

Living Seashells of the Tropical Indo-Pacific

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Andrey Ryanskiy

Living Seashells of the Tropical Indo-Pacific



Photographic guide with 1500+
species covered

Andrey Ryanskiy



INTRODUCTION Seashell or sea shells are the hard exoskeleton of mollusks such as snails, clams, chitons. For most people, acquaintance with mollusks began with empty shells. These shells often delight the eye with a variety of shapes and colors. Conchology studies the mollusk shells and this science dates back to the 17th century. However, modern science - malacology is the study of mollusks as whole organisms. Today more and more people are interacting with ocean - divers, snorkelers, beach goers - all of them often find in the seas not empty shells, but live mollusks - living shells, whose appearance is significantly different from museum specimens. This book serves as a tool for identifying such animals.

The book covers the region from the Red Sea to Hawaii, Marshall Islands and Guam. Inside the book:

- Photographs of 1500+ species, including one hundred cowries (Cypraeidae) and more than one hundred twenty allied cowries (Ovulidae) of the region;
- Live photo of hundreds of species have never before appeared in field guides or popular books;
- Convenient pictorial guide at the beginning and index at the end of the book

ACKNOWLEDGMENTS

The significant part of photographs in this book were made by Jeanette Johnson and Scott Johnson during the decades of diving and exploring the beautiful reefs of Indo-Pacific from Indonesia and Philippines to Hawaii and Solomons. They provided to readers not only the great photos but also in-depth knowledge of the fascinating world of living seashells.

Sincere thanks to Philippe Bouchet, National Museum of Natural History (Paris), for inviting the author to participate in the La Planete Revisitee expedition program and permission to use some of the NMNH photos.

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I was lucky to receive ongoing support in my book projects from Philippe and Guido Poppe. Jacky and Evelyn Guillot de Suduiraut are kindly acknowledged for permission to use photos of Emmanuel Guillot de Suduiraut. Sven Kahlbrock knows Red Sea ovulids as no one else and his photos enriched the book. Massimo Scali shared with readers his photos of the rare Indian Ocean cowries. Jake Adams, Josina Tivaouane and Jocelyn Senia helped to make Tridacna pages successfully finalized. Bob Abela helped with some rare species, photographed in Guam, Charles E. Rawlings contributed unique volutidae photos from the Indian Ocean. Brian Mayes kindly shared with readers his outstanding collection of superb living ovulidae images.

Special mention must be paid to amazing Sci-Hub project (The first website in the world to provide mass & public access to research papers!), Biodiversity Heritage Library and ResearchGate networking site.

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I would like to thank my wife Irina Khlopunova for patient support during the work on this book.

ABBREVIATIONS

Principal photo contributors: ©JJ: Jeanette Johnson ©SJ: Scott Johnson

IT - Identification Tentative; sp. - used when the actual specific name cannot or need not be specified

cf. - used to indicate undescribed species assumed related to, but distinct from a described species

WIO, IO, IP, IWP, WP, WCP, PO, SP - West Indian Ocean, Indian Ocean, Indo-Pacific, Indo-West Pacific, West Pacific, Western Central Pacific, Pacific Ocean, South Pacific accordingly.

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Front cover photos: upper left: *Dentiovula eizoi* (Igor Bogachenko), upper right: *Vexillum jeanetteae* (Jeanette Johnson, yes, it is not a coincidence of names!), bottom left: *Cribrarula cribraria* (Jeanette Johnson), b. right: *Limaria fragilis*.

SEASHELLS: FACTS AND DISTINCTIVE FEATURES



MARINE GASTROPODS (SNAILS AND SLUGS)

- the most diversified class in the phylum Mollusca
- gastropods mostly have a one-piece, often coiled shell
- they have a well-defined head with two sensory tentacles with eyes
- they have a ventral foot, which gives them their name (stomach and foot, from Greek “gaster” and “pous”)
- they are distinguished by an anatomical process known as torsion which occurs in all gastropods during larval development.
- torsion is the rotation of the visceral mass, mantle, and shell 180° with respect to the head and foot
- many gastropods can seal the entrance to their shell with a tough corneous or calcareous operculum
- snails are gastropods with an external shell, slug has no shell or a very reduced shell (in loose terms). We are dealing with marine snails in this book, look for slugs in the “Nudibranchs of the Coral Triangle” book.

BIVALVES - BIVALVIA

- majority of bivalves consist of two identical valves that are connected to one another by a flexible hinge
- bivalves have no head
- some bivalves have eyes
- the gills have evolved into specialized organs for feeding and breathing - ctenidia
- some bivalves have a retractable foot, enabling the animal to burrow in the sand or to move, often with jumps.
- bivalves range in size from about one millimeter to over a meter in length
- bivalves are mostly filter feeders, they lack the radular rasping organ typical of most mollusks
- in giant clams (subfamily Tridacninae) symbiotic zooxanthellae are kept within the mantle tissue, providing additional nutrition
- near three million metric tons of bivalves are harvested throughout the world each year
- bivalves were rare in the oceans before Permian–Triassic extinction event (approximately 252 million years ago) but became numerous and diverse after it



CHITONS - POLYPLACOPHORA

- the chitons are **exclusively marine**, unlike gastropods and bivalves
- all living chitons have **eight shell plates** surrounded by chitinous girdle and large adhesive **foot**
- it allows chitons to roll into a **protective ball** when dislodged
- live in **intertidal/subtidal waters** along rocky coastlines worldwide
- most chitons are herbivorous grazers, with some omnivorous and some carnivorous species
- chitons are **slowly moving animals**, but several species can move much faster

