorid cruenta* (Quoy & Gaimard, 1832), East Borneo, photo J. Hinterkircher.

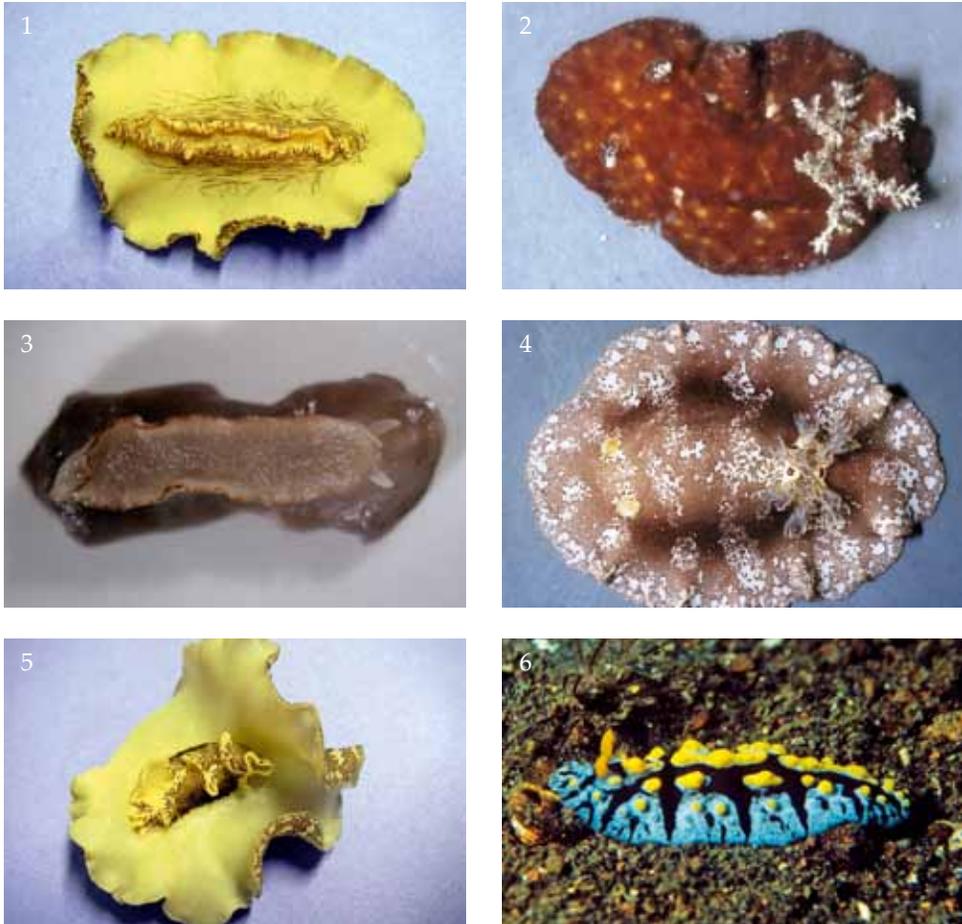


Plate 6

Fig. 1. *Platydoris cruenta* (Quoy & Gaimard, 1832), RBE stn 27, Leitimur, 52 mm preserved, ventral view, photo N. Yonow.

Fig. 2. *Platydoris sanguinea* Bergh, 1905, RBE stn 21, Hitu, 17 mm preserved, photo M. Lavaleye.

Fig. 3. *Platydoris sanguinea* Bergh, 1905, RBE stn 21, Hitu, 17 mm preserved, ventral view, photo N. Yonow.

Fig. 4. *Platydoris scabra* (Cuvier, 1804), RBE stn 30, Hitu, 60 mm preserved, photo M. Lavaleye.

Fig. 5. *Platydoris scabra* (Cuvier, 1804), RBE stn 30, Hitu, 60 mm preserved, ventral view, photo N. Yonow.

Fig. 6. *Fryeria picta* (Pruvot-Fol, 1957), Bali, 24 mm preserved, photo H. Debelius.



Plate 7

Fig. 1. *Phyllidia coelestis* Bergh, 1905 (typical), Halmahera, Indonesia, photo E. Kodiat.

Fig. 2. *Phyllidia coelestis* Bergh, 1905 (dark), Rob Roy Reef, Kimberley, Western Australia, WAM 210-88, photo C. Bryce.

Fig. 3. *Phyllidia elegans* Bergh, 1869, Mactan Island, Philippines, BEP PH/41, photo B. Picton.

Fig. 4. *Phyllidia ocellata* Cuvier, 1804 (typical), RBE stn 18, Hitu, 31 mm preserved, photo M. Lavaleye.

Fig. 5. *Phyllidia ocellata* Cuvier, 1804 ("japonica"), West Java, Indonesia, photo E. Kodiat.

Fig. 6. *Phyllidia varicosa* Lamarck, 1801, RBE stn 37, Hitu, 65 mm preserved, photo M. Lavaleye.



Plate 8

Fig. 1. *Phyllidiella nigra* (van Hasselt, 1824), RBE stn 1, Leitimur, 34 mm preserved, photo W. Kolvoort.

Fig. 2. *Phyllidiella pustulosa* (Cuvier, 1804), RBE stn 15, Hitu, 23 mm preserved, photo M. Lavaleye. Note defensive secretions.

Fig. 3. *Phyllidiopsis burni* Brunckhorst, 1993, RBE stn 37, 35 mm preserved, photo N. Yonow.

Fig. 4. *Phyllidiopsis pipeki* Brunckhorst, 1993, East Borneo, photo J. Hinterkircher.

Fig. 5. *Phyllidiopsis shireenae* Brunckhorst, 1990, East Borneo, photo J. Hinterkircher.

Fig. 6. *Reticulidia halgerda* Brunckhorst in Brunckhorst & Burn, 1990, RBE stn 44, Leitimur, 72 mm preserved, photo M. Lavaleye.