

Molluscan diversity at Bunaken National Park, Sulawesi

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Abstract

Within the framework of an international bioinventory, the marine molluscan biodiversity of the Bunaken National Park (BNP), Sulawesi, has been surveyed for the first time. With 323 species found and documented within only 10 days of collecting, and an additional 94 species identified in the field, the molluscan fauna at BNP is obviously highly diverse. Our species list is clearly biased on polyplacophorans and gastropods, and still far from being complete. However, it more than doubles the number of molluscs previously known from BNP and may serve as a good basis for future inventories, taxonomic studies and conservation activities. While all but one shelled species were already described, several opisthobranchs and nearly all interstitial molluscs seem to be new to science. Siladen Island shows a very diverse fauna of interstitial opisthobranchs indicating that the tropical Indopacific may play a major role as a center of diversity and radiation for interstitial taxa. Our survey was a good example for international collaboration, combining scientific aspects with joint collecting and taxonomic analysis and benefit sharing due to teaching, joint processing of the data and publication of results. A promising beginning that motivates for further projects on the marine molluscan diversity of Sulawesi.

Zusammenfassung

Im Rahmen einer internationalen Bioinventarisierung wurden zum ersten Mal die Mollusken des Bunaken Nationalparks (BNP) in Nordsulawesi erfasst. Während der 10 Sammeltage wurden 326 Arten gesammelt und weitere 94 im Habitat identifiziert, was eine augenscheinlich diverse Fauna widerspiegelt. Dabei wurde besonders Augenmerk auf die Gastropoden und Polyplacophoren gerichtet, und die Liste kann somit keinen Anspruch auf Vollständigkeit erheben. Dennoch verdoppelt sie die Anzahl der bisher im BNP nachgewiesenen Arten und kann somit als gute Basis für zukünftige Inventuren, taxonomische Bearbeitungen und Schutzvorkehrungen dienen. Während nur eine der beschalteten Arten noch als unbeschrieben gilt, sind einige der gesammelten Opisthobranchia Arten sowie alle interstitiellen Arten für die Wissenschaft neu. Die Insel Siladen weist eine hohe Diversität interstitieller Opisthobranchia auf und spiegelt deutlich die Rolle des Indo-Pazifiks als Radiations- und Diversitätszentrum wider. Unsere Expedition war mit der Kombination aus gemeinsamem Sammeln, dem taxonomischen Aufarbeiten der Proben, dem praktischen Erfahrungsaustausch, dem Austausch der gesammelten Daten sowie dem gemeinsamen Veröffentlichen, ein gutes Beispiel internationaler Zusammenarbeit. Letztlich war die Inventarisierung ein vielversprechender Start für zukünftige Diversitätsprojekte mariner Mollusken in Sulawesi.

Key words: Indonesia, Sulawesi, Bunaken Island, Mollusca, diversity

Introduction

Tropical coral reefs are amongst the most diverse and most endangered ecosystems on earth. Although situated within the center of the Indopazific »triangle« of highest marine biodiversity, the invertebrate fauna of Sulawesi is still poorly known. The Bunaken National Park (BNP) of Northern Sulawesi consists of five major islands with volcanic origin, rising up steeply from the deep sea. They are surrounded by extensive fringing reefs with a wide variety of habitats such as reef-walls, canyons, slopes, lagoons, and mangroves. Within the framework of the first international survey on the biodiversity of the BNP in July 2003, our team focussed on benthic Mollusca, with emphasis on aplacophorans, polyplacophorans and gastropods. Our objectives were three-fold: 1) teaching local taxonomists, 2) collecting specimens for special research projects, and 3) investigate the Molluscan biodiversity at BNP. Previously, only Manado Tua Island has been surveyed for molluscs by FONTEMAGGI (2001) who reported 172 gastropods and 29 bivalves. The present study gives a list of molluscan species found within the limits of the BNP that is intended to

serve as a basis for further taxonomic and ecological studies, future surveys and conservation purposes.

Material and Methods (Figs. 1–9)

Between 12-22 July 2003, 10 days of intensively collecting have been performed at various localities at all 5 major islands of the BNP (Fig. 1). Epibenthic species were collected and photographed by using SCUBA and snorkeling day and night. Subsamples of different algae, seagrass, and coral rubble were examined for small and cryptic species under the dissecting microscope. Coral sand from different depths was analyzed for macroscopic and microscopic molluscs. Intertidal habitats such as beaches, mangroves, and rocks were surveyed as well. Molluscs were documented by photographs, preliminarily identified, usually anesthetized with 7 % $MgCl_2$, and fixed (70 % or 96 % ethanol, 4 % formalin-seawater). Reference specimens were deposited in the collection of the Fisheries and Marine Science Department of the Sam Ratulangi University, Manado, and in the Zoological State collection Munich (ZSM).

List of Species

This list only comprises species, geographical records, and depth ranges that are documented by photographs and/or museum material. All species have been found in the (epi-)benthos except for those marked to inhabit the marine interstitial, the intertidal zones (mangrove roots, rocks), or terrestrial habitats close to the sea shore. When figured, the number is indicated too.

Abbreviations:

B: Bunaken Island, S: Siladen Island, M: Mantehage Island, MT: Manado Tua Island, N: Nain Island; i= interstitial.

SOLENOGASTRES GEGENBAUER, 1878

Solenogastres sp. 1; S; 15 m; i. Fig. 10.

Solenogastres sp. 2; S; 15 m; i. Fig. 11.

POLYPLACOPHORA GRAY, 1821

Leptochitonidae DALL, 1889

Parachiton cf. *acuminatus* (THIELE, 1909); M; 7.5m

Callochitonidae PLATE, 1901

Callochiton cf. *subsulcatus* KAAS & VAN BELLE, 1985; MT; 2m

Ischnochitonidae DALL, 1889

Ischnochiton albinus THIELE, 1911; B, MT; 1–2m

Ischnochiton bouryi DUPUIS, 1917; B, MT, S; 0.5–3m

Ischnochiton winckworthi LELOUP, 1936; S; 0.5–2m

Callistoplacidae PILSBRY, 1893

Callistochiton granifer HULL, 1923; B, MT, S; 0.5–3m

Chitonidae RAFINESQUE, 1815

Chiton (Tegulaplex) hululensis (E. A. SMITH, 1903); B, S; 1–3m

Acanthopleura gemmata (DE BLAINVILLE, 1825); B; intertidal. Fig. 14.

Acanthopleura spinosa (BRUGUIÈRE, 1792); B; intertidal. Fig. 13.

Lucilina cf. *sowerbyi* (NIERSTRASZ, 1905); B, MT; 1–5m

Lucilina lamellosa (QUOY & GAIMARD, 1835); B, MT, N, S; 1–12m

Schizochitonidae DALL, 1889

Schizochiton incisus (SOWERBY, 1841); B, MT; 1–2m

Cryptoplacidae H. & A. ADAMS, 1858

Cryptoplax burrowi (E. A. SMITH, 1884); B; 0.5m

Acanthochitonidae PILSBRY, 1893

Acanthochitona leopoldi (LELOUP, 1933); B; 1–3m

BIVALVIA LINNAEUS, 1758

Pteriomorpha BEURLIN, 1944

Arcida STOLICZKA, 1871

Arcidae LAMARCK, 1809

Barbatia amygdalumtosum (RÖDING, 1798); B; 2–3m

Barbatia velata (SOWERBY, 1843); B; 2–3m

Mytilida FÉRUSSAC, 1822

Pinnidae LEACH, 1819

Pinna muricata LINNAEUS, 1758; B; 2–3m

Pteriida NEWELL, 1965

Pterioidea GRAY, 1847

Isognomonidae WOODRING, 1925

Isognomon isognomum (LINNAEUS, 1758); B; 2–3m

Isognomon perna (LINNAEUS, 1767); MT; 2m

Ostreida FÉRUSSAC, 1822

Ostreoidea RAFINESQUE, 1815

Pectinidae WILKES, 1810

Gloripallium pallium (LINNAEUS, 1758); MT; 10–16m

Spondylidae GRAY, 1826

Spondylus ducalis RÖDING, 1798; B; 0–1m

Spondylus sp.; B; 20 m. Fig. 12.