PICTORIAL INDEX TO FAMILIES



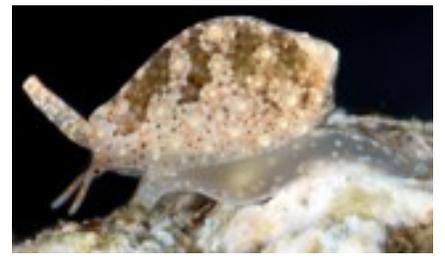
CYPRAEIDAE - 8



OVULIDAE - 29



TRIVIIDAE - 58



ERATOIDAE - 60



VELUTINIDAE - 61



STROMBIDAE - 65



SERAPHSIDAE - 73



NATICIDAE - 73



FICIDAE - 80



LITTORINIDAE - 80



RISSOINIDAE - 80



ZEBINIDAE - 81



TONNIDAE - 81



BURSIDAE - 83



CASSIDAE - 85



PERSONIDAE - 88



CHARONIIDAE - 89



CYMATIIDAE - 89



EULIMIDAE - 94



VANIKORIDAE - 98



HIPPONICIDAE - 99



CAECIDAE - 99



VERMETIDAE - 99



XENOPHORIDAE - 100



CERITHIIDAE - 101



MODULIDAE - 106



PLANAXIDAE - 106



EPITONIIDAE - 106



CERITHIOPSISIDAE - 109



TRIPHORIDAE - 110



BUCCINIDAE - 115



NASSARIIDAE - 115

PICTORIAL INDEX TO FAMILIES



PISANIIDAE - 121



FASCIOLARIIDAE - 124



COLUBRARIIDAE - 127



COLUMBELLIDAE - 128



CONIDAE - 134



TEREBRIDAE - 150



CLAVATULIDAE - 156



TURRIDAE - 156



CLATHURELLIDAE - 159



DRILLIIDAE - 161



HORAICLAVIDAE - 164



MANGELIIDAE - 165



MITROMORPHIDAE - 168



RAPHITOMIDAE - 169



PSEUDOMELATOMIDAE - 173



MITRIDAE - 173



MURICIDAE - 184



MURICIDAE - 192



HARPIDAE - 196



OLIVIDAE - 197



ANCILLARIIDAE - 200



COSTELLARIIDAE - 201



TURBINELLIDAE - 214



CYSTISCIDAE - 214



MARGINELLIDAE - 215



CANCELLARIIDAE - 216



VOLUTIDAE - 217



NERITIDAE - 219



PHENACOLEPADIDAE - 219



NERITOPSIDAE - 219



CALLIOSTOMATIDAE - 220



PHASIANELLIDAE - 220

PICTORIAL INDEX TO FAMILIES



TEGULIDAE - 221



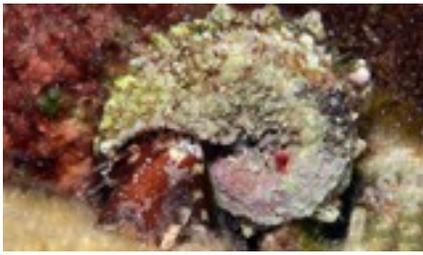
TURBINIDAE - 222



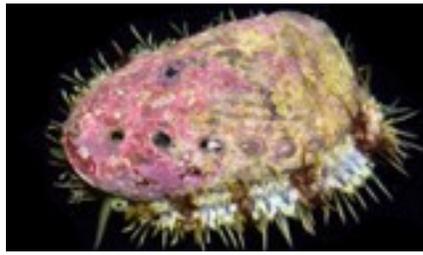
TROCHIDAE - 223



LIOTIIDAE - 228



ANGARIIDAE - 228



HALIOTIDAE - 228



FISSURELLIDAE - 229



CHILODONTAIDAE - 232



ARCHITECTONICIDAE - 233



PYRAMIDELLIDAE - 235



ONCHIDIIDAE - 236



TRIDACNINAE - 237



CARDIIDAE - 242



GALEOMMATIDAE - 244



VENERIDAE - 247



CHAMIDAE - 248



CLAVAGELLIDAE - 249



ARCIDAE - 249



LIMIDAE - 250



LUCINIDAE - 252



MYTILIDAE - 252



GRYPHAEIDAE - 252



OSTREIDAE - 253



PTERIIDAE - 253



PINNIDAE - 255



PECTINIDAE - 256



SPONDYLIDAE - 259



ACANTHOCHITONIDAE - 261



CHITONIDAE - 261



CRYPTOPLACIDAE - 262



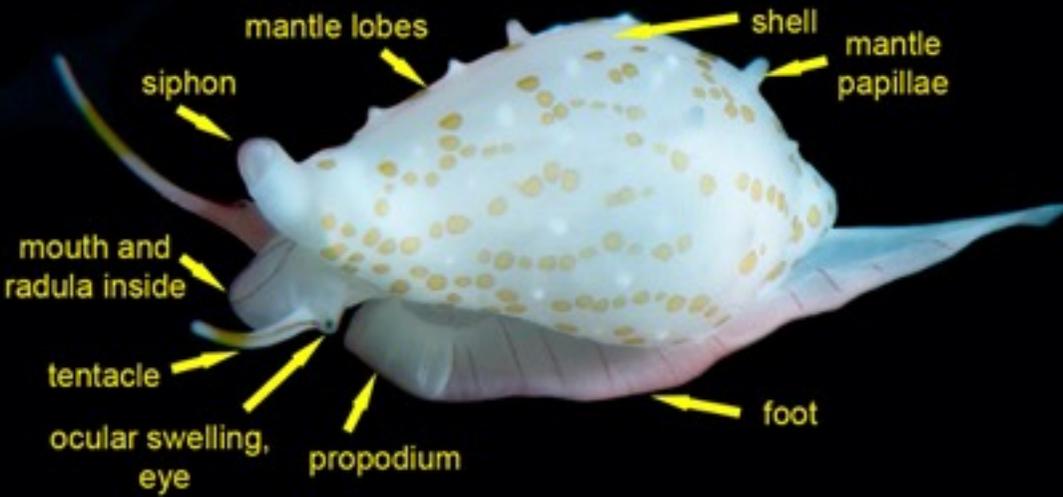
ISCHNOCHITONIDAE - 263



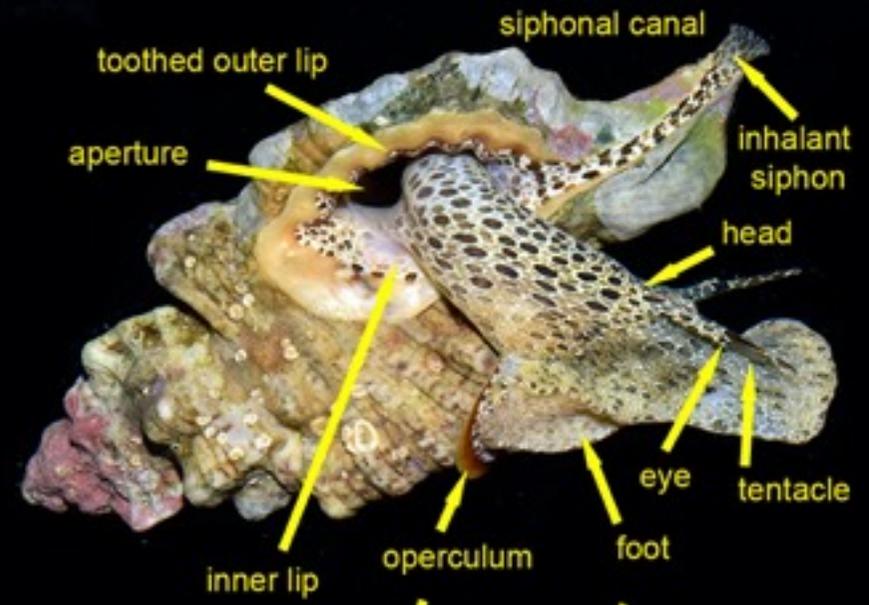
SCHIZOCHITONIDAE - 263

GASTROPODA

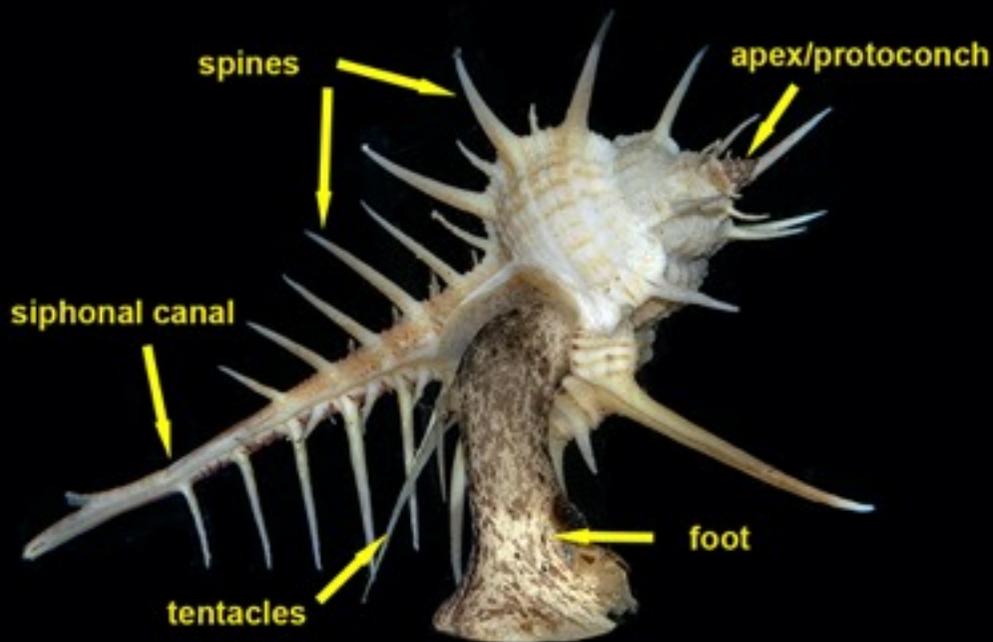
Ovula (Cypraeoidea)



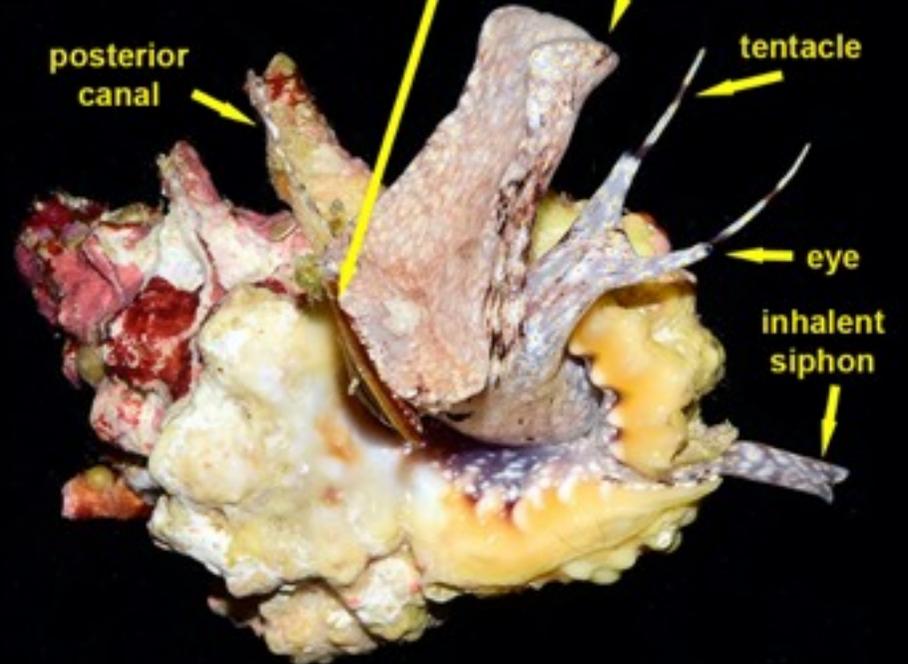
Triton (Tonnoidea)



Murex (Muricidae)

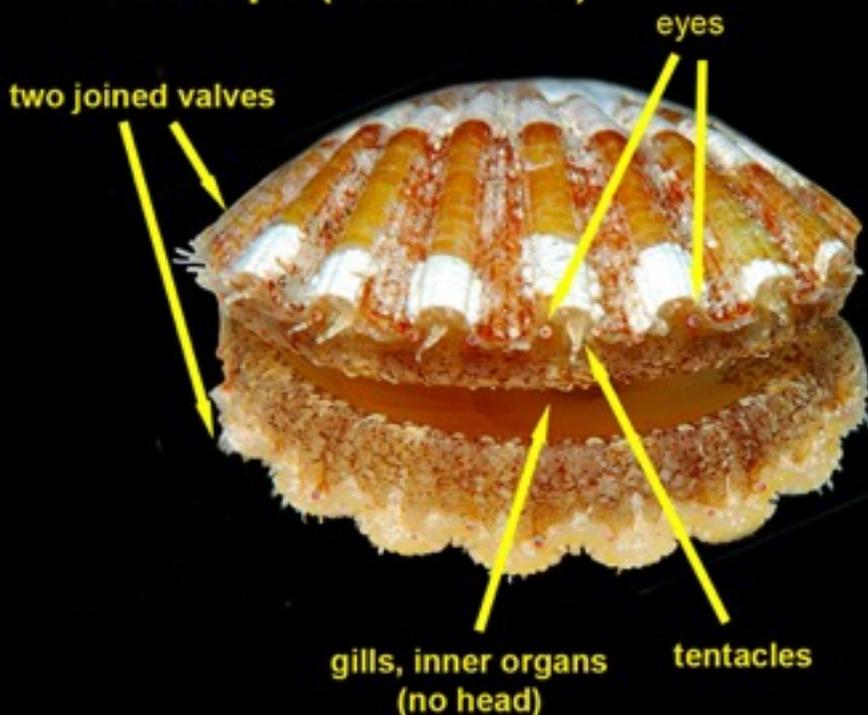


Bursa (Bursidae)

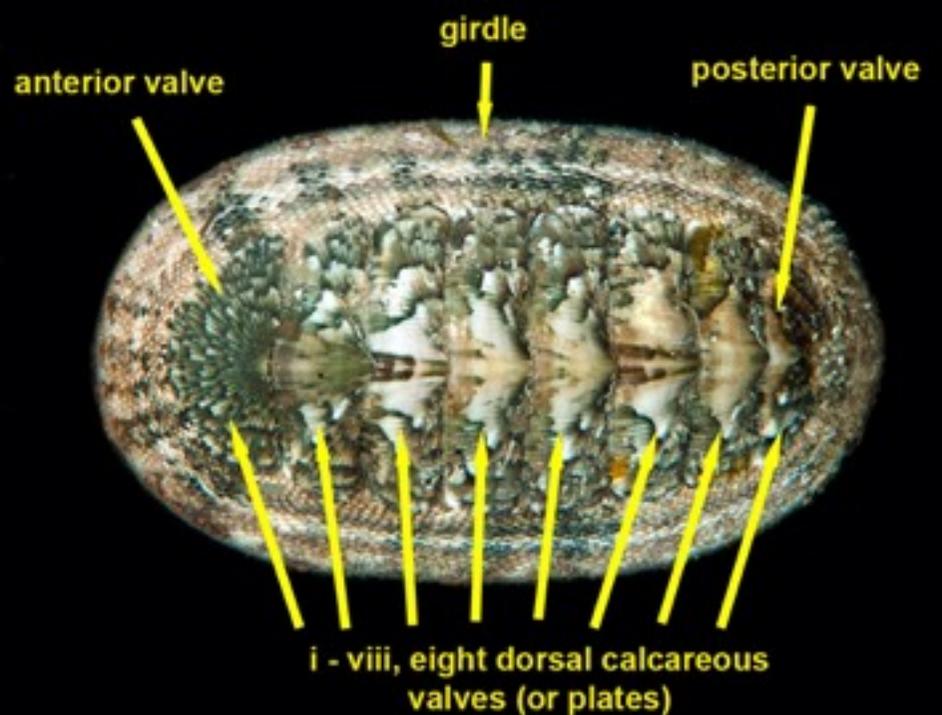


BIVALVIA

Scallops (Pectinidae)



CHITONS - POLYPLACOPHORA





Teulere's Cowry *Barycypraea teulerei* IO: Oman, intertidal mud flats, 67 mm. Transparent mantle with no papillae. Considered extinct due to over-collection, until Massimo Scali found a new population in 2012 at Masirah



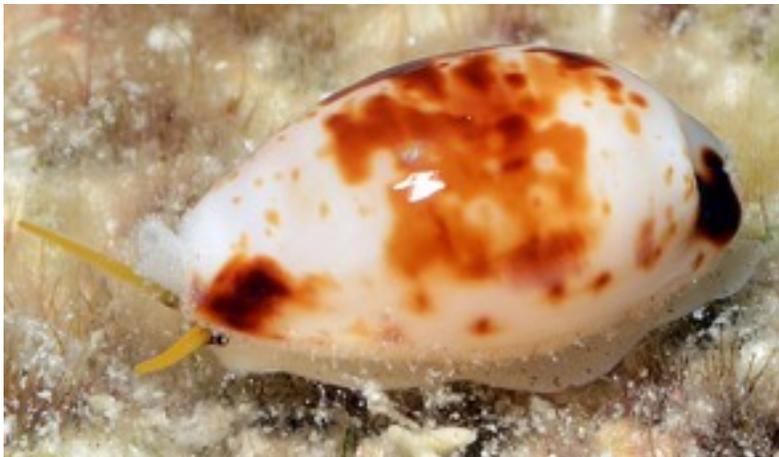
Teulere's Cowry *Barycypraea teulerei* (cont'd) uses shells to nest its eggs. All 3 photos: © Massimo Scali.



