

# Results of the Rumphius Biohistorical Expedition to Ambon (1990)



## Part 11. Doridacea of the families Chromodorididae and Hexabran- chidae (Mollusca, Gastropoda, Opisthobranchia, Nudibranchia), including additional Moluccan material

N. Yonow

Yonow, N. Results of the Rumphius Biohistorical Expedition to Ambon (1990). Part 11. Doridacea of the families Chromodorididae and Hexabran-  
chidae (Mollusca, Gastropoda, Opisthobranchia, Nudibranchia), including additional Moluccan material.

Zool. Med. Leiden 75 (1), 24.xii.2001: 1-50, figs 1-12, colour pls 1-5— ISSN 0024-0672.

Nathalie Yonow, School of Biological Sciences, University of Wales, Singleton Park, Swansea SA2 8PP, Wales, U.K. (e-mail: N.Yonow@swansea.ac.uk).

Key words: Indonesia; Ambon; Chromodorididae; Hexabran-  
chidae; Nudibranchia; Opisthobranchia; Gastropoda; systematics; taxonomy.

Twenty-one species belonging to the family Chromodorididae and one species of *Hexabran-  
chus* (Hexabran-  
chidae) are present in the 1990 Rumphius Biohistorical Expedition (RBE) collection. The 1996 Fauna  
Malesiana Marine Maluku Expedition (Mal) collected 43 lots of nudibranchs, mostly chromodorids: 17  
species were identified, six of which were not represented in the RBE collection. A total of 35 chro-  
modorid species, belonging to nine genera, are described from Ambon and nearby localities. Four  
species are new to science, and seventeen species are recorded from Indonesian waters for the first time.  
Brief descriptions are given for the species which are well known, highlighting significant features, dif-  
ferentiating characters from similar species, and allowing recognition. A number of species are less well  
known and described and figured in more detail. The name *Chromodoris marindica* nom. nov. is proposed  
for *Chromodoris reticulata* sensu Eliot, 1904, and Farran, 1905 (not *C. reticulata* Pease, 1866) and *C. inopinata*  
sensu Rudman, 1973 (not *C. inopinata* Bergh, 1905). The monogeneric family Hexabran-  
chidae is repre-  
sented by four specimens of *Hexabran-  
chus marginatus* (Quoy & Gaimard, 1832). All but three species are  
illustrated with colour photographs of the living specimens. Species of which the type locality is Ambon  
are tabulated in Appendix 1, while a list of species described as new from Indonesia, with comments, is  
presented in Appendix 2.

### Contents

Introduction .....	2
Material and methods .....	3
Chromodorididae	
<i>Ceratosoma sinuata</i> (van Hasselt, 1824) .....	4
<i>Ceratosoma tenue</i> Abraham, 1876 .....	4
<i>Chromodoris albopunctata</i> (Garrett, 1878) .....	6
<i>Chromodoris annae</i> Bergh, 1877 .....	6
<i>Chromodoris aspersa</i> (Gould, 1852) .....	9
<i>Chromodoris bullockii</i> Collingwood, 1857 .....	9

<i>Chromodoris coi</i> (Risbec, 1956) .....	11
<i>Chromodoris collingwoodi</i> Rudman, 1987 .....	11
<i>Chromodoris diana</i> Gosliner & Behrens, 1997 .....	13
<i>Chromodoris fidelis</i> (Kelaart, 1858) .....	15
<i>Chromodoris geometrica</i> Risbec, 1928 .....	15
<i>Chromodoris hintuanensis</i> Gosliner & Behrens, 1997 .....	16
<i>Chromodoris inopinata</i> Bergh, 1905 .....	18
<i>Chromodoris kuniei</i> Pruvot-Fol, 1930 .....	22
<i>Chromodoris leopardus</i> Rudman, 1987 .....	23
<i>Chromodoris lineolata</i> (van Hasselt, 1824) .....	23
<i>Chromodoris lochi</i> Rudman, 1982 .....	24
<i>Chromodoris magnifica</i> (Quoy & Gaimard, 1832) .....	24
<i>Chromodoris sinensis</i> Rudman, 1985 .....	26
<i>Durvilleodoris pusilla</i> Bergh, 1874 .....	26
<i>Glossodoris atromarginata</i> (Cuvier, 1804) .....	27
<i>Glossodoris cincta</i> (Bergh, 1888) .....	27
<i>Glossodoris cruentus</i> Rudman, 1986 .....	28
<i>Glossodoris hikuerensis</i> (Pruvot-Fol, 1954) .....	28
<i>Glossodoris kophos</i> spec. nov. ....	28
<i>Hypselodoris infucata</i> (Rüppell & Leuckart, 1828) .....	30
<i>Hypselodoris kanga</i> Rudman, 1977 .....	31
<i>Hypselodoris katerythros</i> spec. nov. ....	31
<i>Hypselodoris maridadilus</i> Rudman, 1977 .....	33
<i>Hypselodoris zephyra</i> Gosliner & Johnson, 1999 .....	34
<i>Mexichromis katalexis</i> spec. nov. ....	36
? <i>Noumea alboannulata</i> Rudman, 1986 .....	39
<i>Pectenodoris trilineata</i> (Adams & Reeve, 1850) .....	40
<i>Risbecia apolegma</i> spec. nov. ....	40
<i>Risbecia tryoni</i> (Garrett, 1873) .....	43
Hexabanchidae	
<i>Hexabanchus marginatus</i> (Quoy & Gaimard, 1832) .....	44
Acknowledgements .....	44
References .....	45
Appendices .....	48

## Introduction

The Chromodorididae and Hexabanchidae form a small part of the large collection of opisthobranchs made by the Rumphius Biohistorical Expedition (RBE) in November and December 1990. These have been supplemented by specimens collected by the Fauna Malesiana Marine Maluku Expedition (FMMME) (stations prefixed by Mal.) to Ambon in November 1996, as well as with specimens or photographs by divers and/or photographers from Indonesian waters. A subsequent field trip by H.L. Strack to Ambon and Ceram in 1997 produced a further two species not represented in the original collections, and nine species were photographed in the vicinity of Bali, Borneo, and Sulawesi in the last ten years, of which only three were represented in the expedition

collections. Thirty-six species are recorded in total (35 from Ambon and nearby localities), of which four are new to science. Most species have been recorded from the west Pacific previously, although more than half are new records for Indonesia. *Chromodoris magnifica* has been rarely recorded previously and is represented in the collections by 14 specimens. *Hypselodoris kanga*, an Indian Ocean species, is recorded for only the second time in the Pacific Ocean.

Previous work on this group from Indonesian waters include Quoy & Gaimard's Voyage of the "Astrolabe" (1832), Abraham (1877), Semper's travels documented by Bergh (1870-1890), and the Siboga expedition by Bergh (1905). Van Hasselt (1824), Adams & Reeve (1850), Collingwood (1881), André (1896), and Engel & Nijssen-Meyer (1964) have also described a number of chromodorids and hexabranichids from Indonesian waters. Eight species have Ambon as their type locality: these are detailed in Appendix 1, with updated taxonomy, descriptions, and notes as required. Six species are currently recognized, of which two were collected again from Ambon by the above named expeditions and activities, *Ceratosoma tenue* and *Chromodoris annae*.

Rumphius (1705) described many molluscs, of which only a few were opisthobranchs belonging to the shelled Cephalaspidea, Notaspidea, and Anaspidea; there were no nudibranchs. An account and history of the RBE collections is given in Strack (1993, 1998), and all stations are described in detail therein. Of the 36 marine stations sampled around Leitimur and Hitu, only twelve yielded chromodorids. Larike, on the west coast of Hitu, station 39, was top of the list, with six species records. Both RBE specimens of *Hexabranichus marginatus* were found at station 23 (Kaitetu, on Hitu), on two sequential days of the 40-day expedition. The third specimen was found at the same site seven years later, while the fourth was found several kilometres east along the same coastline, at station Mal.12 (near Mamala). The Maluku Expedition formed part of the Fauna Malesiana Marine project, with the aim of establishing core works for certain marine groups (e.g. molluscs, crustaceans, corals), in an attempt to define and understand the biodiversity of the area. An account of this expedition and a description of the stations is given by van der Land (1996). Twenty-six stations were sampled on both Hitu and Leitimur, of which nineteen provided chromodorids. Station Mal.12, on the north coast of Hitu, had six species records.

### Materials and methods

The chromodorids of the RBE and FMMME collections were generally well narcotized, either by menthol or freezing, preserved in 4% formaldehyde, and transferred to 70% alcohol. Series of colour slides accompany the RBE specimens and most of the FMMME material. Radulae were dissected out by making a small longitudinal slit by the head crossed by a horizontal one. The buccal bulb was carefully cut out and dissolved in 50:50 bleach; the radula was rinsed in several washes of water, and stained and flattened on glass slides with lignin pink in lactophenol. For scanning electron microscopy (SEM) they were rinsed in alcohol and acetone. The radulae were then mounted onto stubs and gold-coated for photography. All these radulae were very weak and completely distorted during SEM preparation. Although tooth shape can be defined and illustrated, in most cases teeth and row counts could not be made. During preservation of the RBE collection something unforeseen must have happened as addi-

tional preparations for light microscopy only proved equally difficult. The FMMME radulae were only prepared for light microscopy to avoid the risk of destroying any more material; these preparations were successful.

All specimens have been deposited in the National Museum of Natural History in Leiden, The Netherlands. The Rumphius expedition specimens are prefixed by RBE, and the Maluku expedition material by Mal. before the station number in the listings of material examined. The genera and species described here are arranged alphabetically, and do not reflect any phylogenetic relationships.

## Taxonomic report

### Family Chromodorididae

#### *Ceratosoma sinuata* (van Hasselt, 1824) (pl. 1 fig. 1)

*Doris sinuata* van Hasselt, 1824: 239.

*Miamira sinuata*; Bergh, 1887: 309, pl. 6 fig. 10; Wells & Bryce, 1993: 135, fig. 174.

Material.— Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual 45 mm in length alive, photographs only.

Remarks.— The photographs of *Ceratosoma sinuata* are clearly identifiable, despite the lack of specimens for morphological examination. A discussion of the genus *Miamira* was given by Yonow (1994), which recorded this species from Java north to Japan, east to New Britain, Samoa, Tahiti, and south-east off the Australian coast in the Lord Howe Islands (= The Gambier Islands). *Ceratosoma sinuata* is distinguished from the more variable *C. magnifica* by its green body and foot colour, covered in small yellow spots and fewer larger iridescent blue spots; both the body and foot are edged in white with yellow spots. The yellow spots actually cap small pustules on both the foot and the body. One photograph shows the animal laying an egg mass which is a spiralled, convoluted ribbon approximately 5 mm wide and pale yellow in colour (pl. 1 fig. 1). Recently, it has been proposed that *Miamira* is a junior synonym of *Ceratosoma* (cf. Valdés & Gosliner 1999).

#### *Ceratosoma tenue* Abraham, 1876 (pl. 1 fig. 2)

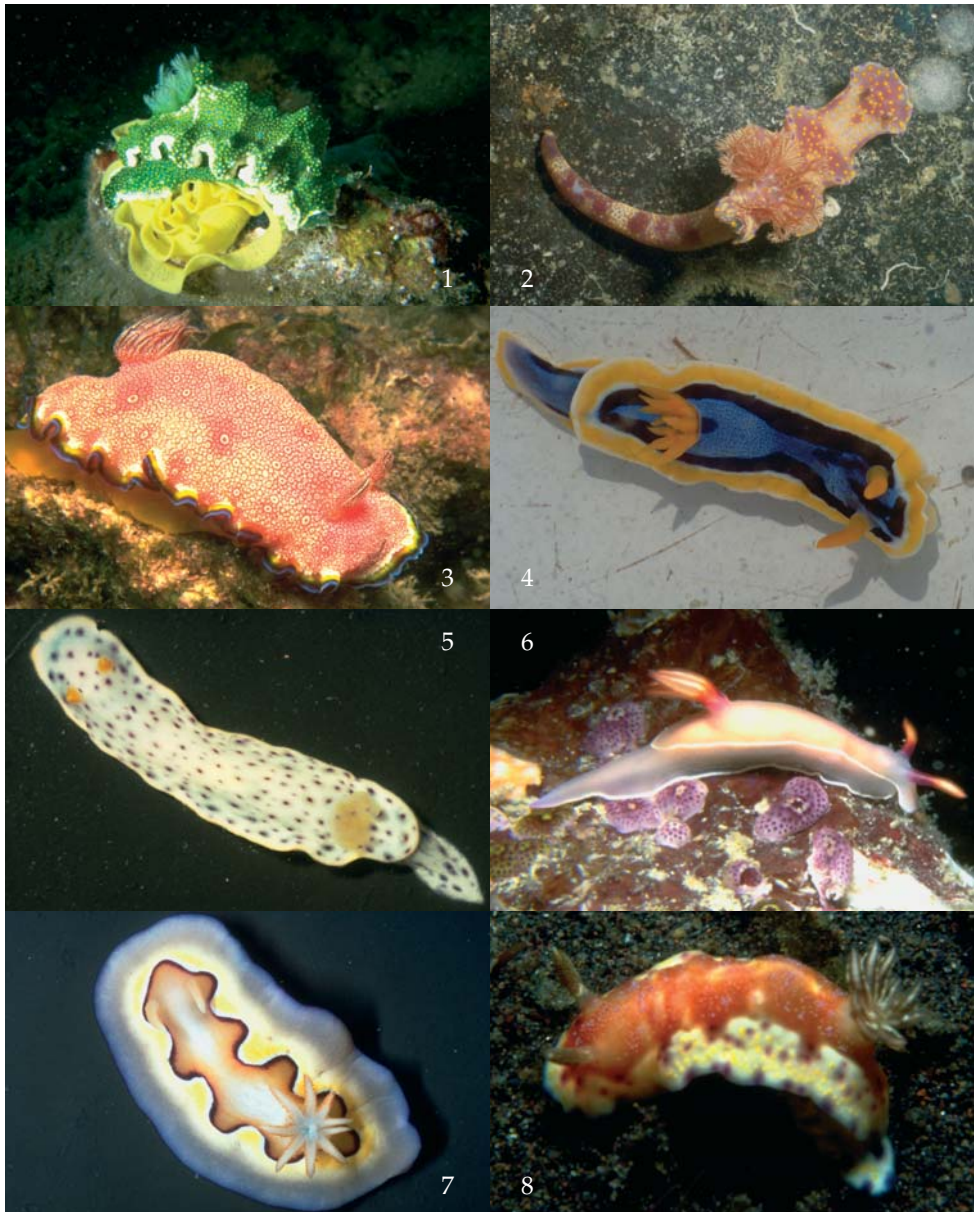
*Ceratosoma tenue*; Rudman, 1988: 148, figs 1F, G, 7A, 8-12, 24, 25; Wells & Bryce, 1993: 129, fig. 166.

*Ceratosoma ornatum* Bergh, 1890: 946, pl. 89 figs 29-31.

*Ceratosoma bicorne* Bergh, 1905: 167, pl. 4 fig. 16, pl. 17 figs 2-3.

Material.— RBE Stn 1, west side of Hunut, Hitu, 8 m depth, 30.xi.1990, leg. C. Fransen, one specimen 90 × 20 (across 2nd lobe) × 25 (high) mm preserved, photos M. Lavaleye 36-35/37, 37-1/3; RBE Stn 4, Wainitu, Leitimur, in rock pool at low tide zone, 7.xi.1990, leg. H.L. Strack, one specimen 50 × 13 (across 2nd lobe) × 20 (high) mm preserved.

Remarks.— *Ceratosoma sensu stricto* is a distinctive genus, with a stiff body and a posterior mantle lobe extended to form a raised lure; in this are concentrated the defen-



## Plate 1

- Fig. 1. *Ceratosoma sinuata* (van Hasselt, 1824), Derawan, Borneo, 45 mm alive, photo J. Hinterkircher.  
 Fig. 2. *Ceratosoma tenue* Abraham, 1876, RBE Stn 1, 90 mm preserved, photo M. Lavaleye.  
 Fig. 3. *Chromodoris albopunctata* (Garrett, 1878), Piru Bay, Ceram, 17 mm preserved, photo H.L. Strack.  
 Fig. 4. *Chromodoris annae* Bergh, 1877, Hila, Hitu, 18 mm preserved, photo H.L. Strack.  
 Fig. 5. *Chromodoris aspersa* (Gould, 1852), RBE Stn 39, 11 mm preserved, photo M. Lavaleye.  
 Fig. 6. *Chromodoris bullockii* Collingwood, 1857, Derawan, Borneo, J. Hinterkircher.  
 Fig. 7. *Chromodoris coi* (Risbec, 1956), RBE Stn 27, 15 mm preserved, photo M. Lavaleye.  
 Fig. 8. *Chromodoris collingwoodi* Rudman, 1987, Tulamben Bay, Bali, photo H. Debelius.

sive glands, and not infrequently, specimens are found with the lure bitten off. *Ceratosoma tenue* is distinguished from other species in the genus by its body shape and the colour pattern: the foot extends for the equivalent of the body length beyond it, the primary lobes are not large, and there is a pair of smaller secondary mantle lobes. Of the colour pattern, most consistent are the purple dots, patches or lines along the edge of the mantle and the foot. Specimens can be banded pink and yellow, as were the Ambon specimens, or uniformly olive green, but both colour morphs have red and yellow spots. *Ceratosoma tenue* ranges in distribution from the Red Sea and East Africa through Indonesia and the Philippines to Australia and New Caledonia. *Ceratosoma ornatum* Bergh was originally described from Ambon, and is a junior synonym of *C. tenue*. Bergh (1905) also described as a new species an aberrant specimen of *C. tenue* from the Indonesian island of Sumbawa as *C. bicornis*. *Ceratosoma trilobatum* (Gray) also occurs in the region with equally variable colour pattern, but with a single and much larger pair of lateral mantle lobes. There are colour photographs of *C. tenue* in Allen & Steene (1994: 196) and Debelius (1996: 233, lower right photo only).

*Chromodoris albopunctata* (Garrett, 1879)  
(pl. 1 fig. 3)

*Chromodoris albopunctata*; Bertsch & Gosliner, 1989: 254, figs 3, 13-18; Wells & Bryce, 1993: 120, fig. 150.

Material.— Hatuhuran, Piru Bay, Ceram, 1 m depth, 28-30.xi.1997, leg. and photo H.L. Strack, one specimen 17 × 12 mm preserved.

Description.— Immediately recognized by its bright lemon-yellow foot. In the living animal the mantle is red with white spots and rings of various sizes, banded around its margin by lemon yellow and lilac. Extra banding occurs when the colours overlap: there is an orange band between the mantle and the yellow band, and a dirty purple band between the yellow and lilac bands. Additionally, there are broken red and/or white lines around the red dorsum anterior to the yellow band. The rhinophores are deep red becoming darker towards their tips; the stalks and edges of the lamellae are speckled with white, and there is a median white line on each side. The numerous pinnate gills, at least 20, are somewhat orange and marked with white speckles. The preserved specimen is a deep plum colour.

Remarks.— The species was originally described from the Society Islands, and has since been recorded only from Hawaii and the Solomon Islands (Bertsch & Gosliner, 1989), Western Australia, and Christmas Island in the eastern Indian Ocean (Wells & Bryce, 1993); this is a new record for Indonesian waters. Pam Kemp has photographed *Chromodoris albopunctata* from the Seychelles, identical in colours to the Ceram specimen; this photograph constitutes a new record for the western Indian Ocean. Colour photographs have been published in Colin & Arneson (1995: 181) and Debelius (1996: 208).

*Chromodoris annae* Bergh, 1877  
(fig. 1 a-c, pl. 1 fig. 4)

*Chromodoris annae*; Bergh, 1890: 931, pl. 86 fig. 5, pl. 89 figs 12-14; Rudman, 1982: 210, figs 1H, 13, 15.  
*Chromodoris annae* var. *unitaeniata* André, 1896: 401 (**syn. nov.**).

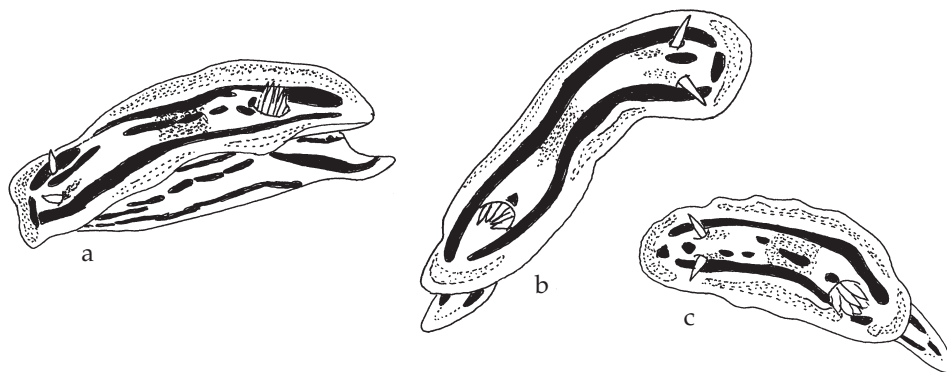


Fig. 1. *Chromodoris annae* Bergh, 1877. Variations in dorsal pattern similar to *Chromodoris annae unitaeniata* André, 1896. a, Mal. 15 (11 mm preserved); b, Mal. 16 (37 mm); c, Mal. 20 (28 mm).