Heterodonta NEUMAYR, 1884

Venerida H. & A. ADAMS, 1856

Cardiidae LAMARCK, 1809

Corculum humanum RÖDING, 1798; B; 1–2m

Tridacnidae LAMARCK, 1819

Hippopus hippopus (LINNAEUS, 1758); B; 2–3m

Veneridae RAFINESQUE, 1815

Periglypta puerpera (LINNAEUS, 1771); B; 2–3m

SCAPHOPODA BRONN, 1862

Scaphopoda sp. 1; S, 15 m

CEPHALOPODA CUVIER, 1797

Octopodidae D'ORBIGNY IN FÉRUSSAC & D'ORBIGNY, 1840

Haplochaena lunulata (QUOY & GAIMARD, 1832); B, MT; 0–2m

Octopus cyanea GRAY, 1849; MT; 3m

Sepia sp.; B, 2–3 m. Fig. 15.

GASTROPODA CUVIER, 1795

PROSOBRANCHIA MILNE EDWARDS, 1848

Docoglossa TROSCHEL, 1866

Lottiidae GRAY, 1840

Patelloida saccharina (LINNAEUS, 1758); B; rocky intertidal

Neritaemorphi KOKEN, 1896

Neritidae LAMARCK, 1809

Nerita (Ritena) chamaeleon LINNAEUS, 1758; B; rocky intertidal

Nerita (Ritena) plicata LINNAEUS, 1758; B; rocky intertidal

Nerita (Ritena) undata LINNAEUS, 1758; B; rocky intertidal

Nerita (Theliostyla) albicilla LINNAEUS, 1758; B, S; rocky intertidal
Nerita (Theliostyla) polita LINNAEUS, 1758; B; rocky intertidal
Nerita (Theliostyla) signata MACLEAY in LAMARCK, 1822; B; rocky intertidal
Smaragdia cf. souverbiana (MONTROUZIER, 1866); B; 0–2m
Smaragdia rangiana (RÉCLUZ, 1841); B; 0–2m

Titiscaniidae BERGH, 1890
Titiscania limacina BERGH, 1875; B; 0–2m. Fig. 16.

Vetigastropoda SALVINI-PLAWEN, 1980

Haliotidae RAFINESQUE, 1815
Haliotis asinina LINNAEUS, 1758; B; 1m
Haliotis clathrata REEVE, 1846; B; 2m
Haliotis ovina GMELIN, 1791; B; 2m
Haliotis varia LINNAEUS, 1758; S; 0–15m

Fissurellidae FLEMMING, 1822
Diodora cf. granifera (PEASE, 1861); S; 15m
Diodora singaporensis (REEVE, 1850); N; 1–2m
Emarginula cf. variegata (A. ADAMS, 1851); MT, S; 2m
Emarginula sp.; B; 1m
Rimula cf. verrieri CROSSE, 1871; S; 15m
Scutus unguis (LINNAEUS, 1758); S; 2m

Trochidae Rafinesque, 1815
Clanculus atropurpureus (GOULD, 1849); B; 2–3m
Herpetopoma atrata (GMELIN, 1791); MT, (?)S; 0–1m
Monilea cf. vernicosa GOULD, 1861; B; 1–2m
Monodonta (Osilinus) labio (LINNAEUS, 1758); B; 0.5m
Stomatella auricula LAMARCK, 1816; S; 15m
Stomatella varia A. ADAMS, 1850; B, M, S; 0–12m
 ? *Stomatia phymotis* HELBLING, 1779; B; 1–2m
Tectus fenestratus (GMELIN, 1791); B; 2–3m

Turbiniidae RAFINESQUE, 1815
Angaria delphinus (LINNAEUS, 1758); B; 2–3m
Angaria delphinus melanacantha (REEVE, 1842); B; 1–2m
Astraea calcar (LINNAEUS, 1758); B, S; 1–15m
Astraea rhodostoma LAMARCK, 1822; MT; 2m
Astraea semicostata (P. FISCHER, 1875); B; 2–3m
Dentarene sarcina IREDALE, 1929; (?)B, MT, S; 1–15m
Leptothyra laeta (MONTROUZIER, 1863); B; 0–3m
Liotina peronii (KIENER, 1839); B; 1–2m
Phasianella solida (BORN, 1778); B; 1–2m
Turbo (Lunella) cinereus BORN, 1778; B; 0.5m
Turbo (Marmarostomus) chrysostomus LINNAEUS, 1758; B; 2–3m
Turbo brunneus (RÖDING, 1798); B; 0.5m

Caenogastropoda Cox, 1959

Architaenioglossa HALLER, 1890
 Cyclophoridae GRAY, 1847
Cyclotus cf. politus SOWERBY, 1843; B; terrestrial, under dead wood

Diplommatinidae THIELE, 1929
 Diplommatinidae sp.; B; terrestrial, on rocks

Sorbeoconcha PONDER & LINDBERG, 1996

Cerithiimorpha GOLIKOV & STAROBOGATOV, 1975
 Cerithiidae FÉRUSAC, 1822
Cerithium cf. (Ischnocerithium) rostratum SOWERBY, 1855; B; 1–2m
Cerithium cf. tenellum SOWERBY, 1855; N; 1–2m
Clypeomorus bifasciatus (SOWERBY, 1855); B; 0.5m
Rhinoclavis cf. kochi (PHILIPPI, 1848); S; 9–11m
Cerithium spiculum HEDLEY, 1899 (= *Cerithium nesioticum* PILSBRY & VANATTA, 1906); N, S; 1–11m

Hypogastropoda PONDER & LINDBERG, 1996

Ctenoglossa GRAY, 1853
 Eulimoidea TROSCHEL, 1853
 Eulimidae PHILIPPI, 1853
Melanella sp.; B; 0–3m. Fig. 19.
Peasistilifer nitidula (PEASE, 1860); B; 0–3m

Thycidae THIELE, 1931
Thyca crystallina (GOULD, 1846); B, S; 1–3m. Fig. 18.

Triphoroidea GRAY, 1847

Triphoridae GRAY, 1847
Iniforis aemulans (HINDS, 1843); S; 15m
Iniforis concors (HINDS, 1843); S; 2m
Litharium maculata (PEASE, 1871); S; 15m
Mastonia rubra (HINDS, 1843); B; 1–3m
Mastonia ustulata (HERVIER, 1897); S; 0–2m
Strobiligera maxillaris (HINDS, 1844); S; 10m
Viriola sp.; B, S; 0–3m

Littorinimorpha GOLIKOV & STAROBOGATOV, 1975

Littorinoidea GRAY, 1840
 Littorinidae GRAY, 1840
Littoraria pallescens (PHILIPPI, 1846); M; mangrove roots
Littorina scabra (LINNAEUS, 1758); B; mangrove roots
Littorinopsis undulata (GRAY, 1839); B; mangrove roots

Rissooidea GRAY, 1847

Caecidae M. E. GRAY, 1857
Caecum sp.; S; 15m. Fig. 17.