Maria's Cowry *Annepona mariae* IP, 21 mm. White with rounded yellow to brown spots. ©JJ.



Hundred-Eyed Cowry *Arestorides argus* IP: East Africa to Marshall Islands, 120 mm. Brownish with wide darker bands and brown ocelli, mantle with raised papillae and depressions that resemble sponge. ©JJ.



Dark-Blotched Cowry *Bistolida fuscomaculata* WCP, 17 mm. Shell with distinct brown blotches. ©JJ.



Swallow Cowry *Bistolida hirundo* IWP, 24 mm. Anterior white transverse mark in the form of a swallow.



Kiener's Cowry *Bistolida kieneri* IWP, 24 mm. Similar in appearance to *B. hirundo* and *B. ursellus*, but anterior white transverse band is irregular in shape and crosses all the grey-bluish area.





Pretty Cowry *Ficadusta pulchella* IWP, 56 mm.
© Philippe & Guido Poppe www.poppe-images.com



Walker's Cowry *Contradusta walkeri* IP, 56 mm. Shell with a brown transverse band. © Ria Tan.



Breger's Cowry *Contradusta bregeriana* WCP, 34 mm. Similar in appearance to *C. walkeri* but tends to be smaller, brown transverse band generally less distinct. Right - © Yves Thévenet.



Tan and White Cowry *Cribrarula cribraria* IWP, 35 mm. Shell brown or orange with round white spots, bright orange to red mantle with tapering papillae. Found under shallow rocks, where it feeds on red encrusting sponge. ©JJ



Gaskoin's Cowry *Cribrarula gaskoini* Hawaii, possibly Marshall Islands, 30 mm. Orange shell with pale round spots. Orange mantle is densely covered with tapering papillae, feeds on red encrusting sponge, nocturnal.



Pale Sieve Cowry *Cribrarula gaspardi* WCP: Marshall Islands to Guam, 22 mm. Similar in appearance to *C. cribraria*, but generally smaller and paler, found on the outer slopes in the night. ©JJ.





Erroneous Cowry *Erronea erronea* IWP: East Africa to West Pacific, 45 mm. Cream to olive-brown shell with faint transverse bands, grey to brownish mantle with white papillae. Right photo: ©JJ.



Onyx Cowry *Erronea onyx* IP: East Africa to Solomons and Palau, 60 mm. Elongate-ovate to pear-shaped shell, golden-brown or even jet black to pale with longitudinal brown stripe. Appears to be a species complex. ©SJ.



Onyx Cowry *Erronea onyx* (cont'd) Mantle dark grey to brown with pinkish papillae, tan tentacles, black siphon. Found in shallow sand and mud areas, feeding on algae and coral polyps. © Ria Tan.



Egg Cowry *Erronea ovum* WCP: from Thailand and Malaysia to Solomons and Palau, 42 mm. Olive-brown shell with faint brown bands, mantle generally grey with brighter and darker areas. © Ria Tan.



Greenish Cowry *Erronea subviridis* WP: Australia, New Guinea to Fiji, 42 mm. Cream-olive, ovate to pear-shaped shell with brown blotches. Grey-greenish mantle with tree-like papillae. Left: © David Masseurin.



Pear-Shaped Cowry *Erronea pyriformis* IWP, 45 mm. Pale shell with faint brown bands. © Ria Tan.



Children's Cowry *Ipsa childreni* WCP, 32 mm. Shell with transverse ridges. Nocturnal. ©JJ.



Map Cowry *Leporicypraea mappa* IP, 10 cm. Shell globose with highly variable wavy brown pattern. Translucent mantle with thin tapering papillae. Nocturnal, found in caves and overhangs. Appears to be a species complex.



Isabel's Cowry *Luria isabella* IP: Red Sea, East Africa to Hawaii, 54 mm. Cylindrical beige to pale reddish-brown shell, translucent-black mantle, dark grey foot, siphon and tentacles. Nocturnal, feeds on sponges, algae, corals.



Carnelian Cowry *Lyncina carneola* IP: Red Sea to Hawaii, 66 mm. Shell pale orange-brown with pale transverse bands, mottled reddish brown to grey mantle with white papillae.



Carnelian Cowry *Lyncina carneola* (cont'd) Photo on the left: with eggs, photo on the right - juvenile (bulla stage, 2 cm)





White-Tufted Spindle Shell *Aclyvolva coarctata* IP: East Africa to Marshall Islands, 30 mm. *Hiatavolva rugosa* a junior synonym. Lives on red to yellow-brown whip-like gorgonians in the genus *Ellisella*.



White-Tufted Spindle Shell *Aclyvolva coarctata* (continued) Mantle coloration matches the color of the host gorgonian. Compound tuft-like retractable papillae mimic the polyps of the host. ©JJ.



Lance Spindle Shell *Aclyvolva lanceolata* IP: Red Sea and East Africa to Guam and Marshall Islands, 35 mm. Elongated shell, mantle with rounded compound papillae. Papillae mimic the polyps of the host gorgonian.



Lance Spindle Shell *Aclyvolva lanceolata* (continued) Color morphs, close to the description of *A. lamyi*, a synonym of *A. lanceolata* now. ©JJ, ©SJ (left, right)



Lance Spindle Shell *Aclyvolva lanceolata* (continued). Color morph, close to the description of *A. nicolamassierae*, a synonym of *A. lanceolata* now. Left (Red Sea): © Sven Kahlbrock, right (Marshall Isl.): ©JJ.



Kurz' Egg Shell *Naviculavolva kurziana* WCP: Indonesia to Marshalls, 17 mm. Feeds on *Rumphella* gorgonian. Species delimitation between *N. kurziana* and *N. malaita* (above) needs to be confirmed with genetic data. ©JJ.



Canoe Egg Shell *Naviculavolva deflexa* WP: Philippines, Indonesia, Australia, PNG, 22 mm. White, pink or grey animal with translucent mantle, shell usually with orange suture line. Feeds on *Rumphella* coral.



Debelius' Egg Shell *Naviculavolva debelius* IO: Red Sea, 15 mm. Feeds on *Rumphella* gorgonian. Yellow or white shell, translucent-whitish mantle, white tentacles with red-brown eye-stripe. © Sven Kahlbrock.



Angas' Egg Shell *Pellasimnia angasi* WP: Japan, Australia, 38 mm. Sea fan form, found on *Melithaea* sea fans. Black coral form (below) appears to be the same species. © Brian R. Mayes.



Angas' Egg Shell *Pellasimnia angasi* Black coral form, feeds on *Myriopathes* black corals. Morphologically identical to Sea fan form. Mottled mantle with tree-like papillae (extended) © Sue Churchill & Rogan Draper.



Annabel's Spindle Shell *Pellasimnia annabelae* WP to Marshall Islands, 35 mm, feeds on *Annella* gorgonians. Morphologically close to *P. brunneiterma* (below), species delimitation was not confirmed with genetic data.



Brown-Tipped Spindle Shell *Pellasimnia brunneiterma*, IWP, 35 mm. On *Annella* gorgonians. Left: Red Sea, ©Sven Kahlbrock with smaller *P. annabelae*, possibly the same species. Right: © Rokus Groeneveld.



Orange-Tipped Spindle Shell *Pellasimnia improcera* WP: Korea to Solomons, 35 mm. Form on *Myriopathes* black corals. Shell with orange tips, mantle with red or orange lines and tapering white papillae. Right photo ©JJ.



Pellasimnia improcera (cont'd) Form on on *Melithaea* sea fans. © Brian R. Mayes.

Golden Spindle Shell *Pellasimnia* sp. SP: Australia, 25 mm, on *Iciligorgia* sp. © Sue Churchill & Rogan Draper



Barbier's Spindle Shell *Phenacovolva barbieri* WP: Japan to Singapore, Malaysia, Brunei, 43 mm. Feeds on gorgonians. Transparent mantle with rounded black spots and yellow tapering papillae. © Brian R. Mayes.



Spindle Cowries on this page can be tentatively identified as follows: *Phenacovolva gracilis*: "a", *Phenacovolva pseudogracilis*: "b"- "h", *Phenacovolva subreflexa* "j"- "i". They are the species with Western Pacific distribution, feeding on black corals, shell size up to 35-38 mm.

Species delimitation in this group needs to be reconsidered with genetic data. It is highly likely that they are the morphs of the same species. Until a revision of this group of species is published it seems optimal to follow Draper & Churchill 2014 and "consider them all the same species, using the original name *Phenacovolva gracilis*". Photo e,f,j,i - ©JJ.



Short-Snouted Spindle Shell *Phenacovolva brevirostris* IWP, 40 mm, feeds on gorgonians. High profile shell with more or less distinct white line across the shoulder, translucent mantle.



Fused Spindle Shell *Phenacovolva fusula* E. Africa to Japan, 29 mm. Hosted on *Acanthogorgia* sea fan. The shell has 3 wide dorsal bands, short terminals tipped in orange/brown. © Brian R. Mayes.



Iredale's Spindle Shell *Phenacovolva nectarea* IWP, 65 mm. Translucent pinkish mantle with red spots, large conical white and yellow papillae with a rounded white areas around the base. Photo: ©Sue Churchill & ©Rogan Draper.



Iredale's Spindle Shell *Phenacovolva nectarea* (continued) Feeds on *Euplexaura* sea fans. Close to *P. rosea* but shell is more robust. ©Ria Tan.



Poppe's Spindle Shell *Phenacovolva poppei* IWP: East Africa to Indonesia and Philippines, 38 mm. Feeds on black corals. High profile shell, white mantle with pattern of dark red lines, long tapering papillae.



