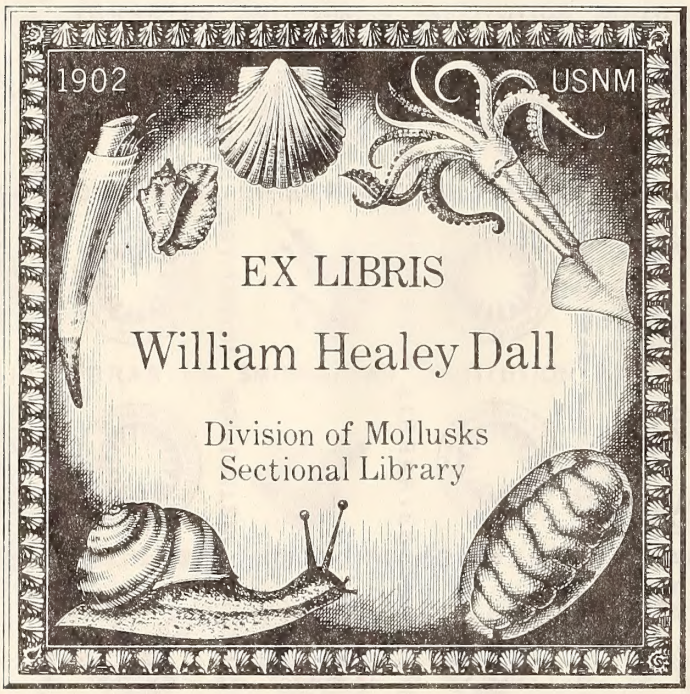
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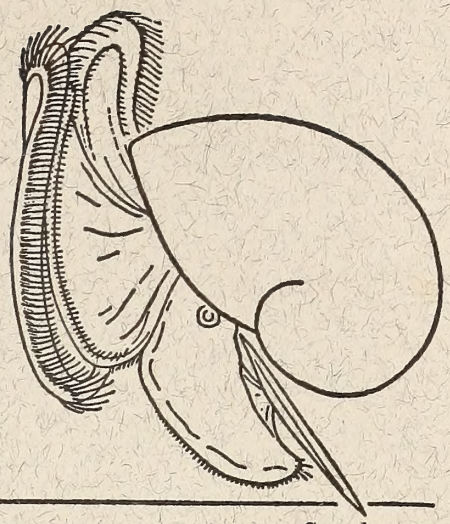

VOLUME 15 January 31, 1973 Supplement

A Systematic Revision of the Recent Cypraeid Family Ovulidae

(Mollusca : Gastropoda)

BY

CRAWFORD NEILL CATE

Figure *131* C
Delonovolva labroguttata (123)

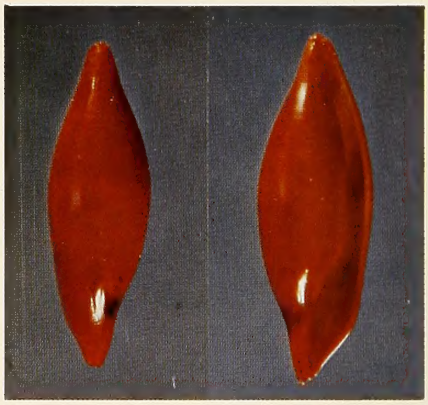

Figure *185* C
Spiculata michaelkingi (163)

Figure *193* C
Sandalia rhodia (169)

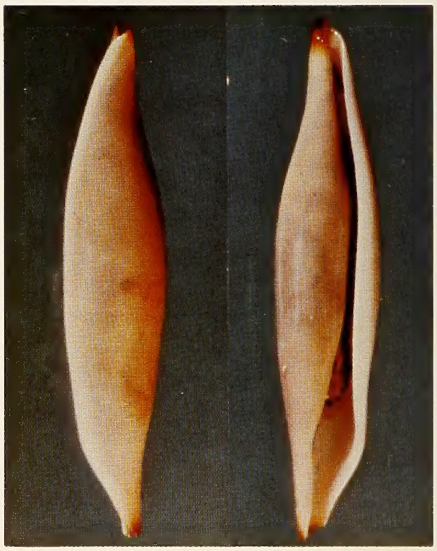

Figure *196* C
Hiata brunneiterma (171)

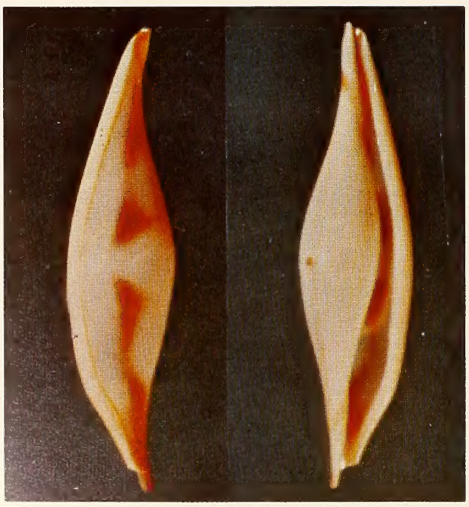

Figure *229* C
Phenacovolva (Pellasimnia) gracilis (198)

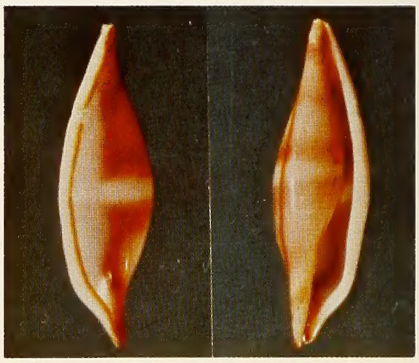

Figure *228* C
Phenacovolva (Pellasimnia) weaveri pseudogracilis (197)

Color photographs by JEAN M. CATE

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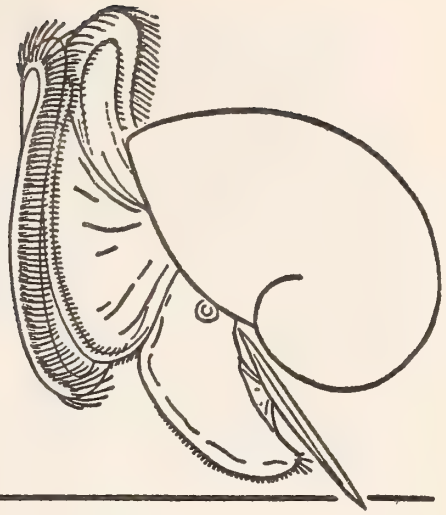

A Systematic Revision of the Recent Cypraeid Family Ovulidae

(Mollusca : Gastropoda)

BY

CRAWFORD NEILL CATE

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(51 Plates, 4 in Color)

Preface

FORTY YEARS HAVE ELAPSED since Professor Schilder attempted to bring the molluscan family of the Ovulidae into modern arrangement; reappraisal is now overdue. The present work on the Ovulidae commenced in 1968, and many of the problems encountered were discussed at length with the late Professor Franz Alfred Schilder. In one of his last communications to me, he said: "I am very glad that you continue an intensified study of the Ovulidae. I myself, as you are aware, concentrated these last fifty years chiefly on the true cowries, and the semi-cowries (Triviidae, Ovulidae) were a second class matter for me; I am glad that your plan to specialize in this forgotten group continues." Professor Schilder passed away 11 August 1970; with deep respect I dedicate my work to this great scholar who first attempted to bring the Ovulidae into conformity with modern concepts. It is my great regret that he could not have lived to see it in print.

Schilder (in the above communication) called the Ovulidae a 'forgotten family'. There seems little doubt of the accuracy of his statement. The monumental problems encountered in the present work, including species identification, the number of new species involved and their illustration; the need for redescription of previously inadequately described species; past indiscriminate relegating of many species into restricted, inadequately proposed genera; and the widespread misidentification of species in important museum collections, all attest to the correctness of Schilder's conclusion.