Rissoidae GRAY, 1847
Morchiella gigantea (DESHAYES, 1850); S; 2m
Rissoina (Rissolina) turricula PEASE, 1861; B; 1–2m

Vitrinellidae BUSH, 1897
 ? *Vitrinella* sp.; S; 15m

Stromboidea RAFINESQUE, 1815

Strombidae RAFINESQUE, 1815
Lambis (Lambis) lambis (LINNAEUS, 1758); B; 2–3m
Lambis (Millepes) millepeda (LINNAEUS, 1758); B; 0.5m
Strombus (Canarium) urceus LINNAEUS, 1758; B; 2–3m
Strombus (Canarium) urceus ustulatus SCHUHMACHER, 1817; B; 2–3m

Strombus (Conomurex) luhuanus LINNAEUS, 1758; B; 2–3m
Strombus (Euprotomus) aurisdianae LINNAEUS, 1758; B; 2–3m
Strombus (Lentigo) lentiginosus LINNAEUS, 1758; B; 2–3m
Terebellum terebellum (LINNAEUS, 1758); B; 2–3m

Vermetoidea RAFINESQUE, 1815

Vermetidae RAFINESQUE, 1815
Serpulorbis cf. medusae (PILSBRY, 1891); MT; 3m
Vermetus sp.; S; 0.5–2m

Neomesogastropoda BANDEL, 1993

Calyptraeidea LAMARCK, 1809
 Calyptraeidae LAMARCK, 1809
Calyptraea cf. extincitorium LAMARCK, 1822; B; 2m

Cypraeoidea RAFINESQUE, 1815

Cypraeidae RAFINESQUE, 1815
Bistolida ursellus (GMELIN, 1791); MT; 1m
Blasicrura teres (GMELIN, 1791); B; 2–3m
Erosaria annulus (LINNAEUS, 1758); B; 2–3m
Erosaria beckii (GASKOIN, 1836); S; 15m
Erosaria erosa (LINNAEUS, 1758); B, M; 0–3m
Erosaria labrolineata (GASKOIN, 1849); B, M; 0–1m
Erosaria moneta (LINNAEUS, 1758); N; 1–2m
Erronea caurica (LINNAEUS, 1758); B; 0.5m
Erronea erronea erronea (LINNAEUS, 1758); B; 2–3m
Cypraea tigris LINNAEUS, 1758; B; 2–3m
Lyncina lynx (LINNAEUS, 1758); B; 2–3m
Lyncina vitellus (LINNAEUS, 1758); B; 2–3m
Notadusta punctata (LINNAEUS, 1771); B; 1m
Palmadusta asellus (LINNAEUS, 1758); S; 2m
Purpuradusta fimbriata fimbriata (GMELIN, 1791); M; 0–1m

Ovulidae FLEMING, 1822

Ovula ovum LINNAEUS, 1758; B; 2–3m

Naticoidea FORBES, 1838

Naticidae FORBES, 1838
Polinices tumidus (SWAINSON, 1840); B; 0.5m

Tonnoidea SUTER, 1913

Bursidae THIELE, 1925
Bursa granularis (RÖDING, 1798); B, S; 0–2m
Bursa granularis affinis (BRODERIP, 1832); M; 0–2m
Bursa rhodostoma (BECK in SOWERBY, 1835); M; 0–2m
Bursa tuberosissima (REEVE, 1844); B; 2–3m

Ranellidae GRAY, 1854

Cymatium sp.; B; 1–2m
Gyrineum gyrinum (LINNAEUS, 1758); B; 1–3m
Gyrineum lacunatum (MIGHELS, 1845); B, S; 0–11m
Gyrineum roseum (REEVE, 1844); S; 15m

Velutinoidea GRAY, 1840

Capulidae FLEMING, 1822
Capulus danieli (CROSSE, 1858); B; 2–3m

Triviidae Troschel, 1863

Trivirostra edgari (SHAW, 1909); M; 0–3m
Trivirostra ginae FEHSE & GREGO, 2002; S; 15m
Trivirostra hyalina SCHILDER, 1933; MT; 0–3m
Trivirostra oryza (LAMARCK, 1810); S; 0–3m
Trivirostra shawi SCHILDER, 1933; B, S; 0–3m
Trivirostra spoinsula CATE, 1979; B; 0–3m
Trivirostra tryphaenae FEHSE, 1998; MT; 0–3m
Trivirostra vitrina CATE, 1979; B, M; 0–3m

Eratoidae SCHILDER, 1927

Cypraeerato gemma (BAVAY, 1917); S; 15m

Velutinidae GRAY, 1840

Lamellaria sp.; M, S; 10–15m

Neogastropoda WENZ, 1938

Muricoidea DA COSTA, 1776

Buccinidae RAFINESQUE, 1815
Caducifer truncatus (HINDS, 1844); B; 2–3m
Cantharus (Pollia) fumosus (DILLWYN, 1817); B; 0.5m
Cantharus (Pollia) pulcher (REEVE, 1846); M, MT, S; 0–3m
Cantharus (Pollia) wagneri (ANTON, 1839); MT, S; 0–2m
Cantharus (Prodotia) iostomus (GRAY in GRIFFITH & PIDGEON, 1834); B, M, (?)MT; 0–2m
Cantharus undosus (LINNAEUS, 1758); S; 0–2m
Engina alveolata (KIENER, 1836); MT, S; 0–11m
 ? *Engina pasinola* (DUCLOS, 1840); B; 1–2m
Engina zonalis (LAMARCK, 1822); B; 2–3m
 ? *Pisania ignea* (GMELIN, 1791); MT; 1m

Columbellidae SWAINSON, 1840

? *Indomitrella lischkei* (SMITH, 1879); B; 1–2m
Mitrella venulata (SOWERBY, 1894); B; 1–2m
Pyrene deshayesii (CROSSE, 1859); M, S; 9–25m
Pyrene ocellata (LINK, 1807); B; 0.5m

Coralliophilidae CHENU, 1859

Coralliophila neritoidea (LAMARCK, 1816); B; 2–3m

Costellariidae McDONALD, 1860

Vexillum (Costellaria) cf. amanda (REEVE, 1845); MT; 1m
Vexillum (Costellaria) cf. polygonum (GMELIN, 1791); S; 10m
Vexillum (Costellaria) cf. semifasciatum (LAMARCK, 1811); B; 1–2m
Vexillum plicarium (LINNAEUS, 1758); B; 2–3m
Vexillum sculptile (REEVE, 1845); S; 15m

Cystiscidae STIMPSON, 1865

Crithe cossinea COSSIGNANI, 1997; B, S; 1–12m. Fig. 20.

Fasciolaridae GRAY, 1853

Colubraria nitidula (SOWERBY, 1833); B, M; 0–2m
Latirolagena smaragdula (LINNAEUS, 1758); B; 1–3m
Latus nodatus (GMELIN, 1791); S; 0.5m
Latus noumeensis (CROSSE, 1870); S; 9–11m
Latus turritus (GMELIN, 1791); B; 1–3m
Peristernia nassatula (LAMARCK, 1822); S; 2m

Marginellidae FLEMING, 1828

Marginella sp.; M; 10m
Volvarina cf. *hirasei* (BAVAY, 1917); B, MT; 1–2m

Mitridae SWAINSON, 1831

Imbricaria olivaeformis (SWAINSON, 1821); B; 5–10m
Mitra (*Strigatella*) *peculiaris* REEVE, 1845; S; 2m
Mitra cf. *litterata* LAMARCK, 1811; S; 0–2m
Mitra imperialis RÖDING, 1798; M; 0.5m
Mitra papalis (LINNAEUS, 1758); B; 2–3m
Mitra paupercula (LINNAEUS, 1758); B; 0–3m
Mitra pellisserpentis REEVE, 1844; MT; 1–3m
Mitra retusa LAMARCK, 1811; S; 2m
Mitra tabanula LAMARCK, 1811; S; 2m
Neocancilla papilio (LINK, 1807); MT; 2m

Muricidae RAFINESQUE, 1815

Chicoreus brunneus (LINK, 1807); S; 0–2m
Chicoreus cf. *torrefactus* (SOWERBY, 1841); B; 0–3m
 ? *Cronia aurantiaca* (HOMBRON & JAQUINOT, 1853); B; 0–3m
Cronia cf. *margaritcola* (BRODERIP, 1833); B; 1–2m
Drupa grossularia (RÖDING, 1798); M; 0–2m
Drupa morum RÖDING, 1798; N, S; 1–40m
Drupa ricinus (LINNAEUS, 1758); S; 10m
Drupa rubusidaeus RÖDING, 1798; MT; 2m
Drupella cf. *rugosa* (BORN, 1778); B; 1m
Drupella cornus (RÖDING, 1798); S; 9–40m
Maculotriton serriale (DESHAYES in LABORDE & LINANT, 1834); B, MT, S; 1–2m
Morula biconica (DE BLAINVILLE, 1832); B, MT; 1–3m
Morula granulata (DUCLOS, 1832); S; 2m
 ? *Muricodrupa fenestrata* (DE BLAINVILLE, 1832); S; 9–11m
Nassa sarta (BRUGUIÈRE, 1789); S; 2m
Spinidrupa dumosa (CONRAD, 1837); S; 10m
Thais aculeata DESHAYES, 1844; S; splashzone
Thais tuberosa RÖDING, 1798; S; 0–3m