Rosy Spindle Shell *Phenacovolva rosea* IP: East Africa to Central Pacific, 65 mm. The most widespread and common species of Ovulidae. Translucent mantle with red-brown spots of varying size. Shell with more or less distinct white line across the shoulder. Large reddish, yellow or white papillae are accompanied by a pattern of much smaller white conical papillae.

Feeds on gorgonians, roosting on a record number of host species.

Photos "e"- "j" - ©JJ, "i" - ©SJ.



Elegant Egg Shell *Diminovula concinna* (cont'd) Found on *Capnella* and *Paralemnalia* octocorals. White mantle with polygonal orange islands. Fine transverse lines on the foot.



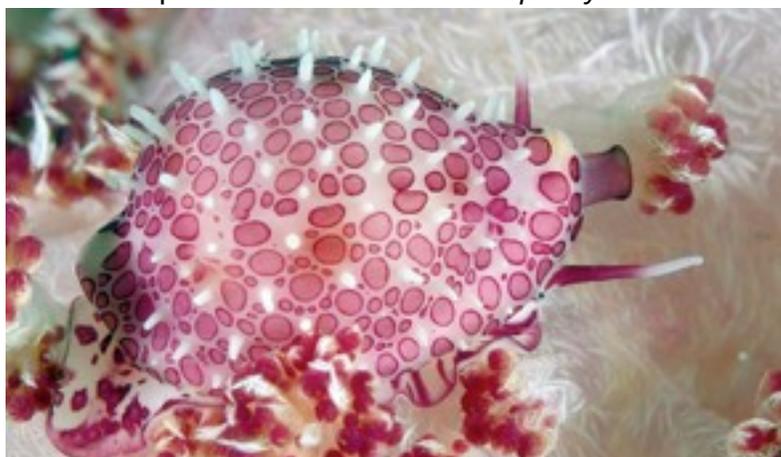
Rose Egg Shell *Diminovula coroniola* WP, 15 mm. Found on *Dendronephthya* corals. Translucent mantle with polygonal pink islands. Shell with dark spots in a rows (highlighted by arrows). Foot with blurry transverse



White Egg Shell *Diminovula alabaster* IWP: 15 mm. *D. alabaster*, *coroniola*, *aurantiomacula*, *punctata*, *kosugei*, *whitworthi* are hard to tell apart in the field. Treated by Draper & Churchill 2014 as a single variable species. © Ria Tan.



Yellow-Spotted Egg Shell *Diminovula aurantiomacula* WP: Australia to Japan, 11 mm. Shell with yellow/brownish spots. Feeds on *Dendronephthya* soft corals. Left: © Marty Kiser, right: ©SJ.



Punctate Egg Shell *Diminovula punctata* IWP: East Africa to Japan and Australia, 15 mm. Shell with dark spots in a rows. Feeds on *Dendronephthya* soft corals. Look comment to *D. alabaster*. © Johji Nishio.



Ridged Egg Shell *Diminovula culmen* IWP, 18 mm. One of the most common and variable species of Ovulidae in the region. White mantle with areas of red reticulations. White papillae with rounded white base.



Ridged Egg Shell *Diminovula culmen* (continued) Feeds on *Dendronephthya* soft corals. Color morph with mantle, mostly covered by red reticulation. © Philippe & Guido Poppe www.poppe-images.com



Ridged Egg Shell *Diminovula culmen* (continued) Note brown spots spots and suture line on the shell. Photo on the left : two *D. culmen*, smaller one possibly male (©JJ).



Nielsen's Egg Shell *Diminovula nielseni* WP: Australia to Japan, 11 mm. © Sue Churchill & Rogan Draper.



Fainzilberi's Egg Shell *Diminovula fainzilberi* IO: Red Sea, 8 mm. © Sven Kahlbrock.



Incised Egg Shell *Diminovula incisa* WP: Japan, Philippines, Brunei, 9 mm. Shell with orange blotches, mantle with similar pattern, on *Scleronephthya* sp. soft coral. Photo: (left, right): © E.G de Suduiraut, © Brian R. Mayes.

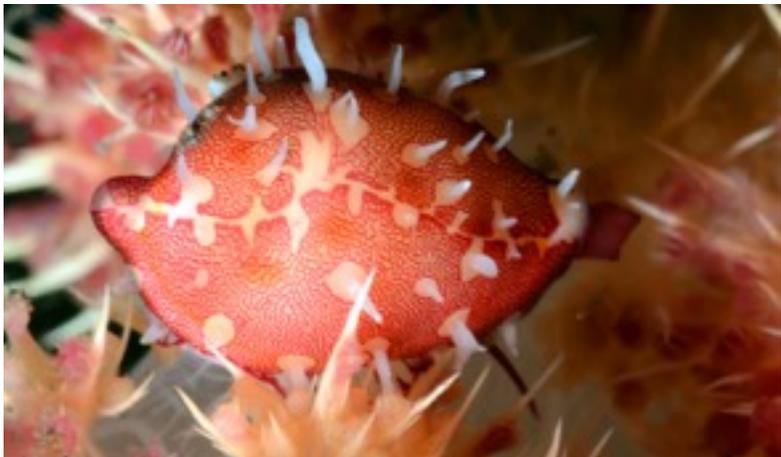




Kosuge's Egg Shell *Diminovula kosugei* WP: Japan to Malaysia, Australia and New Caledonia, 12 mm. Member of *D. alabaster* - *D. whitworthi* group of similar species. Inflated shell with faint spots. © Brian R. Mayes.



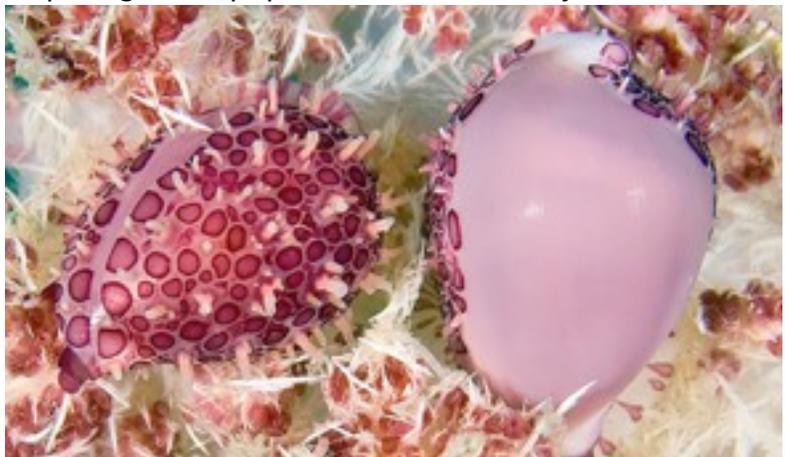
Margarita Egg Shell *Diminovula margarita* WP: Japan to Australia, 13 mm. Translucent mantle with pink rounded spots with dark red outline. Shell with orange suture line, visible at the ends.



Marked Egg Shell *Diminovula stigma* WP, 16 mm. Feeds on *Dendronephthya* soft corals. Globular shell with curved terminals. Mantle with red reticulation, tapering white papillae. ©SJ.



Whitworth's Egg Shell *Diminovula whitworthi* WP: Australia, Indonesia to Japan, 19 mm. Feeds on *Dendronephthya* soft corals. Mantle with red blotches and tapering white papillae. © Brian R. Mayes.



Cavanagh's Eggs Shell *Globovula cavanaghi* SP: Australia, 22 mm. Feeds on *Dendronephthya* soft corals. Pink mantle with numerous rounded darker spots and pinkish papillae. © Stephen D.A. Smith.



Spherical Egg Shell *Globovula sphaera* WP: Taiwan to Malaysia and Australia, 23 mm. Found on *Dendronephthya* soft corals. White mantle with pink or red spots. Left: © Asyraf Hadee, right: (juvenile) ©JJ.



Enigmatic Egg Shell *Habuprionovolva aenigma* IWP, 10 mm. Feeds on *Dendronephthya* soft corals. Close to *H. basilica* (below) but red lines on the mantle are fine and less distinct. Photo on the right © Brian R. Mayes.



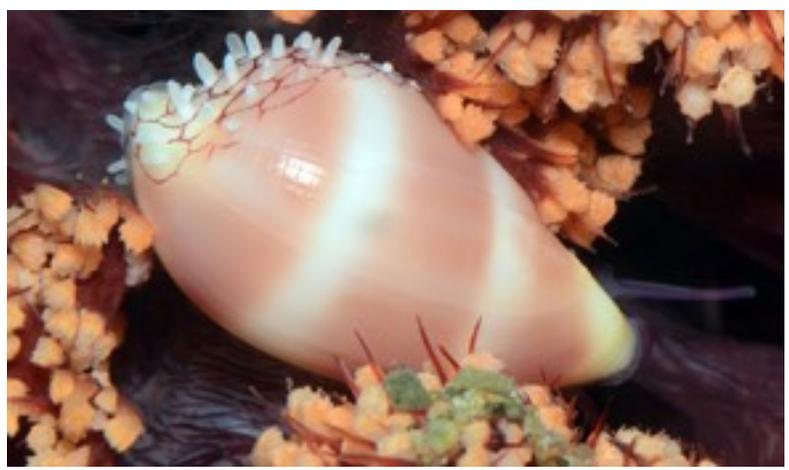
Diadem Egg Shell *Habuprionovolva basilica* IP, 10 mm. Feeds on *Dendronephthya* soft corals. Shell with 3 transverse dark line, visible through the mantle. Right: © Bernd Hoppe.



Umbilicate Egg Shell *Habuprionovolva umbilicata* WP: Indonesia, Philippines, China, 10 mm. Uniformly white shell, white mantle with fine red lines and tapering white papillae between. ©JJ.



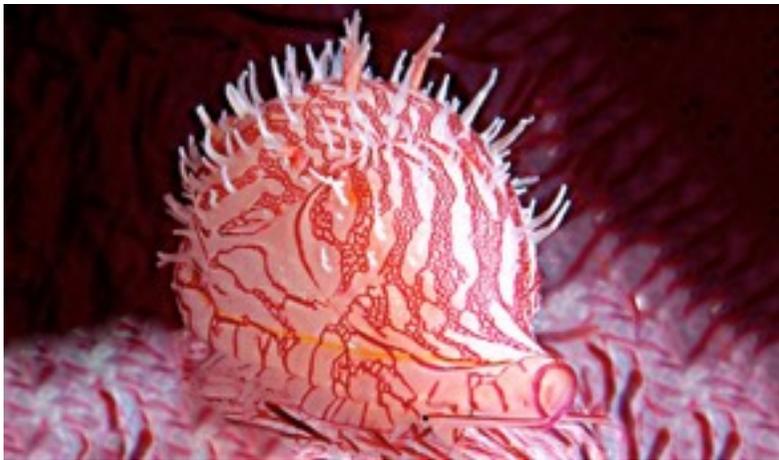
Ringed Egg Shell *Margovula anulata* WP, 22 mm. Feeds on *Umbellulifera* soft corals. Pink mantle, domed papillae with white areas around. Photos, left: © Marty Kiser, right: © Sue Churchill & Rogan Draper.