Abbreviations and Conventions

AGSN - Accademia Gioenia di Science Naturali, Catania, Sicilia
AMNH American Museum of Natural History, New York
AM - Australian Museum, Sydney, New South Wales
ANSP - Academy of Natural Sciences, Philadelphia, Pennsylvania
BMNH - British Museum (Natural History), London, Engiand
BPBM - Bernice P. Bishop Museum, Honolulu, Hawaii
BUMO Bairstow Collection, University Museum, Oxford, England
CAS - California Academy of Sciences Geology Department Type Collection, Golden Gate Park, San Francisco, California
CNC - Cate, Crawford N., Sanibel Island, Florida
DMNH - Delaware Museum of Natural History, Greenville, Delaware
ELM - East London Museum, Cape Province, South Africa
FAS - Schilder, Franz Alfred, Halle-Saale, DDR 402
FMNH - Field Museum of Natural History, Chicago, Illinois
FSM - Florida State Museum, Gainesville, Florida
GIY - Geological Institute, Yokohama National University, Yokohama, Japan
HNSM - Hirohito Collection (National Science Museum, Tokyo, Japan)
IFAD - Institut Fondamental d'Afrique Noir, Dakar, West Africa
IRSN - Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium
LACM Los Angeles County Museum of Natural History, Los Angeles, California
LSL - Linnaean Society of London, London, England
MA - Azuma, Masao, Nishinomiya, Hyogo, Japan
MCZ - Museum of Comparative Zoology, Harvard College, Cambridge, Massachusetts
MHN - Museum d'Histoire Naturelle, Geneva, Switzerland
MNHN - Museum National d'Histoire Naturelle, Paris, France
MS - Schilder, Maria, Halle-Saale, DDR 402
NMV - National Museum of Victoria, Victoria, Australia
NMW - National Museum of Wales, Cardiff, United Kingdom
NRS - Naturhistoriska Riksmuseet, Stockholm, Sweden
NSMT - The National Science Museum, Ueno Park, Tokyo, Japan
OCCM - Oxford City and County Museum, Oxford, England
PNM - Philippine National Museum, Manila, Philippines
RGM - Rijksmuseum van Geologie en Mineralogie, Leiden, Holland
SAM - South Australian Museum, Adelaide, South Australia
SDNHM - San Diego Natural History Museum, San Diego, California
SU - Stanford University Paleontology Type Collection, Stanford, California
UMM - University of Manchester Museum, Manchester, England
UPSO - Université de Paris, Faculté des Sciences, Laboratoire de Paléontology, Orsay, France
USNM - United States National Museum (Smithsonian Institution), Washington, D. C.
UZMC - University Zoological Museum, Copenhagen, Denmark
WAM - West Australian Museum, Perth, West Australia
ZMA - Zoologisch Museum, Universiteit van Amsterdam, Holland

[OD] - by original designation
[SD] - by subsequent designation
[TT] - by absolute tautonymy
(C0000) - shell specimen in collection of C. N. Cate

INTRODUCTION

THE FAMILY OVULIDAE, as understood today, comprises several well known species. Their nomenclature dates from the six species of LINNAEUS (1758). Since that time our knowledge of the species has broadened, with new taxa having been added over the years. Recognition of these species has been slow because of the many complexities of their shell morphology; only in most recent times have efforts been made to study their anatomy, but even this is limited perhaps to less than a dozen dissections.

The purpose of this work is to furnish a revision of the family Ovulidae. In the present work, 94 new species, 7 new subspecies, 19 new genera, and 7 new subgenera are described, and a reevaluation of the generic structure as a whole is presented. The type specimens of all species have been illustrated, wherever possible; in addition, the type specimens of many of the synonymous species are also illustrated, to enable the student to assess for himself the judgments that have been made in synonymizing them. In a few instances where only a type specimen has heretofore been known, or for other reasons the identification of a species seems uncertain, recently collected specimens are also illustrated.

Monographs of the Ovulidae commenced with KIENER (1843), who listed 23 species; this was followed by SOWERBY 2nd (1848), who recognized 43 species. REEVE (1865) listed 66 species; ROBERTS (1868–70) briefly recorded 72 species, mostly without comment; WEINKAUFF (1881) included 72 species; TRYON (1885) monographed 48 species, placing many more into synonymy. SCHILDER (1932), 47 years later, with a modified prodrome of a monograph, listed 72 species in what was apparently the first modern attempt to arrange them systematically and to record localities, range, shell description, and distribution; his locality data, however, seem to be based upon information taken from labels and not entirely from verified, first-hand field collections. To avoid similar difficulties only confirmed localities, or localities otherwise reasonably to be assumed accurate through extrapolation, will be recorded here. In cases where the labels accompanied misunderstood species, these records are, of course, of doubtful value.

Recently SCHILDER & SCHILDER (1971) use 9 genera and 4 subgenera to list all the presently known recent and fossil ovulid species, with reference to them in the literature. Additional recent references in the literature appear to offer pertinent identifications relative to those in this present work; these are: ANDREWS (1971: 98) *uniplicata* (= *marferula*), and WILSON & GILLETT (1972: 62; plt. 44, fig. 8) *philippinarum* (= *angasi*).

Since this is the first major revision of the Ovulidae since SCHILDER (1932), it seems appropriate to reassess the relative systematic positions of the currently accepted genera. The present study has revealed that the most outstanding characteristic to be seen in this group is the transverse dorsal striation present in nearly all of the species (with only a few exceptions); only the cyphomids and a very small number of species in other genera lack this typical sculptural character. The dorsal striation may vary from being restricted in number over either terminal process, to a complete ornamentation of the dorsal surface, the base, and even the columella. Unlike the shells in the closely related family Cypraeidae, the ovulids are not, as a general rule, as spectacularly colored and ornamented.

After much study of these shells, it becomes increasingly clear to me why collectors and serious students alike have tended to avoid confrontation with them. Many of the species are extremely small and thus have been ignored, or simply classified as some unknown, vaguely similar form. The shells of many of these species are white or nearly so; others are punctate, with similar spotting merely adding to the confusion; several have similar overall shape, often even possessing the same shell color, yet appearing decidedly distinct specifically for other reasons. These are only a few similarities that have met the appraising eye. Additionally, confusing museum labels and the erroneous work of some recent authors after studying their shell identifications, tend to emphasize the difficulties encountered in this group.

If one will compare the species' shell measurements in this text with the corresponding illustrations, it will be noted that magnification (sometimes to × 12) has been planned to facilitate comparison of material from the field with established species dimensions. The author readily agrees that this monograph leaves much to be done, and many questions are left unanswered. Even so, for the first time in most instances, the presently known species will be photographically available for future research.

One difficulty encountered in the search for the type specimens was the presence of more than one species in some of the type lots; while this situation was a problem, the original author's description and illustration often made it possible to isolate the correct specimen.

To further simplify the understanding of this complicated group of shells, there seemed to be need for additional taxonomic division among them. Because of the discovery of many new species with various shell forms, it seemed necessary to add several new genera and subgenera to accommodate them. Due to the lack of knowledge of the radulae and soft parts of nearly all the species, it has been necessary to base these new taxa on shell morphology alone; therefore future study of this group will probably make further taxonomic revision necessary. For the pres-

ent, however, the systematic arrangement used here seems to me the most appropriate.

A number of early original descriptions are without reference to any illustration; in these cases I have listed the first subsequent figure to appear in the literature as that for the species. In the interest of further economy of space, abbreviations are used to identify well known measurements, locality names, geographic direction, etc.

LOCALITIES

The animals of the Ovulidae are widely distributed throughout the world seas and, interestingly, seem to parallel the distribution and ranges of the Cypraeidae (true cowries). As with this group, the greatest concentration of species is found on the west and east coasts of Australia, the Philippines, and Japan.

The time interval between modern studies of the Ovulidae has permitted the accumulation of much material in museums; except for the well known species, most of the material is without proper identification. A large part of the material has resulted from formal collecting expeditions into the field in recent years, which produced many shell lots, all with excellent station data. These expeditions have been an important source for the locality information noted for various species in this present work. The number of unknown "*Ovula* sp. ?" species that have accumulated in the various collections will be noted herein.

In the text will be found the type locality as designated by the original author for a species. If it is listed as 'Unknown', or is substantially inconclusive, or is evidently incorrect for the species as its present distribution is known, a confirmed locality will be given as an indication of the presently known range for the species.

SYSTEMATICS

The systematics for the family Ovulidae, as arranged under the superfamily Cypraeacea, will include the genera and subgenera currently accepted in the literature as valid, with some new genera and subgenera added, and a new arrangement of the old. The outline of this work will be based upon the "Generic Classification of Cowries [Ovulidae]" (SCHILDER, 1968). The superfamily Triviacea, which includes the families Triviidae and Pediculariidae, will not be considered in this work; only the genera and species of the family Ovulidae will be considered.

Very few of the species are of common occurrence, and they are usually found living on gorgonians, sea fans (including sea whips), various species of kelp, even occasionally on algae-covered substrata. Their benthic range varies from tide mark, depending upon the species, to very deep water—the latter notably off the Kii Peninsula, Japan, and in the area NNW of Madagascar, Indian Ocean.

It is important to mention that several well known, long-established ovulid species appear to lack designated holotype specimens. It would seem evident that early authors had selected a specimen from the type lot of shells to describe a new species, eventually returning the type-shell to the lot, where its identity became lost; this would have been especially true had not hand-drawn figures assisted in selecting lectotypes, as designated herein. No attempt will be made to designate neotypes, although some type shells seem to have become lost, and no original shells remain for the species.