Nassariidae IREDALE, 1916

Nassarius (*Niotha*) *albescens* (DUNKER, 1846); B; 1–2m
Nassarius (*Niotha*) cf. *distortus* (A. ADAMS, 1852); B; 1–2m
Nassarius (*Plicarcularia*) *pullus* (LINNAEUS, 1758); B; 0–3m
Nassarius (*Telasco*) *luridus* (GOULD, 1850); B; 0.5m
Nassarius arcularius (LINNAEUS, 1758); B, MT; 0–1m
Nassarius globosus (QUOY & GAIMARD, 1833); B; 2–3m

Olividae LATREILLE, 1825

Oliva annulata (GMELIN, 1791); MT; 2m

Turbinellidae SWAINSON, 1840

Vasum turbinellum (LINNAEUS, 1758); B, N; 1–3m

Volutidae RAFINESQUE, 1815

Cymbiola (*Aulicina*) *vespertilio* (Linnaeus, 1758); B; 2–3m

Conoidea FLEMING, 1822**Conidae RAFINESQUE, 1815**

Conus ebraeus LINNAEUS, 1758; B; 0.5m

Conus glans HWASS, 1792; B; 2–3m
Conus lividus HWASS, 1792; N; 1–2m
Conus marmoreus LINNAEUS, 1758; B; 2–3m
Conus miles LINNAEUS, 1758; M; 10m
Conus parvatus WALLS, 1979; S; 15m
Conus planorbis BORN, 1778; B, (?)MT; 1–3m

Terebridae MÖRCH, 1852

Terebra affinis GRAY, 1834; B, N, S; 1–2m
Terebra felina (DILLWYN, 1817); S; 8–10m
Terebra funiculata HINDS, 1844; B; 2–3m
Terenolla pygmaea (HINDS, 1844); S; 2m

Turridae SWAINSON, 1840

Clavus pica (REEVE, 1843); MT; 2m
Clavus unizonalis (LAMARCK, 1822); B; 1–3m
Daphnella ornata HINDS, 1844; S; 2m
Eucithara celebensis (HINDS, 1843); B; 1–2m
Turridrupa cerithina (ANTON, 1838); S; 2–11m

Heterobranchia J.E. GRAY, 1840**Euthyneura SPENGLER, 1881****Pulmonata CUVIER in DE BLAINVILLE, 1814*****Systemommatophora* PILSBRY, 1948****Onchidiidae RAFINESQUE, 1815**

Onchidella sp. 1; B; intertidal. Fig. 14.

Veronicellidae GRAY, 1840

Veronicella sp. 1; B; terrestrial

Eupulmonata MORTON, 1955**Archaeopulmonata MORTON, 1955****Ellobiidae PFEIFFER, 1854**

Auriculastra subula (QUOY & GAIMARD, 1832); B; terrestrial

Auriculastra tornatelliformis (PETIT, 1842); B; terrestrial

Cassidula nucleus (GMELIN, 1791); B; terrestrial

Melampus castaneus (VON MÜHLFELD, 1816); B; terrestrial

Melampus luteus (QUOY & GAIMARD, 1832); B; terrestrial

Pythia scarabaeus (LINNAEUS, 1758); B; terrestrial

Stylommatophora SCHMIDT, 1856**Helicarionidae BOURGUIGNAT, 1877**

Helicarionidae sp. 1; B; terrestrial

Ariophantidae THIELE, 1931

Nanina citrina (LINNAEUS, 1758); B; terrestrial

Opisthobranchia MILNE EDWARDS, 1848**Cephalaspidea s.l. P. FISCHER, 1883****?Diaphanoidea ODHNER, 1914****?Diaphanidae ODHNER, 1914**

Colpodaspis thompsoni BROWN, 1979; B, MT, N; 1–5 m. Fig. 21.

Philinoidea GRAY, 1850**Aglajidae PILSBRY, 1895**

Chelidonura amoena BERGH, 1905; S

Chelidonura hirundinina (QUOY & GAIMARD, 1832); B; 0–3 m cf *Chelidonura* sp. 1; M

Gastropteridae SWAINSON, 1840

Siphopteron tigrinum GOSLINER, 1989; MT; 0-5 m. Fig. 22.

Philinidae GRAY, 1850

Philine sp. 1; S; 15 m, i

Philine sp. 2; S; 15 m, i

Philinoglossidae HERTLING, 1932

Philinoglossa marcusii; S; 15 m, i. Fig. 24.

Philinoglossa sp. 1; S; 15 m, i

Bulloidea LAMARCK, 1801

Bullidae LAMARCK, 1801

Bulla cf. ampulla LINNAEUS, 1758; MT; 0-5 m

Haminoeidae PILSBRY, 1895

Atys cf. semistriata PEASE, 1860; S; 15 m

Haminoea curta (ADAMS, 1850); S; 15 m

Haminoea sp. 1; S; 15 m

Haminoea sp. 2; S; 15 m

Limulatys cf. ooformis HABE, 1952; S; 15 m

Smaragdinellidae ADAMS & REEVE, 1848

Phanerophthalmus cf. smaragdinus (RÜPPELL & LEUCKART, 1828); B, M; 0-3 m. Fig. 23.

Runcinoidea ADAMS & ADAMS, 1854

Runcinidae ADAMS & ADAMS, 1854

cf. Runcina sp. 1; N; 0-3 m

Anaspidea P. FISCHER, 1883

Aplysiidae LAMARCK, 1809

Aplysia sp. 1; MT

Dolabella auricularia (LIGHTFOOT, 1786); MT; 0-3 m. Fig. 26.

Phyllaplysia sp. 1; B; 0-3 m. Fig. 25.

Stylocheilus striatus (QUOY & GAIMARD, 1825); B; 0-3 m

Sacoglossa IHERING, 1876

Plakobranchoidea BLAINVILLE, 1814

Plakobranichidae RANG, 1829

Elysiella pusilla BERGH, 1872; B, M; 0-15 m

Thuridilla bayeri MARCUS, 1965; N, S; 1-3 m

Thuridilla cf. hoffae GOSLINER, 1995; S; 3 m

Thuridilla gracilis (RISBEC, 1928); B, S; 1-3 m

Thuridilla lineolata BERGH, 1905; B, M, N; 1-20 m. Fig. 27.

Thuridilla sp. 1; S; 3 m

Caliphyllidae THIELE 1912

Cyerce elegans BERGH, 1870; B; 10-13 m. Fig. 29.

Cyerce sp. 1; B, S; 2-13 m. Fig. 28.

Acochlidea ODHNER, 1939

***Incertae sedis*:**

cf. Acochlidea sp. 1; S; 15 m; i. Fig. 31.

Acochlidea sp. 2; S; 10-15 m; i

Hedylopsoidea ODHNER, 1952

Hedylopsidae ODHNER, 1952

Hedylopsis sp. 1; S; 15 m; i

Microhedyloidea ODHNER, 1937

Microhedyllidae ODHNER, 1937

Pontohedyle sp. 1; S; 3-15 m; i. Fig. 32.

Pontohedyle sp. 2; S; 15 m; i

Pontohedyle sp. 3; S; 15 m; i

Pontohedyle sp. 4; S; 15 m; i. Fig. 33.

Microhedyle sp. 1; S; 3 m; i. Fig. 34.