Fruit Egg Shell *Prionovolva brevis* WP: Australia to Philippines, 25 mm. Feeds on *Dendronephthya* corals. Pale shell with wide brownish transverse bands. Mantle with white papillae and red network pattern. Photo: ©JJ.



Fruit Egg Shell *Prionovolva brevis* (continued) Color morph with pronounced red areas around white papillae bases was treated as a separate species before, *P. wilsoniana*. Photo on the right: © Stephen D.A. Smith.



Don Dan's Egg Shell *Serratovolva dondani* WP, 23 mm. Feeds on *Dendronephthya* corals. Mantle with longitudinal red striations. Right: © Sue Churchill & Rogan Draper, left: © Charles E. Rawlings.



Minabe's Egg Shell *Serratovolva minabeensis* IWP: E. Africa, Philippines, Japan, 14 mm. Shell with brown bands, visible through translucent mantle with dark dots. Left: © Johji Nishio, right: © Yui Kawahara.



Nebulose Egg Shell *Testudovolva nebula* WP, 12 mm. Feeds on *Dendronephthya* corals. Shell with blotches that join and swirl. White mantle with pattern of red lines. Right: © B. Hoppe, left: ©JJ.



Oriental Egg Shell *Testudovolva orientis* WP: Japan to Indonesia, 10 mm. White shell with small separate brown spots (merged in large blotches in *T. nebula*) Left: © Kelvin Tan HY, right - © Dennis Teck Lee Liew.



Japanese Egg Shell *Testudovolva nipponensis* WP: Japan to Philippines and Brunei, 18 mm. Shell with large blotches that sometimes touch each other. © Brian R. Mayes.



Erica's Egg Shell *Testudovolva ericae* WP, 14 mm. Feeds on *Dendronephthya* corals. Shell is totally white, without spots. White mantle with islands of red lacy pattern. Foot with fine transverse lines.



Erica's Egg Shell *Testudovolva ericae* (cont'd) Rare form with pinkish shell. © Brian R. Mayes.

Jean's Egg Shell *Pseudosimnia jeanae* IWP: S. Africa, Japan to N. Guinea, 21 mm. © E.G de Suduiraut.



Pirie's Egg Shell *Amonovula piriei* WP, 22 mm. Feeds on *Euplexaura* sea fans. Elongated hump-shaped shell, yellow to red mantle with papillae, matching host's polyps. © Sven Kahlbrock



Club Egg Shell *Archivolva clava* PO: Papua New Guinea to Japan and Marshall Islands, 17 mm. Found on *Siphonogorgia* octocorals. Brownish shell with hump, more prominent on smaller animals. ©JJ.

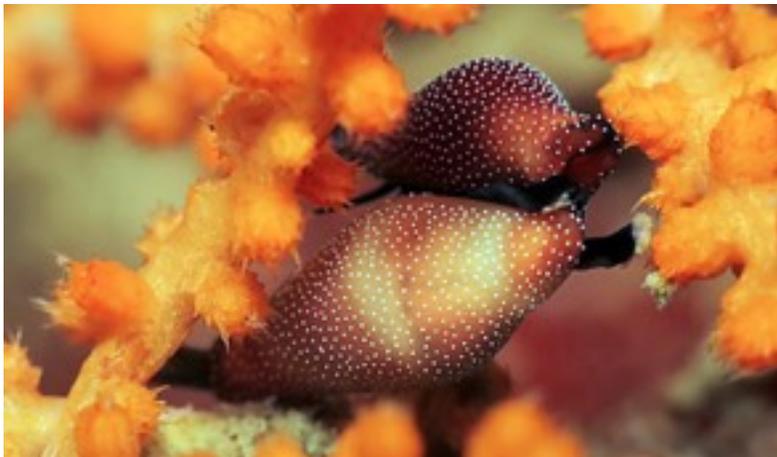


Kahlbrock's Egg Shell *Archivolva kahlbrocki* IO: Red Sea, 15 mm. © Sven Kahlbrock.

Alex Brown's Egg Shell *Archivolva alexbrownii* Red Sea, 16 mm. © Sven Kahlbrock.



Golden Egg Shell *Crenavolva aureola* WP, 11 mm. Feeds on *Acanthogorgia* gorgonians. Yellow to orange or reddish shell, mantle with white dots, foot and siphon are black.



Chiapponi's Egg Shell *Crenavolva chiapponii* WP: Philippines, Brunei, 10 mm. Synonymised with *C. aureola* based on DNA studies of specimens from Indonesia. Kept as a separate species for now. © Brian R. Mayes.



Groves' Egg Shell *Crenavolva grovesi* WP: Japan to Philippines and New Caledonia, 12 mm. Feeds on sea whips. Translucent white or yellowish mantle, domed papillae. Left: © Chay Hoon, right: © Tsu Soo Tan.



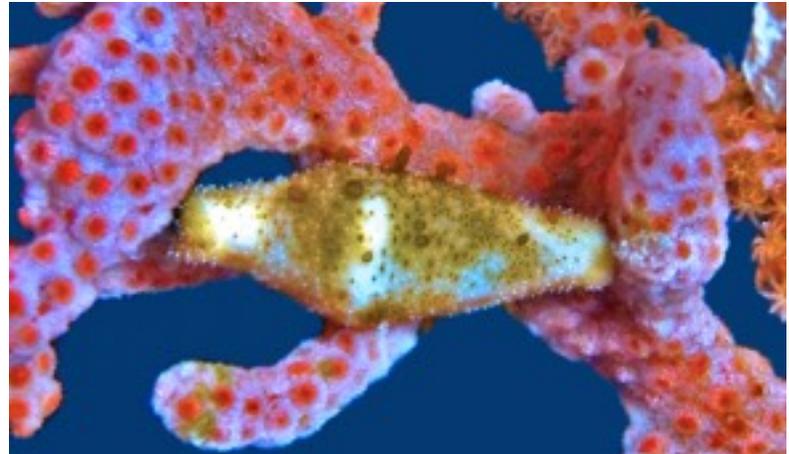
Guido's Egg Shell *Crenavolva guidoi* WP: Philippines to Brunei and Australia, 10 mm. Feeds on sea whips. Orange-brown to mauve shell, large white papillae. © Brian R. Mayes.



Matsumiya's Egg Shell *Crenavolva matsumiyai* Japan to Papua New Guinea and Solomons, 14 mm. Feeds on *Echinogorgia*. Red or brown mantle, large papillae. Right: © Sue Churchill & Rogan Draper, left: © Johji Nishio.



Striated Egg Shell *Crenavolva striatula* IWP, 16 mm. Feeds on *Echinogorgia* sea fans. Red and yellow color forms, both with 3 pale transverse bands on the shell. © Philippe & Guido Poppe www.poppe-images.com



Marbled Egg Shell *Crenavolva marmorata* WP: Australia to N. Caledonia, 15 mm. Close to *C. striatula*, but possesses no distinct transverse bands on the shell. Left: © Luc Faucompre, right: © Yves Thévenet.



Leopard Egg Shell *Crenavolva leopardus* WP: Japan to Indonesia, Brunei, 12 mm. Pale to red-orange shell without distinct marking, with fine striation over the dorsum. Mantle with small dark spots. © Brian R. Mayes.



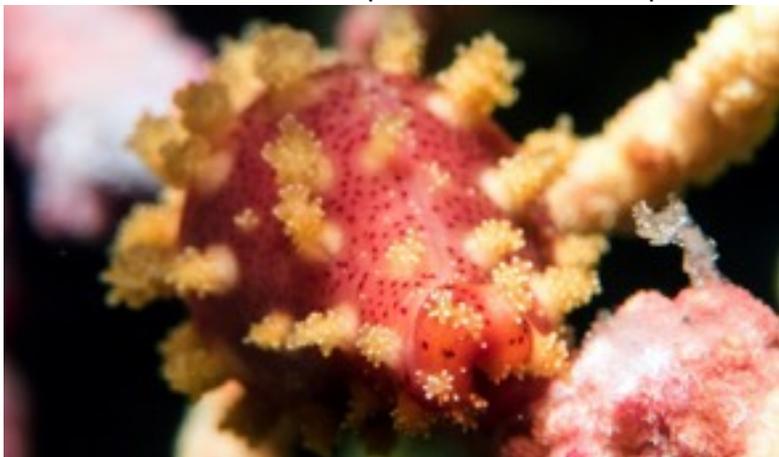
Trail's Egg Shell *Crenavolva traillii* WP, 16 mm. Red or yellow mantle, small white dots. Transverse middorsal pale band is rare. Feeds on several species of gorgonians. © Philippe & Guido Poppe www.poppe-images.com.



Tinted Egg Shell *Crenavolva tinctura* WP: Japan to Australia, 13 mm. Feeds on several species of gorgonians, including *Paraplexaura*, *Subergorgia*, *Echinomuricea*. Shell with angular profile, orange at the tips.



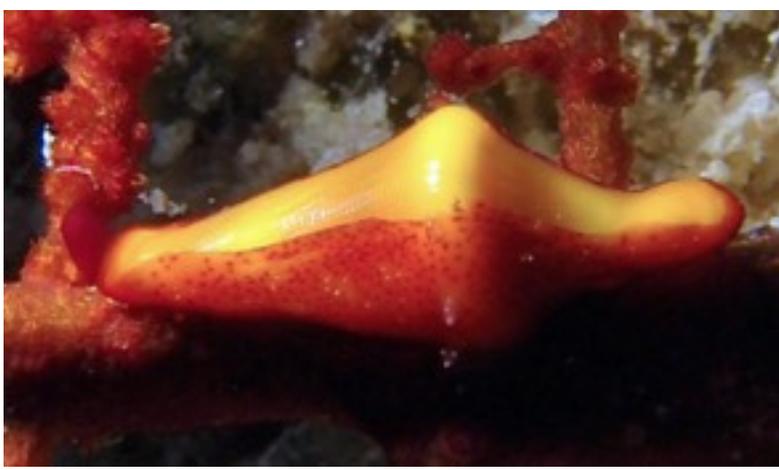
Tinted Egg Shell *Crenavolva tinctura* (continued) Mantle with red-brown spots and tiny white dots, often united into transverse islands. Siphon and foot transparent to reddish.



Odd Egg Shell *Crenavolva* sp. WP: Indonesia, Brunei, 12 mm. Branching papillae. © Arto Järvenpää.



Glassy Egg Shell *Crenavolva vitrea* WP: Japan, Philippines, 14 mm. © Yui Kawahara.



Martin's Egg Shell *Crenavolva martini* IO: E. Africa, Red Sea (1st report), 14 mm. Photo: © S. Kahlbrock.



Tosa's Dissona *Dissona tosaensis* WP: Japan, 15 mm. Mantle with red spots and white dots. Photo: © J. Nishio



Allyn Smyth' Egg Shell *Cuspivolva allynsmithi* WP: Japan, Korea, Brunei, 11 mm. Similar to *C. cuspis* (below) but differs by the less colorful rose-grey shell with tips of terminals creamy yellow. © Brian R. Mayes.