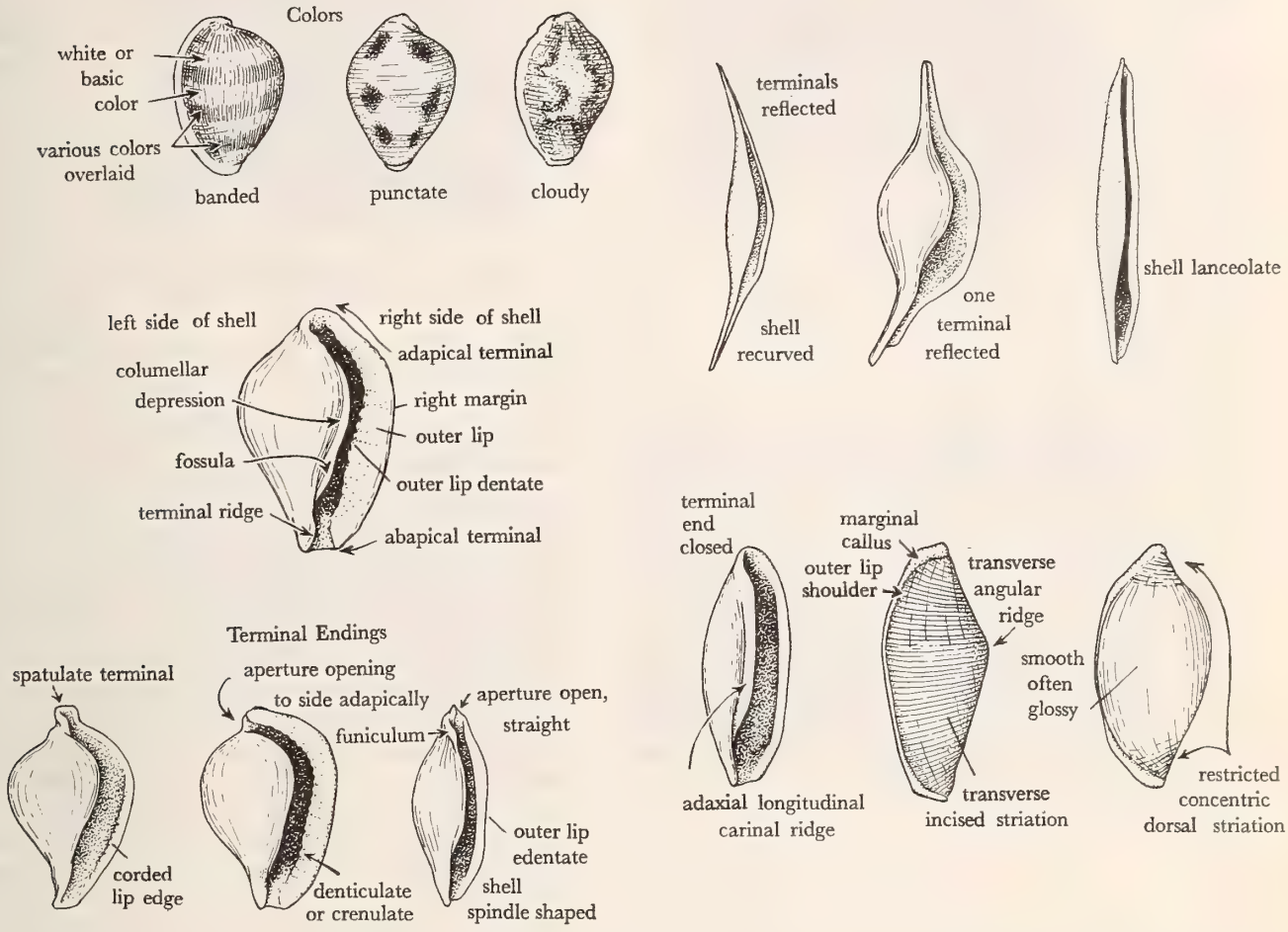
SYNONYMY

No attempt has been made to include more than a brief outline of secondary synonymy in this work. Most references are readily available elsewhere and would only add unnecessary volume to the monograph. However, the important primary synonymy has been listed, and where possible the synonymous species have been illustrated, in order to give the reader his own option in determining the validity of the synonymy proposed here. Despite careful search it was found impossible to locate many of the type specimens of synonymous taxa and it appears that many have been lost.

ACKNOWLEDGMENTS

In searching out the ovulid types of Linnaeus for use in this work, I had personal communication with Mr. S. Peter Dance, NMW. Because of his personal involvement with the curation of the Linnaean collection (LSL), his remarks are pertinent to an understanding of the Linnaean ovulid types: "I worked on the Linnaean collection for several months and segregated *representatives* (I don't call them types) of several hundred Linnaean species. The collection is fully labeled by me, is well stored and is available for study." Further remarks by Mr. Dance will be quoted elsewhere at the appropriate place; i.e., under each of the Linnaean species in the text.

To accomplish much of this work it was important to have the assistance of individuals and museums the world over; the latter will be indicated by code letters listed below. As mentioned above, the scope of this work is worldwide, and is based to a large extent upon the knowledge, field work, and curatorial ability of many collectors



Illustrations of Terminology used in the Ovulidae

and colleagues, literally everywhere. The following can only be a partial list of those persons who contributed of their time and energy in my behalf, to make this revision of the Ovulidae possible. There were countless other friends who assisted in various ways who remain unidentified, yet without whose help this work could not have been completed. To all of them I express my deepest appreciation. Because the list is so voluminous, nearly as long as the list of species herein, only the following are mentioned:

From Australia: Mollie Bowman; Donald Byrne; Philip H. Coleman, AM; Leslie Figgis; T. A. Garrard, AM; W. A. Howland; Neville Jennings; Helene M. Laws, SAM; Tom Neilsen; William F. Ponder, AM; Lorraine Rutherford; Alex Schelechoff; Shirley M. Slack-Smith, WAM; Brian Smith, NMV; Archer Whitworth; Barry Wilson, WAM.

Europe: W. Adam, IRSN; Alec Anderson, NRS; E. Binder, MNH Geneva; A. Capart, IRSN; Henry Coomans, ZMA; Gerda de Groot, RGM; E. Fischer, MNHN; Henning Lemche, UZMC; Franz and Maria Schilder; A. M. Testud, MNHN.

The United Kingdom: Bryan P. Blake, OCCM; Stanley Peter Dance, NMW; Robert Gay; W. H. T. Tams,

BM(NH); J. D. Taylor, BM(NH); Norman Tebble, BUMO; Kathie Way, BM(NH).

Japan: Masao Azuma; Tadashige Habe, NSM; Sadao Kosuge, NSM; Tokio Shikama, GIY;

Taiwan: Barbara Wilson.

United States: Twila Bratcher; Walter J. Byas, USNM; Jean M. Cate; Eugene Coan; George M. Davis, ANSP; Bertram Draper; Helen Du Shane; William K. Emerson, AMNH; Mary and Flynn Ford; Leo G. Hertlein, CAS; A. Myra Keen, SU; Okano Kikuyu; Michael King; Elsie Malone; Virginia McClure; James A. McLean, LACM; Maude and Harvey Meyer; James Moore; Edith Mugridge; William E. Old, AMNH; Forrest and Roy Poorman; George E. Radwin, SDNHM; Harald Rehder, USNM; Emily Reid; Robert Robertson, ANSP; Gladys Rodrigue; Joseph Rosewater, USNM; Nancy Rulon, ANSP; Allyn G. Smith, CAS; Allene Snow; Alan Solem, FMNH; Gale G. Sphon, LACM; Ellen and James Starr; Franz Steiner; Rudolf Stohler; Takeo Susuki; Fred Thompson, FSM; Kuniko Watanabe; Clifton S. Weaver.

South Africa: Hazel Jeffries; R. N. Kilburn, NM.

Worldwide: Igor Marche-Marchad, Abidjan, Ivory Coast; Thomas Montgomery, Guam; Ottavio Priolo, AGSN; F. J. Taylor, Auckland University, N.Z.; Richard Willis, Yacht Rambler, Pacific Ocean; Victor Dan, Manila; Fernando G. Dayrit, Manila.

Special thanks are extended to Jean Cate and Bertram Draper for the many excellent photographs illustrating the various species. The film was specially processed by Takeo Susuki.