Thecosomata BLAINVILLE, 1823/4

Euthecosomata MEISENHEIMER, 1905

Cavoliniidae D'ORBIGNY, 1842

Cavolinia cf. globulosa GRAY, 1850; S; 15 m

Limacinidae BLAINVILLE, 1823

Limacina cf. helicina (PHIPPS, 1774); S; 15 m

Nudipleura WÄGELE & WILLAN, 2000

Pleurobranchoidea FÉRUSSAC, 1822

Pleurobranchidae FÉRUSSAC, 1822

Berthella sp. 1; B; 0-3 m

Pleurobranchus peroni CUVIER, 1804; B; 0-2 m

Pleurobranchus sp. 1; B, S; 0-3 m

Nudibranchia BLAINVILLE, 1814

Anthobranchia FÉRUSSAC, 1819

Doridoidea RAFINESQUE, 1815

Incertae sedis: Hexabranichidae BERGH, 1891

Hexabranichus sanguineus (RÜPPELL & LEUCKART, 1828); MT, S; 1-15 m

Phanerobranchia P. FISCHER, 1883

Gymnodorididae ODHNER, 1941

Gymnodoris citrina BERGH, 1875; B; 0-2 m

?*Gymnodoris* sp. 1; S; 15 m; i?

Polyceridae ALDER & HANCOCK, 1845

Nembrotha cristata BERGH, 1877; MT; 6 m. Fig. 39.

Roboastra gracilis (BERGH, 1877); S; 0-3 m

Tambja morosa (BERGH, 1877); S; 0-3 m

Cryptobranchia P. FISCHER, 1883

Labriostomata VALDÉS, 2002

Labriostomata sp. 1; B, MT; 3-15 m

Actinocyclusidae PRUVOT-FOL, 1934*

? *Hallaxa* sp. 1; S

Chromodorididae BERGH, 1891

Ceratosoma sinuata (VAN HASSELT, 1824); B, 0-2 m

Chromodoris annae BERGH, 1877; B, M, MT, S; 1-25 m

Chromodoris decora (PEASE, 1860); S, 0-13 m

Chromodoris diana GOSLINER & BEHRENS, 1998; S, B, M; MT; 0-15 m. Fig. 35.

Chromodoris geometrica (RISBEC, 1928); B, MT, N; 3-15 m

Chromodoris lochi RUDMAN, 1982; B, M, MT, S; 3-25 m

Chromodoris sp. 1; B; 0-15 m

Chromodoris strigata RUDMAN, 1982; B; 13 m. Fig. 36.

Chromodoris tinctoria (RÜPPELL & LEUCKART, 1828); S; 0-3 m

Chromodoris willani RUDMAN, 1982; S; 0-8 m

Hypselodoris apolegma (YONOW, 2001); N; 8 m
Noumea varians (PEASE, 1871); MT; 8 m
Risbecia tryoni (GARRETT, 1873); MT; 0–5 m

Discodorididae s.l. (sensu VALDÉS, 2002)
 Discodorididae sp. 1B; 0–3 m

Dorididae s.l. (sensu VALDÉS, 2002)
Halgerda batangas CARLSON & HOFF, 2000; MT; 15 m.
 Fig. 37.

Porostomata BERGH, 1892

Dendrodorididae O'DONOGHUE, 1924
Dendrodoris elongata BABA, 1936; B, MT, S; 0–3 m
Dendrodoris sp. 1; S

Phyllidiidae RAFINESQUE, 1815
Phyllidia coelestis BERGH, 1905; M, MT; 1–15 m
Phyllidia elegans BERGH, 1869; N; 1–3 m
Phyllidia ocellata CUVIER, 1804; M, N; 1–15 m
Phyllidia varicosa LAMARCK, 1804; B, M, MT, N; S; 1–15 m
Phyllidiella pustulosa (CUVIER, 1804); B, M, S; 1–18 m
Phyllidiella cf. *lizae* BRUNCKHORST, 1993; M; 12–15 m
Phyllidiella nigra (VAN HASSELT, 1824); B, S; 1–15 m
Phyllidiopsis striata BERGH, 1888; B; 18 m. Fig. 38.

Cladobranchia WILLAN & MORTON, 1984

Dendronotoidea ALLMAN, 1845

Bornellidae P. FISCHER, 1883
Bornella stellifer (ADAMS & REEVE, 1848); S; 8–10 m

Arminoidea RAFINESQUE, 1814

Zephyrinidae IREDALE & O'DONOGHUE, 1923
Janolus mirabilis BABA & ABE, 1970; B; 10–13 m. Fig. 40.
Janolus sp. 1; B; 10–13 m. Fig. 41.

Aeolidoidea GRAY, 1827

Aeolidoidea sp. 1; M; 12 m

Flabellinidae BERGH in CARUS, 1890

Flabellina exoptata GOSLINER & WILLAN, 1991

Embletoniidae PRUVOT-FOL, 1954

Embletonia gracilis RISBEC, 1928; M; 10–15 m; i?. Fig. 42.

Glaucidae OKEN, 1815

Phyllodesmium briareum (BERGH, 1896); M; 12 m
Phyllodesmium jakobsenae; B; 0–2 m. Fig. 44.
Phyllodesmium sp. 1; B; 0–3 m. Fig. 45.
Pteraeolidia ianthina (ANGAS, 1864); M, N; 1–15 m

Pseudovermidae THIELE, 1931

Pseudovermis cf. *mortoni* CHALLIS, 1969; S; 10–15 m; i

Tergipedidae VAYSSIÈRE, 1888

Phestilla lugubris (BERGH, 1870); B, S; 0–2 m
Phestilla minor RUDMAN, 1981; B, S; 1–3 m

Incertae sedis

Rhodopemorpha SALVINI PLAWEN, 1991

? Rhodopidae sp. 1; S; 15 m; i. Fig. 30.

Discussion

A total of 323 molluscan species (Table 1) has been documented and/or collected from the BNP during our 10-days survey. Of these, 11 species are terrestrial but were found to occur very close to the shore. An additional approx. 94 marine molluscan species were visually detected in the field (Table 2) but not included in the present list and analysis, since their identifications cannot be verified anymore. This high number of more than 400 species suggests the BNP to be inhabited by a highly diverse molluscan fauna. Collecting obviously was quite efficient through covering a wide variety of habitats also including some special (micro)habitats such as algae, coral rubble, sand, mud, mangroves etc, and species living parasitically (e.g., Eulimidae) on other marine animals. On the other hand, our lists are certainly far from being complete even for the main scope taxa due to our short stay at BNP.

As indicated in Table 1, members of 5 molluscan classes have been found, however, in very different quantities. The striking dominance of gastropods (90% of all species found) obviously not only reflects their higher species diversity but also collecting bias to this group.

Table 1: Taxa composition

Taxon	No. of species found	No. and percentage of presumably new species
Solenogastres	2	? (100%)
Polyplacophora	14	0 (0%)
Bivalvia	11	0 (0%)
Scaphopoda	1	?
Cephalopoda	3	0 (0%)
Gastropoda	292	~ 24 (~8%)
	193	1? (<1%)
Prosobranchia	89	~23 (~26%)
Opisthobranchia		
Pulmonata	10	0 (0%)
Total:	323	~26 (~8%)

The overall percentage of presumably new species is approximately 8 % (Table 1). Most potentially new species refer to opisthobranch gastropods, and, beside several cryptical epibenthic species, especially to small interstitial species. The potentially new *Solenogastres* spp. (Figs. 10, 11) and the pro-sobranch *Caecum* sp. (Fig. 17) also refer to tiny mesopsammic specimens. Due to their small size, all these specimens have to be analyzed by time-consuming microanatomical or histological means, thus definite identifications and species descriptions are far beyond the scope of this study.

In contrast, most of the macroscopic and almost all shelled taxa found in the BNP were already described from other regions of the tropical Indo-Pacific. Most bivalves and shelled gastropods were also already reported from Indonesia by DHARMA (1988, 1992) and FONTEMAGGI (2001). Exceptions are the parasitic *Thyca crystallina* (GOULD, 1846) (Fig. 18) and the tiny but common *Crithhe cossinea* COSSIGNANI, 1997 (Fig. 20) that may be new records for Indonesia. Since catalogues of the marine molluscan fauna of Sulawesi do not exist yet (except for FONTEMAGGI 2001), many of the molluscan species listed herein, e.g. the externally shell-less neritacean prosobranch *Titiscania limacina* BERGH, 1875 (Fig. 16), may constitute the first documented records for Sulawesi, and are certainly new records for the BNP.

