

The opisthobranchs of the Mariana Islands

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Abstract—The opisthobranch fauna of Guam and the Commonwealth of the Northern Marianas (CNMI) is listed based on existing collections and literature records. 485 species have been identified with approximately half of these being undescribed. The actual diversity of the opisthobranchs for the Marianas is likely considerably higher, due to limited collecting in several areas of Guam and few collections made in the CNMI. That the documented opisthobranch fauna is nevertheless one of the most diverse known, implies that the opisthobranch species richness in truly megadiverse locations like Indonesia, the Philippines, and Papua New Guinea, will be found to be several times as high as currently documented.

Introduction

On the 17th of March 1819, the French corvette Uranie, under the command of Captain Louis de Freycinet, dropped anchor in Umatac Bay, Guam. Among the members of that voyage, sent out for scientific exploration, were the zoologists Quoy and Gaimard. The results were published in 1824 and 1825 and included a description of *Bulla guamensis*. Thus began the study of the opisthobranchs of the Mariana Islands. In 1828, Quoy & Gaimard again visited Guam, this time aboard the Astrolabe. Species found included 4 shelled forms and an *Aplysia* (Quoy & Gaimard 1832-1833). There have been no subsequent records of opisthobranchs from the area until Ernst Marcus (1965) published the results of his study of 130 lots sent to him by the Smithsonian Institution in Washington, D.C. This material was collected from Micronesia in the period just after WWII. It included specimens from Guam collected in 1945 by J.L. Gressitt and D.H. Johnson, and in 1954 by D.G. Frey. There was also a single specimen from Saipan collected in 1949 by P. E. Cloud.

The authors have been collecting on Guam since 1969 and have made limited collections on other Mariana islands (Commonwealth of the Northern Mariana Islands (CNMI))(Figure 1). The latter include collections from Rota (40 species) in 1979, 1981, 1986, 1995, and 2001; Tinian (18 species) in 1981, and 1999; Saipan (40 species) in 1975, 1981, 1984, 1985, 1988, 1989, and 1996. In the spring of 1971 a sailing trip aboard the 42 foot Tahiti ketch, the Wanderer, was made to Anatahan (14 species), Sarigan (14 species), Guguan (6 species), and

Pagan (32 species). In the spring of 1972 another trip aboard the Wanderer was made to Agrihan (12 species), Asuncion (7 species), Maug (28 species), and Uracas (2 species). The limited number of species collected in these islands was due to the limited time and few areas collected. Collections in the northern islands were usually limited to only one site per island, and, in the case of Uracas, only one dive was made due to bad water conditions. A very strong current prevented collecting at Alamagan.

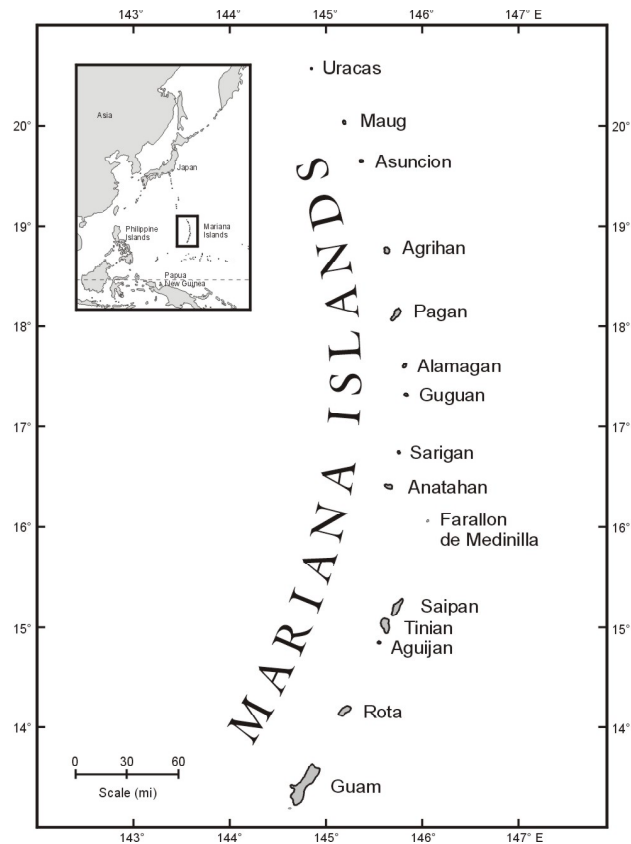


Figure 1. Map of the Mariana Islands.

Other collections of opisthobranchs from the northern Marianas include material from a survey of Maug in November 1977 (Eldredge et al. 1977) that also includes species collected by Carlson and Hoff in 1972. A comprehensive inventory of the known mollusc fauna of the northern Marianas soon followed (Vermeij et al. 1983). An expedition to the Northern Marianas by the Natural History Museum and Institute, Chiba led to additional opisthobranch records, summarized by Asakura & Furuki (1994), that included previous records from Eldredge et al. (1977).

Methods

This paper is based primarily on the collections of the authors and records from the literature. Some species have been collected by faculty and students at the University of Guam Marine Laboratory. Since 1969 we have been collecting both by scuba diving and snorkeling. Specimens were either collected and brought into the laboratory for description and photography or, if not needed for further study, were left in the field. All specimens either seen or collected were noted in a database. When traveling, descriptions and photography were done in either the lodging where we stayed or aboard a boat when sailing. Specimens to be kept were relaxed in MgCl₂/Seawater, chilled and then placed in chilled 10% buffered formalin, and stored in 70% ethanol. Some of the more recent specimens have been fixed in 95% ethanol, so as to be available for molecular study.

A database has been kept since 1969 that allows access to all collecting records from throughout the Micronesian areas studied by the authors. It provides a complete record of all specimens seen, their location, as well as size and depth records for those collected. Also included are lists of animals by major group, a list of animals from a particular collecting area, and a list of islands where a particular species has been found.

Some species were described by the authors (see species list), some were sent to other researchers (see Brunckhorst 1993; Gosliner 1989, 1995; Jensen 1992; Jensen & Wells 1990; Marcus 1976, 1982; Rudman 1978, 1982), and many remain undescribed. Some specimens were dissected for anatomical descriptions; drawings were made of radula, male and female genital systems, gizzard and other appropriate anatomical structures. SEMs have been done of radulae when possible. Most of our collection, including photographs, drawings, SEMs are located at our laboratory in Merizo, Guam. Voucher specimens for species we described have been placed in the Bernice P. Bishop Museum, Honolulu (BPBM), while some specimens have been deposited in other collections (see Appendix 1). Specimens of some species have been deposited in more than one collection. Material from Vermeij et al. (1983) are deposited in the University of Guam Marine Laboratory collection, in the Vermeij collections, and the Kay collections at the University of Hawaii. Cited photographs (Appendix 1) are on the WWW at: <http://www.flmnh.ufl.edu/reefs>; they are also available on the Marine Biodiversity of Guam CD-ROM copublication.

The classification used in our checklist (Appendix 1) follows Rudman & Willan (1998). Mikkelsen (1996) suggested removing the more primitive shelled forms from the Opisthobranchia; these families are marked by an asterisk in Appendix 1. Appendix 1 constitutes a working list. Both species level identifications and the classification of opisthobranchs will certainly change and improve with additional research. The cited voucher specimens and photo vouchers provide a reference handle on the presently known opisthobranch fauna of the Marianas, to which future improvements can be made.

Results and Discussion

We have documented 485 species of opisthobranchs on Guam and the CNMI: 119 Cephalaspidea, 1 Acochlidioidea, 94 Sacoglossa, 11 Anaspidea, 11 Notaspidea, 11 Thecostomata, and 238 Nudibranchia (Table 1, Appendix 1). Of the Nudibranchia 158 were from the suborder Doridina, 9 Dendronotina, 6 Arminina and 65 Aeolidina. Only 18 of those found in the CNMI were not also found on Guam. Approximately 50% of the opisthobranch species from Guam and the CNMI are undescribed. Of the species encountered on Guam, 338 have been recorded from Bile Bay on the southwest of the island, the home of the authors.