Pointed Egg Shell *Cuspivolva cuspis* WP: Japan, Philippines, Vietnam, Brunei, 12 mm. Hosts on *Euplexaura* sp., *Ellisella* sp. Recognizable inflated shell with pointed posterior tip, mantle with dark and white spots. © Brian R. Mayes



Draper's Egg Shell *Cuspivolva draperi* IP: East Africa to Japan and Australia, 18 mm. Shell with angular profile and wavy pattern, visible through the mantle. Mantle with yellow-brown spots. © Stephen D.A. Smith.



Howland's Egg Shell *Cuspivolva howlandae* Philip-pines to Australia, 10 mm. © Stephen D.A. Smith.



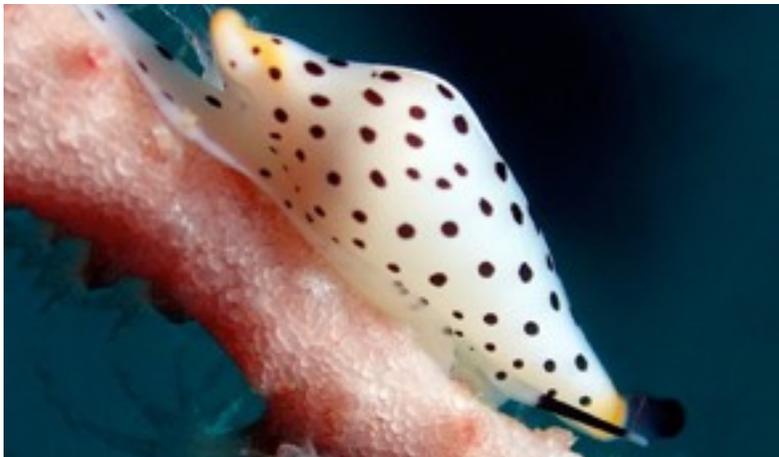
Ostheimer's Egg Shell *Cuspivolva ostheimerae* WP: Australia to Japan, 8 mm. © Brian R. Mayes.



Platypus Egg Shell *Cuspidolva platysia* WP: Japan to Australia, 12 mm. Shell with orange areas on the tips. Mantle and foot with black spots, black siphon. © Stephen D.A. Smith (left), © Brian R. Mayes (right).



Beautiful Egg Shell *Cuspidolva pulcherrima* WP: Philippines, Brunei, 16 mm. Shell with a cloudy violet and white pattern. Hosted on *Euplexaura* sp. gorgonian sea fan. © Brian R. Mayes.



Elongated Egg Shell *Cuspidolva* sp. Indonesia, 12 mm. ID tentative. © Charles E. Rawlings. ID tentative.



Tiger Egg Shell *Cuspidolva tigris* WP: S. Korea to Indonesia, New Caledonia and Vanuatu, 17 mm.



Tiger Egg Shell *Cuspidolva tigris* (cont'd) Yellow shell, mantle with transverse black bands. Yellow foot with rounded black spots. Feeds on *Euplexaura* sea fans. Probably imitates toxic nudibranch *Phyllidia ocellata*.



Queensland Egg Shell *Cuspidolva queenslandica* IWP: South Africa to Australia and Singapore, 12 mm. Feeds on *Pseudopterogorgia* sea fans. Translucent mantle with small maroon dots. Photos © Sue Churchill & Rogan.





Azuma's Egg Shell *Dentiovula azumai* IWP: South Africa to Japan, 10 mm. Yellow to pale maroon to match host's color, mantle with dark red spots and prominent papillae. © Johji Nishio.



Dorsal Egg Shell *Dentiovula dorsuosa* IP, 18 mm. Feeds on *Siphonogorgia* and *Chironephthya* octocorals. The shell is white in color with yellow lines. Foot with pink rings. © Brian R. Mayes.



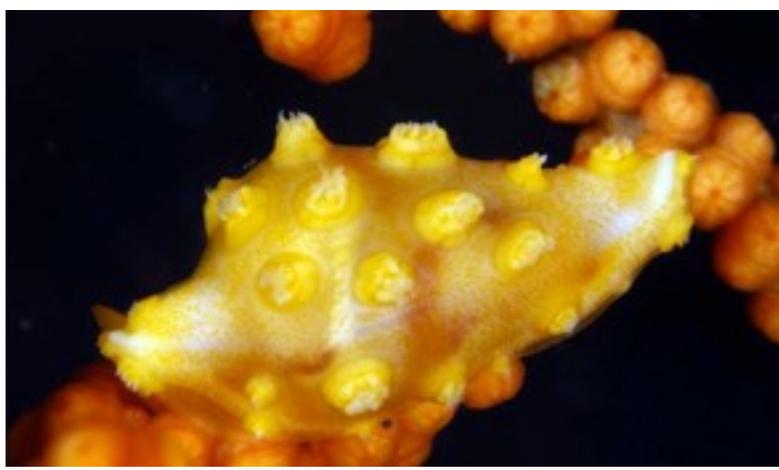
Dorsal Egg Shell *Dentiovula dorsuosa* (cont'd) Pink or yellowish mantle with small red dashes and white tapering papillae. Right: © Nick Hobgood, left: © Rokus Groeneveld.



Eizo's Egg Shell *Dentiovula eizoi* IP: East Africa to Central Pacific, 12 mm. Feeds on *Acanthogorgia* sea fan. Mantle with brown dots, prominent branching papillae. Left: © I. Bogachenko, right: © Dave Johnson.



Eizo's Egg Shell *Dentiovula eizoi* (continued) Several color morphs from yellow to maroon are matching the colors of host gorgonians. ©JJ.



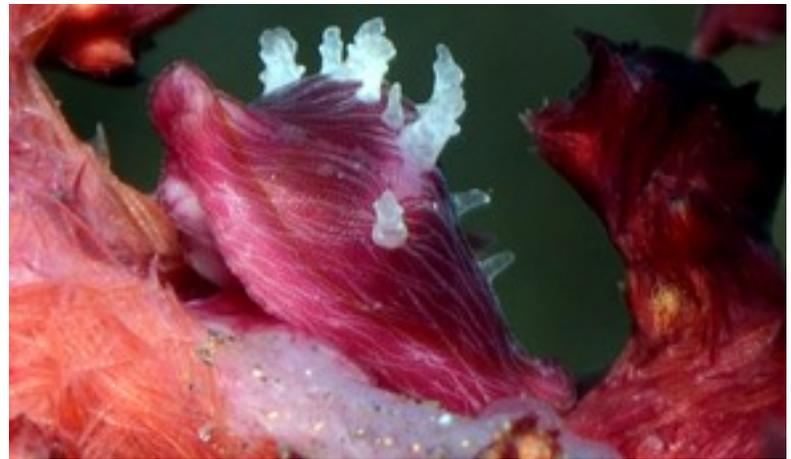
Shortened Egg Shell *Dentiovula colobica* IP: Red Sea to Japan, 11 mm. Shell with humped profile, translucent yellow mantle, prominent papillae are matching the host's polyps. © Johji Nishio.



Hora's Egg Shell *Dentiovula horai* WP: Brunei to Japan and Philippines, 18 mm. Rhomboid shell with sharp angulation at the shoulder, cream to mauve or reddish. © Philippe & Guido Poppe www.poppe-images.com.



Hora's Egg Shell *Dentiovula horai* (cont-d) Feeds on *Solenocaulon* false sea fan. Mantle with small spots, white, pink or reddish in color. Often long papillae across the shoulder. © Brian R. Mayes.



Silky Egg Shell *Dentiovula mariae* IP: Madagascar to Papua New Guinea, 8 mm. The shell is pale purplish to mauve in color. Feeds on *Chironophthya* soft corals. Left: © Steven Ng, right: ©JJ.



Silky Egg Shell *Dentiovula mariae* (cont'd) Similar to *D. dorsuosa* (above), but much smaller, with angular, less rounded profile. © Brian R. Mayes.



Masao's Egg Shell *Dentiovula masaoi* WP: Brunei to Japan and Vanuatu, 18 mm. The shell with sharp angulation at the shoulder, cream to orange or reddish. © Sue Churchill & Rogan Draper (left), © Steven Ng (right).



Masao's Egg Shell *Dentiovula masaoi* (cont'd) Feeds on *Siphonogorgia* corals. Mantle with tiny dark dots and large papillae, imitating coral polyps in form and color © Brian R. Mayes.



Constellate Egg Shell *Primovula astra* WP: Japan, Brunei, New Guinea, 10 mm. Pinkish white striated shell with bright orange spots. Translucent mantle with white papillae and orange dots. © Brian R. Mayes.



Violet Egg Shell *Primovula formosa* IWP, 16 mm. Feeds on *Euplexaura* sea fans. Easily identified by bright purple color. Left: © Rokus Groeneveld, right: © Tsu Soo Tan.



Panther Egg Shell *Primovula panthera* IWP: Madagascar to Japan, Philippines and N. Caledonia, 8 mm. Feeds on *Paraminabea* corals. The shell is yellow in color, translucent mantle with dark spots. © Johji Nishio.



Boomerang Egg Shell *Primovula roseomaculata* WP, 10 mm. Feeds on *Scleronephthya* soft corals. Shell with 3 rows of orange boomerangs, visible through the mantle. Left: © Dennis Teck Lee Liew, right: © Johji Nishio.



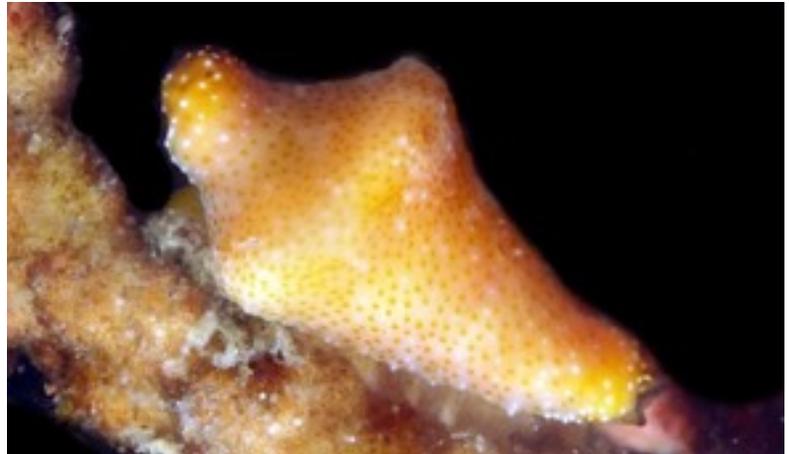
Rosewater's Egg Shell *Primovula rosewateri* IWP: South Africa to West Pacific, 15 mm. The shell with more or less angular profile, smooth or calloused, with orange terminals. Feeds on a variety of octocorals. ©JJ (right)



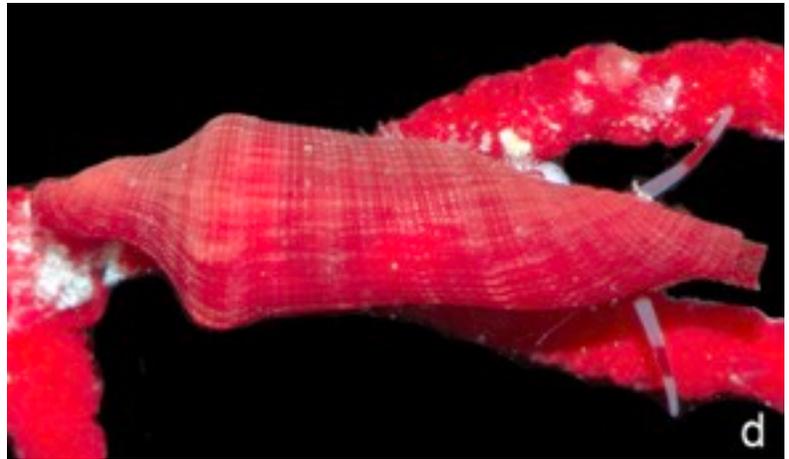
Rosewater's Egg Shell *Primovula rosewateri* (cont'd) White mantle with large rounded spots and scattered yellow conical papillae, the pattern and color depend on host. © Brian R. Mayes.