SYSTEMATIC ACCOUNT

Pseudocypraea Schilder, 1927[1]

Arch. Naturgesch. 91/A (10): 71

Type species: *Cypraea adamsonii* Sowerby 2nd, 1832 [OD]
Conch. Illust., London: fig. 7

Syn.: *Sulcocypraea* Conrad, 1865
Amer. Journ. Conchol. 1: 31
Type species: *Cypraea lintea* Conrad, 1847 [M]
Proc. Acad. Nat. Sci. Philadelphia 3: 282
: *Sphaerocypraea* Schilder, 1927
Arch. Naturgesch. 91/A (10): 74
Type species: *Cypraea bowerbankii* Sowerby 2nd, 1850 [OD]
in F. Dixon: Geol. Foss. Sussex: 189; plt. 8, figs. 1, 2
: *Marginocypraea* Ingram, 1947
Bull. Amer. Paleo., Ithaca, N. Y., 1947
Type species: *Marginocypraea paraguana* Ingram, 1947 [OD]
= *Sphaerocypraea wegeneri* Schilder, 1939
Abh. Schweiz. Paläont. Gesell. 72: 1

The shells of this genus are cypraeid in form, with *Trivia*-like bold transverse dorsal striation (lacking the central dorsal longitudinal furrow of *Trivia*), and having well developed teeth throughout both the outer lip and the columellar base.

1. *Pseudocypraea adamsonii* (Sowerby 2nd, 1832)

(Figure *1*: holotype)

1832 *Cypraea adamsonii* Sowerby 2nd, Conch. Illust., *Cypraea*: fig. 7

Description (holotype): "*Cypraea adamsonii*—Shell pear-shaped, with numerous transverse ribs, decussated by less distant and more distant longitudinal ribs; whitish, mottled with pale brown; teeth numerous, close set and sharp" (Sowerby 2nd, 1832; fig. 7).

Description (hypotype): Shell small, sub-pyriformly ovate, cypraeiform, strong; terminals barely produced; dorsum broadly humped, incisedly transversely ridged with numerous uneven, upraised lines, which are unevenly interrupted by longitudinal growth lines, forming lateral ridges, knobs, and depressions; margins thickened on right side, semi-shouldered, and incisedly striate; aperture fairly narrow, gently curving throughout; columella broad, shallowly depressed, transversed by numerous fine ridges; fossula somewhat deeper, with an inner wall adaxially, and abaxial teeth without; base broadly, bulbously inflated, and numerously incisedly ridged, with these ridges terminating as teeth at columellar edge; outer lip broad, strongly, deeply, sharply denticulate; color basically off-white, with pronounced light brown blotches on lip-margin, and with large irregular fields of light brown on dorsum (C2597).[2]

Measurements, type: "Length, 0.4, breadth, 0.25."

Measurements, [hypotype[3]:] L - 11.1; W - 7.1; H - 5.9 mm.

Type Locality: Capul Island, Philippines.

Distribution: Tahiti; New Caledonia; South-Central Pacific to eastern Samar, Philippines; Mauritius; Shanzu (Mombasa), East Africa; Eilath, Israel, Red Sea.

Type: BMNH, No. 1969139 [holotype].

---

[1] For an explanation of the presentation of the synonymy see Schilder (1968: 270 - 272)

[2] The reference number preceded by a C denotes a catalogued specimen in the author's collection (ex.: C3616)

[3] Hypotype, as used here, refers either to the animal or the shell of an established species whose presence in the literature is precisely identified by being listed, measurements recorded, whose shell is described, or whose likeness is figured

Figure *1*
Pseudocypraea adamsonii (1)

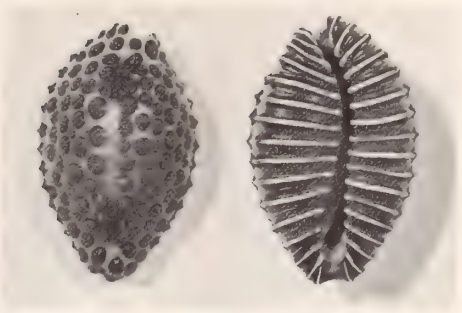


Figure *2*
Jenneria pustulata (2)

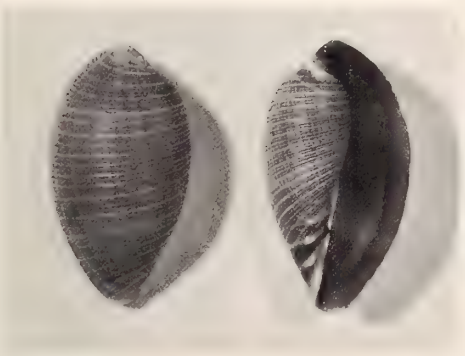


Figure 2 a
Jenneria pustulata (immature) (2)

Figure *3*
Galera *hervieri* (3)

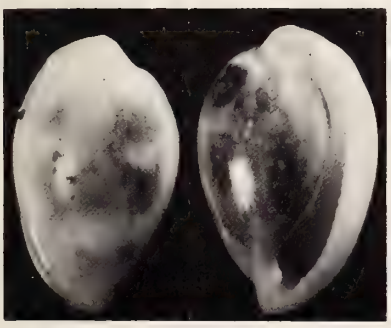


Figure *4*
Galera *manifesta* (4)

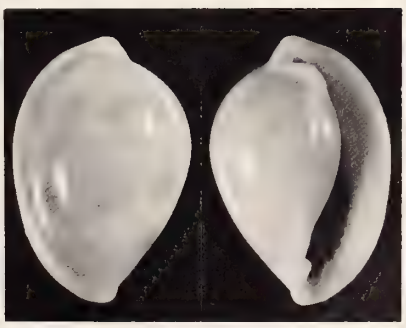


Figure *4* a
Galera *manifesta* (4)

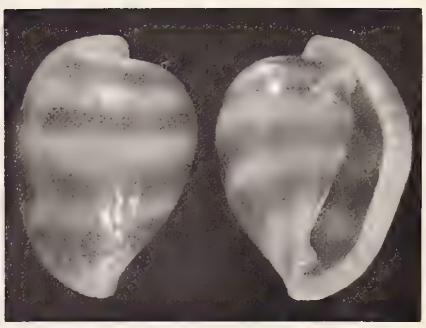


Figure *5*
Galera *aenigma* (5)

Discussion: This species is well placed in the Ovulidae, rather than in the Triviidae [*adamsonii* and *pustulata* are survivors of the Eocypraeini—F. A. Schilder, personal communication]. The hypotype listed here is from New Caledonia, and in addition to the measurements given above, has 22 teeth on the outer lip and 22 on the columella.

(Cyproglobinini Schilder, 1932)

Foss. Cat. **1**: Animalia, part 55: Cypraeacea: 202
Type species *Cyproglobina parvulorbis* Gregorio, 1880
Fauna S. Giov. Ilarione 29, Palermo
Syn.: Jenneriini Thiele, 1929, Handb. syst. Weichtierk. 1/1: 267

Jenneria Jousseaume, 1884

Natural. **1884**: 414, *nom. nud.*
Bull. Soc. Zool. France, 1884, **9**: 98

Type species: *Cypraea pustulata* Lightfoot, 1786 [SD]
Cat. Port. Mus., London, 1786: 106 (2330)
= *C. pustulata* Solander, 1786
non C. pustulata Lamarck, 1810
Syn.: *Pustularia* Melvill, 1888 (*nom. van.*), [ICZN Art. 33a (ii)]
Mem. Manchester Lit. Soc. (4) **1**: 245
Type species: *Cypraea pustulata* Lamarck, 1810
: *Transovula* Gregorio, 1880 (*nom. nud.*); Faun. S. Giov. Ilarione, Palermo, 1880: 27
Type species: *Transovula schefferi* Gregorio, 1880 [Cossmann, 1903: M and SD; *fide* Schilder, 1968]

Shells are cypraeiform, having well developed teeth on both the outer lip and columellar base; they are boldly distinct, and are continuous to the side margins; on the dorsum there are large, bright red pustules each encircled with a brown ring.

2. *Jenneria pustulata* (Lightfoot, 1786)

(Figure *2*: C3820)

1786 *Cypraea pustulata* Lightfoot, Cat. Portland Mus., London: 106 (2230 [err. = 2330]
1941 *Cypropterina (Jenneria) pustulata;* Schilder, Arch. Molluskenk. **73** (2/3): 106

Description, (neotype): Shell oval, somewhat flattened, cypraeiform, with a narrow, almost central, barely curving aperture; terminals are broad, blunt, and open at either end; margins are slightly flanged; base and outer lip are convex; apertural teeth traverse both base and outer lips as sharply elevated white ridges; pale grey dorsum is divided by a mantle line, and the overall dorsal surface is thickly overlaid with bright orange pustules, which are encircled each by a brown ring; there are two large brown spots superimposed over the area inward from either terminal; (C3820).

Measurements, type: L - 19.0; W - 12.5; H - 8.0 mm.