Table 1. Relative diversity of major opisthobranch taxa

TAXA	1982	%	1992	%	2002	%	PNG	HI
Cephalaspidea	72	20.2	100	23.5	111	23.8	13.2	19.0
Anaspidea	7	2.0	7	2.0	11	2.4	1.7	4.4
Sacoglossa	72	20.2	84	21.8	91	19.4	11.3	13.7
Notaspidea	6	1.7	7	1.7	10	2.1	1.5	4.8
Nudibranchia	194	54.3	210	50.9	232	49.7	72.3	58.3
Doridacea	133	37.3	144	38.5	157	33.6	47.8	37.9
Dendronotacea	7	2.0	8	1.8	8	1.7	4.6	2.4
Arminacea	5	1.4	5	0.8	5	1.1	1.7	1.2
Aeolidacea	49	13.7	53	9.9	62	13.3	18.2	16.5
Other*	1	0.3	13	3.1	12	2.6	-	-
Total	357		421		467		538	248

Data for Guam for 1982, 1992, and 2002 based on authors' database; data for PNG and HI (Hawaii) from Gosliner (1992).

*Thecostomata, Acochlidioidea

The 485 species here recorded are close to the greatest diversity of opisthobranchs known from anywhere in the world, namely 538 species documented from Papua New Guinea (PNG) (Gosliner 1992). Nevertheless we consider the opisthobranch fauna of the Marianas to be still far from well documented, and considerably more diverse. Note that 110 species were added to the fauna in the past 20 years and 46 species in the past decade (Table 1). New records and species are still regularly encountered in habitats that have been well surveyed in the past, and many more are certainly waiting to be discovered in unusual habitats (e.g. windward reef slope, deep water), and in the geologically and ecologically quite distinct, under-surveyed islands of the northern CNMI.

The greatest diversity of marine life in most taxa lies in the Indo-Malayan triangle (Gosliner 1992). The Marianas although not too distant, lie well outside this center of diversity. In well documented groups, like fishes or reef corals species richness is typically 2-3 times higher in Indonesia, the Philippines, or PNG, than in the Marianas. That the opisthobranch fauna of the Marianas is nevertheless almost as diverse as that of the richest documented fauna in the

Indo-Malayan area likely reflects the greater level of documentation that this fauna has received, rather than unusual richness in opisthobranchs. It implies that, with further study the opisthobranch fauna of the Indo-Malayan area will be found to be several times as diverse as currently documented.

Opisthobranch faunas show both stochastic and environmentally induced changes through time. Thus we have documented substantial changes in the diversity of opisthobranchs of Bile Bay over the years. Run off from road and sewer construction as well as bad infestations of *Acanthaster planci* in the late 1960s and 1980s have degraded the reefs causing a loss of habitat for many opisthobranch species. One species, *Sagaminopteron bilealbum*, has been found only in Bile Bay and Agat on the sponge *Dysidea* aff. *herbacea* (see Note 6). Although the sponge is common in other locales in Guam and the CNMI as well as elsewhere in the Pacific, no other sightings have been reported. Both *S. bilealbum* and *Ilbia mariana* were common in the 1970s and 1980s but are rarely seen now. *I. mariana* has been found in other areas of the Indo-Pacific; but unless the reef is returned to a healthy condition the future for *S. bilealbum* is questionable. Numerous other species have not been seen in recent years.

Twenty-three species have been found only in the area of Apra Harbor, the only deep lagoon in the Marianas and the busiest port in Micronesia. This includes 5 of the 10 Nembrothinae (Polyceridae) and 9 of the 48 Chromodorididae. A new species of *Plakobranthus* (Sacoglossa) that has been recorded from various areas in the Philippines has also been found in the harbor. Whether these harbor-limited taxa are indigenous and restricted to this unusual environment by ecological factors, or were introduced by the heavy shipping traffic of this major port, is a subject for further study. The harbor hosts several sponges and bryozoans found nowhere else on Guam. These serve as hosts for the above-mentioned nudibranchs and provide a mechanism for ecological restriction of the nudibranchs. However the origin of the host animals themselves faces the same question (see Kelly et al. 2003).

The relative proportions of the major opisthobranch groups on Guam has changed little in the past two decades as more species became documented, and largely similar to that of the PNG and Hawaiian opisthobranch faunas (Table 1). The relative diversity of the Cephalaspidea and Sacoglossa are high and the Nudibranchia low on Guam. The higher proportion of Cephalaspidea on Guam likely reflects our concerted effort on these animals.

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Appendix 1. Opisthobranchs of the Marianas

Voucher/photo: Voucher and photo numbers. 'C&H' numbers (taxon codes & species number) refer to both specimen and photo vouchers in the authors' collection unless an 'n' appears in the Notes column indicating there is no associated photograph. Cited photographs are online at: <http://www.flmnh.ufl.edu/reefs> and also available on the Marine Biodiversity of Guam CD-ROM copublication. Additional cited voucher specimens are at the following collections: AM, Australian National Museum, Sydney; BMNH British Museum of Natural History, London; Bernice P. Bishop Museum, Honolulu (BPBM); NTM, Northern Territories Museum, Darwin; USNM, United States National Museum, Washington, D.C.; NHMIC, Natural History Museum and Institute, Chiba, with the code CBM-ZM; CASIZ, California Academy of Sciences; MNCN, Museo Nacional de Ciencias Naturales, Madrid, Spain.

Ref: references: 1) Quoy & Gaimard 1824; 2) Vermeij et al 1983; 3) Marcus 1976; 4) Quoy & Gaimard 1832; 5) Carlson & Hoff 1972; 6) Kurozumi et al 1994; 7) Rudman 1978; 8) Gosliner, 1989; 9) Carlson & Hoff 1974; 10) Hoff & Carlson 1990; 11) Carlson & Hoff 1971; 12) Marcus 1982; 13) Carlson & Hoff 1978; 14) Marcus 1965; 15) Gosliner & Johnson 1994; 16) Brunckhorst 1993; 17) Carlson & Hoff 1973; 18) Rudman 1982; 19) Gosliner & Willan 1991; 20) Gosliner 1980; 21) Carlson & Hoff 2000; 22) Avila et al 1998

Note(s): s – shell only; n – no photo or no useable photo; numbered notes listed at the end of Appendix 1.

Is: island codes: G = Guam, R = Rota, T = Tinian, S = Saipan, A = Anatahan, Sr = Sarigan, Gg = Guguan, Al = Alamagan, P = Pagan, Ag = Agrihan, As = Asuncion, M = Maug, U = Uracas. Parenthesis around islands indicate specimens not seen by the authors.

Taxon	Voucher/photo	Ref	Notes	Is
SUBCLASS: OPISTHOBRANCHIA				
ORDER: CEPHALASPIDEA				
SUPERFAMILY: ACTEONOIDEA				
*FAMILY: ACTEONIDAE				
<i>Pupa nitidula</i> (Lamarck, 1816)	C&H C.97		s	G
<i>Pupa sulcata</i> (Gmelin, 1791)	C&H C.51			G
<i>Pupa</i> sp. 1, white	C&H C.117		s	G
*FAMILY: BULLIDAE				
<i>Bullina lineata</i> (Gray, 1825)	C&H C.55		s	G
<i>Bullina vitrea</i> Pease, 1860	C&H C.49			G
*FAMILY: HYDATINIDAE				
<i>Hydatina amplustre</i> (Linnaeus, 1758)	C&H C.35			G
<i>Hydatina physis</i> (Linnaeus, 1758)	C&H C.136		1, n	G
<i>Micromelo undata</i> (Bruguière, 1792)	C&H C.20	1 2	2	G, P (P)
SUPERFAMILY: RINGICULOIDEA				
*FAMILY: RINGICULIDAE				
<i>Ringicula</i> sp. 1, one tooth	C&H C.95		s	G
SUPERFAMILY: DIAPHANOIDEA				
*FAMILY: DIAPHANIDAE				
<i>Colpodaspis thompsoni</i> Brown, 1978	C&H C.50			G
SUPERFAMILY: PHILINOIDEA				
FAMILY: CYLICHNIDAE				
<i>Acteocina gaimardi</i> (Finlay, 1927)	C&H C.26	3		G
<i>Acteocina hawaiiensis</i> Pilsbry, 1921		2		(Gg, M)