Tadashige's Egg Shell *Primovula tadashigei* WP: Brunei to Japan, PNG, 14 mm. Feeds on *Solenocaulon* false sea fan. Right photo © Sue Churchill & Rogan Draper, left: © Brian R. Mayes.



Seven-Spots Egg Shell *Rotaovula septemmacula* Red Sea and E. Africa to Japan, 10 mm. Feeds on different gorgonians. Shell with 7 brown spots. Right (Japan): © Johji Nishio, left (Red Sea): © Sven Kahlbrock.



a-h. Dragon Egg Shell *Prosimnia draconis* WCP, 16 mm. Shell with a strong transverse ridge.
j-i. Semper's Egg Shell *Prosimnia semperi* IWP, 15 mm. Shell without a strong transverse ridge.
 Species delimitation in this group needs to be reconsidered with molecular data. Draper & Churchill (2014) treated them as variations of *P. semperi*.
 Photos: a, b, h - ©JJ, c - © Bjarte Håkonsen, f,g - © Yves Thévenet, j,i - © Sven Kahlbrock.



Minor Harp *Harpa amouretta* IP: Red Sea, E. Africa to Hawaii, 65 mm. Small, elongated shell, white in color with cream and brown banding. In danger, the animal can cast off the hind part of the foot. Photo (left, right): ©SJ,©JJ



Minor Harp *Harpa amouretta* (cont'd) unusual nearly white animal, Marshall Islands. ©JJ.



Articulate Harp *Harpa articularis* IWP: Burma, Thailand to Fiji, N. Caledonia and Japan, 110 mm.



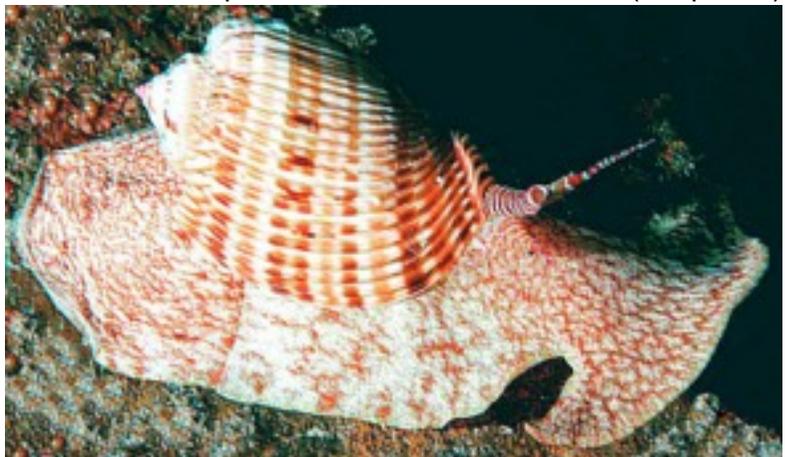
Articulate Harp *Harpa articularis* (cont'd) Distinguished by relatively narrow ribs and dark blotch, that nearly covers the ventral side of body whorl. Preys on shrimps and crabs, trapping them by foot (left photo). Right photo: mating.



True Harp *Harpa harpa* IP: Red Sea, E. Africa to Hawaii and Polynesia, 110 mm. Distinguished by rectangular red or brown spots between ribs, the ventral side of body whorl with 3 separate brown blotches. ©JJ (left photo)



Kajiyam's Harp *Harpa kajiyamai* IWP: E. Africa to Japan, Philippines, 72 mm. © E.G de Suduiraut.



Imperial Harp *Harpa costata* IO: Mauritius; Réunion; Madagascar, 110 mm. © Charles E. Rawlings



Major Harp *Harpa major* IP: Red Sea, E. Africa to Polynesia and Hawaii, 130 mm. Distinguished by the dark blotch, divided in the middle into 2 parts, on ventral side of body whorl. ©JJ



MacDonald's Morum *Morum macdonaldi* CP: Marshall Islands endemic, 20 mm. ©SJ.



Ichiyama's Morum *Morum uchiyamai* WP, 65 mm. MNHN Kanacono 2016. © David Massemin.



Teramachi's Morum *Morum teramachii* Depth >90 m. WP: Japan to N.Caledonia, 66 mm. © E.G de Suduiraut.



Watanabe's Morum *Morum watanabei* WP: Japan to Philippines, 45 mm. Deep water. © E.G de Suduiraut.



Striped Olive *Miniaceoliva efasciata* WCP: N. Guinea to Polynesia, 75 mm. Cream-yellow shell with lilac flames and lines in irregular zigzag pattern, 2 interrupted transverse bands. Foot whitish with opaque white spots. ©JJ



Head Concave Olive *Oliva concavospira* WP: Vietnam to Philippines and Japan, 44 m. Grey to brownish, with pattern of longitudinal dark zigzag lines. © Philippe & Guido Poppe www.poppe-images.com





Deshayes's Volute *Cymbiola deshayesi* SP: New Caledonia, 105 mm. The shell is fusiform, solid, with conic spire. White to cream with 2 broad interrupted red bands. Animal red with yellow dots, foot with yellow margin.



Noble Volute *Cymbiola nobilis* WP: Thailand to Singapore and Philippines, 222 mm. Fusiform shell, beige with a zig-zag lines. Animal black with yellow spots. Right: © Arthur Anker, juvenile. Left: © Tsu Soo Tan.



Palawan Volute *Cymbiola palawanica* WP: Philippines, Palawan Island, 110 mm. © Barbier Jean-Pierre.

Rossini's Volute *Cymbiola rossiniana* SP: New Caledonia (endemic), 185 mm. © Luc Faucompre.



Bat Volute *Cymbiola vesperilio* WP: Thailand to Vietnam, Philippines, Indonesia and Australia, 160 mm. Outer coloration variable, generally cream to olive brown, with darker overlays of zigzag lines, blotches or streaks.



Vexillate Volute *Harpulina arausiaca* IO: Sri Lanka, India, 105 mm. © Charles E. Rawlings.

Brown-Lined Volute *Harpulina lapponica* IO: Sri Lanka, India, 103 mm. © Charles E. Rawlings.



Clover's Lyria *Lyria cloveriana* IO: Sri Lanka, Thailand, 98 mm. © Charles E. Rawlings.



Delightful Lyria *Lyria deliciosa* SP: Australia, New Caledonia, 42 mm. © Uwe Weinreich.



Bohol's Lyria *Lyria boholensis* WP: Philippines, New Caledonia, Borneo, 86 mm. © E.G de Suduiraut.



Diadem Volute *Melo amphora* WP, 550 mm. Shoulder with elevated spines. © Uwe Weinreich.



Crowned Baler *Melo aethiopicus* WP: Indonesia to Vietnam and Philippines, Malaysia, N. Guinea, 250 mm. Globose shell, red-orange in color, with low spire. Shoulder with short elevated spines. © Ludovic David.

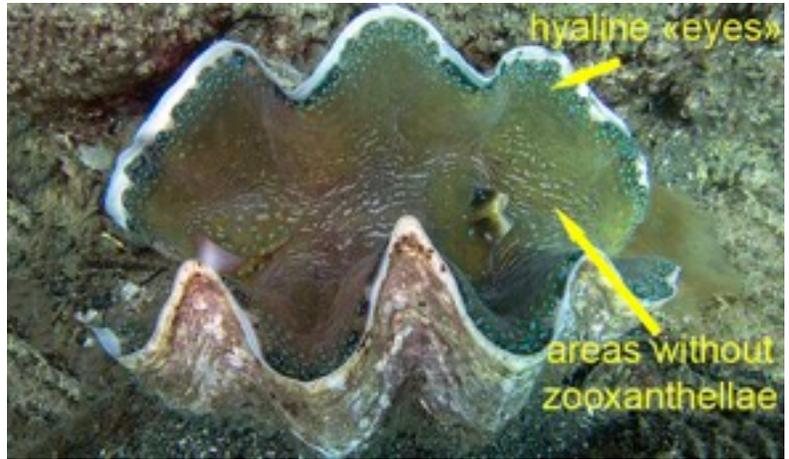
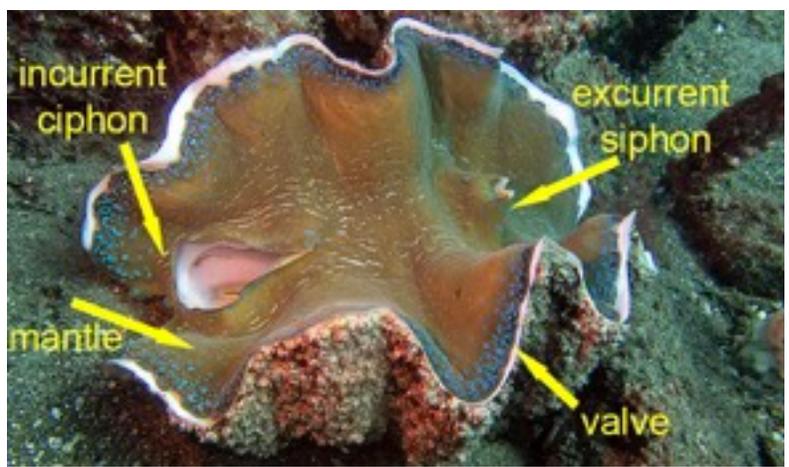


Crowned Baler *Melo broderipii* WP: Indonesia to Philippines and N. Guinea, 360 mm. Globose shell, cream to pale brown in color. Shoulder with short elevated spines. © Philippe & Guido Poppe www.poppe-images.com



Cymbium Melo *Melo melo* WP: India to Philippines and Indonesia, 365 mm. Large globose shell, spire covered by body whorl, shoulder devoid of spines. Outside orange, often with banding of brown spots. © Ria Tan.