Material.— RBE Stn 16, west coast of Pombo Island, 15-17.xi.1990, leg. A.M. Hatta, one specimen 13 × 6 mm preserved and contracted, photos M. Lavaleye 14-22/24; Menado, North Sulawesi, 5-15 m depth, xi.1990, leg. H. Debelius, one specimen 15 × 8 mm preserved and contracted but gills and rhinophores extended; Mal. 05, west of Hila, Hitu, 7.xi.1996, leg. C. Fransen, one specimen 50 mm (21 mm preserved), photo J. Goud; Mal. 19, Cape Bata Dua, Hitu, 3 m depth, 19.xi.1996, leg. B.W. Hoeksema, one specimen 36 mm, photo J. Goud; Mal. 21, Cape Hatupero, Hitu, 5 m depth, 20.xi.1996, leg. M. Slierings, one specimen 43 mm, photo J. Goud; Mal. 32, near Cape Miriam, Hitu, 7 m depth, 23.xi.1996, leg. J. Goud, one specimen 33 mm (no photo); 1 km west of Hila, Hitu, 2-5 m depth, 25-26.xi.1997, leg. H.L. Strack, one specimen 18 × 10 mm preserved and contracted; Mal. 15, near Amahusu, Leitimur, 12 m depth, 16.xi.1996, leg. and photo J. Goud, two specimens 18 mm and 11 mm preserved (with reticulations); Mal. 16, near Tawiri, Hitu, 5 m depth, 18.xi.1996, leg. B.W. Hoeksema, one specimen 37 mm (15 mm preserved), photo J. Goud (with reticulations); Mal. 20, near Lilibooi, Hitu, 3 m depth, 20.xi.1996, leg. and photo J. Goud, one specimen 14 mm preserved (with reticulations).

Remarks.— Recognized by its sky-blue dorsum which appears to be made up of a pale blue ground colour with superimposed darker blue dots. In the living animal this region is surrounded by a black band, which may extend longitudinally between the rhinophores for a short distance, followed by a white line and a bright yellow margin edged with white. The gills and rhinophores are orange of a deeper and different colour than the yellow in the margin. All but one specimen were as described by Bergh (1890) and different from Rudman's (1982) synopsis in having two or three black lines on the side of the foot instead of one, and all specimens had an orange edge all around the foot instead of just anteriorly and posteriorly. André (1896) described his variety from Ambon as having only one stripe on the foot, and the encircling black band on the dorsum broken anteriorly and posteriorly. Two specimens in the collection (Mal. 16 and Mal. 20) are very similar to André's description. In these specimens, the black is broken anteriorly and posteriorly, and in both specimens there are two black patches anteriorly, one in front of the other, as well as a patch in front of the gill pocket. Mal. 20 additionally has five patches of black on the dorsum (fig. 1c). In the 11 mm specimen (Mal. 15) the extra black pigment forms a very discontinuous line medially (fig. 1a). In all four of these preserved specimens, the blue pigment is better described as reticulated whereas in the remaining specimens it is speckled: these retain a bluish central dorsum with

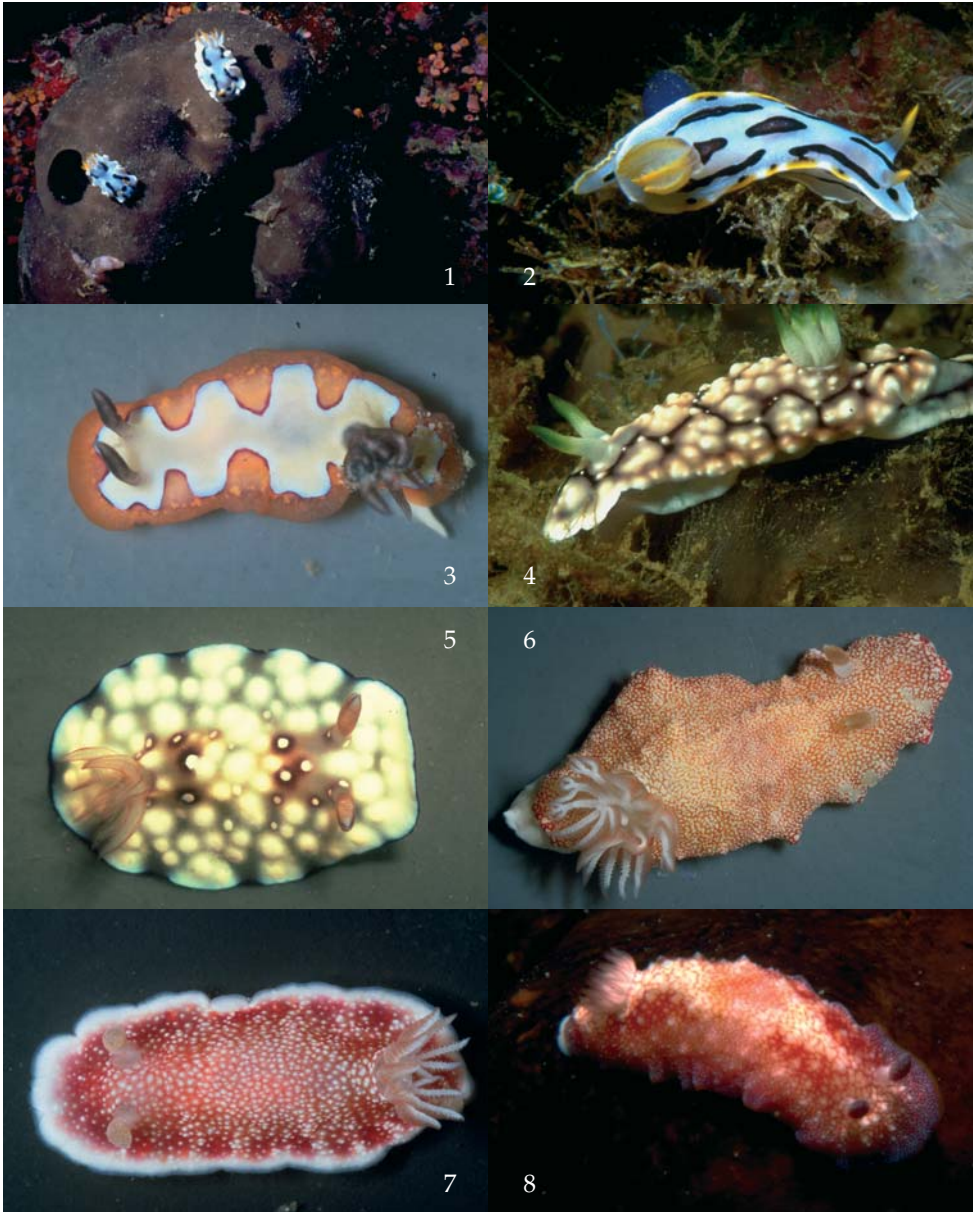


Plate 2

- Fig. 1. *Chromodoris diana*e Gosliner & Behrens, 1997, Sipaden, Borneo, photo, S. Hart.
- Fig. 2. *Chromodoris diana*e var., Derawan, Borneo, photo J. Hinterkircher.
- Fig. 3. *Chromodoris fidelis* (Kelaart, 1858), RBE Stn 23, 14 mm preserved, photo M. Lavaleye.
- Fig. 4. *Chromodoris geometrica* Risbec, 1928, RBE Stn 5, photo W. Kolvoort.
- Fig. 5. *Chromodoris hintuanensis* Gosliner & Behrens, 1997, RBE Stn 38, 13 mm preserved, photo M. Lavaleye.
- Fig. 6. *Chromodoris inopinata* Bergh, 1905, RBE Stn 23, 25 mm preserved, photo M. Lavaleye.
- Fig. 7. *Chromodoris inopinata* Bergh, 1905, RBE Stn 18, 10 mm preserved, photo M. Lavaleye.
- Fig. 8. *Chromodoris marindica* nom. nov., Seychelles, photo P. Kemp.



darker small round spots. The foot is banded with black and blue in all specimens, with a pale (orange in life) margin.

*Chromodoris annae* was previously recorded from Ambon by Bergh (1890): four specimens were found with a specimen of *C. elisabethina* by Brock 'in the vicinity of Ambon'. The species has been recorded from the Philippines, Indonesia, Guam, Papua-New Guinea, Queensland, and Christmas Island (Indian Ocean). There are colour photographs available in Colin & Arneson (1995: 181), Schuhmacher & Hinterkircher (1996: 196), Debelius (1996: 203), and Gosliner et al. (1996: 162).

*Chromodoris aspersa* (Gould, 1852)

(pl. 1 fig. 5)

*Chromodoris aspersa*; Rudman, 1983: 145, figs 12c-d, 18, 19; Yonow & Hayward, 1991: 12, figs 8D-F.

Material.—RBE Stn 39, south side of Larike, Hitu, low water mark, 8.xii.1990, leg. M. Lavaleye, one specimen 11 × 5 mm preserved (relaxed), photos M. Lavaleye 48-20/22, 48-28/29.

Remarks.—This species has been recorded most commonly from the Indian Ocean, but is also found in the west Pacific in its typical colour form as seen here. The elongated oval mantle is creamy white with 'blurred' purple spots, a yellow to orange border, orange rhinophores, and watery yellow orange gills. Records from Hawaii (Kay & Young, 1969 as *Doris liliacina*) and the Red Sea (Yonow, 1989) differ slightly in colour pattern. It has not been recorded from Indonesia previously. There are colour photographs in Schuhmacher & Hinterkircher (1996: 198) and Debelius (1996: 211).

*Chromodoris bullockii* Collingwood, 1881

(pl. 1 fig. 6)

*Chromodoris bullockii* Collingwood, 1881: 128, pl. 9 figs 15-17.

Not *Chromodoris bullocki* (sic); Wells & Bryce 1993: 126, fig. 160.

Material.—Derawan, East Borneo, iv.1997, J. Hinterkircher, three individuals, colour photographs only.

Remarks.—This appears to be the first correct recognition and spelling in the scientific literature of *Chromodoris bullockii* as described by Collingwood from Recruit Island, north-east of Taiwan. He described a 70 mm long, translucent / semi-transparent specimen. It had seven simple gills in three sets emanating from a thick retractile peduncle, all enclosed within a low-rimmed sheath. The colour was described as deep amethystine on the head tending to reddish on the dorsum. There was an opaque white edge, and the gill peduncles and rhinophores were deep amethyst; the rhinophore lamellae and gill leaflets were deep orange yellow. The foot was pale, but the tip was the same deep colour as the head. The three animals photographed here were milky white in colour, with suffusions of lilac (not as deep as implied in Collingwood's description), especially on the tip of the tail. Other details of colour are as described by Collingwood. It is unfortunate that no material was collected, as the radula has never been described.

There are colour photographs presented in Gosliner et al. (1996: 162) and Debelius (1996: 230 and 232 except bottom right = *Risbecia apolegma* spec. nov.). Coleman's photo-



Plate 3

- Fig. 1. *Chromodoris kuniei* Pruvot-Fol, 1930, RBE Stn 21, 34 mm preserved, photo M. Lavaleye.
- Fig. 2. *Chromodoris leopardus* Rudman, 1987, RBE Stn 5, photo M. Lavaleye.
- Fig. 3. *Chromodoris lineolata* (van Hasselt, 1824), Derawan, Borneo, photo J. Hinterkircher.
- Fig. 4. *Chromodoris lochi* Rudman, 1982, RBE Stn 16, photo W. Kolvoort.
- Fig. 5. *Chromodoris magnifica* (Quoy & Gaimard, 1832), RBE Stn 39, 30 mm preserved, photo M. Lavaleye.
- Fig. 6. *Chromodoris sinensis* Rudman, 1985, Hila, Hitu, 9 mm preserved, photo H.L. Strack.
- Fig. 7. *Durvilledoris pusilla* Bergh, 1874, Derawan, Borneo, 6 mm alive, photo J. Hinterkircher.
- Fig. 8. *Glossodoris atromarginata* (Cuvier, 1804), Derawan, Borneo, photo J. Hinterkircher.

graph (1989: 31) also appears to be of this species, allowing for the blue overtones of the printing. All appear to have a translucent mantle with suffusions of violet on the body, and yellow rhinophores and gills. A number of species appear to have been referred to *C. bullocki* (*sic!*), but they do not match Collingwood's species. One of these is described from the present collection as a new species, but belonging to the genus *Risbecia* (p. 40).

*Chromodoris coi* (Risbec, 1956)  
(pl. 1 fig. 7)

*Glossodoris coi* Risbec, 1956: 9, pl. 22.

*Chromodoris coi*; Rudman, 1987: 395, figs 39, 47, 49, 50.

Material.— RBE St. 27, Hutumuri, Leitimur, 6 m depth, 26.xi.1990, leg. J. van Egmond, one specimen 15 × 11 mm preserved, photos M. Lavaleye 32-2/6; Mal. 17, near Laha, Hitu, 4 m depth on purple sponge covering rock, xi.1996, leg. and photo J. Goud, one specimen 20 mm (11 mm preserved); Mal. 24, Seri Bay, Leitimur, 10 m depth, 22.xi.1996, leg. J. Goud, one specimen 35 mm (22 mm preserved), no photo; Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual, colour photograph only.

Remarks.— Despite the distinctive colour pattern, there were no markings remaining on the preserved RBE animal, although the FMMME specimens retained some markings: the white line with dark edges remains as an undulating ring, and the mantle is whiter inside the white line and ochre to lilac marginally. The living animal has the mantle creamy in colour with a deep violet brown wavy line encircling the gills and rhinophores. Outside this dark line are yellow patches while inside the line, the mantle is fawn to coffee-coloured. The gills are white with brown lamellae and the rhinophores are straw-coloured.

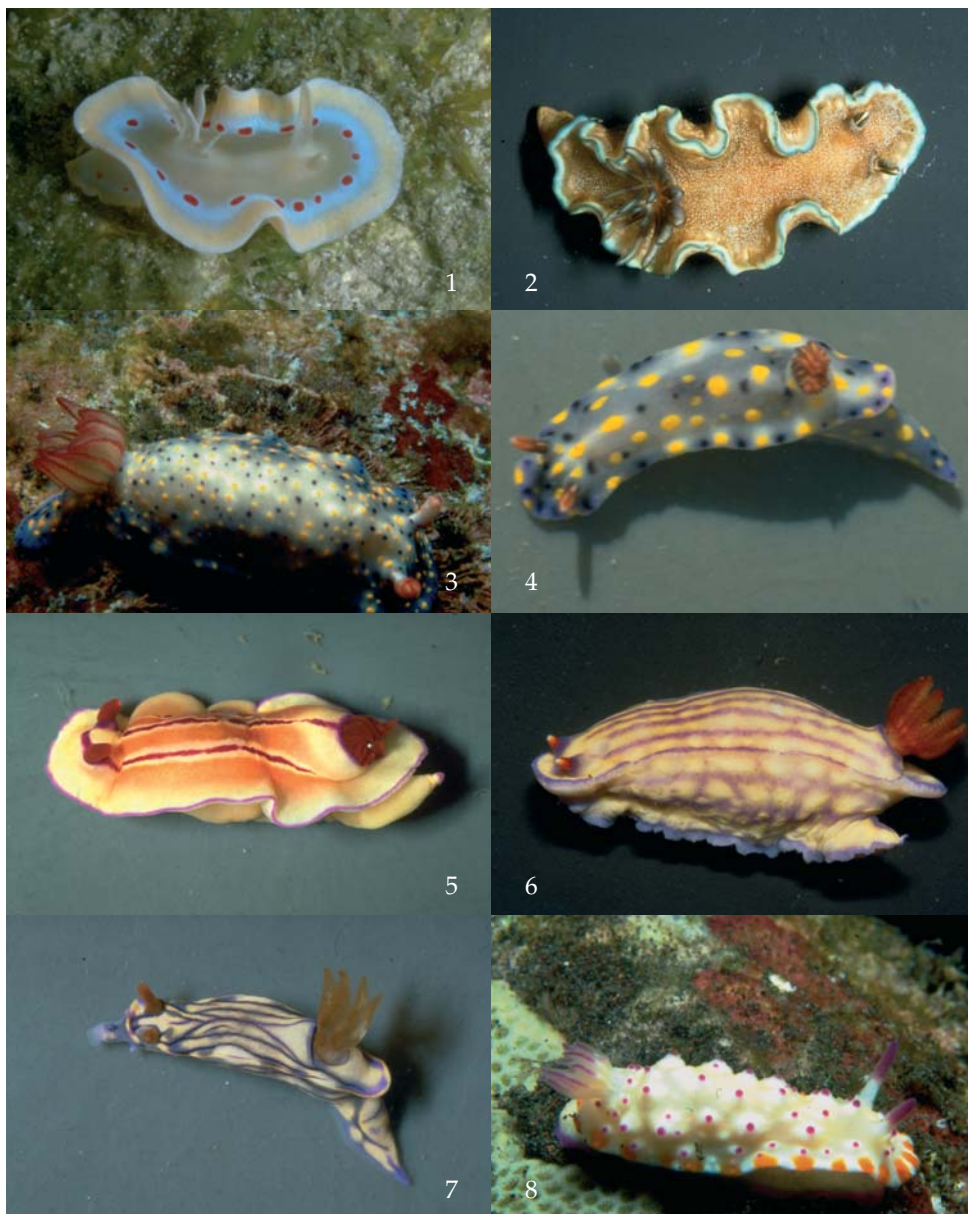
A similar species, *C. gleniei*, is found in the Indian Ocean and differs in having a central orange patch with purple brown markings (Yonow, 1994). This species appears to be limited in distribution to the west Pacific, with records from northern Australia, Vanuatu, the Solomon Islands, the Philippines, New Caledonia, and Viet Nam (Rudman, 1987). There are colour photographs available in Coleman (1989: 32); Allen & Steene (1994: 196); Colin & Arneson (1995: 182); Debelius (1996: 205); and Gosliner *et al.* (1996: 163).

*Chromodoris collingwoodi* Rudman, 1987  
(pl. 1 fig. 8)

*Chromodoris collingwoodi* Rudman, 1987: 358, figs 23E-F, 32-35; Baba, 1989b: 23, fig. 2; Wells & Bryce, 1993: 117, fig. 144.

Material.— Tulamben Bay, North-east Bali, 3-20 m depth, xi.1990, H. Debelius, one individual, colour photograph only.

Remarks.— Two colour forms of this species are currently recognized. The individual photographed here belongs to the colour form recorded from western Australia, Queensland, New South Wales, Lord Howe Islands (= Gambier Islands), the Solomon Islands, and Japan (Rudman 1987). It grows to approximately 40 mm and has a reddish central region speckled with white, followed by an irregular white band with purple



## Plate 4

Fig. 1. *Glossodoris cruentus* Rudman, 1986, Derawan, Borneo, photo J. Hinterkircher.

Fig. 2. *Glossodoris kopfos* spec. nov., RBE Stn 18, holotype 20 mm preserved, photo M. Lavaleye.

Fig. 3. *Hypselodoris infucata* (Rüppell & Leuckart, 1828), Tulamben Bay, Bali, photo H. Debelius.

Fig. 4. *Hypselodoris kanga* Rudman, 1977, RBE Stn 17, 14 mm preserved, photo M. Lavaleye.

Fig. 5. *Hypselodoris katerythros* spec. nov., RBE Stn 37, holotype 26 mm preserved, photo M. Lavaleye.

Fig. 6. *Hypselodoris maridadilus* Rudman, 1977, RBE Stn 5, 14 mm preserved, photo M. Lavaleye.

Fig. 7. *Hypselodoris zephyra* Gosliner & Johnson, 1999, RBE Stn 5, 11 mm. preserved, photo M. Lavaleye.

Fig. 8. *Mexichromis katalexis* spec. nov., Tulamben Bay, Bali, 12 mm preserved, photo H. Debelius.

spots inside and yellow spots outside, and a patchy purple band around the edge of the mantle. The gills and rhinophores are translucent with reddish brown lamellae and white speckles, and the gills additionally have an almost black line along the edges. There are colour photographs in Coleman (1989: 28) and Debelius (1996: 207). The second colour form, from Hong Kong, has the central region of the dorsum reduced to a few orange brown patches on a creamy background (Rudman & Darvell 1990: pl. 6B).