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Acteocina voluta</i> (Quoy & Gaimard, 1832)	C&H C.84	4		G
<i>Acteocina</i> sp. 1, brown fleck	C&H C.104			G
<i>Acteocina</i> sp. 2, heavy fold	C&H C.127			G
<i>Acteocina</i> sp. 3, high spire	C&H C.43		3	G, P, M
<i>Acteocina</i> sp. 4, translucent, short spire	C&H C.130			G
<i>Cylichna</i> cf. <i>crispula</i> Watson, 1883	C&H C.90		s	G
cylichnid sp. 2, rodged gizzard	C&H C.83		4	G
cylichnid sp. 3, golden brown, deep	C&H C.89		s	G
cylichnid sp. 5, slight fold	C&H C.98		s	G
cylichnid sp. 6, white, from Ga'an	C&H C.106		s	G
cylichnid sp. 7, tan, anterior striate	C&H C.108		s	G
cylichnid sp. 8, ventral red spot	C&H C.61		5	P
FAMILY: RETUSIDAE				
<i>Pyrrunculus concentrica</i> (A.Adams, 1850)	C&H C.81			G
<i>Retusa minima</i> Yamakawa, 1911	C&H C.32			G
retusid sp. 1, thin, deep	C&H C.107			G
FAMILY: PHILINIDAE				
<i>Philine orca</i> Gosliner, 1988	C&H C.33			G
<i>Philine?</i> sp. 1, black dots	C&H C.135			G
<i>Philine</i> sp. 2, white w/ notch	C&H C.126			G
FAMILY: AGLAJIDAE				
<i>Aglaja?</i> <i>orientalis</i> Baba, 1949	C&H C.41			G
<i>Chelidonura fulvipunctata</i> Baba, 1938	C&H C.19	5		G, P
<i>Chelidonura hirundinina</i> (Quoy & Gaimard, 1833)	C&H C.15	5		G, P, Sr, M, Ag
<i>Chelidonura inornata</i> Baba, 1949	C&H C.8	5		G, Sr, P, Ag
	CBM-ZM-107190	6		(P)
<i>Nakamigawaia spiralis</i> Kuroda & Habe in Habe, 1961	C&H C.53			G, P
<i>Nakamigawaia</i> sp. 1, magenta	C&H C.57			G
<i>Noalda</i> sp. 1, white	C&H C.71			G
<i>Odontoglaja guamensis</i> Rudman, 1978	BMNH 1975627	7		G
<i>Philinopsis gardineri</i> (Eliot, 1903)	C&H C.9			G
<i>Philinopsis pilsbryi</i> (Eliot, 1899)	C&H C.37			G
<i>Philinopsis speciosa</i> Pease, 1860	C&H C.85			G
Aglajid sp. 1, brown w/ white spots	C&H C.72			G
Aglajid sp. 2, light tan lumpy	C&H C.44			G
Aglajid sp. 3, pointed head	C&H C.45			G, S
Aglajid sp. 4, salt & pepper	C&H C.82			G
Aglajid sp. 5, whitish, small	C&H C.52			G
FAMILY: GASTROPTERIDAE				
<i>Sagaminopteron bilealbum</i> Carlson & Hoff, 1973	BPBM 8933	8	6	G
<i>Sagaminopteron nigropunctatum</i> Carlson & Hoff, 1973	BPBM 8931	8		G, R
<i>Sagaminopteron psychedelicum</i> Carlson & Hoff, 1974	BPBM 207580	8		G, P