Giant Clam *Tridacna gigas* IP, 137 cm. Smooth shells with no ribbing and four or five vertical folds. Unlike other *Tridacna* species, **incurrent siphon bears no tentacles**. Areas with no zooxanthellae cells in the central axis are often marked with a white longitudinal lines. Mantle olive-brown or greenish. Iridescent blue ocelli, hyaline light-sensitive organs (“eyes”) are concentrated near the edge of the mantle. In many regions giant clams are becoming endangered due to intensive exploitation. Photo: “f”, “h”, “i” ©JJ, photo “g”: ©SJ.



Fragile Galeommatid *Scintilla* sp. SP: New Caledonia, 10 mm. Shell transparently yellowish, elliptical oval in shape, smooth. Shallow intertidal, under rocks, host unknown. NHMN Koumac-2018 expedition.



Smooth Galeommatid *Scintilla* sp. WP: Philippines, Indonesia, 12 mm. Shell transparently white, elliptical oval in shape, smooth. Shallow subtidal, under rocks, host unknown. ID tentative.



Tuberculated Galeommatid *Scintilla* sp. WP: N. Guinea to Philippines, 10 mm. Mantle w/orange-tipped tubercles.



Fuzzy Galeommatid *Scintilla* sp. WP: Indonesia, 12 mm. Shallow rocks, associated with brittle stars.



Mammillate Galeommatid *Scintilla* sp. SP: New Caledonia, 10 mm. Shell transparently white, elliptical oval in shape. Mantle totally covered by rounded tubercles. NHMN Koumac-2018 expedition.



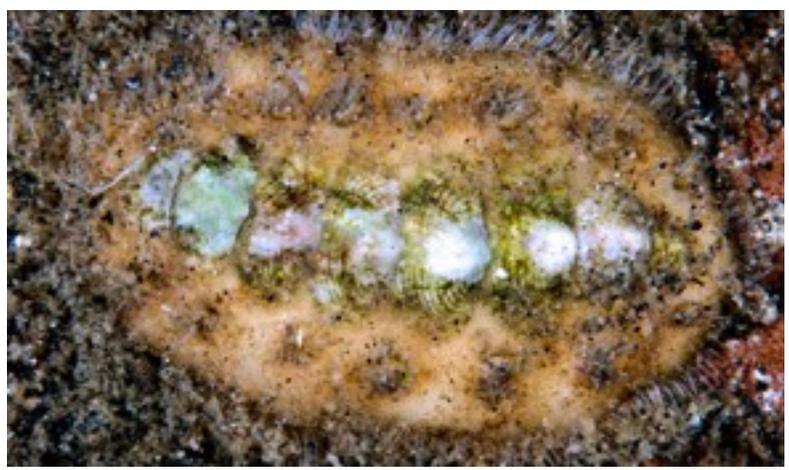
Orange-Spotted Galeommatid *Scintilla* sp. SP: New Caledonia, 9 mm. NHMN Koumac-2018 expedition.



Red-Shell Galeommatid *Scintilla* sp. WP: Papua New Guinea, 8 mm. © Arthur Anker. ID Tentative.



Britaev's Chiton *Acanthochitona britayevi* WP: Vietnam, 13 mm. © O. Savinkin.



Jewel Spiny Chiton *Acanthochitona cf. leopoldi* WP: Philippines, 15 mm.



Velvety Chiton *Leptoplax* sp. WP: Philippines, 20 mm. Medium-sized chiton, trapezoidal pinkish plates are surrounded by orange-brown to tan girdle. Common on shallow rocks.



Jewelled Chiton *Acanthopleura gemmata* IWP: East Africa, Phuket, Philippines to Australia, Vanuatu, 70 mm. Large, oval shaped body with dimpled plate margins, a brown girdle and long spicules.



Vaillant's Chiton *Acanthopleura vaillantii* IO: Red Sea, Oman, mainland Yemen and Socotra, Persian Gulf, 50 mm. Large elongate oval body, valves are beaked and solid. Head valve is semicircular.



Spiny Chiton *Acanthopleura spinosa* WP: Philippines, Indonesia, Australia, 100 mm.



Balinese Chiton *Rhysoplax baliensis* WP: Indonesia, 50 mm. Large, girdle with rounded triangular scales.



Densilirata Chiton *Rhyssoplax densilirata* WCP: Philippines, Indonesia, Papua New Guinea, 52 mm. Variable in color from olive-green to greyish-brown, reticulated girdle, plates often with a dark wedge-shaped marks.



Densilirata Chiton *Rhyssoplax densilirata* (cont'd)
Common on the shallow rocks in the Philippines.



Mauritanian Chiton *Rhyssoplax mauritiana* IO: East Africa to Seychelles, 40 mm. © Philippe Bourjon.



Lamellate Chiton *Lucilina lamellosa* WP: Vietnam and Philippines to N. Caledonia and Samoa, 40 mm. Coloration variable, of chestnut brown and greyish-green. Identified by the pattern of numerous eye-like sensors on the plates.



Hulule Chiton *Tegulaplex hululensis* IWP: Red Sea, E. Africa to Maldives, Vietnam, Fiji, also Mediterranean Sea, 32 mm. Plates and girdle are lilac in color.



Dawydoff's Chiton *Cryptoplax dawydoffi* WP: Vietnam to Philippines, Indonesia, 40 mm.



Eliot's Chiton *Cryptoplax elioti* New Caledonia, Samoa to Marshalls, 100 mm. Plates are much reduced.

CRYPTOPLACIDAE



Slug-Like Chiton *Cryptoplax larvaeformis* IWP: Maldives and Thailand to Philippines, Indonesia, Fiji and Australia. 150 mm. Plates are reduced, flexible fast-moving animal. Nocturnal, hides under rocks during the day.



Eye Chiton *Cryptoplax oculata* WP, 130 mm. Found on hard corals, retreats in the crevices when disturbed.



Caledonian Chiton *Cryptoplax larvaeformis* f. *caledonicus* New Caledonia, 120 mm.



ISCHNOCHITONIDAE



Adorned Chiton *Ischnochiton comptus* WP: Japan, Korea, China, Philippines: 25 mm. Variable in color, girdle scales are smooth and large. Found on intertidal rocks.



Bonin's Chiton *Ischnochiton* cf. *boninensis* WP: Philippines, 30 mm. Close to *I. boninensis* from Japan.



Alata Chiton *Stenoplax alata* IWP: India to Vietnam, Japan, China, 51 mm. Brownish girdle with dark spots.

SCHIZOCHITONIDAE



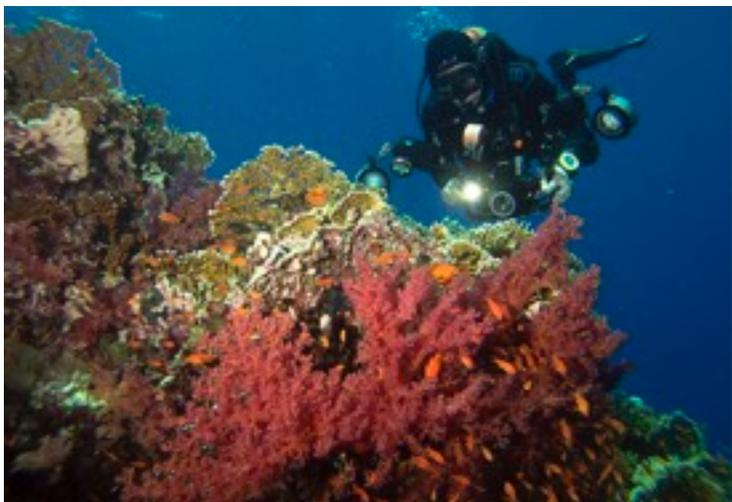
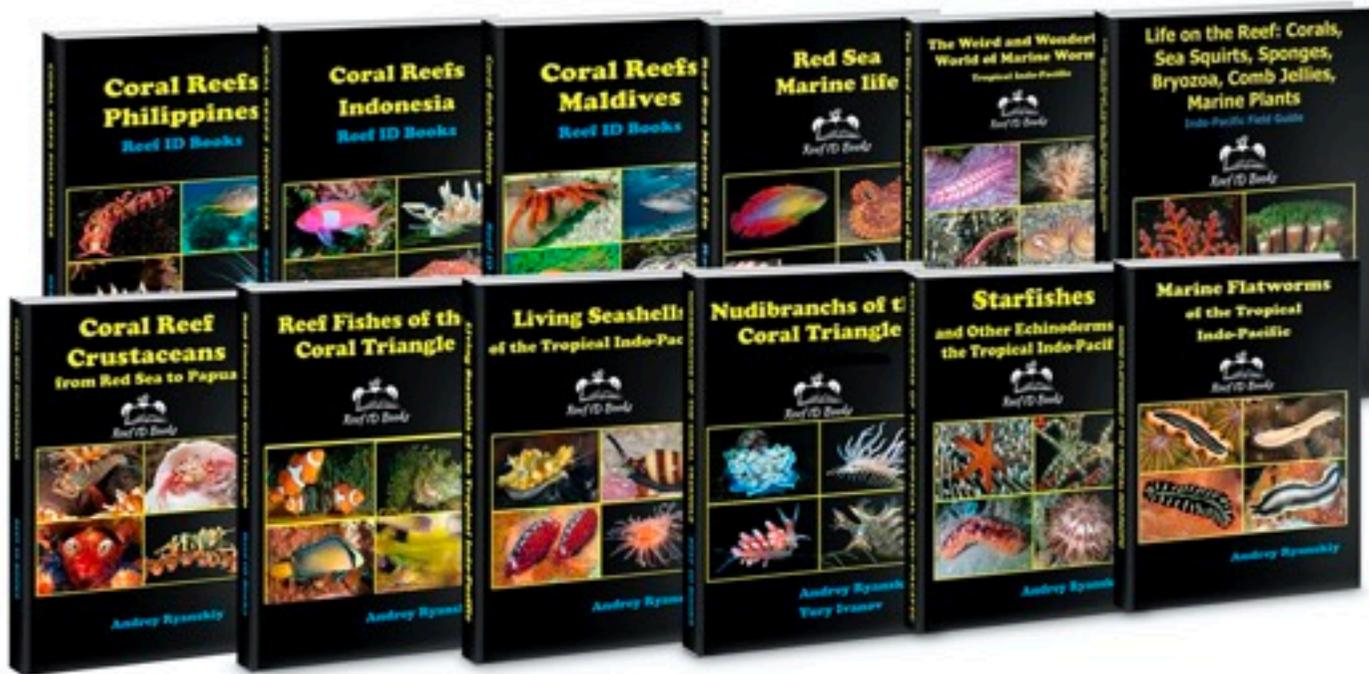
Swollen Chiton *Schizochiton incisus* IWP: Seychelles, Chagos, Maldives, Philippines to Indonesia, Solomons and Australia, 50 mm. Easily recognizable by the deep V-shaped caudal sinus in the tail valve.



CRYPTOPLACIDAE

ISCHNOCHITONIDAE

SCHIZOCHITONIDAE



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