Type Locality: (here designated): Puertecitos, E Baja California del Norte, Mexico.

Distribution: West coast of Mexico, Guaymas; El Dorado Bay, 32 miles N of Manzanillo to Venado Beach, Pacific Panama. It has also been collected at Puerto Escondido, Baja California east.

Type: LACM, No. LACM-1422 [neotype].

Discussion: I have been unable to locate the holotype of this species; it now seems likely the type may have been lost in the Portland Museum collection sales (1786). (Dance, 1966: 107): "Portland collection was dispersed widely and only a few of the Duchess's (of Portland) shells can now be traced." Therefore the specimen described and illustrated here is proposed as neotype to represent the species (Art. 75, ICZN).

Ovulinae Fleming, 1828

Stoliczka, 1867, Paleo. Ind. (5) **2**: 45

Ovulini Fleming, 1828

Schilder, 1968, The Veliger **10** (3): 271

Galera Cate, gen. nov.

Type species: *Ovula hervieri* Hedley, 1899

Shell elliptic, sub-circular, helmet-shaped; rear terminal barely produced; frequently with a curving, flexuous keel on the base; lip teeth do not reach the outer periphery of outer lip edge. The new genus name is derived from the Latin *galerus,* meaning bonnet, cap, hat, helmet.

3. *Galera hervieri* (Hedley, 1899)

(Figure *3*: holotype)

1899 *Ovula hervieri* Hedley, Mem. Austral. Mus., Sydney, 3 (7): 448; fig. 34
1941 *Prionovolva hervieri;* Schilder, Arch. Molluskenk. **73** (2/3): 106
1956 *Primovula (Primovula) hervieri;* Allan, Cowries World Seas: 120

Description, holotype: "Shell small, broadly ovate; color pale yellow, with four spiral bands of rose, visible alike

within the aperture, across the callus and on the dorsal surface—these bands are in equal breadth to their interstices. Sculpture: about thirty-five spiral lyrae, separated by narrow, sharply incised grooves around the shell; the outer lip is much thickened and reflected without, and bears within about ten slight and widely parted denticles. The callus on the inner lip is very heavy, its surface shagreened, posteriorly it rises into an abrupt boss and anteriorly is heaped in a longitudinal ridge" (HEDLEY, 1899: 448).

Measurements, type: "Length, 4, breadth, 3 mm."

Type Locality: Funafuti [Ellice Islands]; "Taken alive from the deep water Gorgonidae raised from the western slope [of the island] in eighty to forty fathoms." (HEDLEY, *op. cit.)*

Type: AM,No. C.5962 [holotype].

Discussion: Having not seen this shell, I shall repeat Hedley's further comment: "This very distinct little species, the smallest of its genus known, appears to find its nearest relation in *Ovula caledonica,* Crosse; from which it is easily separated by smaller size, greater proportional breadth, coarser sculpture and fewer labial denticles. It is named in compliment to the Rev. J. Hervier, the author of many clear descriptions and admirable drawings of Pacific shells."

Our present knowledge of the Ovulidae would suggest that the Hedley species now most closely approaches the new Japanese form, ***Galera aenigma*** (Cate, 1971). See that species for a comparison.

4. *Galera manifesta* (Iredale, 1936)

(Figure *4*: holotype)

1936 *Diminovula manifesta* Iredale, Rec. Austral. Mus. **19** (5): 313; plt. 24, fig. 10
1941 *Prionovolva manifesta*; Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: *"Diminovula manifesta*—Shell is narrowly ovate, thin, surface shining, [glossy], outer lip denticulate [21] all its length; inner lip quite smooth, a nodule at the posterior (apex) end, and a rather prominent columellar tooth [funiculum] in front of the short canal. Coloration glassy white, with three rows of brown blotches, the ends each being marked with brown, the outer lip medially unmarked. There are about thirty crenulations on the outer lip, which is a little varied [varicated], and the denticulations cross the pseudovarix" (IREDALE, 1936: 313).

Measurements, type: L - 9; W - 5.5 mm.

Measurements, hypotype: L - 7.0; W - 4.7; H - 3.9 mm. (MCZ 197902).

Type Locality: "New South Wales; on the Continental Shelf."

Distribution: off Port Stephens, in 30–40 fathoms of water.

Type: AM,No. C.60687 [holotype]; paratype, MCZ, No. 197902 (Figure *4*a).

Discussion: The type was dredged in 55–60 fathoms, approximately 10 miles east of Sydney. Iredale speaks of the denticulations as being crenulations; in the paratype (Figure *4*a), the teeth appear to be fairly well developed. It should be further noted that there are transverse incised dorsal striae, wavering and widely spaced, emanating from either terminal beak, the distance of coverage greater adapically, with the central surface almost smooth. This species appears to be much like ***Testudovolva nipponensis*** (Pilsbry, 1913); however, a close examination reveals they are generally quite distinct from one another.

5. *Galera aenigma* (Azuma & Cate, 1971)

(Figure *5*: holotype)

1971 *Prionovolva (Prionovolva) aenigma* Azuma & Cate, The Veliger **13** (3): 261; fig. 1

Description, holotype: "Shell small, roundly pyriform; terminals produced, curved left, semi-pointed in back, rounded, slightly recurved in front; dorsum smooth, glossy, except that surface shows evidence of breaks, cracks, and repairs; base ovate, smooth, glossy, tapering sharply, thickly (ridge-like) to the front; a small triangular elevated eruption of callus forming a funiculum on rear base; columella smooth, very broad (extending from interior adaxial carinal ridge out to a perceptible central ridge on base), which deepens and converges to the front to form a fossula (a circular injury is also visible on columella); aperture crescent shaped, broad, becoming exceedingly broad to the front; outer lip semi-circular, thick, though barely shouldered above, with inward plane of lip flattened and numerously dentate with 14 fairly well formed large teeth; shell color basically a honey-ivory color, with four broad bands of deep rose extending over dorsum from the outer lip shoulder, across the base and columella, to the interior adaxial carinal ridge" (CATE, 1971: 181).

Measurements, type: L - 5.0; W - 3.5; H - 2.8 mm.

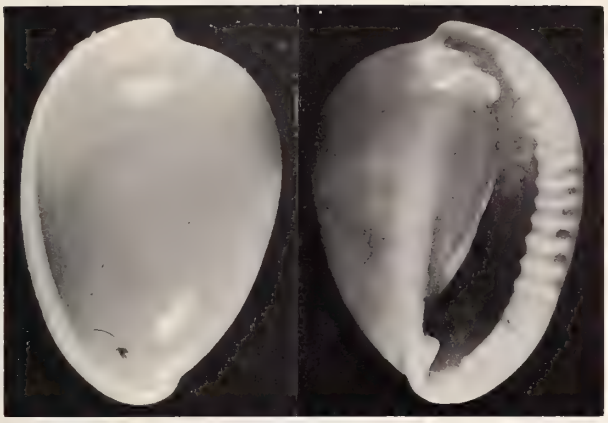


Figure *6*
Galera choshiensis (6)

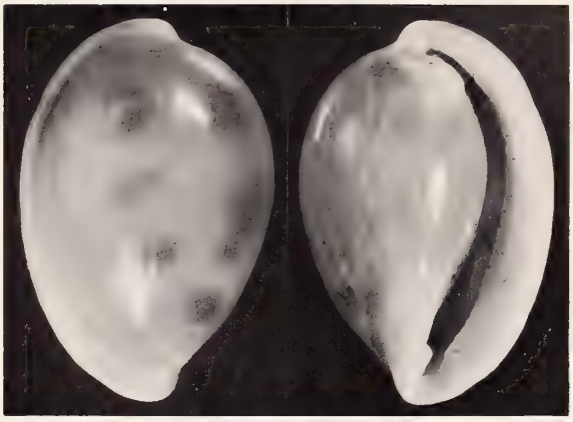


Figure *7*
Testudovolva nipponensis (7)

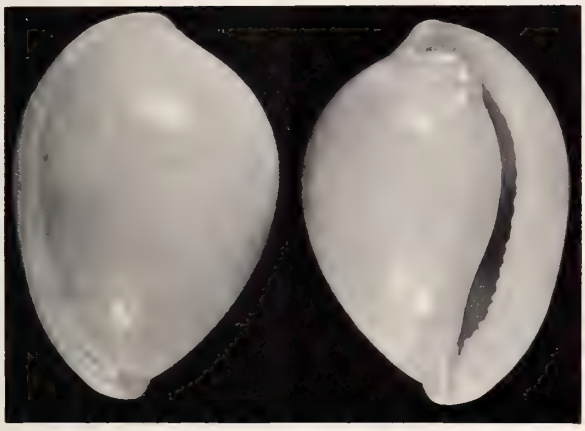


Figure *8*
Testudovolva orientis (8)