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Siphopteron brunneomarginatum</i> (Carlson & Hoff, 1974)	BPBM 207586	8		G
<i>Siphopteron citrinum</i> (Carlson & Hoff, 1974)	BPBM 207578	8		G
<i>Siphopteron flavum</i> (Tokioka & Baba, 1964)	C&H C.2	9		G, R, P, Ag, M, U
<i>Siphopteron ladrones</i> (Carlson & Hoff, 1974)	BPBM 207583	8		G
<i>Siphopteron</i> sp. 1, bumpy	C&H C.73			G
<i>Siphopteron</i> sp. 2, red tip	C&H C.92			G
<i>Siphopteron</i> sp. 3, Asuncion	C&H C.39			As
SUPERFAMILY: HAMINOEOIDEA				
FAMILY: HAMINOEIDAE				
<i>Aliculastrum costulosa</i> (Pease, 1869)	C&H C.105		s	G
<i>Aliculastrum parallela</i> (Gould, 1847)	C&H C.65			G
<i>Aliculastrum cf debilis</i> (Pease, 1860)	C&H C.42			G, P, M
<i>Aliculastrum</i> sp. 1, Agana deep	C&H C.112			G
<i>Aliculastrum</i> sp. 2, Alutom	C&H C.114			G
<i>Aliculastrum</i> sp. 3, Nimitz 12	C&H C.124		7	G
<i>Atys multistriatus</i> Schepman, 1913	BPBM 249297	21		G
<i>Atys naucum</i> (Linnaeus, 1758)	C&H C.123		n, 8	G
<i>Atys semistriata</i> Pease, 1860	C&H C.4			G
<i>Cylichnatys</i> sp. 1, brown spots	C&H C.68			G
<i>Diniatys dentifer</i> (A. Adams, 1850)	C&H C.30			G, R, T, S, P, M, Ag, As
	CBM-ZM-108007	6		(Gg, P, U)
<i>Diniatys? dubia</i> (Schepman, 1913)	C&H C.100			G
<i>Diniatys monodonta?</i> (A. Adams, 1850)	C&H C.133			G
<i>Haloa flavescens</i> (A. Adams, 1850)	CBM-ZM-106253	6	9	(P)
<i>Haminoea crocata</i> Pease, 1861	C&H C.62			G, A
<i>Haminoea cymbalum</i> (Quoy & Gaimard, 1833)	C&H C.12		10	G, R, T, S, Gg, M
			2	(A, Gg, As)
	CBM-ZM-106849	6		(A, Gg, Al)
<i>Haminoea nigropunctatum</i> Pease, 1868	C&H C.38			G
<i>Haminoea ovalis</i> Pease, 1868	C&H C.31			G, R, M
<i>Haminoea cf. ovoidea</i> (Quoy & Gaimard, 1833)	C&H C.14			G
<i>Haminoea virginalis</i> Thiele, 1925	C&H C.17			G
<i>Haminoea</i> sp. 1, all orange spots	C&H C.5			G
<i>Haminoea</i> sp. 2, similar to <i>ovalis</i>	C&H C.86			G
<i>Haminoea</i> sp. 3, orange spots from Tinian	C&H C.88			G, R, T, S
haminoeid sp. 1, bulbous, brown lines	C&H C.7			G
haminoeid sp. 2, bulbous, redbrown	C&H C.132			G
haminoeid sp. 4, on <i>Hormothamion</i>	BMNH 1989124		11	G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
haminoeid sp. 5, long head	C&H C.56			G, P
haminoeid sp. 6, brown network	C&H C.66			G
haminoeid sp. 7, white, heavy shell	C&H C.110			G
haminoeid sp. 8, transparent w/orange spots	C&H C.111			G
haminoeid sp. 9, big, shell only	C&H C.116		s	G
haminoeid sp. 10, crosshatched shell	C&H C.121			G
haminoeid sp. 11, white stripe	C&H C.122		s	G
haminoeid sp. 12, white, striate	C&H C.28		n	G
haminoeid sp. 13, mouldy	C&H C.60		n	P
haminoeid sp. 14, mini, brown, short tail	C&H C.24			G, P
haminoeid sp. 15, mini, brown bars, long tail	C&H C.36			G
haminoeid sp. 16, mini, long white tail	C&H C.70			G
haminoeid sp. 17, mini, flared head, long tail	C&H C.93			G
haminoeid sp. 18, mini, black blotches	C&H C.94			G
<i>Liloa curta</i> (A. Adams, 1850)	C&H C.34			G
<i>Liloa</i> sp. 1, grey	C&H C.134		n	G
<i>Mnestia bizona</i> (A. Adams, 1850)	CBM-ZM-108008	2		(Gg)
<i>Mnestia</i> sp. 1, brown stripes	C&H C.6			G
<i>Mnestia villica</i> (Gould, 1859)	C&H C.27		12	G, S
FAMILY: SMARAGDINELLIDAE				
<i>Phanerophthalmus smaragdinus</i> (Rüppell & Leuckart, 1828)	C&H C.10			G, T, S
<i>Phanerophthalmus</i> sp. 1, white, rust spots	C&H C.48			G
<i>Phanerophthalmus</i> sp. 2, white w/ brown	C&H C.64			G, R, A, Ag
<i>Phanerophthalmus</i> sp. 3, mottled brown	C&H C.96			G
<i>Phanerophthalmus</i> sp. 4, brown	C&H C.59		28	G
<i>Phanerophthalmus</i> sp. 5, midline white	C&H C.25			G
<i>Smaragdinella calyculata</i> (Broderip & Sowerby, 1829)	C&H C.63	4	13	G, Sr, P, M
		2		(A, Gg, P, As)
	CBM-ZM-106805	6		(A, Gg, P, Ag, As, U)
SUPERFAMILY: BULLOIDEA				
FAMILY: BULLIDAE				
<i>Bulla difcilis</i> Habe, 1950	CBM-ZM-1066671	6		(P)
<i>Bulla vernicosa</i> Gould, 1859	C&H C.40			G
<i>Bulla</i> sp., anterior striate, mottled brown	C&H C.109			G
SUPERFAMILY: RUNCINOIDEA				
FAMILY: RUCINIDAE				
<i>Lapinura</i> sp. 1, spotted, exposed shell	C&H C.54		n	G
<i>Lapinura</i> sp. 2, green, exposed shell	C&H C.103			G
<i>Metaruncina setoensis</i> Baba, 1954	C&H C.13	10		G, R
runcinid sp. 1, brown fr. <i>Schizothrix</i>	C&H C.99		n	G
runcinid sp. 2, brown w/white flecks	C&H C.102			G
runcinid sp. 3, brown	C&H C.69			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
runcinid sp. 4, striped	C&H C.58		n	Ag
FAMILY: ILBIIDAE				
<i>Ilbia mariana</i> Hoff & Carlson, 1990	BPBM 209629			G, R, T, S, P, M
ORDER: ACOCHLIOIDEA				
SUPERFAMILY: MICROHEDYLOIDEA				
FAMILY: MICROHEDYLIDAE				
<i>Microhedyle?</i> sp. 1, coiled viscera	C&H #2			G
ORDER: SACOGLOSSA				
FAMILY: ?				
<i>Cylindrobulla</i> sp. 1	C&H El.68		14	G
SUPERFAMILY: OXYNOOIDEA				
FAMILY: VOLVATELLIDAE				
<i>Ascobulla</i> cf. <i>japonica</i> (Habe, 1969)	C&H El.46			G, S
<i>Ascobulla</i> sp. 2, yellow on head	C&H El.106			G
<i>Volvatella angeliniana</i> Ichikawa, 1993	C&H El.51			G
<i>Volvatella pyriformis</i> Pease, 1868	C&H El.24			G, R, T
<i>Volvatella</i> cf. <i>vigourouxi</i> (Montrouzier, 1861)	C&H El.63		15	G, S
<i>Volvatella viridis</i> Hamatani, 1976	C&H El.23			G
<i>Volvatella</i> sp. 1, on <i>Caulerpa lentillifera</i>	C&H El.14			G, P
<i>Volvatella</i> sp. 2, Gun Beach	C&H El.41			G
<i>Volvatella</i> sp. 3, on <i>Caulerpa serrulata</i>	C&H El.64			G
<i>Volvatella</i> sp. 4, pale green, deep	C&H El.101			G
FAMILY: OXYNOIDAE				
<i>Lobiger souverbiei</i> P.Fisher, 1856	C&H El.28			G, S
<i>Oxynoe kabirensis</i> Hamatani, 1980	C&H El.76			G
<i>Oxynoe</i> cf. <i>olivacea</i> Rafinesque, 1819	C&H El.88			G
<i>Oxynoe viridis</i> (Pease, 1863)	C&H El.20			G
<i>Oxynoe</i> sp. 1, on <i>Caulerpa filicoides</i>	C&H El.39			G
FAMILY: JULIIDAE				
<i>Julia exquisita</i> (Gould, 1862)	C&H El.35	11		G
		2		(Gg, As)
	CBM-ZM-107974	6		(Gg, Ag)
<i>Julia zebra</i> Kawaguti, 1981	C&H El.97			G
	CBM-ZM-107974			(Gg)
<i>Berthelinia</i> sp. 1, green	C&H El.74			G
<i>Berthelinia</i> sp. 2, 2 adductors	C&H El.91		16, s	G
SUPERFAMILY: ELYSIOIDEA				
FAMILY: PLAKOBRANCHIDAE				
<i>Plakobranchnus ocellatus</i> Hasselt, 1824	C&H El.3			G, R, T, S
<i>Plakobranchnus</i> sp. 1, bumpy white	C&H El.17			G
FAMILY: ELYSIIDAE				
<i>Elysia</i> cf. <i>bennettiae</i> Thompson, 1973	C&H El.22	13		G
<i>Elysia degeneri</i> Ostergaard, 1955	C&H El.2			G, S
<i>Elysia flava</i> Verrill, 1901	C&H El.48	13	17	G, R
<i>Elysia grandifolia</i> Kelaart, 1858	C&H El.25	13		
<i>Elysia</i> cf. <i>japonica</i> Eliot, 1913	C&H El.108		n	G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Elysia mercieri</i> Pruvot-Fol, 1930	C&H El.12	13		G, S
<i>Elysia ornata</i> (Swainson, 1840)	C&H El.1	13		G, R, S
<i>Elysia pusilla</i> (Bergh, 1872)	C&H El.7	13	18	G, M
<i>Elysia rufescens</i> (Pease, 1871)	C&H El.34			G, R
<i>Elysia cf thompsoni</i> Jensen, 1993	C&H El.19			G, R
<i>Elysia tomentosa</i> Jensen, 1997	C&H El.103			G
<i>Elysia yaeyamana</i> Baba, 1936	C&H El.37	13		G
<i>Elysia</i> sp. 1, on <i>Caulerpa racemosa</i>	C&H El.8			G, R, T, S
<i>Elysia</i> sp. 2, unmarginated <i>ornata</i>	C&H El.10			G, T
<i>Elysia</i> sp. 3, rhizophore filamentous	C&H El.11			G
<i>Elysia</i> sp. 4, heavy projections	C&H El.13			G
<i>Elysia</i> sp. 5, striped, on <i>Chlorodesmis</i>	C&H El.18			G, S
<i>Elysia</i> sp. 6, projections, fine orange dots	C&H El.27			G
<i>Elysia</i> sp. 8, on <i>expeditionis</i>	C&H El.42			G
<i>Elysia</i> sp. 9, white mottled	C&H El.54			G
<i>Elysia</i> sp. 10, furrowed head	C&H El.70			G
<i>Elysia</i> sp. 11, salmon	C&H El.71			G
<i>Elysia</i> sp. 12, pink	C&H El.73			G
<i>Elysia</i> sp. 13, brown tipped rhizophores	C&H El.78			G
<i>Elysia</i> sp. 14, pink shoulder	C&H El.81			G, R
<i>Elysia</i> sp. 15, jigsaw parapodia	C&H El.84			G
<i>Elysia</i> sp. 16, on <i>Caulerpa lentillifera</i>	C&H El.86			G
<i>Elysia</i> sp. 17, brown, from Ga'an	C&H El.90			G
<i>Patyclaya arena</i> (Carlson & Hoff, 1977)	BPBM 206978	12		G
<i>Thuridilla bayeri</i> (Marcus, 1965)	C&H El.4	13	19	G, R, Sr, M
<i>Thuridilla carlsoni</i> Gosliner, 1995	CASIZ 099063	13	20	G, P, M
<i>Thuridilla flavomaculata</i> Gosliner, 1995	CASIZ 099066	13		G
<i>Thuridilla hoffae</i> Gosliner, 1995	C&H El.16			G, S, P
<i>Thuridilla kathae</i> Gosliner, 1995	C&H El.33			G, R
<i>Thuridilla livida</i> (Baba, 1958)	C&H El.75	13		G, R, S
<i>Thuridilla splendens</i> (Baba, 1949)	C&H El.94			G
<i>Thuridilla undula</i> Gosliner, 1995	C&H El.80			G
<i>Thuridilla vatae</i> (Risbec, 1928)	C&H El.6	13		G, M
SUPERFAMILY: LIMAPONTIOIDEA				
FAMILY: CALIPHYLLIDAE				
<i>Caliphylla mediterranea</i> A. Costa, 1869	C&H El.92			G
caliphyllid sp. 1, cyerce-like	C&H El.55			G
caliphyllid sp. 2, narrow cerata	C&H El.77			G
<i>Cyerce elegans</i> Bergh, 1888	C&H El.50			G, R
<i>Cyerce kikutarobabai</i> Hamatani, 1976	C&H El.66			M
<i>Cyerce nigra</i> Bergh, 1871	C&H El.47			G, S
<i>Cyerce nigricans</i> (Pease, 1866)	C&H El.36			G
<i>Cyerce</i> sp. 1, pretty	C&H El.31			G
<i>Cyerce</i> sp. 2, brown masking	C&H El.45			G
<i>Cyerce</i> sp. 3, black network	C&H El.60			G
<i>Polybranchia orientale</i> (Kelaart, 1858)	C&H El.21			G, T
<i>Sohgenia palauensis</i> Hamatani, 1991	C&H El.82			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
FAMILY: COSTASIELLIDAE				
<i>Costasiella mandorahae</i> Jensen, 1997	C&H El.30			G, R, S
<i>Costasiella usagi</i> Ichikawa, 1993	C&H El.59			G
<i>Costasiella</i> sp. 1, black on head	C&H El.32			G, R, S, P
<i>Costasiella</i> sp. 2, grey	C&H El.44			G
<i>Costasiella</i> sp. 3, black	C&H El. 49			G
<i>Costasiella</i> sp. 4, white line on rhinophore	C&H El.58			G, S
<i>Costasiella</i> sp. 5, brown head	C&H El.102			G
<i>Costasiella</i> sp. 6, black line on rhinophore	C&H El.104			G
<i>Costasiella</i> sp. 7, black spots	C&H El.87			S
FAMILY: HERMAEIDAE				
<i>Hermaea</i> sp. 1, transparent	C&H El.72		n	G
FAMILY: LIMAPONTIIDAE				
<i>Ercolania</i> cf. <i>caerulea</i> Trinchese, 1892	C&H El. 53			G, M
<i>Ercolania varians</i> (Eliot, 1904)	C&H El. 57			G
<i>Ercolania</i> sp. 1, in <i>Boergesenia forbesii</i>	C&H El. 5			G
<i>Ercolania</i> sp. 2, white specks, green reticulations	C&H El. 40			G
<i>Ercolania</i> sp. 3, fine white spots	C&H El. 52			G
<i>Ercolania</i> sp. 4, on <i>Buddlea composita</i>	C&H El. 56			G, T
<i>Ercolania</i> sp. 5, on <i>Dictyosphaeria versluisii</i>	C&H El. 89			G
<i>Ercolania</i> sp. 6, floppy rhinophores	C&H El. 93			G
<i>Ercolania</i> sp. 7, white from Sella Bay	C&H El. 98			G
<i>Placida</i> cf. <i>dendritica</i> (Alder & Hancock, 1843)	C&H El. 99			G
<i>Placida cremoniana</i> (Trinchese, 1893)	C&H El. 29			G, R
' <i>Styliger</i> ' <i>smaragdina</i> Baba, 1949	C&H El. 62		27	M
ORDER: ANASPIDEA				
SUPERFAMILY: APLYSIOIDEA				
FAMILY: APLYSIIDAE				
<i>Aplysia parvula</i> Guilding in Mörch, 1863	C&H A.7			G, R, T, A, P, Ag, As, M
	CBM-ZM- 106570	6		(P)
<i>Aplysia rufa</i> Quoy & Gaimard, 1832		4	n, 21	(G)