*Chromodoris diana*e Gosliner & Behrens, 1998  
(pl. 2 figs 1, 2)

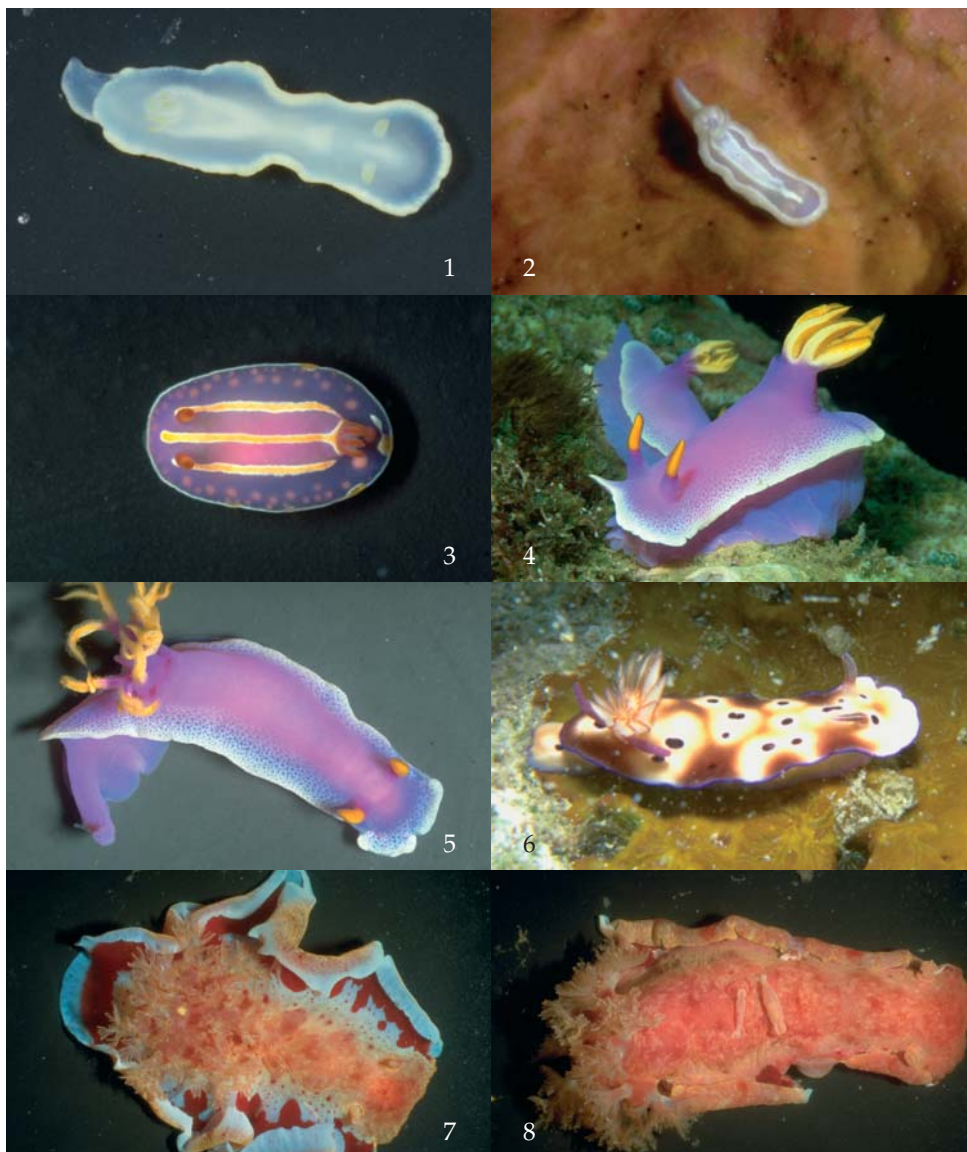
*Chromodoris diana*e Gosliner & Behrens, 1998: 145, figs 1B, C, and numerous figures.

Material.— Manado, North Sulawesi, 5-15 m depth, xi.1990, leg. H. Debelius, one specimen 13 mm preserved; Mal. 04, Cape Hahurong, Leitimur, 2-28 m depth, 6.xi.1996, leg. C. Fransen, one specimen 13 mm preserved, photo J. Goud; Mal. 31, near Batudua, Hitu, 23.xi.1996, leg. J. van Egmond, one specimen 27 mm (9 mm preserved), no photo; Sipaden Island, North-east Borneo, 5-18.iv.1990, Suzanne Hart, two typical individuals, photographs only; Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual with yellow markings, colour photographs only.

Description.— In the living animal the body is very pale blue centrally, surrounded by a broken but thick black band, with a dense white margin around both the mantle and the foot. The blue appears to be a mixture of ground colour and speckles. There is a curved black band in front of the rhinophores, and one each side extending to, then from, the middle of the body to behind the gills, where they meet. Additionally, there is a black spot exactly between the rhinophores. Between the thick broken black line and the mantle edge the skirt is a paler blue, almost white, and characteristically wavy, as if there is too much to lie flat. The straight rhinophores are bright orange, and the eight to ten gills are white basally and orange distally. The foot has at least one black line on each side which does not continue around onto the tail. The preserved specimens are identical to the three photographs of typical *C. diana*e, with a characteristic thick and wide, undulating mantle margin, and black markings present in three sections anteriorly and a loop posteriorly. There is a patch remaining between the rhinophores and a single black band on each side of the foot, broken into two sections.

Photographs of the yellow form (pl. 2 fig. 2) depict the mantle as very pale blue and white, with a white margin suffused with yellow patches. The body is elongated, shaped more like that of *C. boucheti* Rudman. The black markings are more abundant, and not as thick or neat as in the typical form; they were fainter with irregular edges. There are two extra black lines on the midline, and extra spots around the edge. The foot is pigmented like the mantle, and the gills and rhinophores are orange.

Remarks.— There are two records of orange-tinted forms of named species: one is *C. boucheti*, illustrated from the Maldives (Yonow, 1994: fig. 10B), and the second is *C. diana*e, from the Philippines (Gosliner & Behrens, 1998: fig. 1B). The blue speckled pigment present in this yellow individual is reminiscent of *C. annae* but the pattern is different. *Chromodoris diana*e, like *C. annae*, also has its blue colour modified by the absence of blue pigment, producing specks of non-pigmented areas which appear as deeper blue spots; however, this specimen approaches the colour pattern of *C. diana*e more closely than that of *C. annae*. The normal individuals recorded here were pho-



## Plate 5

- Fig. 1. ? *Noumea alboannulata* Rudman, 1986, Mal. 10, 15 mm alive, photo J. Goud.  
 Fig. 2. ? *Noumea alboannulata* Rudman, 1986, Derawan, Borneo, 5 mm alive, photo J. Hinterkircher.  
 Fig. 3. *Pectenodoris trilineata* (Adams & Reeve, 1850), RBE Stn 4, 3 mm preserved, photo M. Lavaleye.  
 Fig. 4. *Risbecia apolegma* spec. nov., RBE Stn 39, holotype 46 mm preserved & paratype 32 mm preserved, photo W. Kolvoort.  
 Fig. 5. *Risbecia apolegma* spec. nov., RBE Stn 39, paratype 32 mm preserved, photo M. Lavaleye.  
 Fig. 6. *Risbecia tryoni* (Garrett, 1873), Derawan, Borneo, 40 mm alive, photo J. Hinterkircher.  
 Fig. 7. *Hexabranichus marginatus* (Quoy & Gaimard, 1832), RBE Stn 23, approximately 110 mm preserved, photo M. Lavaleye.  
 Fig. 8. *Hexabranichus marginatus* (Quoy & Gaimard, 1832), RBE Stn 23, 70 mm wide preserved, photo M. Lavaleye.

tographed on what appears to be similar species of black sponge, although no comparable observations were made by Gosliner & Behrens (1998). *C. diana*e was described from Indonesia and the Philippines, reaching a maximum size of 60 mm. Colour photographs have been published by Allen & Steene (1994: 198) and Colin & Arneson (1995: 183, species 852 and 856).

*Chromodoris fidelis* (Kelaart, 1858)  
(pl. 2 fig. 3)

*Doris fidelis* Kelaart, 1858: 97; 1859: 295.

*Chromodoris flammulata* Bergh, 1905: 151, pl. 4 fig. 9, pl. 16 figs 16-19.

*Chromodoris fidelis*; Rudman & Darvell, 1990: 55, fig. 5E; Wells & Bryce, 1993: 126, fig. 158; Yonow, 1994: 115, fig. 10D.

Material.— RBE Stn 23, Kaitetu, Hitu, 23.xi.1990, leg. J.C. den Hartog, one specimen 14 × 5 mm preserved, photos M. Lavaleye 29-34/36; Mal. 12, near Mamala, Hitu, 13-14.xi.1996, leg. and photo J. Goud, 11 mm (5 mm preserved).

Remarks.— This small but beautiful species is known from the Indian Ocean and Red Sea eastwards to the Pacific. The white, orange and magenta on the mantle make a startling contrast to the black gills and rhinophores. The FMMME specimen partly retains the darkest edges of the colour markings and the rhinophores and gills are still dusted with black. *Chromodoris fidelis* has not previously been recorded from Indonesia. Colour photographs can be found in Schuhmacher & Hinterkircher (1996: 196) and Debelius (1996: 205).

*Chromodoris geometrica* Risbec, 1928  
(pl. 2 fig. 4)

*Chromodoris geometrica* Risbec, 1928: 148, fig. 41 pl 6; Yonow, 1994: 111, figs 2H-L, 10C, 12A,B; Strack, 1998: pl. 3 fig. 7.

Material.— RBE Stn 39, south side of Larike, Hitu, 2 m depth, 8.xii.1990, leg. A. Fortuin, one specimen 11 mm wide preserved, completely curled up, photos M. Lavaleye 48-14/17; Mal. 12, near Mamala, Hitu, 13-14.xi.1996, leg. and photo J. Goud, one specimen 20 mm (12 mm preserved); RBE Stn 5, Galgoek, Leitumur, 5 m depth, 9.xi.1990, W. Kolvoort, one individual, colour photographs only; RBE Stn 21, 21.xi.1990, two individuals, colour photographs only M. Lavaleye 26-14/15, 26-16; Derawan, East Borneo, iv.1997, J. Hinterkircher, two individuals, colour photographs only.

Remarks.— The taxonomy of this species has been discussed in detail by Yonow (1994). *Chromodoris geometrica* is one of a pair of Indian Ocean-Pacific Ocean species. It is more variable than its Indian Ocean counterpart and has a wider distribution, having also been recorded in the Indian Ocean recently (Yonow, 1994). Ground colour of the living material is brownish, with a number of creamy yellow pustules and dark brown to purple reticulations in-between. The proportions between them varied, producing different patterns. The seven or eight gills and the rhinophores are green or greenish yellow distally, translucent with white speckles basally. The preserved FMMME specimen has very dense white spots in a zig zag pattern down each side of

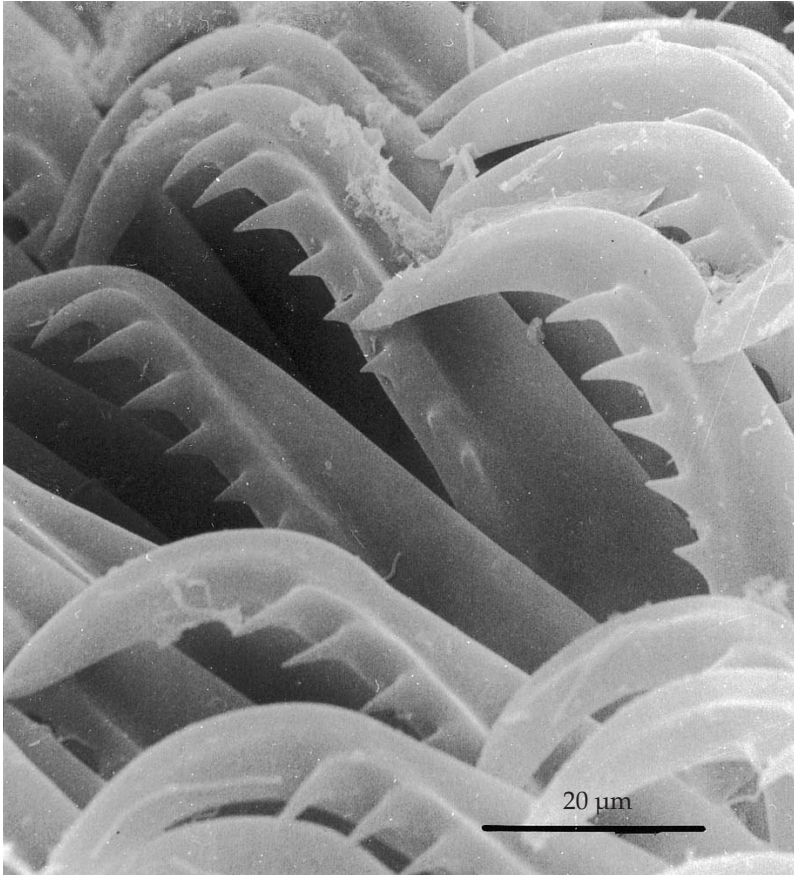


Fig. 2. *Chromodoris hintuanensis* Gosliner & Behrens, 1997. SEM of lateral teeth showing the sharp denticulation on the outside of the main recurved cusp (13 mm preserved).

the mantle, coinciding with those following the dark brown lines in the photograph. In comparison to the Indian Ocean records, these specimens are more elongate and bear a purple ventral crescent anteriorly under the mantle edge. From the series of photographs, it is clear that the anterior mantle edge is flapped up and down in life. There are colour photographs in Allen & Steene (1994: 198), Schuhmacher & Hinterkircher (1996: 194), Debelius (1996: 210 upper and right photos only), and Gosliner et al. (1996: 163).

*Chromodoris hintuanensis* Gosliner & Behrens, 1998  
(fig. 2, pl. 2 fig. 5)

*Chromodoris hintuanensis* Gosliner & Behrens, 1998: 155, figs 8B, 12A-D, 13A-D.

Material.— RBE St. 38, north of Tengahtengah, Hitu, 8.xii.1990, leg. C. Fransen, one specimen 13 mm (minimum) × 9 mm preserved, curled, photos M. Lavaleye 48-9/12.



Description.— The mantle is broadly oval with weak undulations. The dorsum, in life, has a greyish brown ground colour forming a network around cream circles and oval pustules: the preserved specimen is completely smooth. This grey brown colour is darker laterally, and around the margin becomes blue-black. Two areas, one behind the rhinophores and one in front of the gills, have dark reddish brown spots with a white dot centrally but were diffuse around the edges. The rhinophore sheaths are distinctly raised, also reddish brown with at least two white spots on each. The translucent rhinophores are long and straight; the base has a reddish brown tinge and the edges of the lamellae and the midlines are reddish brown. The seven large unipinnate gills are translucent with three faces: the edges between these are reddish brown. In one photo there are several smaller gills indicating that the two ends spiralled inwards as in species of *Glossodoris*. The anal papilla is tall and suffused with reddish brown. The foot is not visible in any of the photographs, and that of the preserved specimen (examined 1996) bears no markings whatsoever.

The radular teeth are denticulate: SEMs of the growing edge show sharp, recurved tips with six or seven sharp denticles decreasing in size away from the cusp, followed by two knobs which could conceivably develop into denticles as the radula grows (fig. 2).

Remarks.— There appear to be a number of these 'white pustular' species. Some have additional purple, yellow, or brown colour on margins, rhinophores, and/or gills. The following list may help to distinguish between the species similar to *C. hintuanensis*. This recently described species is recorded from Indonesia, the Philippines, and Japan. There is a colour photograph in Debelius (1996: 210, bottom left photograph only, as *Chromodoris geometrica*).

*Chromodoris albopustulosa* Pease, 1860: creamy dorsum with touches of yellow and orange; many small irregular white pustules; purple patches on margin; rhinophores brown with white edges to the lamellae. Hawaii & Eniwetok: Bertsch & Johnson, 1981.

*Chromodoris albonotata* Bergh, 1875: yellowish dorsum; white margin; golden yellow rhinophores (? and gills). Tahiti: Bergh, 1875.

*Glossodoris tomsmithi* Bertsch & Gosliner, 1989: beige to light brown dorsum; large rounded pustules; white margin edged in yellow, crenulate; dark brown rhinophores and gills with white median lines. Hawaii: *C. albonotata* of Bertsch & Johnson 1981.

*Glossodoris rudolphi* Bergh, 1880: orange yellow dorsum; few irregular creamy white spots; margin creamy white with row of violet dots; rhinophores orange with violet tips; gills pale with violet tips; purple spots on edge of foot. Tahiti; notes from Kay & Young (1969) and Rudman (1986a) based on Bergh, but there are no recent specimens.

*Glossodoris albomaculatus* Pease, 1866: orange yellow body with whitish spots; purple border. Pacific Islands: Pease, 1866

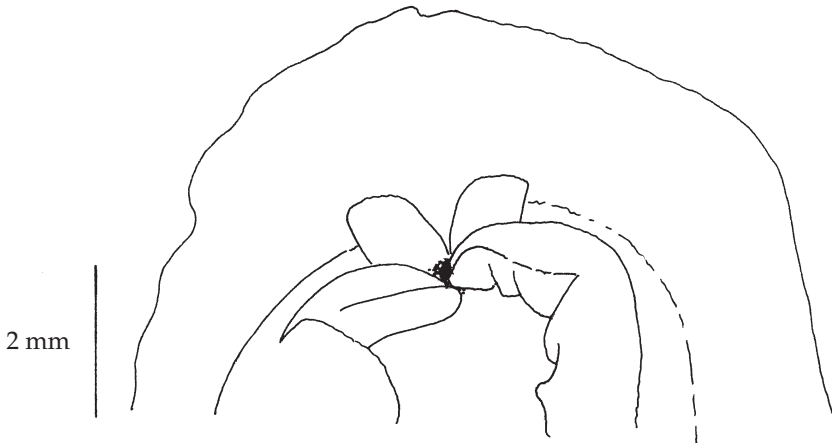


Figure 3. *Chromodoris inopinata* Bergh, 1905, ventral view of head (Mal. 05a, 43 mm).

*Chromodoris inopinata* Bergh, 1905  
(figs 3, 4 a-d, 5 a-b, pl. 2 figs 6-7)

*Chromodoris inopinata* Bergh, 1905: 157, pl. 2 fig. 6, pl. 16 figs 48-52.

*Risbecia reticulata*; Risbec, 1956: 10, pl. 6 figs 25-31, pl. 22 (misidentification).

Not *Chromodoris inopinata*? : Eliot, 1911: 1070, pl. 61 figs 6-7.

Not *Chromodoris inopinata*; Rudman, 1973: 179, pl. 1C figs 2a, 3.

Material.— RBE Stn 23, Kaitetu, Hitu, 12 m depth, 22/23.xi.1990, leg. A. Fortuin, one specimen 25 × 18 mm preserved, curled, photo M. Lavaleye 28-27 (radular prep. SEM); RBE Stn 18, east side of Laha, Hitu, 4-5 m depth, 24.xi.1990, leg. K. van Egmond, one specimen 10 × 8 mm preserved and curled, photos M. Lavaleye 31-29/31 (radular prep. SEM); RBE Stn 27, Hutumuri, Leitimur, 6 m depth, 26.xi.1990, leg. K. van Egmond, one specimen 25 × 13 mm preserved, curled, photos M. Lavaleye 33-6/7 (radular prep. light microscope); 1 km west of Hila, Hitu, 2-5 m depth, 25-26.xi.1997, leg. H.L. Strack, two specimens, 22 × 15 mm and 22 mm in width (preserved, contracted), (photograph of one specimen); Mal. 05a, west of Hila, Hitu, 6 m depth, 7.xi.1996, leg. and photo J. Goud, one specimen 43 mm (23 × 13 mm preserved, well relaxed), (figure ventral); Mal. 05b, west of Hila, Hitu, 6 m depth, 7.xi.1996, leg. and photo J. Goud, one specimen 35 mm (15 × 15 mm preserved, curled, contracted), (radular prep. light microscope and figure ventral); RBE Stn 16, west coast of Pombo Island, 15/17.xi.1990, W. Kolvoort and M. Lavaleye 22-18/19, one large individual, photographs only; Bay of Tulamben, Bali, 3-20 m depth, xi.1990, H. Debelius, small individual, photo only; Derawan, East Borneo, iv.1997, J. Hinterkircher, two small individuals, photographs only.