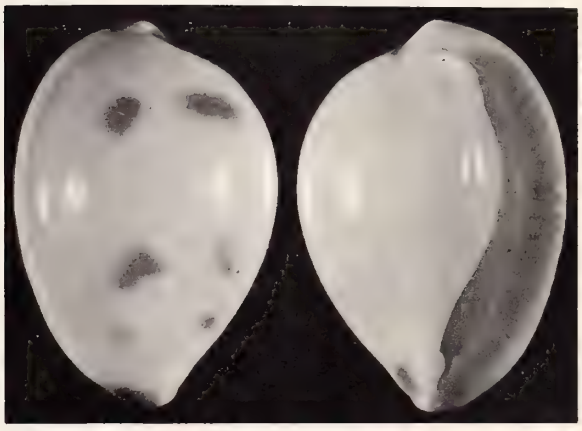


Figure *8* a
Testudovolva orientis (8)

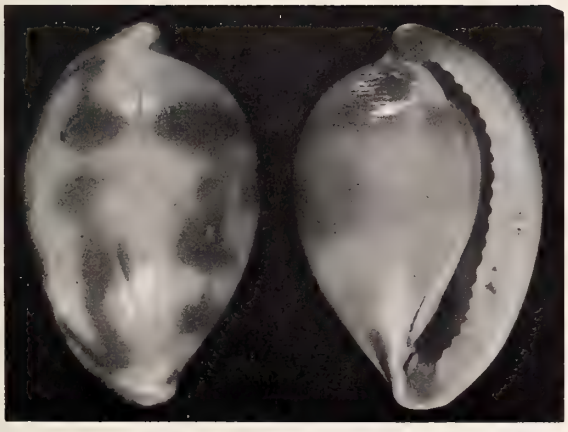


Figure *9*
Testudovolva nebula (9)

Figure *10*
Testudovolva intricata (10)

Type Locality: 1-2km, off Kirimezaki, Kii Peninsula, Japan (34°00'N; 134°48'E); in 30m of water; leg. M. Azuma.

Type: MA, No. 14826A [holotype].

Discussion: This relatively new ovulid species derives its name from its original confusion with *Ovula* [now *Galera*] *hervieri* Hedley, 1899; (See AZUMA 1970, 28 (4): 179; text fig. 1, spec. 2 from left). It can be seen that the Hedley species (Figure *3*) differs considerably from the Azuma shell which was originally included as a second specimen of *G. hervieri*. *Galera aenigma* (Cate, 1971), differs from the *G. hervieri* by being more rounded and globular in shape; by lacking the significant, incised dorsal striae over all—by being smooth, glossy; by having a differently formed funicular projection on the adapical base; by a greater number of outer lip teeth, differently formed and constituted; and by a different arrangement of shell colors. Future investigation of these animals, however, may suggest relating them subspecifically to each other.

6. *Galera choshiensis* Cate, spec. nov.

(Figure *6*: holotype)

Description, holotype: Shell small, broadly ovate, inflated, humped; dorsum exceedingly finely transversely striate with wavy lines, which does not impair the dorsal glossiness; base convexly ovate, narrowing toward the front, where an upraised callus, thickened ridge originates to cross the base longitudinally in a curving manner, broadening gradually to the front; outer lip thick, rounded, shouldered above, with numerous (19) very highly developed teeth, seven of which protrude in the manner of the genus; shell color an even mauve-yellow throughout, with the outer lip, terminal ends, curving basal callus-ridge, and funiculum, off-white.

Measurements, type: L - 9.2; W - 6.4; H - 5.2mm.

Type Locality: Choshi, Japan (35° 40'N; 140° 48'E); known only from type locality.

Holotype: CAS, No. 13320.

Discussion: This new species has been likened to that of *Galera hervieri* (Hedley, 1899), but it differs from that species by being larger; by having a solidly colored dorsum; by lacking the dorsal striae; and by having more numerous and a decidedly different type of labial teeth. The type locality lies at the eastern end of the Chiba Prefecture, on the southeast coast of Honshu, Japan, at the northern end of the warm Kuroshio ocean current.

Testudovolva Cate, gen. nov.

Type species: *Testudovolva orientis* Cate, spec. nov. [herein]

The shells of this new genus appear to have an unusual outline, roundly oblong, often of a flattened, compressed nature; they may or may not be dorsally striate; and they may be without dorsal coloring. The name is derived from the Latin *testudo,* meaning turtle.

7. *Testudovolva nipponensis* (Pilsbry, 1913)

(Figure 7, 7C: C3831)

1931 *Ovula nipponensis* Pilsbry, Nautilus **26:** 114; plt. 7, fig. 9
1941 *Prionovolva nipponensis*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Prionovolva brevis;* Allan, Cowries World Seas: 125

Description, holotype: "*Ovula nipponensis*—The shell is oval, angular at the ends, glossy, bright flesh-pink gradually becoming paler towards the lip; very indistinctly 4-banded with brown [in a series of specimens the banding may consist of irregular spots], maculate with brown on the back and behind the ends of the outer lip, which is fleshy yellowish on the face. Sculpture of irregular growth lines and weak, microscopic spiral striation, scarcely visible except under compound microscope. At each end there are about seven spiral grooves, which are widely separated except close to the ends. The outer lip is very convex on the face, somewhat thickened outside, incurved and armed with about 28 unequal, but very strong teeth. The grooves [interstices] between the teeth extend as far as the middle of the face of the lip. The columella bears a strong white fold [terminal ridge], terminating outwardly in a vertical callus on the ventral side of the base of the shell. There is scarcely any anterior notch [abapical canal opening]. Posteriorly the callus of the peristome extends downward from the apex and toward the aperture. Deep within the aperture there is a longitudinal callus ridge on the parietal wall of the aperture" (PILSBRY, 1913: 114).

Measurements, type: "Length, 13.5, diam. 9mm."

Measurements, hypotype: L - 8.0; W - 5.0; H - 4.5mm (Figure 7: C3831)

Type Locality: "Fakara, Awaji [E of Harima Sea, island S of Honshu & NE of Shikoku I.], Japan."

Type: CAS, No. 13684 [hypotype]. I have been unable to locate the holotype of this species (it may be in a private collection in Japan?); its whereabouts is unknown at ANSP; Japanese workers appear not to know where it is.

Discussion: This species has been put into the synonymy of *Prionovolva brevis* (Sowerby [1st], 1828) and *Pseudosimnia caledonica* (Crosse, 1872) by SCHILDER (1941: 107). This may have been done by using the Pilsbry measurements, which may possibly be erroneous for this species. None of the shells I have examined approach those of Pilsbry in size; the Schilder synonyms, on the other hand, are large, do generally agree with those cited as ***Testudovolva nipponensis*** in the literature. The C3831 hypotype agrees almost exactly with the Pilsbry description and illustration.

8. ***Testudovolva orientis*** Cate, spec. nov.

(Figure *8*: holotype)

Description. holotype: Shell small, bulbously ovate; terminals restrictedly produced; dorsum roundly inflated, smooth, centrally with broadly spaced transverse, incised striae emanating a short distance from either end; base convexly ovate, converging in front with a short terminal ridge, elevating adapically to form a long, low, thick funicular projection, which forms the left side of the curving rear canal; aperture fairly broad, curving, acutely so in back; columella broad, smooth, concave, deepening in front to form a large, deep fossula, an upraised longitudinal ridge within providing a wall for both adaxially; outer lip thick, broad, longitudinally elevated centrally, sloping to either side, numerously, though somewhat weakly dentate (26) along inner edge of lip, smooth on outer lip surface, which is very broad, shouldered above; shell color of holotype off-white over all (dead shell); hypotype: porcelain white over all, with two small round red-brown spots above each terminal beak, and three sets of two spots each on dorsum.

Measurements, type: L - 7.0; W - 4.7; H - 3.0 mm.

Measurements, hypotype: L - 9.0; W - 6.4; H - 5.3 mm. (Figure *8a*: MA 14826)

Type Locality: USNM Smithsonian Sta. 5311; in 160 meters; on sand and shell bottom; off Pratas Island, China Sea (21°00′N; 117°00′E).

Distribution: North to the Kii area, Japan.

Type: USNM, No. 285039, [holotype].

Discussion: Pratas Island is among a cluster of islets and reefs in the China Sea, between Hong Kong and Luzon, Philippines; Pratas is about 200 miles SE of Hong Kong, and belongs to the Chinese Democratic Republic. The new species derives its name from the Latin word of the same spelling, meaning east; a variation of the meaning refers to the rising sun. This new species approaches ***Testudovolva nipponensis*** (Pilsbry, 1913) in a general way, but differs from it by being more roundly ovate; by having a more flattened shell form, less humped; by having a broader, more oblique outer lip, especially in front, with weaker, less distant teeth thereon; there is less constriction of the abapical base in these shells, and the color spotting is distinct, not run together forming dorsal color banding.