<i>Dolabella auricularia</i> (Solander, 1786)	USNM 570246	14		G, R
<i>Dolabrifera dolabrifera</i> (Rang, 1828)	C&H A.2			G, R, T, A, M, U
	CBM-ZM- 107018	6		(U)
<i>Petalifera petalifera</i> (Rang, 1828)	C&H A.12			G
<i>Petalifera viridis</i> (Bergh, 1905)	C&H A.1		22	G, R, S
<i>Petalifera</i> sp. 1, lab tank	C&H A. 6			G
<i>Petalifera</i> sp. 2, on Fucales	C&H A.10			G
<i>Stylocheilus longicaudus</i> (Quoy & Gaimard, 1824)	C&H A.5		23	G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Stylocheilus striatus</i> (Quoy & Gaimard, 1832)	C&H A. 4			G, R, S, A, Gg, P, Ag, M (P)
	CBM-ZM- 107285	6		
ORDER: NOTASPIDEA				
SUPERFAMILY: TYLODINOIDEA				
FAMILY: UMBRACULIDAE				
<i>Umbraculum umbraculum</i> (Lightfoot, 1786)	C&H N.9			G
SUPERFAMILY: PLEUROBRANCHOIDEA				
FAMILY: PLEUROBRANCHIDAE				
<i>Berthella caledonica</i> (Risbec, 1928)	NTM C14575			G
<i>Berthella grisea</i> (Bergh, 1905)	C&H N.1		n	G
<i>Berthella martensi</i> (Pilsbry, 1896)	C&H N.5			G
<i>Berthella stellata</i> (Risso, 1826)	C&H N.2			G, S
<i>Berthellina delicata</i> (Pease, 1860)	C&H N.4			G
<i>Pleurehdera haraldi</i> Marcus & Marcus, 1970	C&H N.12			G
<i>Pleurobranchus albiguttatus</i> (Bergh, 1905)	C&H N.3			G
<i>Pleurobranchus forskali</i> Rüppell & Leuckart, 1828	C&H N.8			G
<i>Pleurobranchus grandis</i> Pease, 1868	C&H N.14			G
<i>Pleurobranchus</i> sp. 1, white w/ brown	C&H N.7			Ag
ORDER: THECOSTOMATA				
FAMILY: LIMACINIDAE				
<i>Creseis acicula</i> (Rang, 1828)	BPBM 252715		s	G
FAMILY: CAVOLINIIDAE				
<i>Styliola subula</i> (Quoy & Gaimard, 1827)	BPBM 252716		s	G
<i>Hyalocylis striata</i> (Rang, 1828)	BPBM 252717		s	G
<i>Clio cuspidata</i> (Bosc, 1802)	BPBM 252719		s	G
<i>Clio lanceolata</i> (Lesueur, 1813)	BPBM 252718		s	G
<i>Cuvierina columnella</i> (Rang, 1827)	BPBM 252720		s	G
<i>Diacria trispinosa</i> (Blainville, 1821)	BPBM 252721		s	G
<i>Diacria quadridentata</i> (Blainville, 1821)	BPBM 252722		s	G
	CBM-ZM- 010791	6		(Ag)
<i>Diacavolinia longirostris</i> (Blainville, 1821)	BPBM 252723		s	G
<i>Cavolinia globulosa</i> (Gray, 1850)	BPBM 252724		s	G
<i>Cavolinia inflexa</i> (Lesueur, 1813)	BPBM 252725		s	G
ORDER: NUDIBRANCHIA				
SUBORDER: DORIDINA				
SUPERFAMILY: ANADORIDOIDEA (=PHANEROBRANCHIA)				
FAMILY: GONIODORIDIDAE				
<i>Goniodoridella?</i> sp. 1, white with brown 'V'	C&H D.121			G
<i>Goniodoridella?</i> sp. 2, w/ yellow	C&H D.114			G
<i>Goniodoris felis</i> Baba, 1949	C&H D.117			G
<i>Goniodoris joubini</i> Risbec, 1928	C&H D.31			G, S
<i>Trapania</i> sp. 1, brown & white	C&H D.130			G
<i>Trapania</i> sp. 2, brown, gold projections	C&H D.66			G
FAMILY: POLYCERIDAE				
<i>Nembrotha milleri</i> Gosliner & Behrens, 1997	C&H D.84			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Nembrotha</i> sp. 1, orange at 30m	C&H D.32			G
<i>Nembrotha</i> sp. 2, red spots w/ grey	C&H D.58			G
<i>Nembrotha</i> sp. 3, dark grey, red spots	C&H D.82			G
<i>Nembrotha</i> sp. 5, black, red spots	C&H D.13			G
<i>Plocamophorus</i> sp. 1, orange w/ brown	C&H D.202			G
<i>Polycera japonica</i> Baba, 1949	C&H D.47			G
<i>Polycera</i> sp. 1, white and brown	C&H D.64			G
<i>Polycera</i> sp. 2, olive-green with white	C&H D.78			G
<i>Polycera</i> sp. 3, white fleck	C&H D.113			G
<i>Roboastra gracilis</i> (Bergh, 1877)	C&H D.11			G, M
<i>Tambja amakusana</i> Baba, 1987	C&H D.81			G
<i>Tambja limaciformis</i> (Eliot, 1908)	C&H D.99			G
<i>Tambja morosa</i> (Bergh, 1877)	C&H D.76			G
<i>Tambja</i> sp. 1, orange stripes	C&H D.188			G
FAMILY: GYMNODORIDIDAE				
<i>Gymnodoris ceylonica</i> (Kelaart, 1858)	C&H D.102			G
<i>Gymnodoris citrina</i> (Bergh, 1877)	C&H D.9			G
<i>Gymnodoris okinawae</i> Baba, 1936	C&H D.33			G
<i>Gymnodoris</i> sp. 1, white, sparse orange spots, horseshoe branchia	C&H D.29			G
<i>Gymnodoris</i> sp. 2, white bumps, no cephalic projections	C&H D.52			G, Sr, Gg
<i>Gymnodoris</i> sp. 3, translucent, red dots	C&H D.55			G
<i>Gymnodoris</i> sp. 4, close branchia	C&H D.105			G
<i>Gymnodoris</i> sp. 5, intense yellow	C&H D.110			G
<i>Gymnodoris</i> sp. 6, transparent yellow	C&H D.145			G
<i>Gymnodoris</i> sp. 7, orange line on head	C&H D.157			G
<i>Gymnodoris</i> sp. 8, transparent, smooth	C&H D.159			G
<i>Gymnodoris</i> sp. 9, Apra orange	C&H D.207			G
<i>Gymnodoris</i> sp. 10, pink, with red & white spots	C&H D.95			M
<i>Gymnodoris</i> sp. 12, white with red-orange spots	C&H D.79			G
FAMILY: AEGIRETIDAE				
<i>Aegirus citrinus</i> Pruvot-Fol, 1930	C&H D.70			G
<i>Aegirus punctilucens</i> (d'Orbigny, 1837)	C&H D.125			G
FAMILY: VAYSSIEREIDAE				
<i>Vayssiorea felis</i> (Collingwood, 1881)	C&H D.23			G, M
SUPERFAMILY: EUDORIDOIDEA (=CRYPTOBRANCHIA)				
FAMILY: HEXABRANCHIDAE				
<i>Hexabranchnus sanguineus</i> (Rüppell & Leuckart, 1828)	C&H D.22			G
FAMILY: ACTINOCYCLIDAE				
<i>Actinocyclus japonicus</i> (Eliot, 1913)	C&H D.75			G
<i>Hallaxa hileenae</i> Gosliner & Johnson, 1994	C&H D.86	15		G
<i>Hallaxa iju</i> Gosliner & Johnson, 1994	C&H D.106		n	G
<i>Hallaxa indecora</i> (Bergh, 1905)	C&H D.118		n	G
<i>Hallaxa</i> sp. 1, translucent white	C&H D.87			G
FAMILY: DORIDIDAE				
<i>Aldisa</i> sp. 1, red, low bumps	C&H D.21			G
<i>Aldisa</i> sp. 2, red mesa	C&H D.169			G
<i>Aldisa</i> sp. 3, red, two holer	C&H D.108			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Asteronotus cespitosus</i> (Hasselt, 1824)	C&H D.42			G
<i>Atagema echinata</i> (Pease, 1860)	C&H D.93			G, A
<i>Discodoris lilacina</i> (Gould, 1852)	C&H D.69			G
<i>Discodoris</i> sp. 2, brown marbling, white pimples	C&H D.111			G
<i>Discodoris</i> sp. 3, brown, star branchia	C&H D.120			G
<i>Doriopsis granulosa</i> Pease, 1860	C&H D.45	29		G
<i>Doriopsis pecten</i> (Collingwood, 1881)	C&H D.36			G, R, S, A
<i>Doriopsis viridis</i> Pease, 1860	C&H D.41			G, S
<i>Doriopsis</i> sp. 1, brown	C&H D.34			G
<i>Doriopsis</i> sp. 2, pale yellow	C&H D.149			G
<i>Doriopsis</i> sp. 3, muddy yellow w/ brown	C&H D.73			G
<i>Halgerda albocristata</i> Gosliner & Fahey, 1998	C&H D.74			G
<i>Halgerda brunneomaculata</i> Carlson & Hoff, 1993	C&H D.20			G, Sr
<i>Halgerda dalanghita</i> Fahey & Gosliner, 1999	C&H D.56			G
<i>Halgerda</i> cf. <i>elegans</i> Bergh, 1905	C&H D.85			G
<i>Halgerda guahan</i> Carlson & Hoff, 1993	C&H D.2			G
<i>Halgerda malessio</i> Carlson & Hoff, 1993	C&H D.1			G, Sr
<i>Halgerda onna</i> Fahey & Gosliner, 2001	C&H D.109			G
<i>Halgerda tessellata</i> (Bergh, 1880)	C&H D.6			G
<i>Halgerda</i> sp. 1, brown spots	C&H D.146			G
<i>Hoplodoris bifurcata</i> (Baba, 1993)	C&H D.59			G
<i>Hoplodoris nodulosa</i> (Angas, 1864)	C&H D.50			G
<i>Jorunna alisonae</i> ? Ev. Marcus, 1976	C&H D.148			G
<i>Jorunna funebris</i> (Kelaart, 1858)	C&H D.5			G, R
<i>Jorunna</i> ? sp. 1, dark brown	C&H D.60			G, P
<i>Platydorid cruenta</i> (Quoy & Gaimard, 1833)	USNM 574207	14	n, 25	(G)
<i>Platydorid formosa</i> (Alder & Hancock, 1864)	C&H D.10			G
<i>Platydorid scabra</i> (Cuvier, 1804)	C&H D.61			G
<i>Rostanga lutescens</i> (Bergh, 1905)	C&H D.77			G
<i>Rostanga</i> sp. 1, red spiculose	C&H D.162			G
<i>Sclerodoris</i> sp. 1, Kay's <i>apiculata</i>	C&H D.26			G
<i>Sclerodoris</i> sp. 2, green/purple	C&H D.91			G
<i>Sclerodoris</i> sp. 3, open network on dorsum	C&H D.156			G
<i>Sclerodoris</i> sp. 4, on <i>Dysidea</i> aff. <i>herbacea</i>	C&H D.167			G
<i>Sebadoris nubilosa</i> ? (Pease, 1871)	C&H D.103			G
<i>Thordisa</i> sp. 1, rose branchia	C&H D.104			G
<i>Thordisa</i> ? sp 2., brown scabrous	C&H D.46			G, A
dorid sp. 1, yellow, brown lines	C&H D.43			G, Sr, P
dorid sp. 2, spongelike, yellow, magenta spots	C&H D.71		n	G
dorid sp. 4, white, brown spots	C&H D.98			G
dorid sp. 5, tan, brown spots	C&H D.122			G
dorid sp. 6, platydorid-like, white	C&H D.62			G
FAMILY: CHROMODORIDIDAE				
<i>Cadlinella ornatissima</i> (Risbec, 1928)	C&H D.152			G
<i>Ceratosoma miamirana</i> (Bergh, 1875)	C&H D.49			G
<i>Ceratosoma sinuata</i> (Hasselt, 1824)	C&H D.35			G
<i>Chromodoris annae</i> Bergh, 1877	C&H D.166			G
<i>Chromodoris aspersa</i> (Gould, 1852)	C&H D.24			G
<i>Chromodoris coi</i> (Risbec, 1956)	C&H D.83			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Chromodoris colemani</i> Rudman, 1982	C&H D.178			G
<i>Chromodoris decora</i> Pease, 1860	C&H D.25			G
<i>Chromodoris diana</i> e Gosliner & Behrens, 1998	C&H D.189			G
<i>Chromodoris elisabethina</i> Bergh, 1877	C&H D.3			G
<i>Chromodoris fidelis</i> (Kelaart, 1858)	C&H D.7			G
<i>Chromodoris geometrica</i> Risbec, 1928	C&H D.37			G
<i>Chromodoris hintuanensis</i> Gosliner & Behrens, 1998	C&H D.18			G
<i>Chromodoris rubrocornuta</i> Rudman, 1985	C&H D.96			G
<i>Chromodoris rufomaculata</i> Pease, 1871	C&H D.67			G
<i>Chromodoris setoensis</i> (Baba, 1938)	C&H D.39			G
<i>Chromodoris strigata</i> Rudman, 1982	C&H D.192			G
<i>Chromodoris verrieri</i> (Crosse, 1875)	C&H D.115			G
<i>Chromodoris willani</i> Rudman, 1982	C&H D.14			G
<i>Chromodoris</i> sp. 1, black lines	C&H D.4			G
<i>Chromodoris</i> sp. 2, broken magenta lines	C&H D.40			G
<i>Chromodoris</i> sp. 3, purple/white dorsum	C&H D.89			G
<i>Chromodoris</i> sp. 4, white, yellow edge, purple	C&H D.90			G
<i>Chromodoris</i> sp. 5, white & purple	C&H D.92			G
<i>Chromodoris?</i> sp. 7, purple & white	C&H D.136			G
<i>Durvilledoris lemniscata</i> (Quoy & Gaimard, 1832)	C&H D.54			G
<i>Durvilledoris pusilla</i> (Bergh, 1874)	C&H D.44			G
<i>Glossodoris atromarginata</i> (Cuvier, 1804)	C&H D.12			G, Sr, Gg, As
<i>Glossodoris cincta</i> (Bergh, 1889)	C&H D.163			G
<i>Glossodoris hikuensis</i> (Pruvot-Fol, 1954)	C&H D.15			G
<i>Glossodoris pallida</i> (Rüppell & Leuckart, 1828)	C&H D.150			G
<i>Glossodoris symmetricus</i> Rudman, 1990	C&H D.107			G
<i>Glossodoris tomsmithi</i> Bertsch & Gosliner, 1989	C&H D.17			G
<i>Glossodoris</i> sp. 1, pale maroon	C&H D.88			G
<i>Hypselodoris infucata</i> (Rüppell & Leuckart, 1828)	C&H D.28			G
<i>Hypselodoris maculosa</i> (Pease, 1871)	C&H D.38			G
<i>Hypselodoris whitei</i> (Adams & Reeve, 1850)	C&H D.27			G
<i>Noumea crocea</i> Rudman, 1986	C&H D.206			G
<i>Noumea varians</i> (Pease, 1871)	C&H D.177			G
<i>Noumea</i> cf. <i>angustolutea</i> Rudman, 1990	C&H D.165			G
<i>Noumea norba</i> Marcus & Marcus, 1970	C&H D.51			G
<i>Noumea</i> cf. <i>romeri</i> (Risbec, 1928)	C&H D.112			G
<i>Noumea</i> cf. <i>simplex</i> (Pease, 1871)	C&H D.65			G
<i>Risbecia imperialis</i> (Pease, 1860)	C&H D.101			G
<i>Risbecia tryoni</i> (Garrett, 1873)	C&H D.63			G
<i>Thorunna australis</i> (Risbec, 1928)	C&H D.94			G, Ag
<i>Thorunna daniellae</i> (Kay & Young, 1969)	C&H D.161			G, R
<i>Thorunna furtiva</i> (Bergh, 1878)	C&H D.57			G, R
FAMILY: DENDRODORIDIDAE				
<i>Dendrodoris albobrunnea</i> Allan, 1933	C&H D.30			G
<i>Dendrodoris carbunculosa</i> (Kelaart, 1858)	C&H D.147			G
<i>Dendrodoris coronata</i> Kay & Young, 1969	C&H D.48			G
<i>Dendrodoris nigra</i> (Stimpson, 1856)	C&H D.8			G, R, T, S, A, Ag