Description.— The preserved specimens bear no markings or colour, but the original alcohol in which the Hitu 10 mm specimen is preserved is tinged orange. All the specimens except one have contracted to form a soft swollen body with an ample mantle skirt. The additional photographs of apparently larger Ambon individuals also represent the same species: the dorsum is patterned with reddish orange reticulations which surround raised creamy pustules, and is generally knobbly. There are additional scattered raised areas, located laterally, devoid of red pigment and appearing translucent (equivalent to Bergh's "light yellow patches"). The red pigment is concentrated

around the edge of the mantle to form a deeper red band; there is a thin white border around the margin of the mantle, which irregularly folded and curled in the photographs provided. In the smaller specimens and photographs of smaller individuals, the dorsum is also pustular, but the white marginal band is broader, and the edge lies flat but with indentations. The pustules appear whiter than in the adults, and the general effect is that of a redder and whiter animal. The completely white foot, without coloured margins, protrudes well beyond the mantle edge in photographs of most specimens. The rhinophores appear to have had a dark red core with white lamellar edges and translucent white stalks in the larger animals; the clubs are more orange in the smaller specimens. There is no rim around the openings, but in some photographs the white stalks give the impression of the presence of a rim. The large gills number up to twenty-two (Mal. 05b) and are branched at their tips in the largest animals; there are also numerous smaller ones. The rachis of each is white, and the lamellae are translucent white with watery red or orange edges only on the outside surfaces. The raised rim is pustulose and reticulate, in continuation with the mantle ornamentation. The anal papilla is tall and white. Ventrally, the foot is bilaminate and both laminae are notched in the single relaxed specimen (Mal. 05a); the oral tentacles are plump, although only one is clearly visible (fig. 3). These characters are also visible in the 25 × 18 mm specimen, in which both oral tentacles could be seen with some manipulation, but the laminae were not notched.

The radula of the largest and smallest RBE specimens were scanned (fig. 4a-c). In the smaller specimen the foregut is black, and the radula brown; it has 65 rows of teeth. Both were damaged during drying, but the shape of the teeth is the same: the teeth are all denticulate, and the main cusp has a larger, separated "prong" at the end. The eight to ten denticles are sharp, more obviously so in the smaller specimen. The base is at right angles with a bump at the angle of the cusp. The last few teeth in the row become smaller and rounder, like little hands. A third specimen (Mal. 05a) was dissected and the radula examined under light microscopy for the presence or absence of a denticulate median cusp as described and illustrated by Risbec but none could be found; only a faint thickening is visible (fig. 5a). The first lateral tooth on each side has the main cusp hooked with denticles on both sides; there are 4-5 sharper denticles on the outside, similar to those on the remaining laterals, and one or two large cusps on the inner (median) side. The first lateral on the left is displaced to the centre (which may explain Risbec's description and illustration of a median cusp) (fig. 5b). The formula for this 35 mm specimen is  $60 (+ 5) \times 73-66.(1). 66-73$ .

Remarks.— The species described and illustrated by Bergh (1905) from Selayar Island, Indonesia, is correctly recognised for the first time. Bergh had one specimen measuring 50 mm long by 25 mm wide when alive. The diameter of the gills was 20 mm. The description is clear: an elongate oval mantle covered in pustules, low in profile. The mantle skirt was wide, the hyponotum flat [there is no mention of a coloured marginal line]. The ground colour was yellowish, nearly completely covered with small dense red brown to plum red rings. Scattered on the dorsum were light yellow patches. The mantle was surrounded by a wider inner plum red band and a narrow white margin. The rhinophore clubs were reddish, and there was no rim around the opening. The large pinnate gills were whitish, in five groups on substantial stalks; the gill pocket had a short rim and the anal papilla was truncated. The oral tentacles were

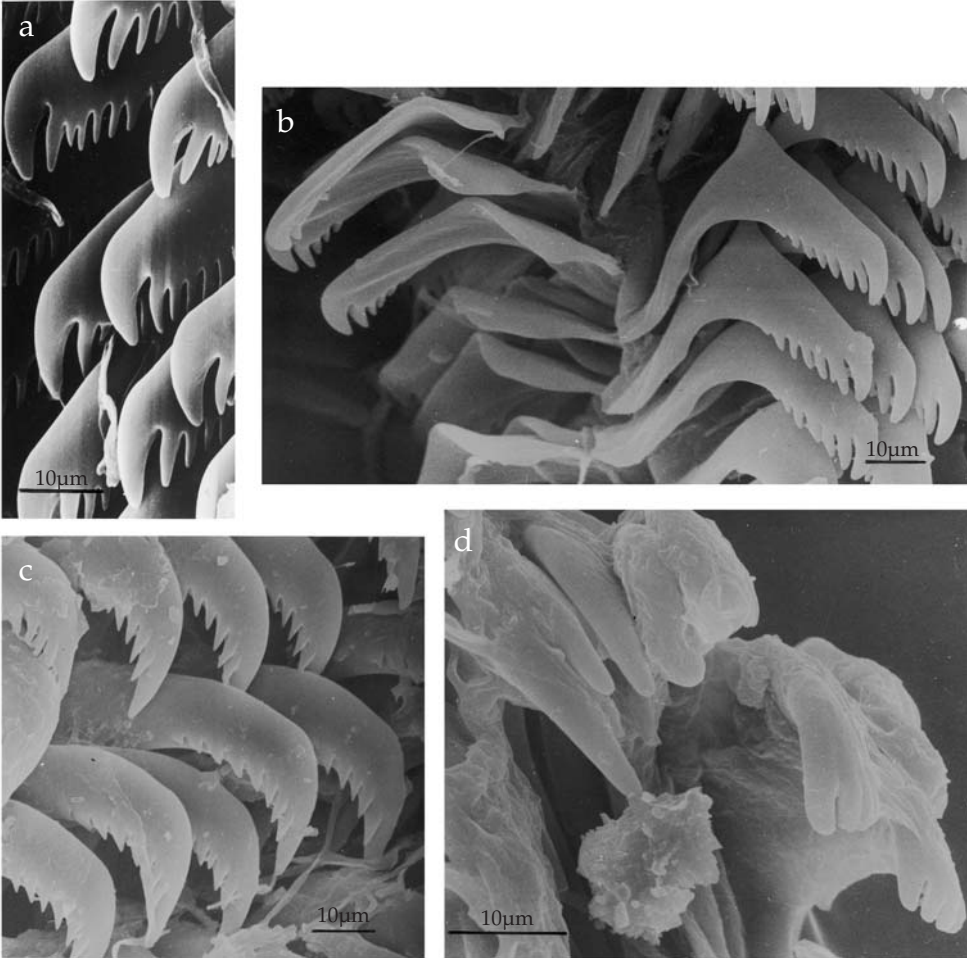


Fig. 4. *Chromodoris inopinata*, Bergh, 1905. SEM of radular teeth of two specimens. a, teeth in centre of row (ML 31-29/31, 10 mm); b, teeth towards end of row (ML 31-29/31, 10 mm); c, teeth in centre of row (ML 28-27, 25 mm); d, teeth at or very near edge (ML 28-27, 25 mm).

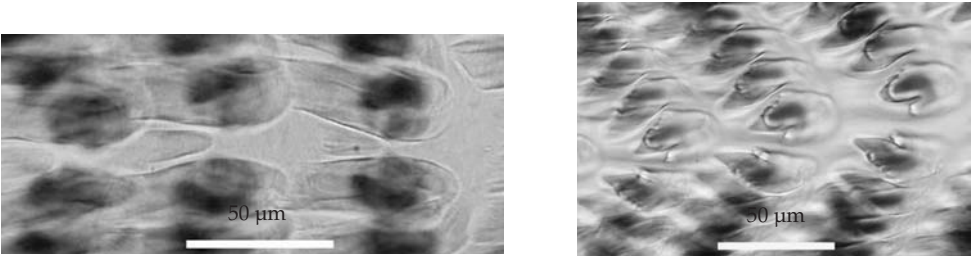


Fig. 5. *Chromodoris inopinata* Bergh, 1905. Light micrographs of central region of radular teeth (Mal. 05b, 35 mm). a, rows 11-13 showing the median thickening; b, rows 36-38 showing the displaced left first lateral.

shaped like bowling pins, with the tips slightly inverted. The foot was "strong", bilaminar with a groove and foot corners. The sole was broad, and the tail was not short, and rounded [no mention of any coloured margins]. The colour painting (and drawings of gills to a lesser extent) and figures of selected radular teeth match this material precisely.

Rudman (1973) thought he had found Bergh's species, although his material had a yellow-orange margin which was also visible ventrally. His specimen also had a crescent anteriorly between the red reticulation and deep carmine submargin. Apart from the absence of an anterior crescent, Eliot's (1904) *Chromodoris reticulata* is the same species, and both were recorded from Zanzibar. Rudman recognized the difference between his (and Eliot's) species and Risbec's (1956) species, which had no yellow or orange edging. Farran (1905) described a *Chromodoris reticulatus* from the Gulf of Manaar, which also belongs to this Indian Ocean species. Colour slides of an individual from the Seychelles (Pam Kemp) are identical to Eliot's description of his first specimen (the second was much darker) and that of Farran; it differs from Rudman's description and illustration in lacking the white crescent anteriorly (pl. 2 fig. 8). The orange margin, white foot, bicoloured rhinophores and gills, and pustular dorsum are clearly visible and the same as in the previous descriptions. Presuming Rudman's specimens belong to the same species, the radula differs from *C. inopinata* in having a strong median triangular plate. The first lateral also differs in having several small cusps on the inner side and not only one or two large cusps as in the Pacific material. It clearly differs from *C. inopinata* Bergh and *C. reticulata* Pease, 1866, and the name *Chromodoris marindica* nom. nov. is proposed for the Indian Ocean species.

Risbec's (1956) description and illustration of *Risbecia reticulata* (Quoy & Gaimard, 1832) from Viet Nam matches Bergh's species and the present specimens. Risbec thought he recognized the species described by Quoy & Gaimard (1832). However, their specimen (12-15 lignes = 38-47.5 mm) was described as having "all the surface of the body reticulated with red brown and spots of paint, while the underneath is a beautiful white; only the foot is bordered by yellow" (translated from French). Their painting clearly shows a foot patterned as the dorsum with a distinct coloured border. No other species in this complex (*C. alderi* Collingwood, *C. tinctoria* Rüppell & Leuckart, *C. reticulata* Pease and other unnamed species) has only the foot bordered with yellow; these also have an orange or yellow border to the mantle, except *C. reticulata* Quoy & Gaimard and *C. inopinata* Bergh. Quoy & Gaimard's species differs from Bergh's species and Risbec's specimens in having the foot patterned with red and edged in yellow.

Risbec's larger specimen (60 mm length) was covered in "a polygonal network of red lines. The edge was lined with a narrow white band. ... Red gills. Rhinophores golden yellow. White foot" (translation). Risbec mentioned a second, smaller, specimen which "could be taken for another species, although its appearance is extremely close." He described the two radulae as similar: the 10 mm (approximately) specimen had a formula of  $40 \times 90.1.90$  while the 60 mm specimen had approximately 90 rows of teeth. A median tooth was described, cusped and denticulate on both sides, as was the first lateral; the remaining teeth were denticulate only on their outer sides. Rudman (1984: 207) postulated that median tooth described by Risbec may have been a first lateral, and that the species belonged to the genus *Chromodoris*. It was the presence of a median tooth which persuaded Risbec to place his specimens, as Quoy & Gaimard's species, in

the genus *Risbecia*, which in fact does not have a median radular tooth. In the light microscope preparation of this material, the first lateral on the left was clearly displaced to the centre (fig. 5b), and in some rows looked precisely like that figured by Risbec. In his case, probably the right first lateral was displaced to the centre. Rudman realized his specimen was not the same as that described and illustrated by Risbec, but thought he had Bergh's species. However, there is no mention in Bergh's text or figure of an orange submarginal band, also visible ventrally, as in Rudman's description and figure; in fact, Bergh clearly stated that there was a white margin next to the darker red (inner) band.

Examination of the radular teeth of the specimens from the present collection places the species in the genus *Chromodoris*, as Bergh's original designation, although he did not illustrate the first lateral. I am content to include Risbec's specimens in this taxon; although there are numerous red reticulate species which need clarification (see above and Rudman, 1973), Risbec's description and figures can be identified with Bergh's species and with the present specimens. I expect that the species described by Quoy & Gaimard will prove to be valid when more material becomes available. Rudman's (1973) species described under the name *inopinata* also belong to this complex, but is not the same species as Bergh's; Eliot's (1904) and Farran's (1905) *C. reticulata* are probably the same species as Rudman's, and are given a name in this paper. Eliot's (1911) species from the Red Sea is quite different and belongs to a recently described species, *Glossodoris charlottae* Schrödl, 1999 (Yonow 1989, 2000).

The present species, *Chromodoris inopinata* Bergh, 1905, is quite distinctive and perfectly recognizable; there are colour photographs in Allen & Steene (1994: 198), Colin & Arneson (1995: 183, species 849), Gosliner et al. (1996: 164), and Debelius (1996: 207). Although Bergh only described one specimen, this species appears to be relatively common in the south-western Pacific.

*Chromodoris kuniei* Pruvot-Fol, 1930  
(pl. 3 fig. 1)

*Chromodoris kuniei*; Rudman, 1987: 381, figs 39, 42-43; Wells & Bryce, 1993: 120, fig. 151.

Material.— RBE Stn 21, Mamala, Hitu, 15-20 m depth, 21.xi.1990, leg. A. Fortuin, one specimen 34 × 19 mm preserved, well relaxed (13 gills), photos M. Lavaleye 26-10/13; Mal. 12, near Mamala, Hitu, 15 m depth, 13-14.xi.1996, J. Goud, two individuals, both 33 mm, colour photos only; Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual 22 mm in length, photos only.

Remarks.— This beautiful species is relatively common in the south-west Pacific, with records also from Christmas Island (eastern Indian Ocean) and now Ambon. It is replaced in the Indian Ocean by *C. geminus* Rudman and *C. tritos* Yonow. The species is characterized by three purple bands and a creamy one around the edge of the mantle, with a creamy dorsum covered in bright violet spots. It is known to move the widely overlapping edges of its mantle rhythmically. There are colour photographs in Allen & Steene (1994: 197), Colin & Arneson (1995: 182), Debelius (1996: 209), and Gosliner et al. (1996: 163).

*Chromodoris leopardus* Rudman, 1987  
(pl. 3 fig. 2)

*Chromodoris leopardus* Rudman, 1987: 387, figs 39, 42, 45-46; Baba, 1989b: 96, figs 1-2.

Material.— RBE Stn 5, Galghoek, Leitimur, 1 m depth, 9.xi.1990, leg. and photos M. Lavaley 4-33/37, 5-1/2, two specimens, curled and distorted; 1 km west of Hila, Hitu, 5 m depth, 25.xi.1997, leg. H.L. Strack, one specimen, contracted 33 mm in width, preserved.

Remarks.— *Chromodoris leopardus* is distinguished from the similar *C. kuniei* by its lack of multiple purple bands around the edge of the mantle and the presence of smaller spots but more usually arranged in rings on the dorsum. Ground colour is a warm ochre brown and there is only a thin purple line present around the edge of the mantle. The rings appear to bleach the surrounding area of ochre to cream, creating a patchy effect. The foot extends beyond the mantle and is also ochre with the tip 'bleached' cream, and there is a fine purple line around the edge. The gills and rhinophores are translucent cream, and the rhinophores additionally have a tinge of purple along the midline at the tips. There are no remains of markings on the preserved specimens and, according to the literature, a purple crescent is present anteriorly under the mantle as in *C. geometrica*. The species is recorded from East Australia, the Philippines, and Japan; this is a new record for Indonesia. There are colour photographs in Debelius (1996: 209).

*Chromodoris lineolata* (van Hasselt, 1824)  
(pl. 3 fig. 3)

*Doris lineolata* van Hasselt, 1824: 238.

*Chromodoris funerea* Collingwood, 1881: 131, pl. 9 figs 30-33; André, 1896: 402, fig. 8.

*Chromodoris lineolata*; Bergh, 1887: 308; 1890: 933; Rudman, 1982: 196, figs 1D, 8-9.

*Glossodoris lineolata*; Engel & Nijssen-Meyer, 1964: (28), colour plate fig. 4.

Material.— Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual, colour photograph only.

Remarks.— The orange edge to the foot and mantle (without a thick white submarginal band), the continuous circumferal stripes, the speckled plumose gills (their bushiness reminiscent of those of *Dendrodoris*), and the white edges to the rhinophore pockets conform with descriptions of *Chromodoris lineolata*. The mantle is fairly elongate, and crumpled around the edges. The thick foot extends 1/4 to 1/3 of the body length beyond the mantle. The general colour is red-brown to brown-black with irregular white concentric lines. The plumose gills and the rhinophores are reddish with white speckles, precisely as Collingwood (1881, as *C. funerea*) described them. André (1896) described three specimens from Ambon (no sizes), stating that they appeared, to him, to have slightly fewer yellowish lines than Collingwood's figure. One of these specimens had its radular formula approaching  $80 \times 80.0.80$  and the single tooth figured is very similar to equivalent ones figured by Rudman (1982: fig. 9D). Three specimens were described from Ambon by Bergh (1890), collected by Brock "in the vicinity of Ambon" and from Edam; the large preserved specimen measured  $2.8 \times 1.4 \times 1.0$  cm, and the smallest 9 mm. The radular formula was  $81 (+4) \times 65.0.65$ . *Chromodoris lineolata* was originally described from Indonesia, and has been recorded from other

localities in the western Pacific. There are colour photographs in Allen & Steene (1994: 198) and Debelius (1996: 204).

*Chromodoris lochi* Rudman, 1982  
(pl. 3 fig. 4)

*Chromodoris lochi* Rudman, 1982: 186, figs 1A, C, 2-3.

*Chromodoris elisabethina*; Rudman, 1977: 377, figs 12, 15, 17 (misidentification).

Material.— Mal. 08, Liang Bay, Hitu, 10 m depth, 9.xi.1996, leg. B.W. Hoeksema, photo J. Goud, one specimen 38 mm; Mal. 12, near Mamala, Hitu, 25 m depth, 14.xi.1996, leg. J. van Egmond, photo J. Goud, one specimen 40 mm (20 mm preserved); RBE Stn 16, north-west coast of Pombo Island, 12 m depth, W. Kolvoort, one individual, colour photo only; Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual, colour photo only.

Remarks.— The preserved specimens are elongated and very pale blue. There are two black stripes on the sides of the foot with a wide blue one in between. The rhinophores and gills are pale orange, much paler in the first specimen. There are four named blue, black, and white striped species, of which only *C. diana*e, p. 13) is also present in this collection. *Chromodoris lochi* Rudman, 1982, is recorded from Australia, Papua New Guinea, Vanuatu, and Fiji (Rudman, 1977, 1982); it appears to be limited in distribution to the tropical west Pacific. *Chromodoris diana*e Gosliner & Behrens, 1998, also appears to be restricted to the west Pacific, and is present in the collection (p. 00). *Chromodoris boucheti* Rudman, 1982, is known only from the Indian Ocean (Yonow, 1994) and *C. willani* Rudman, 1982, has only been recorded from its type locality of Vanuatu (Rudman, 1982) and Indonesia, Philippines, Guam, and Okinawa (Gosliner et al. 1996). There are illustrations of *Chromodoris lochi* published by Coleman (1989: 25), Ryan (1994: 93), Colin & Arneson (1995: 182), Gosliner et al. (1996: 164), and Debelius (1996: 203). The table below highlights some of the differences between *C. lochi* and similar species.

*Chromodoris magnifica* (Quoy & Gaimard, 1832)  
(pl. 3 fig. 5)

*Doris magnifica* Quoy & Gaimard, 1832: 270, pl. 20 figs 1-4.

*Glossodoris quadricolor*; Engel & Nijssen-Meyer, 1964: 27, pl. 1 figs 3-5 (misidentification).

*Chromodoris magnifica*; Rudman, 1982: 216, fig. 17A-B, 18-19.

Material.— RBE Stn 39, south side of Larike, Hitu, 7 m depth, 9.xii.1990, leg. A. Fortuin, photos M. Laval-eye 49-36/37, 50-1/2, one specimen 30 × 10 mm preserved, curled; Mal. 02, near Rumah Tiga, Hitu, 2-12 m depth, 5.xi.1996, leg. J. Goud, one specimen 26 mm preserved (no photos); Mal. 04, Cape Hahurong, Leitimur, 2-28 m depth, 6.xi.1996, leg. C. Fransen, photo J. Goud, one specimen 10 mm preserved; Mal. 12, near Mamala, Hitu, 25 m depth, 14.xi.1996, leg. J. van Egmond (no photos), two specimens both 24 mm preserved; Mal. 15, west of Amahusu, Leitimur, 1-30 m depth, 16.xi.1996, leg. and photo J. Goud, one specimen 28 mm preserved; Mal. 19, Cape Batu Dua, Hitu, 4 m depth, 19.xi.1996, leg. J. Goud (no photos), one specimen 25 mm preserved; Mal. 19, 3 m depth, 19.xi.1996, leg. and photo J. Goud, one specimen 35 mm preserved; Mal. 20, west of Lilibooi, Hitu, 2-30 m depth, 20.xi.1996, leg. J. Goud (no photos) two specimens 15 mm and 29 mm preserved; Mal. 21, Cape Hatupero, Hitu, 5 m depth, 20.xi.1996, leg. M. Slierings (no photo), one specimen 52 mm alive; Mal. 24, Seri Bay, Leitimur, 2-30 m



Character	<i>C. lochi</i>	<i>C. boucheti</i>	<i>C. willani</i>	<i>C. diana</i> (p. 13)
mantle shape	elongate, spatulate anteriorly	elongate, oval	elongate, oval	broadly oval, undulating margin
colour	pale blue with two thick black lines	blue with three thick black lines and two thin; pale blue or white margin	pale blue with two thin black lines	pale blue with very thick broken black band around dorsum; broad white skirt
rhinophores	pale yellow /orange	yellow orange -	translucent brown with white spots	bright orange
gills	pale yellow	1/2 white, 1/2 yellow orange with black bases	translucent brown with white spots	1/2 white, 1/2 orange
number	5-8	5-7	fewer than 8	8-14
radular formula	16 mm: 74 × 46.0.46	18 mm: 60 × 41.0.41 and 57 × 40.0.40	12 mm: 74 × 54.1.54 and 68 × 51.1.51	no sizes: 76 × 47.0.47 and 71 × 52.0.52
median tooth	low triangular thickening	small triangular thickening	massive with cusp	long thin thickening

depth, 22.xi.1996, leg. and photo of larger specimen only J. Goud, two specimens 19 mm and 25 mm preserved; Mal. 32, near Cape Miriam, Hitu, 0-30 m depth, 23.xi.1996, leg. C. Fransen (no photos), two specimens 44 mm (19 mm preserved) and 30 mm preserved; Mal. 13, near Larike, Hitu, 15 m depth, 15.xi.1996, J. Goud, one individual, colour photo only; Derawan, East Borneo, iv.1997, J. Hinterkircher, two individuals, colour photographs only; Sipaden Island, North-east Borneo, 5-18.iv.1990, Suzanne Hart, one individual, colour photographs only.