9. ***Testudovolva nebula*** (Azuma & Cate, 1971)

(Figure *9*: holotype)

1971 *Prionovolva (Prionovolva) nebula* Azuma & Cate, The Veliger **13** (3): 262; fig. 2

Description, holotype: "Shell small, evenly ovate, humped, solid; terminals only barely produced, with rear projection somewhat curving left and fairly sharply pointed, beaked; dorsum dull, sub-glossy, with fine transverse incised lines emanating limitedly from either terminal, central dorsum is without striation; base ovate, smooth, inflated, narrowing as a thick ridge to the front; a large triangular elevated funiculum is on rear base; columella is broad, smooth, conspicuously concavely depressed, broadening and deepening in front as a fossula; aperture broad, evenly curving; outer lip thick, broad, with a central longitudinal ridge, which causes adaxial plane of lip to slope inward at a sharp angle; outer portion of lip thickly rounded, shoulder above; teeth (22) are evenly formed, well developed, the length of adaxial lip plane; shell color dorsally light beige, with three longitudinal, very irregular color stripes of reddish-brown; funiculum, outer lip, and teeth are off-white." (AZUMA & CATE, 1971a: 262).

Measurements, type: L - 6.6; W - 4.0; H - 3.5 mm

Type Locality: 1–2 km, off Kirimezaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 20–30 fathoms; leg. Azuma, 15 February 1970.

Type: MA, No. 14826B [holotype].

Discussion: The shell derives its name from the Latin word meaning cloud. This species appears to most closely resemble ***Testudovolva nipponensis*** (Pilsbry, 1913) but clearly differs from that species by its more elongately narrow shell; by its more narrowly projecting adapical terminal beak; by a flatter plane on the outer lip, by the more fully developed teeth on the outer lip; and by possessing a distinct dorsal color pattern.

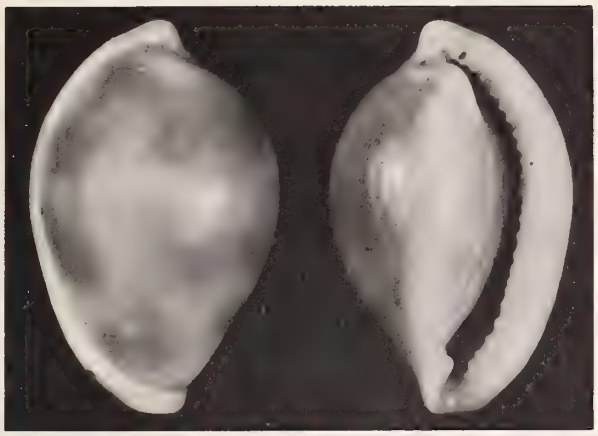


Figure *10* a
Testudovolva intricata (10)

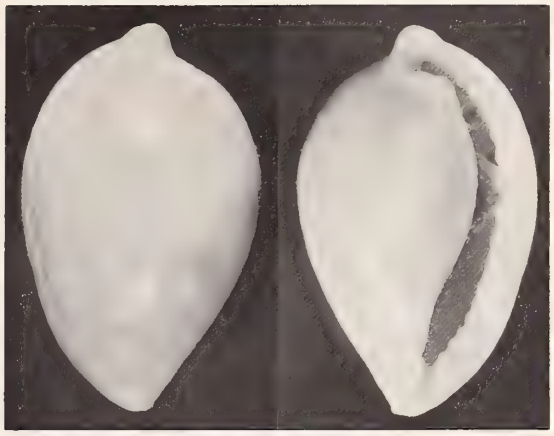


Figure *11*
Testudovolva quaestio (11)

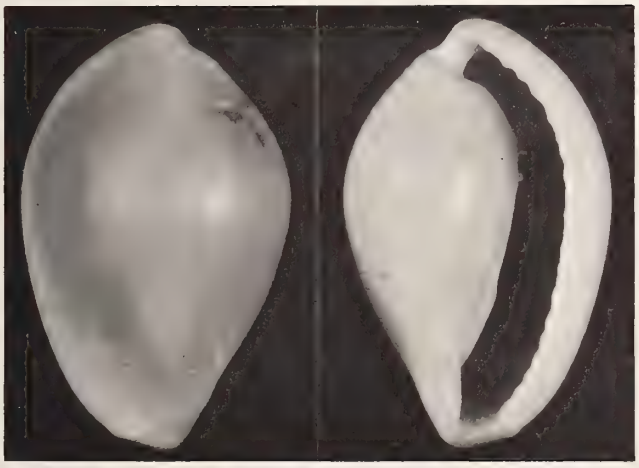


Figure *12*
Testudovolva adamsii (12)

Figure *13*
Testudovolva adamiana (13)

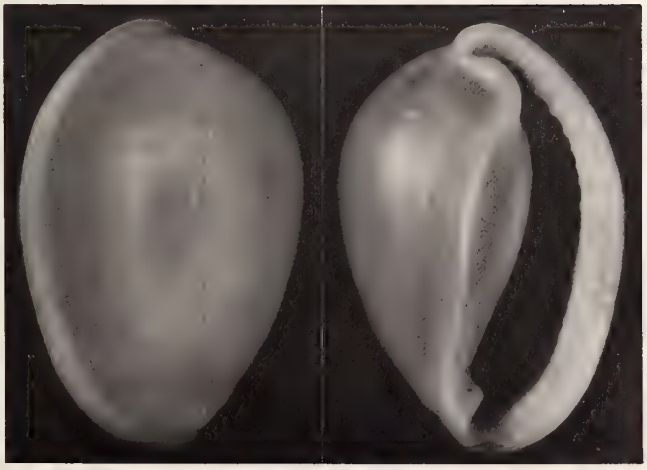


Figure *14*
Prionovolva brevis (14)

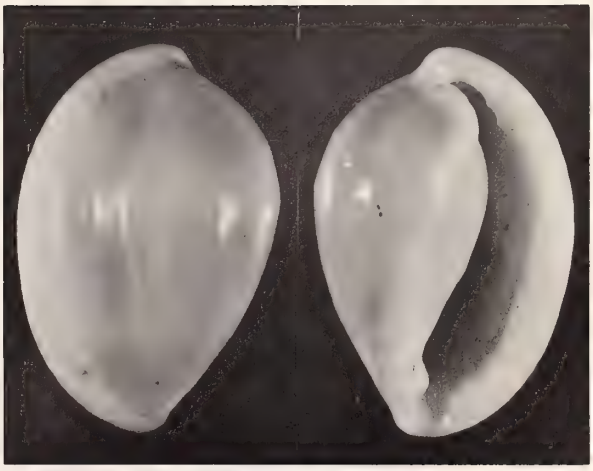


Figure *14* a
Prionovolva brevis (14)

10. ***Testudovolva intricata*** Cate, spec. nov.

(Figure *10*: holotype)

Description, holotype: Shell small, evenly ovate, inflated; terminals produced, sharply adapically, bluntly so in front; dorsum glossy, smooth centrally, with transverse incised striae emanating from either terminal area; base mostly striate, inflatedly ovate, tapering sharply to the front, to parallel the terminal ridge—fairly smooth, right angular funicular projection becomes obscure on the base, almost suggesting a curving callus line to the front terminal ridge; columella broad, shallow, depressed, deepening to a well formed fossula, both columella and fossula longitudinally defined by an adaxial carinal ridge; aperture of average width for the genus, curving; outer lip broad, more so in front, somewhat flattened ventrally, numerously, weakly dentate; color off-white overall, with numerous (13) large, irregular, semi-obscure, pale, light brown, cloudy color areas; unusual color blotches at either side of the terminal collars, and three additional blotches along shell margin, a condition not usually seen in the *punctata* species complex.

Measurements, type: L - 6.5; W - 3.4; H - 3.1 mm.

Type Locality: USNM, Smithsonian Expedition, Sta. 5164; at 33 m, in green mud; off SE Tawi-Tawi Island, Sulu Sea. (5°12′N; 120°00′E).

Type: USNM, No. 283713, [holotype]. (Figure *10*a: BMNH 1891.7.28.2a.)

Discussion: These shells look somewhat like those of ***Testudovolva*** *nebula* (Cate, 1971), but differ by having a straighter aperture, more numerous, finer, and less distinct teeth on the outer lip, and the shell color pattern-markings are fewer and more obscure. In the type lot at BMNH of *Prionovolva pulchella* (H. Adams, 1873), one of two shells is different, without name, without locality, and without reference in the literature, the other shell apparently adequately satisfies the description and illustrative aspects of Adams' species. The second shell, (No. 1891.7.28.2a), without an indication, appears to resemble most closely the new species, ***Testudovolva intricata,*** with which I associate and illustrate it. (Figure *10*a.)