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
FAMILY: PHYLLIDIDAE				
<i>Ceratophyllidia</i> sp.1, white, tan-brown spots	C&H P.28	16		G
<i>Phyllidia carlsonhoffi</i> Brunckhorst, 1993	AM C168769			G
<i>Phyllidia elegans</i> Bergh, 1869	AM C162658	16		G, A, P
<i>Phyllidia guamensis</i> (Brunckhorst, 1993)	AM C162764			G, Gg, M
	CBM-ZM- 107054	6		(Al)
<i>Phyllidia larryi</i> (Brunckhorst, 1993)	AM C169367			G
<i>Phyllidia menindie</i> (Brunckhorst, 1993)	C&H P.10			G
<i>Phyllidia tula</i> Marcus & Marcus, 1970	AM C162715	16		G, A
<i>Phyllidia varicosa</i> Lamarck, 1801	C&H P.22			G
	USNM 574210	14		(G, S)
<i>Phyllidiella annulata</i> (Gray, 1853)	AM C159520	16		G, Sr, As
<i>Phyllidiella granulatus</i> Brunckhorst, 1993	AM C159486			G, P
<i>Phyllidiella pustulosa</i> (Cuvier, 1804)	AM C162683	16		G, S, Sr, Gg, P, As
	CBM-ZM- 107197	6		(P)
<i>Phyllidiopsis burni</i> Brunckhorst, 1993	AM C159542			G
<i>Phyllidiopsis cardinalis</i> Bergh, 1875	AM C162742	16		G
<i>Phyllidiopsis loricata</i> (Bergh, 1873)	C&H P.19	16		G
<i>Phyllidiopsis sphingis</i> Brunckhorst, 1993	C&H P.29		n	G
<i>Phyllidiopsis striata</i> Bergh, 1889	AM C162752	16		G
<i>Phyllidiopsis?</i> sp. 1, orange, white around black spots	C&H P.6			G
SUBORDER: DENDRONOTINA				
FAMILY: TRITONIDAE				
<i>Marianina rosea</i> (Pruvot-Fol, 1930)	C&H Dn.7	17	26	G, R, S, A, P
<i>Marionia?</i> sp, orange tail	C&H Dn.9			G
<i>Tritoniopsis elegans</i> (Audouin, 1826)	C&H Dn.3			G
FAMILY: BORNELLIDAE				
<i>Bornella anguilla</i> Johnson, 1983	C&H Dn.5			G
<i>Bornella stellifer</i> (Adams & Reeve, 1848)	C&H Dn.11			G
<i>Bornella</i> sp. 1, pale rhinophore club, short projections	C&H Dn.1		n	G
<i>Bornella</i> sp. 2, orange rhinophore club, long projections	C&H Dn.4			G
FAMILY: DOTIDAE				
<i>Doto</i> sp. 1, white specks, brown diverticula	C&H Dn.2			G
<i>Doto</i> sp. 2, dark	C&H Dn.6		n	Ag
SUBORDER: ARMININA				
FAMILY: ARMINIDAE				
<i>Dermatobranchus fortunata</i> (Bergh, 1888)	C&H Ar.1			G, R, P
<i>Dermatobranchus sagamianis</i> Baba, 1949	C&H Ar.4			As
<i>Dermatobranchus</i> sp. 1, pink margin	C&H Ar.5			G
FAMILY: DORIDOMORPHIDAE				
<i>Doridomorpha gardineri</i> Eliot, 1903	AM C159668	18		G, R, S