With regard to opisthobranch gastropods, of the 89 species found, approximately 23 (26 %) appear to be new ones. This is within the range of undescribed opisthobranch species (16 %–52 %) found in other tropical locations by GOSLINER & DRAHEIM (1996). Especially interesting findings were two large, unknown *Phyllodesmium* EHRENBERG, 1831 species (Figs. 44, 45), one of which was described as *P. jakobsenae* BURGHARDT & WÄGELE, 2004 by two of us recently (BURGHARDT & WÄGELE, 2004). Both *Phyllodesmium* species were commonly living cryptically on soft corals (*Xenia* spp.), and both showed photosynthetic activity caused by the living zooxanthellae inside the cells of the slugs digestive gland. The photosynthesis was detected by using a Diving-PAM (WÄGELE & JOHNSEN, 2001). Both species probably get their zooxanthellae from their prey, soft corals of the genus *Xenia* LAMARCK 1816. The slugs cerata either mimic a whole closed coral polyp (*Phyllodesmium* sp. 1, Fig. 45) or a part of a polyp (*Phyllodesmium jakobsenae* BURGHARDT & WÄGELE, 2004, Fig. 44). Other mimic species of *Phyllodesmium* were found on *Xenia*-corals in different sampling areas around North Sulawesi (e.g. Lembah Strait, unpublished data). The occurrence of at least 4 different species of these *Xenia*-feeding *Phyllodesmium*-species around North Sulawesi suggests that this region could be a radiation centre of this branch of the genus.

The 13 potentially new interstitial opisthobranchs comprise several species that cannot be easily assigned to any existing family, and identifications are preliminary. E.g., the species referred to as cf. Acochlidea sp. 1 (Fig. 31) may either be an aberrant acochlidian or a sacoglossan related to *Platyhedyle* SALVINI-PLAWEN, 1973, a taxon that is, however, so far only known from the Mediterranean Sea. The species herein called cf. Rhodopidae sp. 1 (Fig. 30) is completely enigmatic due to its lobe-like rhinophores. *Microhedyle* sp. 1 (Fig. 34) may either be undescribed or a juvenile of *Paraganitus ellynnae* CHALLIS, 1968. Detailed anatomical and especially histological studies will have to prove their identity. A philinoglossid cephalaspidean species (Fig. 24) externally resembles *Philinoglossa marcusii* CHALLIS,

1969; its record from BNP would be the second ever and the first one outside the original collecting locality, the Solomon Islands (see CHALLIS, 1969). In fact, Siladen Island is amongst the very few Indo-Pacific sites that were ever carefully sampled for interstitial molluscs. The extremely diverse opisthobranch fauna with 14 acochlidean, cephalaspidean and nudibranch species detected from Siladen Island rises the number of marine interstitial opisthobranch species known worldwide (see ARNAUD et al., 1986) significantly. Both the high species diversity at one locality and the finding of several enigmatic and formerly unknown taxa let us assume that also the other, innumerable Indo-Pacific islands may be inhabited by a surprisingly diverse interstitial fauna (see also SCHRÖDL et al., 2003). This region definitely plays an important role with regard to the radiation of interstitial opisthobranchs.

In absence of comprehensive lists or catalogues we suspect that also many non-interstitial species and higher opisthobranch taxa documented herein form new records for Sulawesi, e.g. the cephalaspidean genus *Phanerophthalmus* ADAMS, 1850 (Fig. 23), or Indonesia, e.g. the Runcinidae, and the anaspidean genus *Phyllaplysia* FISCHER, 1872 (Fig. 25). Massimo Broyer (<http://www.edge-of-reef.com/opisthobranchi/opisthobranchien.htm>) presents an impressive list and splendid photographs of 113 opisthobranch species from »northern Sulawesi«, several of which might have been found within the BNP. Unfortunately, no detailed collecting data is given. Some more species reported from the BNP, but not found during our present inventory, were published via Bill Rudman's Sea Slug Forum (<http://www.seslugforum.net/>), such as *Phyllidiopsis pipeki* BRUNCKHORST, 1993, and *Glossodoris stellatus* RUDMAN, 1986 (ANDERSON, 2001; MORAITIS, 2002). The fact that during our survey we always found additional opisthobranch species at every new collecting site, and even during repetitive sampling at the same sites, let us assume that within the BNP many more species are waiting for discovery.

The polyplacophoran species from Indonesia are still poorly known. The last extensive revision was by NIERSTRASZ (1905) publishing the results of the Siboga expedition. Later work on Indonesian chitons was limited to some single species records, until SCHWABE (2000) published some chitons from Bali Island. Strack (Netherlands), Saito (Tokyo), and Schwabe (Munich) were able to collect several samples from Indonesian waters during the last few years. Based on their unpublished results, 30-35 species of polyplacophora can be expected from Indonesian waters. Thus, the 14 (+ 1 lost) species reported herein reflect about 43-50 % of the whole Indonesian chiton fauna known so far. The finding of *Parachiton* cf. *acuminatus* (THIELE, 1909) is remarkable, since this species was so far only known from the type locality (Bismarck Archipelago), the Samoan Islands (SCHWABE, 2001), and from Japan (SAITO, 2003). Our observations indicate that the spiny chiton *Acanthopleura spinosa* mainly

breath atmospheric air. It was found in the uppermost intertidal zone only and had just sporadic contact with seawater. Also noteworthy is the obvious absence of *Squamopleura miles* (PILSBRY, 1892) (CARPENTER in PILSBRY, 1893). This species generally lives syntopic with *Acanthopleura gemmata* (DE BLAINVILLE, 1825) (reported from Ambon by STRACK (unpublished) and from Bali by (SCHWABE, 2000)) in the high intertidal zone. In Bunaken Island only *A. spinosa* (BRUGUIERE, 1792) and *Onchidella* sp. were found to inhabit the same rocks as *A. gemmata*. While the chiton fauna of the BNP is rather diverse, the specimen abundance was low for most species. Only the two *Acanthopleura* ENGEL, 1927 species mentioned above were common in the intertidal. *Lucilina lamellosa* (QUOY & GAIMARD, 1835) and *Callistochiton granifer* HULL, 1923 were frequently found in shallow subtidal waters, although the latter species is perfectly camouflaged in its habitat and can be easily overlooked.

Table 2: Species observed during field work (not collected or photographed)