Remarks.— A species previously rarely recorded in the scientific literature, and often misidentified, *C. magnifica* was originally described from New Guinea and subsequently recorded from Indonesia as *C. quadricolor* by Engel & Nijssen-Meyer (1964). It has since only been recorded from Australia and Papua-New Guinea (Rudman, 1982). It was the most common chromodorid around the coasts of Ambon during the FMMM Expedition. The ground colour of this species is white, superimposed with three thick black longitudinal lines (sometimes subdivided to make five or seven thinner ones), a broad yellow submarginal band, and a white margin. The rhinophore pockets are distinctly orange, as are the rhinophores; the gills may be a deeper orange than the rhinophores, and the rim of the gill pocket may also be pale orange. The foot is white

with two to four black bands along the sides, and the orange band is always present at the edge rather than submarginally as on the mantle. Diagnostic features are the broad mantle skirt with three, rather wide, circumpheral bands of white-orange-white. The orange band is usually the broadest but not always. Additionally, the median black band does not connect with the outer ones anteriorly (in all photographs and all 14 specimens). The preserved specimens are similar to their photographs in having a broad, dirty yellow mantle skirt; the median black band does not touch the outer black bands anteriorly; the raised rhinophore rims remain in most specimens but not the gill rim; the sides have two to five black lines. Colour photographs of three specimens have a bluish tinge on the central white area, but this may be an artefact. There are colour photographs in Coleman (1989: 34), Allen & Steene (1994: 197), Colin & Arneson (1995: 182), Debelius (1996: 202), and Gosliner et al. (1996: 164).

One of the above specimens of *Chromodoris magnifica* was recorded for the first time in association with the small shrimp *Periclimenes imperator* Bruce (Fransen & Goud, 2000). The shrimp is usually found on *Hexabranichus sanguineus*, and on sea cucumbers.

*Chromodoris sinensis* Rudman, 1985  
(pl. 3 fig. 6)

*Chromodoris sinensis* Rudman, 1985: 272, figs 12C, 13C, 15C, 18-19; Rudman & Darvell, 1990: 56, pl. 5G-H.

Material.—1 km west of Hila, Hitu, 2-3 m depth, 25.xi.1997, leg. and photo H.L. Strack, one specimen 9 × 5 mm preserved; ? Sawai, north coast of Ceram, 1 m depth, 4-8.xii.1997, leg. H.L. Strack (no photo), one specimen 7 mm in length alive.

Remarks.— *Chromodoris sinensis* is recorded only from Japan, China, and Hong Kong at a maximum size of 30 mm. The present specimens are new records for Indonesia and the south-western Pacific. The single photograph depicts a densely white pigmented specimen with two circumpheral, narrow bands, yellow orange inside and deep red outside. The foot does not project behind the mantle posteriorly. The gills and rhinophores are light purple-red. The preserved specimens are identical to each other in that neither present any distinguishing features; both are dense white, although the larger disposes a violet gut in ventral view. Rudman (1985) discussed the differences between similar species; none have the combination of a dense white dorsum with orange and red margins and red rhinophores and gills. The preserved specimens are too small to dissect out the radulae without destroying them completely.

*Durvilledoris pusilla* (Bergh, 1874)  
(pl. 3 fig. 7)

*Durvilledoris pusilla*; Rudman, 1986b: 324, figs 5E, F; Yonow, 1994: 119, figs 10G.

Material.— Mal. 10, east of Erie, Leitimur, 20 m depth on sponge, 12.xi.1996, leg. and photo J. Goud, one specimen 18 mm (7 mm preserved); Derawan, East Borneo, iv.1997, J Hinterkircher, one individual 6 mm in length alive, photograph only.

Remarks.— This appears to be the first record of this species from Indonesia, although Bergh (1874) figured a specimen from the “western Pacific”. It has been

recorded from the Indian Ocean, and North-west Australia and Eniwetok Atoll in the Pacific. The pattern is distinctive and consistent; the mantle is pink with two pairs of tongues on the sides which are deeper in colour, and the posterior and anterior extensions are also deeper magenta. The marginal band is creamy yellow with intense white pigment between the magenta extrusions, and there are two white patches along the midline. Ramifying mantle glands are visible around the mantle skirt, but there is no pattern or colour remaining on the specimen (examined 1999).

*Glossodoris atromarginata* (Cuvier, 1804)  
(pl. 3 fig. 8)

*Casella atromarginata*; André, 1896: 402.

*Casella atromarginata* var. *pallida* Bergh, 1905: 163, pl. 4 fig. 12.

*Glossodoris atromarginata*; Rudman, 1986a: 103, figs 1-3, 46, 47; Yonow, 1989: 298, pl. 14; Yonow & Hayward, 1991: 13, fig 3F.

Material.— Singapore, viii.1990 (via Tropical Marine Centre, Hertfordshire, UK, photographs and notes NY), three specimens 30 mm, 70 mm, and 80 mm minimum lengths alive (but dying); RBE Stn 39, south of Larike, Hitu, 0.5-1 m depth, 8.xii.1990, leg. M. Lavaleye & H.L. Strack; photos M. Lavaleye 48-18/19, two specimens, 15 × 5 mm and 16 × 6 mm approximately (preserved, curled and ?dried); Mal. 05, near Hila, Hitu, 1 m depth on rock with algae, 7.xi.1996, leg. and photo J. Goud, one specimen 70 mm (30 mm preserved); Lathalath, Leitimur, 1 m depth, 14.xii.1997, leg. H.L. Strack, one specimen 10 mm in width preserved; Derawan, East Borneo, iv.1997, J. Hinterkircher, single (?large) individual, colour photograph only.

Remarks.— A frequently encountered species, *Glossodoris atromarginata* is distinguished by its chunky body and permanently undulated mantle, edged submarginally in cream or white and marginally in deep black. The dorsum varies from creamy yellow to brownish green, and the rhinophore pockets are always edged with black, a diagnostic feature of the species. It has a wide distribution, ranging from the Red Sea and East African coast to eastern Australia and Japan. A number of similar species co-exist within the range, but *G. atromarginata* is readily identified by the black rim of the rhinophoral pockets, the high profile, stiff body, and the marginal blue black and submarginal white lines. Notes on the collecting label of the RBE specimens state that the mantle had a blue rim; the Singapore specimens varied in colour from beige brown to yellow-brown, but also with a blue-black margin. The preserved FMMME specimen is pink with a pitch black margin and diffuse white submarginal band. There are colour photographs in Allen & Steene (1994: 198), Colin & Arneson (1995: 184), Debelius (1996: 225), and Gosliner et al. (1996: 165).

*Glossodoris cincta* (Bergh, 1888)

*Glossodoris cincta*; Rudman, 1986a: 149, figs 30A-C, 31-35, 46-47; Yonow, 1994: 120, fig. 10H; Yonow et al., in press.

Material.— Mal. 02, Rumah Tiga, Hitu, 2-12 m depth on the coral *Oxypora lacera*, 5.xi.1996, leg. C. Fransen, one specimen 35 mm preserved (no photo); Mal. 14, Batu Capeo, Leitimur, 15 m depth on sponge, 16.xi.1996, leg. C. Fransen; photo J. Goud, one specimen 60 mm (26 mm preserved).

Remarks.— Both specimens were well relaxed before preservation, and the characteristic reddish rhinophores still have white flecks on the edges of the lamellae. The reddish gills, arranged with both ends spiralling inwards, also retain their dark lines along the axes. Both specimens are patchy brick-red to brown in colour, with both the foot and the mantle retaining a green submarginal band. The oral tentacles of the 35 mm specimen are also green. A photograph of the 60 mm specimen shows a densely white-speckled animal with three marginal bands: a wider ochre inner band, a thin dark line, and a white margin. The foot, which is visible in the mantle undulations and beyond the mantle posteriorly, is darker red-brown, but with the dense white speckles concentrated in smaller patches. The plate-like coral *Oxypora lacera* (Verrill, 1864), was identified by C. Fransen. *Glossodoris cincta* is known throughout the Indo-Pacific region, including the Red Sea (Yonow, 1989) but has not been recorded from Indonesia previously. Its variable colour patterns are illustrated in Wells & Bryce (1993: 134), Schuhmacher & Hinterkircher (1996: 202), and Debelius (1996: 226).

*Glossodoris cruentus* Rudman, 1986  
(pl. 4 fig. 1)

*Glossodoris cruentus* Rudman, 1986: 167, numerous figures; Yonow et al., in press.

Material.— Derawan, East Borneo, iv.1997, J. Hinterkircher, one individual, photograph only.

Remarks.— This species has been described from Australia and found subsequently in Chagos, New Guinea, and the Philippines; it has not been previously recorded from Indonesia. The colour pattern is unmistakable, and this pale individual is within the range described by Rudman (1986a). The central body is pale beige surrounded by a ring of red spots just within a white band. This is followed by a deeper yellow band and white margin; the foot is similarly marked. There are colour photographs in Gosliner et al. (1996: 165) and Debelius (1996: 225).

*Glossodoris hikuensis* (Pruvot-Fol, 1954)

*Glossodoris hikuensis*; Rudman, 1986a: 158, figs 30D, 36-38, 46-47; Yonow, 1994: 120, fig. 14A.

Material.— Mal. 16, near Tawiri, Hitu, 2 m depth on sand of reef flat, 18.xi.1996, leg. La Tanda, photo J. Goud, one specimen 90 mm (55 mm preserved).

Remarks.— The mantle and foot are beige with a thin banded mantle margin: there is a cream band lacking the dorsal beige pigmentation, followed by a broad charcoal grey band; the marginal band and edge of the mantle are beige. The extremely numerous gills retain the beige edge to the axis. Although Indo-Pacific in distribution, *Glossodoris hikuensis* has not been recorded from Indonesia previously. Colour photographs are presented in Wells & Bryce (1993: 134) and Debelius (1996: 227).

*Glossodoris kophos* spec. nov.  
(fig. 6 a-c, pl. 4 fig. 2)

Material.— Holotype: RBE Stn 18, east of Laha, Hitu, 1 m depth, 19.xi.1990, leg. F. de Jong, photo M.

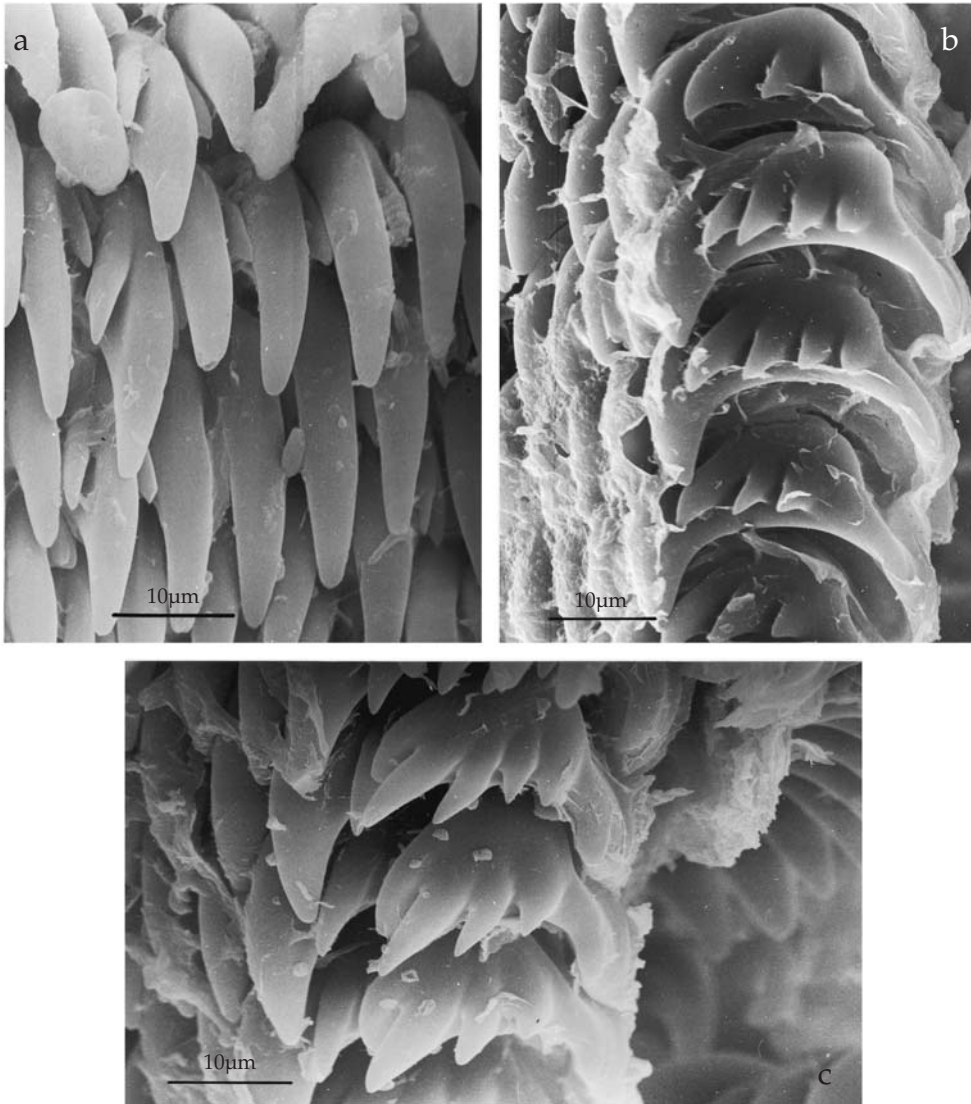


Fig. 6. *Glossodoris kophos* spec. nov. SEM of radular teeth of paratype (22 mm preserved). a, midline showing inner and outer denticles on first laterals; b, lateral teeth with four denticles on outer sides; c, last lateral teeth.

Lavaleye 23/21-22, one specimen 20 × 15 mm preserved (specimen a). Paratypes: curled; RBE Stn 18, east of Laha, Hitu, 1 m depth, 19.xi.1990, leg. F de Jong, 22 × 12 mm preserved (specimen b, radular prep. SEM); RBE Stn 18, east of Laha, Hitu, 1 m depth, 19.xi.1990, leg. F. de Jong, one specimen 20 × 10 mm preserved, curled (specimen c, radular prep. light microscope).

Description.— Alive the colour of the body is beige-brown covered in white spots and speckles; these are lacking towards the edge of the margin to form a continuous

beige-brown band. This is followed by a cream band and the edge was marked by a thick greenish line. The hyponotum is identical in colour pattern; the foot is beige-brown covered in white speckles and spots but without the green margin. The rhinophore sheaths are also speckled but darker brown in ground colour and the rim is not marked by a pigmented line; the rhinophore club, midlines, and tip are cream; the lamellae are deep brown with white edges. The simply pinnate gills have a cream core and grey-brown outer dusting. They number eighteen, arranged in an arc with the ends spiralling inwards; the anal papilla is dark brown as were the rhinophore sheaths, with speckles, but the very edge is cream. The preserved specimens retain the speckled effect of the dorsum and the dark green marginal line. The rhinophores and gills are completely retracted, as was the head and anterior edge of the foot. All three specimens were too contracted to illustrate the head and tentacles.

The radular teeth are all cusped, with one large main cusp, one inner smaller cusp, and 3-4 small cusps on the outer side (fig. 6a-b). The main cusps of the last teeth become reduced, with the three to four outer cusps aligned on the side; the base is small, and appears rather narrow (fig. 6c).

Remarks.— This new species approaches *Glossodoris atromarginata* in shape and form. Externally, it most resembles Rudman's (1986a) *Glossodoris* spec. D: "pale pink with a fine stippling of brown, .. pale creamy band without stippling, and .. a dark green brown line .. described in field notes as olive green." However, not only is the colour pattern different, but the radula is vastly different: the first laterals are similar, but the outermost in spec. D. are elongated with a tuft of rounded, digitate denticles at the end. The outermost laterals of this species retain the main cusp and the 3-4 denticles are aligned alongside. The radular teeth of this new species resemble none of those figured by Rudman in his review of glossodorids belonging to the *atromarginata* group. They differ not only in shape but also in denticulation: they appear to have denticles on both sides of the main cuspec. The radula was damaged during SEM preparation, so row and teeth numbers are not available. A second radula prepared for light microscopy was equally unsuccessful.

Etymology.— "Kophos" is Greek for dull, referring to the colour pattern.

*Hypselodoris infucata* (Rüppell & Leuckart, 1828)  
(pl. 4 fig. 3)

*Doris infucata* Rüppell & Leuckart, 1828: 34, pl. 10.

*Hypselodoris infucata*; Rudman, 1973: 199, figs 7C-D; Yonow, 1989: 302, pl. 20.

Material.— Tulamben Bay, North-east Bali, 3-20 m depth, xi.1990, H. Debelius, one individual, photograph only.

Remarks.— *Hypselodoris infucata* is distinguished from the similar Indian Ocean species *H. kanga* Rudman, 1977 (see below) and the south eastern Australian *H. obscura* (Stimpson, 1855) by its blue green ground colour covered in large yellow spots and small blue spots. The gills are white with an orange-red rachis, and the rhinophores are white with orange lamellae. *Hypselodoris kanga* has tricoloured gills with diagnostic yellow spots up the outside and blue rhinophores with red lamellae whereas *H. obscura* is brownish, with amber gills and rhinophores. *Hypselodoris infucata* is wide-

spread in the Red Sea and the tropical Indian and Pacific Oceans. There are colour photographs in Schuhmacher & Hinterkircher (1996: 198) and Debelius (1996: 236, smaller photograph only).

*Hypselodoris kanga* Rudman, 1977  
(pl. 4 fig. 4)

*Chromodoris semperi*; Eliot, 1905: 246 (misidentification).

*Glossodoris nigrostriata*; Winckworth, 1946: 159, fig. 5 (misidentification).

*Hypselodoris kanga* Rudman, 1977: 356, pl. 1E figs 3-4; Rudman & Darvell, 1990: 63, pl. 7A-B.

Material.— RBE Stn 17, south-east coast of Pombo Island, 2 m depth, 16.xi.1990, leg. C. Fransen, photo M. Lavaley 14-31/32, one specimen 14 × 6 mm preserved.

Remarks.— The most striking features of this species are the bright yellow spots up the outside rachides of the gills and the blue stalks and red lamellae of the rhinophores. The living animal is grey blue, covered in large and small yellow spots and small blue violet spots. These spots also occur on the foot, which extends beyond the posterior mantle edge. Both the mantle and the foot are criss-crossed with deep blue-violet lines. The species name was introduced as a new name for specimens well described but misidentified by Eliot (1905) and Winckworth (1946) from Karachi and Bombay. Rudman's (1977) specimen came from Tanzania, while Rudman & Darvell's (1990) material from Hong Kong constituted the first Pacific record; this is a new record for Indonesia. The preserved specimen is pale blue green with small blue black spots (examined 1996). There are colour photographs in Debelius (1996: 237).

*Hypselodoris katerythros* spec. nov.  
(figs 7, 8a-c, pl. 4 fig. 5)

Material.— Holotype: RBE Stn 37, west of Laha, Hitu, 8 m depth, 6.xii.1990, leg. A. Fortuin, photo M. Lavaley 47-29, one specimen 26 × 15 mm preserved (figure ventral. Paratype: RBE Stn 37, west of Laha, Hitu, 8 m depth, 6.xii.1990, leg. A. Fortuin, one specimen 25 × 13 mm preserved, curled (radular prep.).