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
FAMILY: ZEPHYRINIDAE				
<i>Janolus</i> sp. 1, cream with white, brown specks	C&H Ar.2			G
FAMILY: PINUFIIDAE				
<i>Pimufus rebus</i> Marcus & Marcus, 1960	C&H Ar.6			G
SUBORDER: AEOLIDINA				
FAMILY: FLABELLINIDAE				
<i>Flabellina bicolor</i> (Kelaart, 1858)	C&H Eo.28	19		G, T, S, A, P
<i>Flabellina exoptata</i> Gosliner & Willan, 1991	C&H Eo. 4	19		G
<i>Flabellina rubrolineata</i> (O'Donoghue, 1929)	C&H Eo.21			G
FAMILY: EUBRANCHIDAE				
<i>Eubranchus</i> sp. 1, tan, bulge on cera	C&H Eo.32			G
FAMILY: AEOLIDIIDAE				
<i>Aeolidiella alba</i> (Risbec, 1928)	C&H Eo.13			G
<i>Aeolidiella indica</i> Bergh, 1888	C&H Eo.37			G
<i>Aeolidiella</i> sp. 1, Lisa's blah	C&H Eo.79			G
<i>Baeolidia</i> cf. <i>fusiformis</i> Baba, 1949	C&H Eo.60			G, S
<i>Baeolidia</i> sp. 1, transparent, middorsal white line	C&H Eo.35			G, R
<i>Cerberilla</i> sp. 1, white/black from Bomb Hole	C&H Eo.5			G
<i>Cerberilla</i> sp. 2, broad foot, brownish	C&H Eo.6			G
<i>Cerberilla</i> sp. 3, yellow & black	C&H Eo.1			G
<i>Limanendra nodosa</i> Haefelfinger & Stamm, 1958	C&H Eo.2			G
<i>Protaeolidiella atra</i> Baba, 1955	C&H Eo.67			G
FAMILY: GLAUCIDAE				
<i>Favorinus</i> cf. <i>amoena</i> (Risbec, 1928)	C&H Eo.42			G
<i>Favorinus japonicus</i> Baba, 1949	C&H Eo.20	20		G
<i>Favorinus mirabilis</i> Baba, 1955	C&H Eo.65			G
<i>Favorinus</i> sp. 1, yellow egg eater	C&H Eo.12			G, R, T, S
<i>Favorinus</i> sp. 2, transparent, white band on cerata	C&H Eo.22			G
<i>Favorinus</i> sp. 4, brownish	C&H Eo.43			G
<i>Favorinus</i> sp. 6, black tear	C&H Eo.77			G
<i>Glaucus atlanticus</i> Forster, 1777	C&H Eo.46			G
<i>Godiva</i> cf. <i>rachelae</i> Rudman, 1980	C&H Eo.29			G, T
<i>Herviella albida</i> Baba, 1966	C&H Eo.17			G
<i>Herviella claror</i> Burn, 1963	C&H Eo.44			G
<i>Noumeaella rehderi</i> Ernst Marcus, 1965	C&H Eo.53			G, S
<i>Phidiana bourailli</i> (Risbec, 1928)	C&H Eo.9			G, A
<i>Phidiana</i> cf. <i>obscura</i> (Risbec, 1928)	C&H Eo.62			G
<i>Phidiana indica</i> (Bergh, 1896)	C&H Eo.50			G
<i>Phidiana</i> sp. 1, ringed rhinophores	C&H Eo.40			G
<i>Phidiana</i> sp. 2, not <i>indica</i>	C&H Eo.7			G
<i>Phyllodesmium guamensis</i> Avila et al., 1998	MNCN 15.05/27120	22		G
<i>Phyllodesmium magnum</i> Rudman, 1991	C&H Eo.34			G
<i>Pteraeolidia ianthina</i> (Angas, 1864)	C&H Eo.3			G
FAMILY: EMBLETONIIDAE				
<i>Embletonia gracile</i> Risbec, 1928	C&H Eo.48			G
FAMILY: TERGIPEDIDAE				
<i>Cuthona ornata</i> Baba, 1937	C&H Eo.51			G