Polyplacophora	Gastropoda
Acanthochitonidae PILSBRY, 1893	Neritidae LAMARCK, 1809
<i>Leptoplax coarctata</i> (SOWERBY, 1841) [lost]	<i>Nerita maxima</i> GMELIN, 1791
Bivalvia	Fissurellidae FLEMMING, 1822
Arcidae LAMARCK, 1809	<i>Hermitoma tricarinata</i> (BORN, 1778)
<i>Barbatia decussata</i> (SOWERBY, 1823)	Trochidae RAFINESQUE, 1815
Mytilidae RAFINESQUE, 1815	<i>Chrysostoma paradoxum</i> (BORN, 1778)
<i>Modiolus</i> sp.	<i>Tectus pyramis</i> (BORN, 1778)
Malleidae LAMARCK, 1819	<i>Trochus maculatus</i> LINNAEUS, 1758
<i>Malleus malleus</i> (LINNAEUS, 1758)	<i>Trochus niloticus</i> LINNAEUS, 1767
<i>Vulsella vulsella</i> (LINNAEUS, 1758)	<i>Trochus stellatus</i> GMELIN, 1791
Pinnidae LEACH, 1819	Turbiniidae RAFINESQUE, 1815
<i>Atrina vexillum</i> (BORN, 1778)	<i>Turbo petholatus</i> LINNAEUS, 1758
<i>Pinna</i> sp.	Skeneidae CLARK, 1851
Ostreidae RAFINESQUE, 1815	Skeneidae sp.
<i>Lopha cristagalli</i> (LINNAEUS, 1758)	Helicinidae LATREILLE, 1825
Gryphaeidae VYALOV, 1936	Helicinidae sp.
<i>Hyotissa hyotis</i> (LINNAEUS, 1758)	Pilidae PRESTON, 1915
Spondylidae GRAY, 1826	<i>Pila polita</i> DESHAYES, 1830
<i>Spondylus squamosus</i> SCHREIBERS, 1793	Cerithiidae FÉRUSAC, 1822
Veneridae	<i>Cerithium nodulosum</i> (BRUGUIÈRE, 1792)
<i>Lioconcha hieroglyphica</i> (CONRAD, 1837)	Modulidae FISCHER, 1884
<i>Pitar manillae</i> (SOWERBY, 1851)	<i>Modulus candidus</i> PETIT, 1853
Cardiidae LAMARCK, 1809	Littorinidae GRAY, 1840
<i>Corculum cardissa</i> (LINNAEUS, 1758)	<i>Littorina carinifera</i> MENKE, 1830
<i>Trachycardium rugosum</i> (LAMARCK, 1819)	<i>Littorina melanostoma</i> GRAY, 1839
<i>Trachycardium</i> sp.	Strombidae RAFINESQUE, 1815
Carditidae J. FLEMING, 1828	<i>Strombus mutabilis</i> SWAINSON, 1821
<i>Cardita variegata</i> BRUGUIÈRE, 1792	<i>Strombus gibberulus</i> LINNAEUS, 1758
Lucinidae J. FLEMING, 1828	<i>Lambis crocata</i> (LINK, 1807)
<i>Codakia</i> sp.	<i>Lambis scorpius indomaris</i> ABBOTT, 1961
Tridacnidae LAMARCK, 1819	<i>Lambis cf. chiragra</i> (LINNAEUS, 1758)
<i>Tridacna maxima</i> (RÖDING, 1798)	<i>Lambis truncata</i> (HUMPHREY, 1786)
<i>Tridacna gigas</i> (LINNAEUS, 1758)	<i>Lambis lambis</i> (LINNAEUS, 1758)
<i>Tridacna squamosa</i> LAMARCK, 1819	Vanikoridae GRAY, 1840
Cephalopoda	<i>Vanikoro cancellata</i> (LAMARCK, 1822)
Spirulidae OWEN, 1836	Cypraeidae RAFINESQUE, 1815
<i>Spirula spirula</i> (LINNAEUS, 1758)	<i>Blasicrura pallidula</i> (GASKOIN, 1849)
Nautilidae de BLAINVILLE, 1825	<i>Blasicrura interrupta</i> (GRAY, 1824)
<i>Nautilus pompilius</i> LINNAEUS, 1758	<i>Chelycypraea testudinaria</i> (LINNAEUS, 1758)
	<i>Erronea walkeri</i> (SOWERBY, 1832)
	<i>Mauritia arabica</i> (LINNAEUS, 1758)
	<i>Staphylaea limacina</i> (LAMARCK, 1810)
	<i>Erosaria caputserpentis</i> (LINNAEUS, 1758)
	<i>Talparia argus</i> (LINNAEUS, 1758)
	Ovulidae J. FLEMING, 1822
	<i>Primovula</i> sp.
	Tonnidae SUTER, 1913
	<i>Tonna perdix</i> (LINNAEUS, 1758)
	<i>Tonna</i> sp.
	Bursidae THIELE, 1925
	<i>Bursa bufonia</i> (GMELIN, 1791)
	Cassidae LATREILLE, 1825
	<i>Casmaria erinaceus</i> (LINNAEUS, 1758)
	Personidae GRAY, 1854
	<i>Distorsia anus</i> (LINNAEUS, 1758)
	Ranellidae GRAY, 1854
	<i>Cymatium aquatile</i> (REEVE, 1844)
	<i>Cymatium mundum</i> (GOULD, 1849)
	<i>Cymatium pileare</i> (LINNAEUS, 1758)
	Triviidae TROSCHER, 1863
	<i>Erato</i> sp.
	Epitoniidae BERRY, 1910
	<i>Epitonium</i> sp.
	Buccinidae RAFINESQUE, 1815
	<i>Engina mendicaria</i> (LINNAEUS, 1758)
	Columbellidae SWAINSON, 1840
	<i>Mitrella scripta</i> (LINNAEUS, 1758)
	Coralliophilidae CHENU, 1859
	<i>Rapa rapa</i> (LINNAEUS, 1758)
	Fascioliariidae GRAY, 1853
	<i>Latirus craticulatus</i> (LINNAEUS, 1758)
	<i>Latirus paetelianus</i> (KOBELT, 1874)

- Mitridae SWAINSON, 1831
Mitra chrysalis REEVE, 1844
Mitra ferruginea LAMARCK, 1811
Mitra mitra (LINNAEUS, 1758)
Mitra scutulata (GMELIN, 1791)
Pterygia dactylus (LINNAEUS, 1767)
- Muricidae RAFINESQUE, 1815
Chicoreus capucinus (LAMARCK, 1822)
Nassa francolina (BRUGUIÈRE, 1789)
Spinidrupa spinosa (A. & H. ADAMS, 1853)
Thais echinata (DE BLAINVILLE, 1832)
- Nassariidae IREDALE, 1916
Nassarius limnaeiformis (DUNKER, 1847)
Nassarius cf. *venustus* (DUNKER, 1847)
- Conidae RAFINESQUE, 1815
Conus betulinus LINNAEUS, 1758
Conus capitaneus LINNAEUS, 1758
Conus chaldaeus (RÖDING, 1798)
Conus coronatus GMELIN, 1791
Conus cf. *magus* LINNAEUS, 1758
Conus sponsalis HWASS, 1792
Conus stercusmuscarum LINNAEUS, 1758
Conus cf. *sulcatus* HWASS, 1792
- Terebridae MÖRCH, 1852
Terebra areolata (LINK, 1807)
Terebra cerithina LAMARCK, 1822
Terebra crenulata (LINNAEUS, 1758)
- Turridae SWAINSON, 1840
Tritonoturris cumingsii (POWYS, 1835)
- Architectonicidae GRAY, 1840
 Architectonicidae sp.
- Pyramidellidae GRAY, 1840
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Fig. 1: Collecting area marked by red spots (Bunaken National Park).



Plate 1: Fig. 2: Small expedition boat in front of Manado Tua Island.
Fig. 3: Searching for cryptical molluscs in shallow water.
Fig. 4: Collecting intertidally.
Fig. 5: Reef wall at Manado Tua Island.
Fig. 6: Searching under coral rubble through SCUBA-diving.
Fig. 7: Joint identification of specimens.
Fig. 8: Field laboratory, revising sand for microscopic