Description.— The body in life is creamy yellow with three deep red lines extending its length. Between these red lines and outside them, the dorsum is brownish, fading to the edges of the mantle at the sides, anteriorly, and posteriorly. Anteriorly, the lateral lines surround the rhinophore pockets, and extend in a loop in front of them. Posteriorly the three red lines meet at the gill pocket as a lilac band around the rim. The very edge of the mantle is thin and translucent, and the submargin is lilac. The rhinophores and gills are deep red, the same colour as the three median lines; the rhinophores are tipped with white. The violet at the tip of the tail probably extends all around the edge of the foot (see Debelius, 1996: 235), but there are no other lines or markings. The three red lines are still visible on the preserved material (examined 1996) as opaque white lines, and the gills and rhinophores are dark. No mantle glands are visible, nor are any remains of any other pigment. The body is oval and chunky, and the tail extends well beyond the posterior margin. Ventrally, both specimens are similar: the head and



Fig. 7. *Hypselodoris katerythros* spec. nov. Ventral view of head of holotype (26 mm preserved)

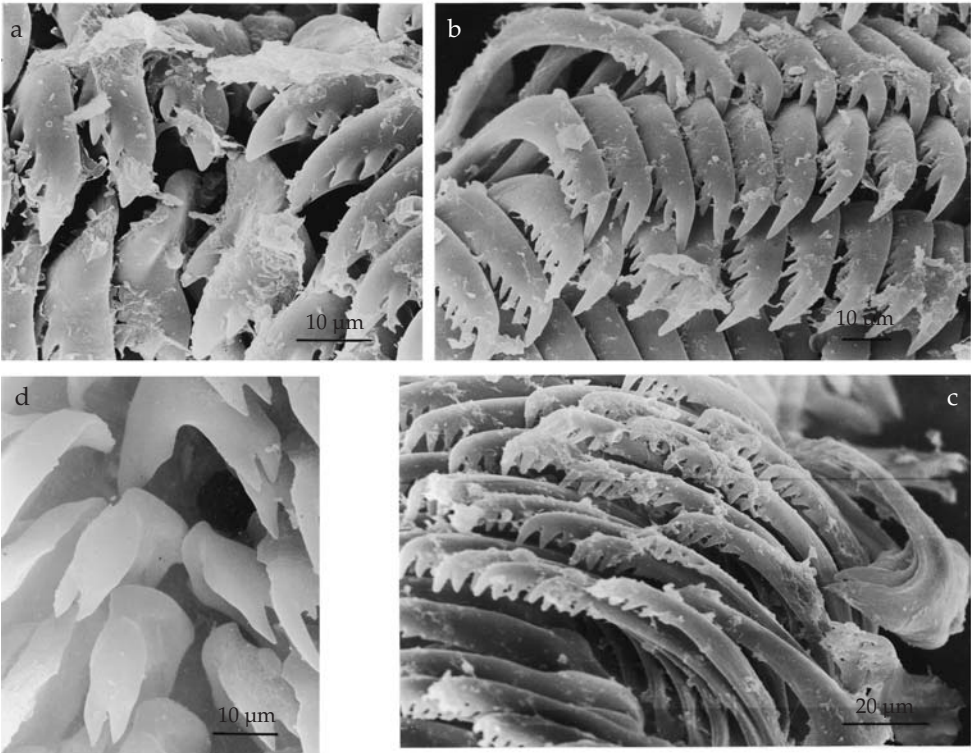


Fig. 8. a-c, *Hypselodoris katerythros* spec. nov. SEM of radular teeth of paratype (25 mm preserved); a, first few laterals and midline; b, midlaterals near edge of row; c, last laterals. d, *Hypselodoris emma* Rudman, 1977 (Maldives). Centre of rows to show difference in shape of first laterals and median thickening (probably 45 mm; reprinted negative from Yonow, 1994).



mouth protrude, the oral tentacles are grooved, and the anterior margin of the foot is bilaminate; neither lamina is notched (fig. 7)

The radula bears 27-30 teeth per half row, with more than 25 rows in the radula (curled during SEM preparation). These approximations may not be too inaccurate, as Rudman (1984) found that the number of teeth per half row approximates the number of rows in the genus *Hypselodoris*. The first lateral bears a large inner denticle and a series of sharp denticles on the outside; the cusp measures 20 mm (fig. 8a). These outer denticles progress to the edge of the tooth along the row, and the outermost teeth become larger, 25-60 mm, comb-like with up to five denticles on a long cusp, and with a chunky root (fig. 8b-c).

Remarks.— Two specimens of this stunning species are present. I can find nothing in the literature remotely similar in colour pattern, except Anderson's photograph from Viet Nam (in Debelius, 1996: 235, larger photograph as *Hypselodoris emma*). Gosliner & Johnson (1999) place this photograph in the synonymy of *Hypselodoris emma* Rudman, 1977, in their review of the genus. As discussed below (*Hypselodoris maridadilus*), I disagree with their synonymies. The stripy hypselodorids of the *maridadilus-emma-centunculus* colour group are creamy with three to five lines of pink or purple and with the margin the same colour and have orange gills and rhinophores; the body is more stream-lined than in this new species, and has a spatulate anterior margin, typical of the genus *Hypselodoris*. A table of differences between the three Indian Ocean species was presented in Yonow (1994: 122). This new species differs in body shape and colour pattern from this *Hypselodoris* complex; the body is elongate oval and barely spatulate anteriorly. The colours of the dorsal stripes and the margin are the same in these three species, while in *Hypselodoris katerythros* spec. nov. the dorsal stripes are deep red and the margin is contrasting in lilac. The rhinophores of the three species are a contrasting orange but in this species they are the same colour as the dorsal stripes. Finally, the gill pocket is rimmed with lilac, lacking in *H. emma*. The denticulate radular teeth of this new species show affinities to those of the colour group of *maridadilus-emma-centunculus*, which have a low number of teeth per half row, all of which are denticulate, but the teeth differ; the Indian Ocean records of *H. emma* seem to have a median thickening which is easily missed. Rudman (1977) described that thickening from only one specimen, and the median thickening is also visible in the original SEM prints of a Maldives specimen (but not in the published version: Yonow, 1994), and is reprinted here (fig. 8d). The shape of the first lateral is distinctly bicuspid in *H. emma* whereas in *H. katerythros* there is a main cusp with a large denticle on the inner side.

Etymology.— “Katerythros” is Greek for deep red, referring to the intense colour of the three lines on the dorsum.

*Hypselodoris maridadilus* Rudman, 1977  
(pl. 4 fig. 6)

*Hypselodoris maridadilus* Rudman, 1977: Yonow & Hayward, 1991: 15, fig 4C; Wells & Bryce, 1993: 114, fig. 141.

Material.— RBE Stn 5, Galghoek, Leitimur, 3 m depth, 2.xii.1990, leg. M. Lavaleye, photos M. Lavaleye 38-15/16, one specimen 14 × 4 mm preserved.

Remarks.— *Hypselodoris maridadilus* is widespread in the Indo-West Pacific, recorded as early as the 1900's under several names. It is characterized by five longitudinal bands, which are coloured brightly magenta, on a creamy coloured mantle. The edge of the mantle is surrounded by a band of the same colour as the dorsal stripes, but the gills and rhinophores are rusty orange. The concentrations of mantle glands anteriorly and posteriorly are visible in the photograph of the moribund specimen (pl. 4 fig. 6). Bergh (1890) described and illustrated *Chromodoris hilaris* from Ambon, which is, in pattern only, very similar to *H. maridadilus*. However, the four (not five) dorsal lines are bluish black and the margins of mantle and foot are brilliant violet (see Appendix 1). Two similar species occur in the western Indian Ocean, *H. emma* Rudman, 1977, and *H. centunculus* Yonow, 1994 (both discussed in Yonow, 1994), while *H. mouaci* Risbec, 1930, and *H. whitei* (Adams & Reeve, 1850) were described from New Caledonia in the Pacific and Indonesia, respectively. Risbec (1930, 1953) and Adams & Reeve (1850) both described lines of yellow patches, but the similarity ends there: Risbec stated that the ground colour was violet and made no mention of the violet lines, while Adams & Reeve described and illustrated an animal with an ultramarine margin, four lilac dorsal lines, and seven pink lines perpendicular to the margin on the foot. Baba (1994) synonymised *H. mouaci* with *H. maridadilus*, whereas Rudman (1984, 1995) retained them as separate species; Gosliner & Johnson (1999) synonymized *H. mouaci* with *H. whitei* and also included the Indian Ocean *H. centunculus* in their synonymy, but they overlooked *H. hilaris* Baba, 1953. As the descriptions and figures of these three species clearly differ, and as it has been shown that Indian Ocean species are distinct from their Pacific counterparts despite similarities in radulae, they are maintained as distinct in this work. Gosliner & Johnson (1999) in fact do not describe or illustrate their species, which only compounds the problems. There are colour photographs of *Hypselodoris maridadilus* in Schuhmacher & Hinterkircher (1996: 200) and Debelius (1996: 239 as *H. mouaci*). The species illustrated as *Hypselodoris maridadilus* from the Marshall Islands in Colin & Arneson (1995: 184) is closest to Adams & Reeve's *Hypselodoris whitei*.

*Hypselodoris zephyra* Gosliner & Johnson, 1999  
(pl. 4 fig. 7)

*Hypselodoris zephyra* Gosliner & Johnson, 1999: 84, figs 30F, 40D, 55-56.

Material.— RBE Stn 5, Galghoek, Leitimur, 12 m depth, 2.xii.1990, leg. A. Fortuin, photos M. Lavaley 38-17/19, one specimen 11 × 3 mm preserved, extended, with minimum 6 gills (specimen b); RBE Stn 5, Galghoek, Leitimur, 2 m depth, 8.xi.1990, leg. A. Fortuin, photos M. Lavaley 4-20/21, one specimen 11 × 5 mm preserved, with minimum 6 gills (specimen a, radular prep. light microscope); RBE Stn 17, south east coast of Pombo Island, 2 m depth, 16.xi.1990, leg. A. Fortuin, photos M. Lavaley 14-29/30, one specimen 19 × 9 mm preserved, with 8 gills (specimen c, radular prep. lost, SEM).

Description.— The body is elongate, spatulate anteriorly and rounded posteriorly. The living animal has a warm buttery yellow colour with longitudinal deep violet to black lines which may meet and cross. There is a tendency for the pair of dark lines extending in front of the rhinophores to form a quadrangle. Patches of lilac areas are scattered on the dorsum and a series of bands or patches are present discontinuously around the margin; there are also fewer patches of deeper yellow. The very edge of the

Character	<i>Hypselodoris nigrostriata</i>	<i>Hypselodoris zephyra</i>
ground colour	milky violet	creamy yellow, few violet patches
mantle edge	yellow	yellow line + patches/spots
foot edge	violet	violet + violet tip
rhinophores rim	deep orange red yellow	orange with white tip orange
gills	deep orange or red with or without white	watery orange
rim number	yellow 7-9	submarginal black horseshoe 6-8
radular formula	80 × 79.0.79 (40 mm, Rudman, 1977) >70 × 65.1.0.1.65 (20 mm pres., Chagos)	65 × 59.1.0.1.59 (11 mm pres., Ambon) 47 × 56.0.56 and 41 × 48.0.48 (no measurements, Gosliner & Johnson 1999)
jaws	rods with posteriorly pointing terminal spine 40 × 10 µm	square plates or elongate rodlets
provenance	Indian Ocean + ? Micronesia	west Pacific Ocean

mantle is a deep yellow line. The raised rims of the gills and rhinophores are dirty orange. The rhinophores are deep orange with a dense white tip, and the 6-8 gills are watery orange with and without white pigment. The foot is buttery yellow with several dark lines and a lilac margin, and the oral tentacles are lilac in colour.

The radular formula is 65 × 59.1.0.1.59. The first lateral is tricuspid and small (20 µm); the remaining teeth are bicuspid, with large bases, and steadily increase in size (25-60 µm). The lateral teeth are the same shape; none are denticulate, only bicuspid. The jaw plates are tightly packed square plates with rounded edges in rear view; there may be a spine present anteriorly.

Remarks.— While work on the collection was in progress, *Hypselodoris zephyra* was described as a new species. The specimens described here were also recognized as new and differing from *H. nigrostriata* Eliot, 1904. The original description of *H. nigrostriata* Eliot (1904) and redescriptions (Rudman, 1977; Yonow et al., in press) are from East Africa and Chagos; they differ from the Pacific species in having a rich milky violet ground colour with distinct yellow patches, a yellow rim to the gill pocket, and deep red or orange gills and rhinophores. These Indonesian specimens are paler and not vio-

let except in patches, especially at the ends of the mantle, and there are dense white tips to the rhinophores; the differences between the two are tabulated below. The radulae are similar in formulae, but there are slight differences in tooth shape. The jaws are quite different; in *H. nigrolineata* they are rods with a strong posteriorly-pointing terminal spine (Rudman, 1977), whereas in the present specimens the base is squared; Gosliner & Johnson, (1999) describing them as elongate and undivided rodlets. However, Ortea et al. (1996) have noted that shape varies with location on the jaw. Externally, our material conforms to the original description. The radula of the 11 mm preserved specimen has many more rows than Gosliner & Johnson's specimen of unrecorded size; tooth shape and size are otherwise comparable. *Hypselodoris zephyra* is currently known from the west Pacific; this is the second record from Indonesia. Coleman's photograph (1989: 33) from the Great Barrier Reef is most similar to the material from Ambon; the figure in Willan & Coleman (1984: 25, species 63) is also similar, as is that in Debelius (1996: 238). Colin & Arneson (1995: 184, species 860) appear to record *Hypselodoris nigrostriata* from the Pacific (Micronesia) for the first time.

*Mexichromis katalexis* spec. nov.  
(figs 9 a-b, 10 a-b, pl. 4 fig. 8)

Material.— Holotype: Mal. 20, west of Lilibooi, Hitu, 20 m depth, 20.xi.1996, leg. L.P. van Ofwegen, photo J. Goud, one specimen 27 mm (16 × 7 mm preserved). Paratypes: Mal. 03, west of Sahuru, Hitu, 1 m depth, 15.xi.1996, leg. and photo J. Goud, one specimen 24 mm (specimen a, 17 mm preserved, well relaxed, radular prep); Mal. 03, west of Sahuru, Hitu, 1 m depth, 15 xi. 1996, leg. and photo J. Goud, one specimen 24 mm (specimen b, 18 mm preserved, well relaxed, fig. ventral); Additional material (not types): Tulamben Bay, North east Bali, 3-20 m depth, xi.1990, leg. and photo H. Debelius, one specimen 12 × 7 mm preserved, curled; RBE St. 37, west of Laha, Hitu, 8 m depth, 6.xii.1990, leg. A. Fortuin, photos M. Lavaley 46-18/20, three specimens 18 × 9 mm, 15 × 7 mm, and 14 × 9 mm curled, all preserved but with gills extended.

Description.— In life, the body is solid and domed, varying in ground colour from dirty yellow to dirty beige. It is covered with single and compound tubercles, and these are creamy white; the terminal nipple of each is purple. The beige mantle colour is absent at the bases of these tubercles and in a band around the margin. This creamy marginal band contains smaller single purple-tipped tubercles and patches of burnt orange, deepest in colour in the holotype, at the very edge. The rhinophore club, distal quarter to half of the gills, tubercles, and the edge of the foot are a deep purple, in contrast to the orange on the mantle margin. The rims of the rhinophore and gill sheaths and the rachis of the gills are creamy white, as is the submarginal band around the foot. The rim of the gills has small single tubercles around the opening. The 9-11 gills are arranged in a ring and held upright in a tulip-shaped bell. Photographs of the specimens are all similar; there are slight variations in the intensity of the dirty colour of the dorsum and in the sizes of the orange marginal patches.

The alcohol-preserved FMMME specimens are white with a yellow to pale orange dorsum (examined 1999). The tubercles, margin, rhinophores, gills, and foot are white. The gills are extended in both specimens, and number ten in specimen b and eleven in specimen a. Both specimens retain the rims around the gills and rhinophore pockets; the rhinophores are barely visible in specimen a. The Balinese specimen, preserved in 4%

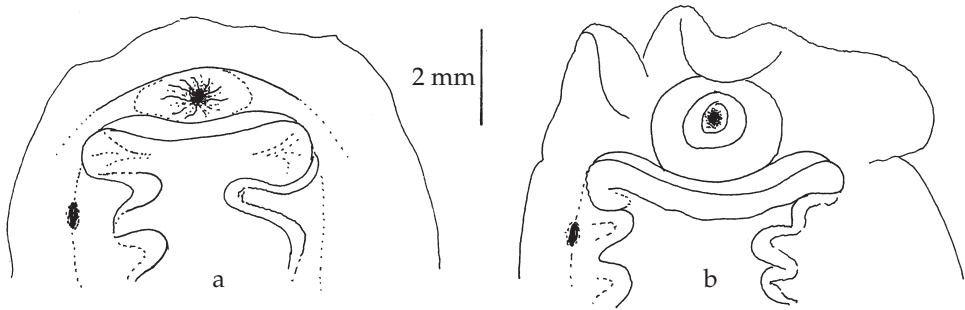


Fig. 9. *Mexichromis katalexis* spec. nov. Ventral view of heads of paratypes; a, Mal. 03a (24 mm preserved.); b, Mal. 03b (24 mm preserved).

formaldehyde, retains the purple pigment around the foot and on the tubercles, gills, and rhinophores (examined in 1996); the mantle glands are also clearly visible around all the mantle edge as dense white pigmentation, larger posteriorly. Ventrally, the head, without tentacles, is visible, and the anterior margin of the foot is bilaminated in the three types (fig. 9a-b).

The radula (Mal. 03, specimen a) is tiny relative to body size, with formula  $51 (+11) \times 40.0.40$ . The shape of the teeth is difficult to describe: it is multicusped, pectinate, or denticulate, each projection being large. The base is small, the main cusp blade-like. There are 5-6 denticles on the cusp which decrease in size away from the tip. The first 5-6 lateral teeth are not as flattened as the remaining ones in the row (fig. 10a). They can be described as having a larger cusp with one large denticle medially and 4-5 denticles laterally, all supported by a proportionately larger base. The laterals are all similar in size and shape (fig. 10b) except for the last one or two in each row which are greatly reduced.

Remarks.— The most similar species is *Mexichromis multituberculata* (Baba, 1989), with conical, pointed, purple-tipped papillae on the dorsum, but the mantle is edged with purple patches. It is known from Japan, China, and Hong Kong (Rudman, 1983; Baba, 1989a). It is also recorded in this paper as two photographs, without specimens, from Bali (H. Debelius). It clearly differs in the shape of the papillae and the purple tuberculate margin. The gills (ten in both photographed individuals) are identical in colour and shape to those of *Mexichromis katalexis* spec. nov. This is the first record of *M. multituberculata* from Indonesia. *Mexichromis mariei* (Crosse, 1872) is also very similar but is only slightly pustular; it has a continuous, sometimes broken, marginal band of orange-yellow around the mantle margin; it has a submarginal (not marginal) purple band on the foot, and purple rims around the rhinophore openings. It has been recorded from Ambon (Bergh, 1890 as *Chromodoris sannio* Bergh, 1890), Australia, and New Caledonia (Rudman, 1983). Other species with similar colour patterns but which are smoother or without tubercles are *M. festiva* (Angas, 1864), much paler in colour with a continuous yellow border (recorded from Australia and Japan) and *M. macropus* Rudman, 1983, pale lilac centrally with perpendicularly elongated patches of orange around the edge (Australia).