Appendix 1. Opisthobranchs of the Marianas / (continued)

Taxon	Voucher/photo	Ref	Notes	Is
<i>Cuthona poritophages</i> Rudman, 1979	C&H Eo.24			G
<i>Cuthona</i> sp. 1, pink head	C&H Eo.16			G
<i>Cuthona</i> sp. 2, orange & blue on cera	C&H Eo.30			G
<i>Cuthona</i> sp. 3, pink, heavy cerata	C&H Eo.33			G
<i>Cuthona</i> sp. 4, small, transparent	C&H Eo.38			G
<i>Cuthona</i> sp. 5, gold	C&H Eo.41			G
<i>Cuthona</i> sp. 6, white, Toguon sand	C&H Eo.56			G
<i>Cuthona</i> sp. 7, purple head, red cephalic tentacles	C&H Eo.64			G
<i>Cuthona</i> sp. 8, orange-pink, dry dock	C&H Eo.78			G
<i>Cuthona</i> sp. 9, on <i>Enhalus</i> hydroid, Saipan	C&H Eo.14			S
<i>Cuthona</i> sp. 10, white sparkley	C&H Eo.70			G
<i>Cuthona</i> sp. 11, white, pink, green	C&H Eo.45			G
<i>Phestilla lugubris</i> (Bergh, 1870)	C&H Eo.15			G
<i>Phestilla melanobrachia</i> Bergh, 1874	C&H Eo.75			G
<i>Phestilla minor</i> Rudman, 1981	C&H Eo.57			G
<i>Phestilla</i> sp. 1, on <i>Goniopora fruticosa</i>	C&H Eo.81			G
<i>Phestilla</i> sp. 2, on <i>Porites lobata</i>	C&H Eo.19			G
<i>Phestilla</i> sp. 3, scattered white flecks	C&H Eo.39			G
INCERTAE SEDIS				
eolid sp. 1, pale yellow	C&H Eo.8			G
eolid sp. 2, small white	C&H Eo.25			G
eolid sp. 3, transparent, red diverticula	C&H Eo.26			G
eolid sp. 4, annulate, from Marine Lab	C&H Eo.36			G
eolid sp. 5, yellow tips	C&H Eo.82			G
eolid sp. 6, orange horseshoe	C&H Eo.61			S
eolid sp. 7, black spots by rhinophore	C&H Eo.55			M
eolid sp. 8, red	C&H Eo.49			G
eolid sp. 9, white	C&H Eo.47			G
eolid sp. 10 white, brown diverticula	C&H Eo.63			G
eolid sp. 11 cf. <i>Eolis skinneri</i> Kelaart, 1858	C&H Eo.54			G

Notes:

- 1) Photo seen of specimen from Tanguisson, Guam. No photo or specimen in the authors' collection.
- 2) Quoy & Gaimard, 1824 as *Bulla guamensis*.
- 3) May be the same as *A. hawaiiensis*.
- 4) Morphology of the living animal as well as radula suggest a cylichnid. The gizzard plates have a series of transverse rows of rods similar to some haminoeid forms.
- 5) Two 6 mm specimens collected from 8 m, Bandara Bay, Pagan, CNMI. These were sent to Robert Burn, Jan. 1982. In later correspondence (6 March 82), Burn suggested that the animals were "...close to *Cylichna concinna* (A. Adams, 1850)".
- 6) Originally published as being associated with the sponge, *Dysidea herbacea*. Relative to the section on sponges (Kelly et al. 2003: this volume), the host would be *Dysidea* sp. 1A.
- 7) Photo is of specimen from Bali, Indonesia. Comparison of shell and male system with Guam specimen shows them to be conspecific.
- 8) *Atys naucum* has been reported from throughout the Indo-Pacific. On Guam, only one dessicated juvenile shell has been found. Identification was aided by the presence of the longitudinally striped periostracum.

- 9) *Haloa* is used here since it occurred in the original report (Kurozumi et al 1994). *Haloa* had previously been synonymized with *Haminoea*. See: Rudman, 1971.
- 10) Quoy and Gaimard's description of *Haminoea cymbalum* was based upon shell alone. The 'type' presently in the Paris Museum is almost twice the size as the specimen listed in the original work. The first valid name, based upon live material, would be *Haminoea simillima* Pease, 1868.
- 11) Host is the cyanobacteria *Hormothamium enteromorphoides*. The shell is transparent and the animals take their color from the host; either light brown, dark brown or green.
- 12) *villica* may be a junior synonym of *Mnestia bizona* (A. Adams, 1850). Material has been submitted for molecular study. *Mnestia* was originally proposed as a subgenus of *Cylichna* by H. & A. Adams, 1854, for the original *Bulla bizona* and *B. marmorata* A. Adams, 1850. Kobelt (1879) treated *Mnestia* as a genus (misspelled as *Morestia*) and designated *M. marmorata* as the type species. The variation in shell shape we have found in breeding populations of *M. villica* suggests that *M. marmorata* may be just an inflated form of *bizona/villica. marmorata*, being the first described, would have priority. *Mnestia* has been found in the literature under both Cylichnidae (Scaphandridae) and Retusidae. The nature of the radula and gizzard plates place *M. villica* in the Haminoeidae.
- 13) Quoy & Gaimard, 1833 as *Bulla viridis* Rang.
- 14) See Jensen (1996) and Mikkelsen (1998) for discussions regarding the relative placement of *Cylindrobulla* to the other shelled Sacoglossa.
- 15) The original description of *vigourouxi* was based on shell alone. The shells of the *Volvatella* are very thin and flexible. Until comparative work is done with internal anatomy it will be difficult to identify *V. vigourouxi* with any certainty.
- 16) Only the left valve of this bivalved Sacoglossa was found.
- 17) As *Elysia obtusa* Baba, 1938.
- 18) As *Elysia halimeda* Macnae, 1954.
- 19) The *Thuridilla* with reference #13, were as *Elysia* in Carlson & Hoff, 1978. See: Gosliner, 1995.
- 20) As *Elysia gracilis* Risbec 1928.
- 21) Quoy & Gaimard, 1832: 314, Pl. 24, fig. 7. Synonymized by Engel (1932) with *S. striatus* (Q & G) [as *S. longicaudus*].
- 22) *Petalifera viridis* is a common form found on the blades of the sea grass *Enhalus acoroides*. It would be surprising if there were not some earlier names available.
- 23) *Stylocheilus striatus* will be found in most pre-2001 literature as *S. longicaudus*. In the original description, Q & G listed *longicaudus* as a pelagic animal. When found today, it is usually after heavy seas have brought some of the host Fucales to shore. *striatus* is found in fairly shallow water associated with the cyanobacteria, *Lyngbya*. See: Rudman, 1999b.
- 24) All specimens dredged by Barry Smith, 19 May 1988; 310 m, Ga'an, Agat, Guam. Id's verified by Dr. Leslie Newman.
- 25) *Platydoris cruenta* has not been recorded from the Mariana Islands since it was reported by Marcus (1965).
- 26) As *Aranucus bifidus* Odhner, 1936.
- 27) Genus is a problem with this species. See: Jensen (2001).
- 28) May be same as *Phanerophthalmus smaragdinus*.
- 29) There is a question as to the actual number of Doriopsis species. See Rudman 1999a. We have opted to keep a number of animals separate until more work is done on the group.