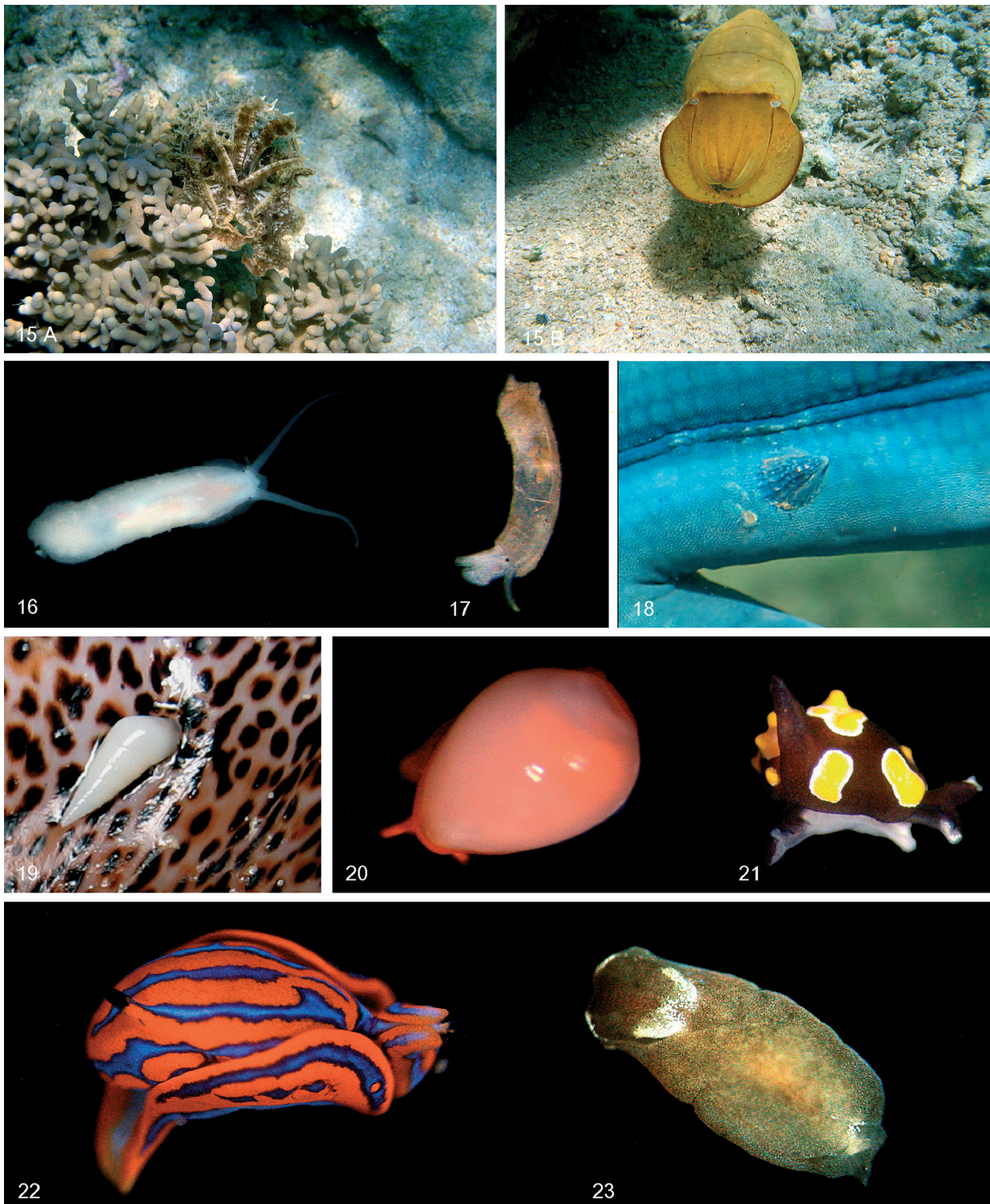


Plate 2: Fig. 15: *Sepia* sp. (approx. 20 cm). A. camouflaged over corals. B. alert, swimming specimen.
 Fig. 16: *Titiscania limacina* (2 cm).
 Fig. 17: *Caecum* sp. (1 mm).
 Fig. 18: *Thyca crystallina* (1 cm) on *Linckia laevigata*.
 Fig. 19: Eulimidae sp. (5 mm) attached to sea cucumber.
 Fig. 20: *Crithe cossinea* (3 mm).
 Fig. 21: *Colpodaspis thompsoni* (3 mm).
 Fig. 22: *Siphopteron tigrinum* (4 mm).
 Fig. 23: *Phanerophthalmus* cf. *smaragdinus* (10 mm).

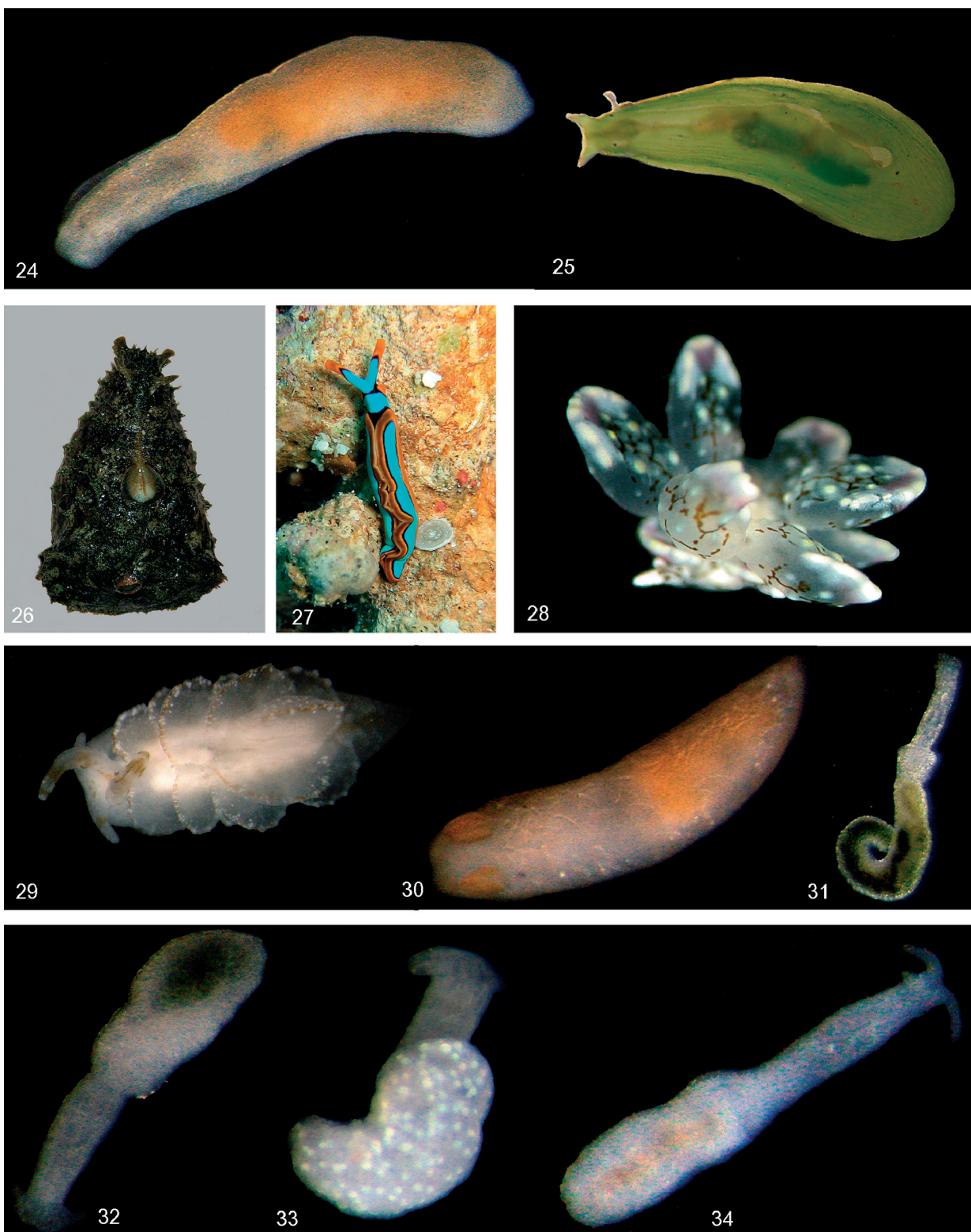


Plate 3: Fig. 24: *Philinoglossa marcusii* (3 mm).
 Fig. 25: *Phyllaplysia* sp. (15 mm).
 Fig. 26: *Dolabella auricularia* (15 cm).
 Fig. 27: *Thuridilla lineolata*(25 mm) .
 Fig. 28: *Cyerce* sp. 1 (4 mm).
 Fig. 29: *Cyerce elegans* (4 mm).
 Fig. 30: cf. *Rhodopidae* sp. (1.5 mm).
 Fig. 31: cf. *Acochlidea* sp. 1 (2 mm).
 Fig. 32: *Pontohedyle* sp. 1 (1.5 mm).
 Fig. 33: *Pontohedyle* sp. 4 (1 mm).
 Fig. 34: *Microhedyle* sp. 1 (1 mm).



Plate 4: Fig. 35: *Chromodoris diana* (4 cm).
Fig. 36: *Chromodoris strigata* (4 cm).
Fig. 37: *Halgerda batangas* (6 cm).
Fig. 38: *Phyllidiopsis striata* (12 mm).
Fig. 39: *Nembrotha cristata* (5 cm).
Fig. 40: *Janolus mirabilis* (6 mm).
Fig. 41: *Janolus* sp. 1 (6 mm).
Fig. 42: *Embletonia gracilis* (5 mm).
Fig. 43: *Flabellina exoptata* (4 cm).
Fig. 44: *Phyllodesmium jakobsenae* (4 cm).
Fig. 45: *Phyllodesmium* sp. 1 on *Xenia* sp. (5 cm).