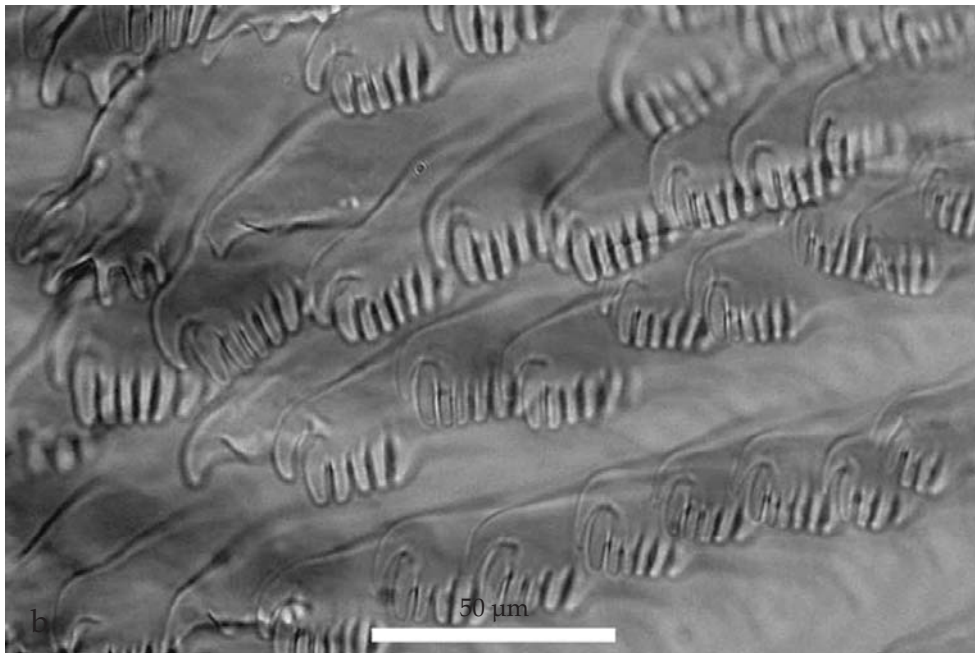
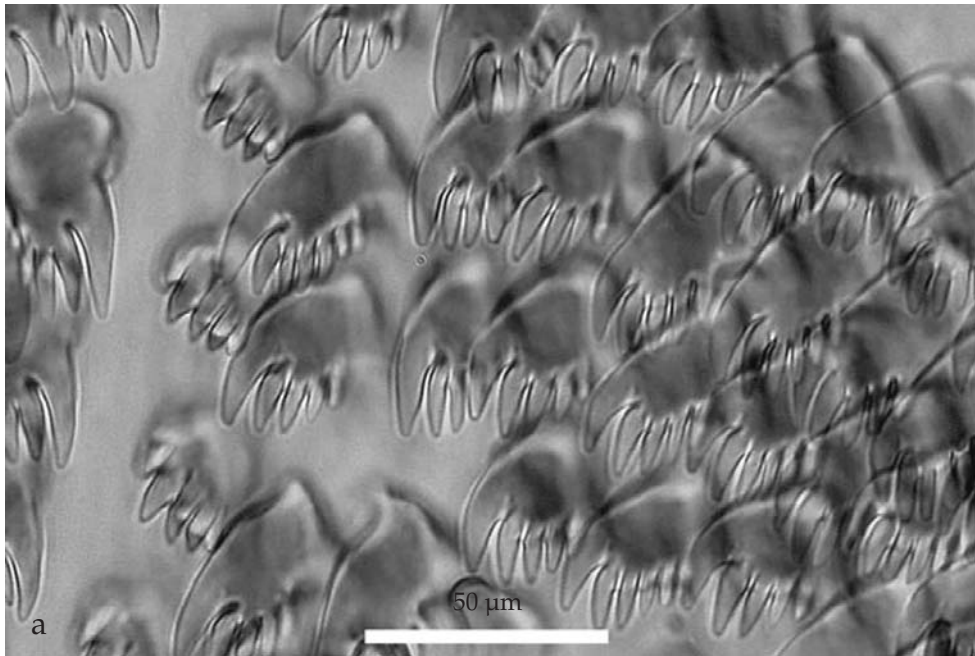


Fig. 10. *Mexichromis katalexis* spec. nov. Light micrographs of radular teeth of paratype (Mal.03a, 24 mm preserved); a, midline of radula and first right laterals, rows 13-16; b, edge of right side, rows 25-29.

The radula is typical of the genus, very small and with the number of teeth per half row approximately 2/3 the number of rows, and with characteristically shaped teeth. The radula of this new species differs from that of *M. multituberculata* and *M. mariei*, the most similar species, in having the first laterals not as flattened as the remaining teeth. The remaining laterals are all similar in size and shape except for the last one or two in each row, which are greatly reduced, as in *M. mariei*.

There are colour photographs of this species in Debelius (1996: 217, two figures) as *Mexichromis multituberculata*.

Etymology.— "Katalexis" is Greek for end or termination, referring to the tips of the tubercles, gills, and rhinophores, which are coloured purple.

? *Noumea alboannulata* Rudman, 1986  
(pl. 5 figs 1, 2)

? *Noumea alboannulata* Rudman, 1986b: 333, figs 1, 9, 11-12.

Material.— Mal. 10, east of Erie, Leitimur, 15 m depth on sponges, 12.xi. 1996, leg. and photo J. Goud, one specimen 15 mm (6 mm preserved); Derawan, East Borneo, iv.1997, leg. and photo J. Hinterkircher, one specimen 5 mm in length alive (4 × 1 mm preserved).

Description.— The colour photograph accompanying the Borneo specimen depicts a pale lilac body with more intense violet in front of the rhinophores and on the tip of the metapodium (pl. 5 fig. 2). The wide margin of the mantle is white with translucent areas, and on its inner edge is a dense line of white pigment. There is a median white band which originates between the rhinophores and divides immediately to form two lines which join in a loop behind the gills. Inside this region the mantle is pale lilac with white mottling. The pointed tail extends beyond the mantle; it is pale lilac with a central white line and violet tip. The rhinophore pockets may be edged in white; the rhinophores and gills are semi-translucent with white pigmentation. The Ambon specimen is much paler lilac, but this may be due to the dense black background of the photograph (pl. 5 fig. 1). The rhinophores and eight gills are tipped with yellow, and the boundaries between the lilac dorsum and white skirt are less distinct than in the Borneo photograph.

The Borneo specimen was preserved with a specimen of *Chelidonura amoena* and as a result is very dark. Otherwise, both specimens are alike, with certain characteristics in common: the dorsum, the sides, and the foot are speckled; the region of the white marginal skirt is thickened; and there is a physical demarcation between the central mantle and the marginal skirt. The rhinophore and gill pockets are barely visible, but slightly darker in colour than the mantle. Ventrally, the foot is contracted all around the edge; the oral tentacles are invisible and the mouth is just a puckered opening in the head. Adjusting the angle of the light source, patches of violet pigment are visible dorsally on both the mantle and the foot on the Borneo specimen (preserved in formaldehyde).

Remarks.— The colour pattern most closely approaches that of *Noumea alboannulata*: the main differences are the presence of a white patch medially and the absence of deep magenta spots between the pink mantle and the white marginal band. Our two specimens are small compared to *Noumea alboannulata*, which can grow to 25 mm, but may

represent juveniles. They are too small to attempt dissection of the ramula. ?*Chromodoris varians* pictured in Willan & Coleman (1984: 27) is similar, as is *Chromodoris* spec. 5 in Gosliner (1987: 79, 7 mm); if the latter had the white line around the central patch, it would be identical externally to the present specimens. The denser pigmentation around the patch of the South African specimen (Gosliner, 1987) could conceivably become a dense line around it as the animal grows and the pattern develops. However, both figured specimens also lack the magenta spots around the margin characteristic of *Noumea alboannulata*.

*Pectenodoris trilineata* (Adams & Reeve, 1850)  
(pl. 5 fig. 3)

*Chromodoris virgata* Bergh, 1905: 161, pl. 4, fig. 11 pl. 16 fig. 47.

*Pectenodoris trilineata*; Rudman, 1984: 159, figs 29-31; 1986b: 319, figs 1C, 5.

Material.— RBE Stn 4, Wainitu, Leitimur, low tide zone, 7.xi.1990, leg. H.L. Strack, photos M. Lavaleye 47-23/24, 47-25/26, two specimens 6 × 4 mm and 3 × 2 mm (both preserved); RBE Stn 37, west of Laha, Hitu, 6.xii.1990, leg. A. Fortuin, photos M. Lavaleye 9-22/24, two specimens approximately 4 mm preserved (hard, dried?).

Description.— The species can only be adequately described by its colours: the intense ground colour is more pink centrally and more violet laterally. There are three yellow longitudinal bands outlined in white, and the whole mantle is edged with a fine white line. There are a few patches of yellow edged with white around the mantle edge, and the defensive mantle glands, arranged around the edge in roughly two series, are visible as pale pink patches. The gills and rhinophores are violet at their bases then translucent white with red markings. The body is elongate to broadly oval in shape; the tail extends slightly beyond the posterior margin.

Remarks.— *Pectenodoris trilineata* is a truly beautiful species. It has been recorded from the South China Sea and the Great Barrier Reef, and Bergh (1905) described it from Indonesia as *Chromodoris virgata*.

*Risbecia apolegma* spec. nov.  
(figs 11-12, pl. 5 figs 4, 5)

*Chromodoris bullocki* (sic.); Wells & Bryce, 1993, 126, fig. 160 (misidentification).

*Chromodoris bullockii*; Strack, 1998: pl. 2 fig. 3 (misidentification).

Material.— Holotype: RBE Stn 39, Het Suikerbroodje, Hitu, 4-5 m depth, 9.xii.1990, leg. and photos W. Kolvoort, 46 × 22 mm preserved and nicely relaxed. Paratypes: RBE Stn 39, Het Suikerbroodje, Hitu, 4-5 m depth, 9.xii.1990, leg. and photos W. Kolvoort, M. Lavaleye 50-3/6, one specimen 32 × 11 mm preserved, nicely relaxed (fig. ventral); Mal. 23, near Cape Nusanive, Leitimur, 24 m depth, 21.xi.1996 leg. B.W. Hoeksema; photo J. Goud, one specimen 80 mm (60 mm preserved, well relaxed, radular prep.).

Description.— *Risbecia apolegma* spec. nov. is recognized by its almost luminescent magenta pink to violet mantle, the colour being connected to an opaque white margin by a region of violet stippling combined with white reticulations. The mantle is elongat-





Fig. 11. *Risbecia apolegma* spec. nov. Ventral view of head of paratype (Mal. 23, 80 mm).

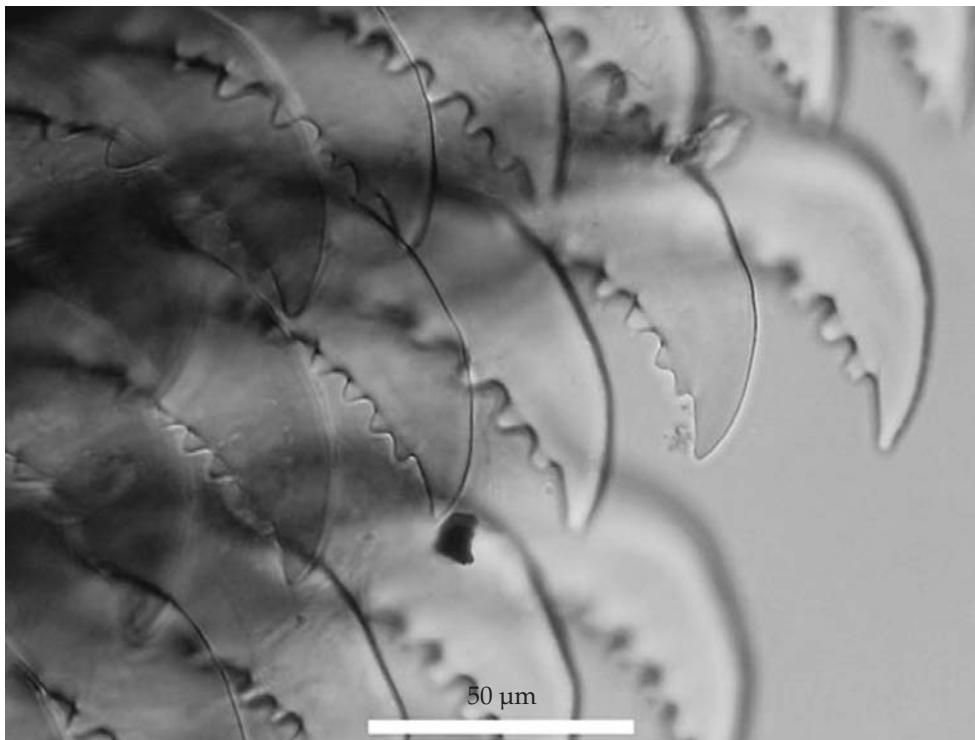


Fig. 12. *Risbecia apolegma* spec. nov. Light micrographs of radular teeth of paratype (Mal. 23, 80 mm), teeth in new third of radula near the midline.

ed, fairly spatulate anteriorly, and the edge is crinkled; these characters remain in the preserved specimens. The body is high and fleshy but firm, and although there is a definite mantle overlap, it is reduced. The foot is also large and firm, and extends beyond the mantle posteriorly. This is visible in the preserved material, where the mantle extends far beyond the foot anteriorly but the reverse occurring posteriorly. The rhinophores are deep orange-yellow with purple peduncles; the holotype has 25 lamellae on the club. One rhinophore is extended in the FMMME specimen: the lamellae meet in an alternating series, rather than opposite each other, and there are 27 lamellae on one side and 29 on the other. The five tripinnate gills are yellow with violet stalks, located far back on the dorsum, and held very high. Both the rhinophores and gills issue from a pocket with a raised rim, which has the same colour as the mantle. Both pocket rims are particularly prominent, in life as well as in the preserved material. The gill pocket is very high in life, almost tubular, and is pimples; these pimples are present immediately surrounding the gill pocket and extending forward beyond the 2/3 mark on the dorsum and remain on the preserved specimens. The foot is uniformly coloured, a shade more purple than the mantle, with no banding around the edge. Ventrally, the foot is bilaminate: neither lamina is notched, although the edges are crumpled. In all three preserved specimens, the folds of the sides of the foot are characteristic, with a main fold just beyond the head, and smaller undulating folds subsequently. The oral tentacles are just visible far on each side of the head (fig. 11). The bilaminate and crumpled front margin of the foot and the oral tentacles are visible in pl. 5 fig. 4.

The radula bears rows of hooked and serrated teeth which are all similar along the row, increasing rapidly in size for the first 5-6 teeth, and remaining more or less constant in size to the last few laterals, which have reduced cusps. There is no central rhachidian or thickening visible; the first lateral has 4-5 denticles on the outer side as do the remaining laterals, and none medially (fig. 12). Each cusp has 4-6 serrations, rarely 7 or 8, along the bottom of the cuspec. The formula is  $90 (+6) \times \text{min. } 121.0.121$  for the 80 mm specimen (Mal. 23).

Remarks.— This species is distinctive and easily recognizable, and photographs can be identified with little difficulty; the species appears to show little if any variation, and its confusion with *Hypselodoris bullockii* is somewhat surprising. It also does not resemble any other species of *Chromodoris* or *Hypselodoris*. Rudman (1995) described two small pink/purple species, but both differ in having a distinct line between the purple mantle and white margin. Also they differ morphologically and belong to different genera, *Durvilledoris albofimbria* Rudman, 1995 (11 mm) and *Hypselodoris punicea* Rudman, 1995 (12 mm). He stated that *Hypselodoris punicea* was virtually identical to *Hypselodoris rosans* (Bergh) from Mauritius: only anatomical characters appear to separate them. *Noumea romeri* Risbec, 1928, also has a thin white line with a definite edge and a circlet of orange gills. Finally, *Noumea simplex* (Pease, 1871) is the only species described as having the interface between pink mantle and white margin as diffuse, but is very small, maximum recorded size being 14 mm. Additionally, it has a deep orange (broken) line around the margin, and the rhinophores and gills are translucent with orange. The new species described here is definitely large, and the gills are not arranged in a circlet as in *Noumea* but are elevated on purple

peduncles. Body shape is typical for *Risbecia*, and the radular teeth are characteristic mid-lateral teeth found in this genus; the sharpness and differentiation of the first few laterals, typical of the genus, were not observed in this specimen. There are slightly more teeth per half row than number of rows, another character of the genus. There are colour photographs in Allen & Steene (1994: 194) and Debelius (1996: 232, bottom right only) as *Hypselodoris bullocki* (*sic.*), and Colin & Arneson (1995: 183, species 853) and Gosliner et al. (1996: 165), from the west Pacific and western Australia.

Etymology.— “Apolegma” is Greek for the hem of a robe, referring to the white margin which is not sharply distinct from the violet mantle.

*Risbecia tryoni* (Garrett, 1873)  
(pl. 5 fig. 6)

*Risbecia tryoni*; Rudman, 1984: 196, figs 60-65; Rudman, 1987: 379, figs 39, 42.

Material.— RBE Stn 30, Suli, Hitu, 5-7 m depth, 29.xi.1990, leg. A. Fortuin, photos M. Lavaleye 35-10/11, one specimen 17 mm long, preserved and distorted; Mal. 05, west of Hila, Hitu, 12 m depth, 7.xi.1996, leg. M. Slierings, photo of 33 mm specimen J. Goud, two specimens 28 mm and 33 mm, both preserved; Derawan, East Borneo, iv.1997, J. Hinterkircher, colour photographs of two individuals both 40 mm in length, alive.

Description.— The RBE specimen alive is very similar to *Chromodoris leopardus* (cf. p. 23) in colouration, with small deep purple-black spots surrounded by a diffuse area of cream. The edge is indigo, and submarginally it is slightly paler so that the iridescent pink mantle glands around the edge, concentrated posteriorly, are clearly visible. The sixteen plumose gills are cream with brown edges, and the rhinophores are brown with white stalks, lamellar edges, and rachides. The foot is patterned like the dorsum, spotted with an indigo edge. The preserved FMMME specimens are dirty brown with the dark spots in life now very dense white, still present on the mantle, metapodium, and sides and top of the foot, while the RBE specimen retained no markings what-so-ever. A faint purple margin partially remains, especially anteriorly. The 33 mm specimen (Mal. 05) had sixteen gills.

Remarks.— *Risbecia tryoni* differs externally from *Chromodoris leopardus* in body shape, shape of the brown markings, presence of spots on the foot, brown rhinophores, and obvious presence of mantle glands. One of the specimens photographed from Derawan (pl. 5 fig. 6) supports a copepod parasite; the purple egg sacs are visible behind the gills. Eliot (1904) noted an infestation of violet copepods in *Chromodoris reticulata* (misidentification: *Chromodoris marinindica* nom. spec., see p. 21 and Risbec (1953) described purple copepods on *Chromodoris marginata* (Pease, 1869) (*Lichomolgus* spec.) and on *Hypselodoris mouaci*, both from New Caledonia. *Risbecia tryoni* is known from Australia, the Solomon Islands, French Polynesia, New Caledonia, and Christmas Island in the eastern Indian Ocean. There are colour photographs in Allen & Steene (1994: 198), Gosliner et al. (1996: 167), and Debelius (1996: 220, two larger photographs).

## Family Hexabranichidae

*Hexabranichus marginatus* (Quoy & Gaimard, 1832)

(pl. 5 figs 7, 8)

*Doris marginatus* Quoy & Gaimard, 1832: 255, pl. 17 figs 1-5.*Hexabranichus adamsii* Gray, 1850: 104 (vol. 4), pl. 219 fig. 1 (vol. 4).*Hexabranichus punctatus* Bergh, 1905: 92.*Hexabranichus marginatus*; Bergh, 1905: 90, pl. 1 fig. 2; Yonow, in prep.*Hexabranichus marginatus* var. Bergh, 1905: 91, pl1 figs 1, 8.

Material.— RBE Stn 23, Kaitetu, Hitu, 2 m depth, 22.xi.1990, leg. and photos M. Lavaleye 27-1/12, 28-10/12, one specimen 110 × 70 mm preserved; RBE Stn 23, Kaitetu, Hitu, 1 m depth, 23.xi.1990, leg. J.C. den Hartog, photos M. Lavaleye 29-25/28, one specimen 70 mm wide preserved, curled; Mal. 12, near Mamala, Hitu, reef flat, 14.xi.1996, leg. J. Goud, one specimen 110 mm preserved (six gills, no photos); 3 km west of Said, Batu Hitam, Hitu, 2 m depth, 23.xi.1997, leg. H.L. Strack, one specimen 35 × 17 mm preserved (eight gills, no photos).

Remarks.— A recent examination of the genus *Hexabranichus* (Yonow, in prep.) establishes the Latin binomial *Hexabranichus marginatus* for the Indo-Pacific species. A literature survey and material from the Pacific and Indian Oceans and the Red Sea was examined, as well as a vast number of colour slides from the regions. The species is well known, and the photographs accompanying these specimens represent the most common colour pattern of blotchy yellow and red, surrounded by a white-red-white margin which can be unfurled. There are variations and some local colour forms, such as the Hawaiian "*pulchellus*", but intermediates occur throughout the Indo-Pacific. The Red Sea species, however, is consistently different and recorded elsewhere only very rarely, and is assigned to *H. sanguineus* (Rüppell & Leuckart, 1830). It was originally described from the northern Red Sea, and all records from the Red Sea record it as consistently deep red with a white margin.

The 110 mm RBE specimen, with six gills, has a radular formula of 54 × 81.0.91, while the 70 mm specimen, with eight gills (the lower two gills are paired), has a formula of 39 × 56-51.0.51-56. The teeth have a simple hook-shaped cusp, with a knob at the top, and a strong base. They are identical in shape to those figured by Rudman (1986b: 20) but much larger. The teeth in Rudman's 10 mm juvenile specimen measured 57.5 mm, while those of the 70 mm specimen measure 370 mm, and those of the 110 mm specimen 326 mm. All measurements were made from the tip of the cusp across to the base in a line perpendicular to the base.

## Acknowledgements

I would like to sincerely thank H.L. Strack (Nationaal Natuurhistorisch Museum, Leiden, The Netherlands) for entrusting the Rumphius Biohistorical Expedition specimens to me, and J. Goud (also NNM, Leiden) for the loan of the Fauna Malesiana Marine Maluku Expedition material, which he collected with special care. I am also grateful to H.L. Strack for additional material, copies of rare papers, and his patience as editor of the reports. Johann Hinterkircher (Munich, Germany) has been collecting and photographing material for me for many years, and for his generosity I am very

grateful. Dr P.J. Hayward and Dr M.R. Fordy were indispensable for SEM work, despite the difficulties encountered, as was Professor J.S. Ryland for the light microscopy; Miss Ruth Zühlke cheerfully translated paragraphs of the great Bergh, and enabled much clarification (all at School of Biological Sciences, Swansea). Universal Book Services (The Netherlands) kindly provided my copy of Bergh's *Siboga Expeditie*. Suzanne Hart (Swansea, Wales, UK) and H. Debelius (IKAN, Frankfurt, Germany) also provided photographs of nudibranchs found on their respective trips to Indonesia, and I thank them.

### References

- Abraham, P.S., 1877. Revision of the anthobranchiate nudibranchiate Mollusca, with descriptions or notices of forty-one hitherto undescribed species.— Proc. zool. Soc. London 1877: 196-269.
- Adams, A. & L. Reeve, 1850. The zoology of the voyage of H.M.S. Samarang under the command of Captain Sir Edward Belcher during the years 1843-1846.— Mollusca (1-3): 1-87.
- Allen, G.R. & R. Steene, 1994. Indo-Pacific coral reef field guide. 1-378.— Tropical Reef Research, Singapore.
- André, E., 1896. Mollusques d'Amboine. In: Voyage de M. Bedot et C. Pictet dans l'Archipel Malais.— Revue Suisse Zool., 4: 395-405, pl. 17.
- Baba, K., 1989a. More studies on two species of *Mexichromis* from Japan (Nudibranchia: Chromodorididae).— Venus 48 (1): 12-20.
- Baba, K., 1989b. Taxonomical study on two species of the "*aureopurpurea*" color group of *Chromodoris* from Japan (Nudibranchia: Chromodorididae).— Venus 48 (1): 21-26.
- Baba, K., 1994. Descriptions of four new, rare or unrecorded species of *Hypselodoris* (Nudibranchia: Chromodorididae) from Japan.— Venus 53 (3): 175-187.
- Bergh, L.S.R., 1870. Malacologische Untersuchungen, 2. Die Nudibranchien des "Sunda-Meer". In: C. Semper, Reisen im Archipel der Philippinen 1 (1): 1-30, pl. 1-8.
- Bergh, L.S.R., 1874. Neue Nacktschnecken der Südsee. II.— J. Mus. Godeffroy 2: 91-116, pl. 1-4.
- Bergh, L.S.R., 1875. Neue Nacktschnecken der Südsee. III.— J. Mus. Godeffroy 3 (8): 53-100, pl. 7-11.
- Bergh, L.S.R., 1887. Die van Hasselt'schen Nudibranchien.— Notes Leyden Mus. 9 (4): 303-323, pl. 6.
- Bergh, L.S.R., 1890. Malacologische Untersuchungen, 2. Die Nudibranchien des "Sunda-Meer". In: C. Semper, Reisen im Archipel der Philippinen 3 (16), pt. 2: 873-994.
- Bergh, L.S.R., 1905. Die Opisthobranchiata der Siboga Expedition.— Siboga Expeditie Monogr. 50: 1-248.
- Bertsch, H. & T.M. Gosliner, 1989. Chromodorid nudibranchs from the Hawaiian Islands.— The Veliger 32 (3): 247-265.
- Bertsch, H. & S. Johnson, 1981. Hawaiian nudibranchs. 1-112.— Oriental Publishing Co., Honolulu, Hawaii.
- Coleman, N., 1989. Nudibranchs of the South Pacific. 1-64.— Sea Australia Resource Centre, Springwood, Australia.
- Colin, P.L. & C. Arneson, 1995. Tropical Pacific invertebrates: A field guide to the marine invertebrates, etc. 1-295.— Coral Reef Press, California, U.S.A.
- Collingwood, C., 1881. On some new species of nudibranchiate Mollusca from the Eastern Seas.— Trans. Linn. Soc., London: Zoology (2) 2 (2): 128-140.
- Debelius, H. (ed.), 1996. Nudibranchs and sea snails: Indo-Pacific field guide. 1-321.— IKAN, Frankfurt, Germany.
- Eliot, C.N.E., 1904. On some nudibranchs from East Africa and Zanzibar. Part IV.— Proc. Zool. Soc., London 1904(1): 380-406.
- Eliot, C.N.E., 1905. Nudibranchs from the Indo-Pacific. 1. Notes on a collection dredged near Karachi and Maskat.— J. Conch. 11: 237-256.
- Eliot, C.N.E., 1911. Chromodorids from the Red Sea, collected and figured by Mr. Cyril Crossland.— Proc. Zool. Soc., London 1911: 1068-1072.

- Engel, H. & J. Nijssen-Meyer, 1964. On *Glosodoris quadricolor* (Rüppell & Leuckart, 1828) (Mollusca, Nudibranchia).— *Beaufortia* 11 (132): 27-32.
- Farran G.P., 1905. Report on the opisthobranchite Mollusca collected by Prof. Herdman at Ceylon, in 1902. In: W.A. Herdman, Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar 3, suppl. rep. 21: 329-364.
- Fransen, C.H.J.M & J. Goud, 2000. *Chromodoris magnifica* (Quoy & Gaimard, 1832), a new nudibranch host for the shrimp *Periclimenes imperator* Bruce, 1967 (Pontoniinae).— *Zool. Med. Leiden* 73: 273-283.
- Gosliner, T., 1987. Nudibranchs of Southern Africa. A guide to opisthobranch molluscs of Southern Africa. 1-136.— Leiden, The Netherlands.
- Gosliner, T.M. & D.W. Behrens, 1998. Five new species of *Chromodoris* (Mollusca: Nudibranchia: Chromodorididae) from the tropical Indo-Pacific Ocean.— *Proc. Cal. Acad. Sci.* 50 (5): 139-165.
- Gosliner, T.M., D.W. Behrens, & G.C. Williams, 1996. Coral Reef Animals of the Indo-Pacific. 1-314.— Sea Challengers, California, U.S.A.
- Gosliner, T.M. & R.F. Johnson, 1999. Phylogeny of *Hypselodoris* (Nudibranchia: Chromodorididae) with a review of the monophyletic clade of Indo-Pacific species, including descriptions of twelve new species.— *Zool. Journ. Linn. Soc.* 125: 1-114.
- Gray, M.E., 1850. Figures of molluscous animals, selected from various authors 2-4: 1-124, pls. 79-312.
- Kay, E.A. & D.K. Young, 1969. The Doridacea (Opisthobranchia, Mollusca) of the Hawaiian Islands.— *Pacific Science* 23: 172-231.
- Kelaart, E.F., 1858. Descriptions of new and little known species of Ceylon nudibranchiate molluscs and zoophytes.— *Journ. Ceylon Branch Roy. Asiatic Soc., Colombo* 3 (1): 84-139.
- Kelaart, E.F., 1859. Description of new and little-known species of Ceylonese nudibranchiate Mollusca.— *Ann. Mag. nat. Hist.* 3 (3): 291-269.
- Land, J. van der (ed.), 1996. Progress Report-Fauna Malesiana Marine Maluku Expedition 1996.— Unpublished report, 1-31, figs 1-6.
- Ortea, J., A. Valdés & J.C. Garcia-Gomez, 1996. Revision de las especies atlánticas de la familia Chromodorididae (Mollusca: Nudibranchia) del grupo cromático azul.— *Avicennia*, supl. 1: 1-165.
- Pease, W.H., 1866. Remarks on Nudibranchiata inhabiting the Pacific Islands, with descriptions of two new genera.— *Am. J. Conch.* 2 (3): 204-208.
- Quoy, J.R.C. & J.P. Gaimard, 1832. Voyage de découvertes de l'Astrolabe exécuté. etc. par M.J. Dumon d'Urville. *Zoologie* 2: 1-320.
- Risbec, J., 1928. Contribution a l'étude des nudibranches Neo-Caledoniens.— *Faune des Colonies Françaises* 2: 1-328.
- Risbec, J., 1930. Nouvelle contribution à l'Étude des nudibranches Neo-Caledoniens.— *Annls Inst. Océanogr.* 7 (7): 263-298.
- Risbec, J., 1953. Mollusques nudibranches de la Nouvelle Calédonie.— *Faune de l'Union Française* 15: 7-189.
- Risbec, J., 1956. Nudibranches du Viet-Nam.— *Arch. Mus. Natn. Hist. Nat.* (7) 4: 5-34.
- Rudman, W.B., 1973. Chromodorid opisthobranch Mollusca from the Indo-West Pacific.— *Zool. J. Linn. Soc.* 52 (3): 175-199.
- Rudman, W.B., 1977. Chromodorid opisthobranch Mollusca from East Africa and the tropical West Pacific.— *Zool. J. Linn. Soc.* 61(4): 351-397.
- Rudman, W.B., 1982. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: *Chromodoris quadricolor*, *C. lineolata* and *Hypselodoris nigrolineata* colour groups.— *Zool. J. Linn. Soc.* 76(3): 183-241.
- Rudman, W.B., 1983. The Chromodorididae (Opisthobranchia: Mollusca) of the Indo-West Pacific: *Chromodoris splendida*, *C. aspersa* and *Hypselodoris placida* colour groups.— *Zool. J. Linn. Soc.* 78 (2): 105-173.
- Rudman, W.B., 1984. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: a review of the genera.— *Zool. J. Linn. Soc.* 81: 115-273.
- Rudman, W.B., 1985. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: *Chromodoris aureomarginata*, *C. verrieri* and *C. fidelis* colour groups.— *Zool. J. Linn. Soc.* 83(3): 241-299.

- Rudman, W.B., 1986a. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: the genus *Glossodoris* Ehrenberg (= *Casella* Hancock and A. Adams).— Zool. J. Linn. Soc. 86 (2): 101-184.
- Rudman, W.B., 1986b. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: *Noumea purpurea* and *Chromodoris decora* colour groups.— Zool. J. Linn. Soc. 86 (4): 309-353.
- Rudman, W.B., 1987. The Chromodorididae (Opisthobranchia, Mollusca) of the Indo-West Pacific: *Chromodoris epicuria*, *C. aureopurpurea*, *C. annulata*, *C. coi* and *Risbecia tryoni* colour groups.— Zool. J. Linn. Soc. 90 (4): 305-407.
- Rudman, W.B., 1988. The Chromodorididae (Opisthobranchia: Mollusca) of the Indo-West Pacific: the genus *Ceratosoma* J.E. Gray.— Zool. J. Linn. Soc. 93 (2): 133-185.
- Rudman, W.B., 1995. The Chromodorididae (Opisthobranchia: Mollusca) of the Indo-West Pacific: further species from New Caledonia and the *Noumea romeri* colour group.— Moll. Res. 16: 1-43.
- Rudman, W.B. & B.W. Darvell, 1990. Opisthobranchs of Hong Kong part I: Goniodorididae, Onchidorididae, Triophidae, Gymnodorididae, and Chromodorididae (Nudibranchia).— Asian Mar. Biol. 7: 31-79.
- Rumphius, G.E., 1705.— D'Amboinische Rariteitkamer, etc. 28, 1-340, 43.
- Rüppell, W.P.E.S. & F.S. Leuckart, 1828. Mollusca. In: Atlas zu der Reise im nördlichen Afrika von Eduard Rüppell. Zoologie der neue wirbellose Thiere des Rothen Meeres: 15-47.
- Ryan, P., 1994. The snorkeller's guide to the coral reef, etc. 1-184.— Exisle Publishing Ltd., Auckland, New Zealand.
- Schrödl, M., 1999. *Glossodoris charlottae*, a new chromodorid nudibranch from the Red Sea (Gastropoda, Opisthobranchia).— Vita Marina 46 (3-4): 89-94.
- Schuhmacher, H. & J. Hinterkircher, 1996. Niedere Meerestiere. 1-319.— Munich, Germany.
- Strack, H.L., 1993. Results of the Rumphius Biohistorical Expedition to Ambon (1990). Part 1. General account and list of stations.— Zool. Verh. Leiden 289: 3-72.
- Strack, H.L. 1998. The Rumphius Biohistorical Expedition.— Vita Marina (1-2): 17-40.
- Valdés, A. & T.M. Gosliner, 1999. Reassessment of the systematic status of *Miamira* Bergh, 1875 and *Orodoris* Bergh, 1875 (Nudibranchia; Chromodorididae) in light of phylogenetic analysis.— J. Moll. Stud. 65: 33-45.
- van Hasselt, J.C., 1824. Extrait d'une lettre ... sur les mollusques de l'île de Java.— Bull. sci. Nat., Paris 3: 81-87, 237-245.
- Wells, F.E. & C.W. Bryce, 1993. Sea Slugs of Western Australia. 1-184.— Western Australian Museum, Perth, Australia.
- Willan, R.C. & N. Coleman, 1984. Nudibranchs of Australasia. 1-56.— Australasian Marine Photographic Index, Sydney, Australia.
- Winckworth, H.C., 1946. *Glossodoris* from Bombay.— Proc. Malac. Soc. London 26: 155-160.
- Yonow, N., 1989. Red Sea Opisthobranchia. 2. The family Chromodorididae (Mollusca, Nudibranchia).— Fauna of Saudi Arabia 10: 290-309.
- Yonow, N., 1994. Opisthobranchs from the Maldive islands, including descriptions of seven new species (Mollusca: Gastropoda).— Revue franç. aquariol. herpétol. 20 (4): 97-130.
- Yonow, N., 2000. Red Sea Opisthobranchia 4: The Orders Cephalaspidea, Anaspidea, Notaspidea, and Nudibranchia: Dendronotacea and Aeolidacea.— Fauna of Arabia 18: 87-131.
- Yonow, N., in prep. Species of *Hexabranichus* in the Indo-Pacific, including the "Red Sea Giant" (Opisthobranchia: Nudibranchia: Hexabranichidae).
- Yonow, N., R.C. Anderson, & S.G. Buttress, in press. Opisthobranch molluscs from the Chagos Archipelago, Central Indian Ocean.— J. Nat. Hist.
- Yonow, N. & P.J. Hayward, 1991. Opisthobranches de l'île Maurice, avec la description de deux espèces nouvelles (Mollusca: Opisthobranchia).— Revue franç. aquariol. herpétol. 18 (1): 1-30.

Appendix 1  
Chromodorids described from Ambon

Original record	Current taxon	Notes	Description
<i>Chromodoris albolineata</i> Bergh, 1877	<i>Chromodoris lineolata</i> (van Hasselt, 1824)	Recorded in this work	see p. 23
<i>Chromodoris sannio</i> Bergh, 1890	<i>Mexichromis mariei</i> (Crosse, 1872)	West Pacific distribution: however, Rudman (1983) (and Yonow 1990) records this species from the Red Sea and western Indian Ocean but these records probably refer to a different species.	Oval or slightly elongated oval, dorsum with low rounded pustules tipped with reddish purple. Mantle edge with patches of orange or yellow, sometimes continuous. Foot extending beyond mantle, with submarginal purple band (see p. 37).
<i>Ceratosoma ornatum</i> Bergh, 1890	<i>Ceratosoma tenue</i> (Abraham, 1876)	Recorded in this work	see p. 4
<i>Casella rufomarginata</i> Bergh, 1890	<i>Glossodoris rufomarginata</i> (Bergh, 1890)	Recorded by Rudman (1986a) and Rudman & Darvell (1990) as one specimen from Hong Kong matching Bergh's description. Otherwise, colour variations throughout Indo-Pacific.	Translucent white with central reddish brown speckling, broad translucent white band, reddish orang marginal line; rhinophores and gills orange brown with white.
<i>Chromodoris hilaris</i> Bergh, 1890	<i>Hypselodoris hilaris</i> (Bergh, 1890)	Unrecorded since Bergh's description and colour illustration; notuled and cusped hooked rodlets of jaw plates and bicuspid denticulate teeth, with general body	Living specimen 5 × 1 cm. Light ochre yellow dorsum and tail, dorsum with four bluish black lines, the outermost of which meet in front of the rhinophores and behind



the gills. Mantle and foot margins both brilliant violet; rhinophores (40 lamellae) and 11 gills bright red with tinge of purple. Radula 86 (+4) × 50.0.50; median thickening. Sides of preserved specimen with a row of large white patches: Bergh described the black lines and violet margins as white in the preserved animal, so these were probably pigmented in life.

shape, place this species in the genus *Hypselodoris*. Denticulate teeth confirming affinities of colour group (*H. maridadiilus* and *H. kateyuthios* spec. nov., see pp. 33 and 31). [Rudman (1977) compares this species with *H. nigrolinata* (Eliot, 1904)].

*Chromodoris nodulosa*  
Bergh, 1905

Incerta sedis cf. Rudman 1983: 161 (described from preserved specimens).

Larger than 50 mm in length, flattened, elongate oval, soft and pulsular. Rhinophores (25 lamellae) and 16 gills greyish. Radula reddish brown, 95 × approx. 50.0.50; no median, first lateral denticulate on both sides.

*Chromodoris mariana* Bergh,  
1890

Body shape is most similar to that of *Risbecia*, as is its large radula size; jaw rodlets conform with Rudman's description (1984) for *Risbecia*; radular teeth are virtually identical in shape and formula to those of *Risbecia apolegma* spec. nov.

Bergh described a single preserved specimen 7 × 1.5 cm, and 1.5 cm high. He commented on the long substantial tail, 1.8 cm long: at the base it is 1.3 cm high, tapering to the end. The mantle skirt is narrow, but broader anteriorly ("forehead sail"). Radula large (8.5 mm): 78 (+4) × 110.0.110.

*Chromodoris annae unithaeni-Chromodoris annae* Bergh, 1877  
*ata* André, 1896

New synonym

see p. 6.

## Appendix 2

New species described from Indonesia: species in bold represent those recorded in this paper.

- Ceratosoma tenue* Abraham, 1876 as *Ceratosoma bicorne* Bergh, 1905  
*Chromodoris bimaensis* Bergh, 1905  
***Chromodoris fidelis*** (Kelaart, 1858) as *Chromodoris flamulata* Bergh, 1905 and *Chromodoris lactea* Bergh, 1905  
*Chromodoris inopinata* Bergh, 1905  
*Chromodoris lineolata* (van Hasselt, 1824) as *Doris lineolatus* van Hasselt, 1824  
***Chromodoris magnifica*** (Quoy & Gaimard, 1832)  
*Chromodoris ophthalmica* Bergh, 1905: 153, pl 4/8, pl 16/26: 35 × 10 mm alive; pale yellowish with red dominating; central dorsum paler with darker band and 4 pairs eye spots; white rhinophore stalks and red clubs; yellow gills; tail (bluish) white with yellow margin; radula with 80 rows of approx. 100 hooked and denticulate teeth (50 per half row).  
*Chromodoris pantherina* Bergh, 1905 (not Ehrenberg, 1831): 155, pl 16/32-34: 7 × 5 mm preserved and shrunken; white with contrasting round red pustules scattered on dorsum; foot narrow, long tail with red tip; red rhinophores and darker red gills; radula with many rows + 50 >hidden= with a minimum of 150 teeth per row; the illustrations of bifid teeth suggest that the species belongs to *Hypselodoris*, although the jaw elements are also bifid. There are no records of red spotted hypselodorids to date.  
*Durvilledoris lemniscata* (Quoy & Gaimard, 1832) as *Chromodoris clitonata* Bergh, 1905  
***Glossodoris atromarginata*** Cuvier, 1804 as *Casella atromarginata pallida* Bergh, 1905  
*Glossodoris sibogae* (Bergh, 1905) as *Chromodoris*  
*Hypselodoris whitei* (Adams & Reeve, 1850) as *Goniodoris*  
***Pectenodoris trilineata*** (Adams & Reeve, 1850) as *Chromodoris virgata* Bergh, 1905  
***Hexabranichus marginatus*** (Quoy & Gaimard, 1832) as *H. adamsii* Gray, 1850,  
*H. punctatus* Bergh, 1905

## Incertae Sedis

- |   |                             |
|---|-----------------------------|
| <i>Doris alba</i> van Hasselt, 1824: 238:                       | nomen dubium: Rudman, 1985. |
| <i>Doris punctulata</i> van Hasselt, 1824: 239:                 | Rudman, 1983.               |
| <i>Casella rubra</i> Bergh, 1905: 163, pl 14 fig. 53:           | Rudman, 1986.               |
| <i>Chromodoris papulosa</i> Bergh, 1905: 156, pl 16 figs 35-37: | Rudman, 1983.               |
| <i>Chromodoris venusta</i> Bergh, 1905: 153, pl 16 figs 22-25:  | Rudman, 1986.               |

Received: 7.vii.2000

Accepted: 8.ii.2001

Edited: W. Vervoort & C. van Achterberg