The name is from the Latin ***intricatus,*** meaning perplexing.

11. ***Testudovolva quaestio*** Cate, spec. nov.

(Figure *11*: holotype)

Description, holotype: Shell small, roundly ovate, subpyriform; terminals only barely produced, though prominent, narrowly beaked, sub-spatulate in back; dorsum glossy, numerously, transversely, incisedly striate throughout; base striate, convex, ovate, tapering sharply to the front to converge with terminal ridge—a low, two-humped, funicular ridge projection terminates at rear canal; columella smooth, broad, depressed, deepening slightly to the front to form a broad shallow fossula, which exhibits a longitudinal mid-ridge; aperture fairly wide, curving; outer lip broad, somewhat flattened, gently angled inward, with numerous (17), lengthened, fairly well developed teeth; shell color greyish off-white over all, subtranslucent.

Measurements, type: L - 5.2; W - 3.1; H - 2.5 mm.

Type Locality: USNM, Smithsonian Expedition, Sta. 5192; from 58.5 m, living on green sand; off SE Bantayan Island, Philippines (11°14′N; 123°44′E).

Type: USNM, No. 280946, [holotype].

Discussion: The derivation of the name for this new species is from the Latin word for problem, uncertainty; for eventually this species may prove to be conspecific with ***Testudovolva intricata*** Cate, spec. nov.; however, under microscopic examination I am tempted to separate the two shell forms. Aside from reasonable geographical separation (southern Sulu Sea to the central Philippines), this species differs from ***T. intricata*** by having a smaller shell; a narrower body whorl; differently formed abapical terminal process that involves the combination of the front base, terminal ridge, and the constriction of the outer lip abapically; a narrower base; a broader, flatter, less curving columella; lacking a dorsal color pattern; the outer lip teeth are larger, less numerous.

12. ***Testudovolva adamsii*** (Reeve, 1865) =

(Figure *12*: lectotype)

1865 *Ovulum adamsii* Reeve, Conch. Icon., *Ovulum*: plt. 5, fig. 24
1881 *Ovula adamsi*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 184; plt. 47, figs. 13, 16
1932 *Primovula (Diminovula) concinna* Schilder, Proc. Malac. Soc. London **20** (1): 51

Description, holotype: "*Ovulum adamsii*—Ov. testá ovatá, inflatá, albá, dorso medio elevatiusculo, transversim inciso-striato, extremitatibus subobtusis, labro modicè incrassato, aperturá curvatá latiusculá, columellá vix plicatá." "Adam's *Ovulum*. Shell ovate, inflated, white, back rather elevated in the middle, transversely incisely striated, extremities rather obtuse, lip moderately thickened, aper-

ture curved, rather broad, columella scarcely plicated" (Reeve, 1865; plt. 5, fig. 24).

Measurements, type: L - 9.0; W - 5.0 mm.

Type Locality: "Hab. New Caledonia; Cuming."

Type: BMNH, No. 1961142 lectotype herein.

Discussion: Reeve comments: "A delicate rather inflated bubble-shaped shell, elaborately sculptured with engraved striae." He does not record the shell's measurements; however, a millimeter scale accompanying the type photograph indicates the approximate dimensions given above. In the literature this species has been relegated to the synonymy of other ovulid species, notably *Adamantia concinna* (A. Adams & Reeve, 1848); this seems to have been a mistake, as a study of the types indicates.

13. *Testudovolva adamiana* Cate, spec. nov.

(Figure *13*: holotype)

1931 *Primovula dautzenbergi* Schilder [pars], Bull. Soc. France 47: 366; fig. 2

Description, holotype: Shell roundly ovate, thinly formed; terminals gently produced; dorsum bulbously rounded, with numerous distinct, incised, transverse striae covering entire surface; base convexly inflated, with a continuation of the dorsal striae over all; there is a compound, weak funicular elevation at rear extremity of base; aperture evenly broad, gently curving; front terminal ridge short, curving; outer lip broadly rounded, with very short, evenly formed teeth; color, pale yellow.

Measurements, type: L - 3.2; W - 2.1; H - 1.3 mm.

Type Locality: "Mer de Chine, coll. L. Morlet."

Type: IRSN, presently without number [holotype].

Discussion: This unique specimen was discovered by Professor Dr. W. Adam, in charge of the Section of Recent Invertebrates, IRSN, as one of four shells in the type lot of *Primovula dautzenbergi* Schilder, 1931. It has now been removed from that shell lot to become the holotype of the new species; its catalogue number is undecided, pending rearrangement of that institution's type collection.

It seems probable that Dr. Schilder recognized an unusual significance in this shell, because he qualified it, using the word 'jeune' [cf. ***Testudovolva*** *dautzenbergi*], and went on to say in a footnote, "Extremities less rostrate, labial folds shorter and less serrate, the two posterior columellar plaits less strong, but well marked; internal fossula straighter and less deep." These qualifications are important, as they explain many of the differences between ***Testudovolva adamiana*** and *T. dautzenbergi*. Both species will undoubtedly require more field work to further satisfactorily proclaim them as fully unrelated ovulid forms.

This new species seems also to somewhat closely approach ***Testudovolva quaestio*** Cate, spec. nov.; eventually a longer series of these animals and their shells may establish the extent of their specific separation, but at the present time ***T. adamiana*** appears to differ in many subtle ways: mainly by being more of an inflated shell form; by being more pyriform, with a longer, narrower, reflexed abapical terminal beak; by having the more distinctly developed dorsal striae, and by having a much weaker, shorter, curving front terminal ridge.

Prionovolva Iredale, 1930

Mem. Queensld. Mus. **10** (2): 85
Type species: *Ovulum breve* Sowerby 1st, 1828 [OD]

Shells are roundly ovate, helmet shaped, with the outer teeth uniquely cutting through the outer lip-edge in a comb-like manner, visible from the lateral aspect of the right lip (Fig. *16*a).

14. *Prionovolva brevis* (Sowerby 1st, 1828)

(Figure *14*: holotype)

1828 *Ovulum breve* Sowerby 1st, Zool. Journ. **4**: 152
1843 *Ovula brevis*; Kiener, Icon. Coq. Viv. **2**: 12; plt. 3, fig. 3
1861 *Ovula bullata* Gould, Proc. Boston Soc. **7**: 385
1935 *Prionovolva brevis;* Iredale, Austral. Zool. **8** (2): 385
1956 *Phenacovolva brevis;* Allan, Cowries World Seas: 125

Description, holotype: "*Ovulum breve*—Shell nearly oval, rather short, [comparatively broad for its length, dorsum glossy, although faintly transversely incisedly striate limitedly away from either terminal end, with central surface smooth—there are numerous fine longitudinal growth lines apparent—base is ovate, smooth and glossy], obtuse at both ends, white [also pale greyish-white to beige-white—lip margins, terminal end, funiculum, and terminal ridge off-white]; inner margin of outer lip toothed; columellar lip forming a strong pliciform tooth [funiculum] at the upper end, thickened on the outer edge, depressed near the base, and forming a tooth-like fold [terminal ridge] at the lower [abapical] end, both canals very short. [Aperture very wide; columella perceptibly flattened, with a low longitudinal ridge within, which lengthens to the front forming a broad, shallow fossular area; front terminal ridge is adaxially oblique, forming a right angle with the columellar base.] The outer lip of the only specimen I have seen is rather sharp, and a few

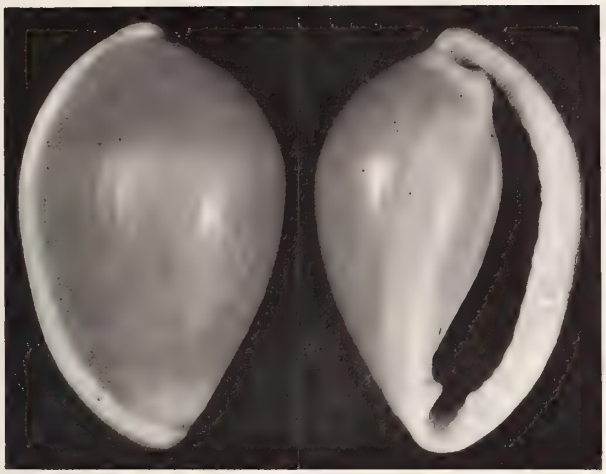


Figure *15*
Ovulum fruticum (15)

Figure *15* a
Prionovolva pudica pudica (15)

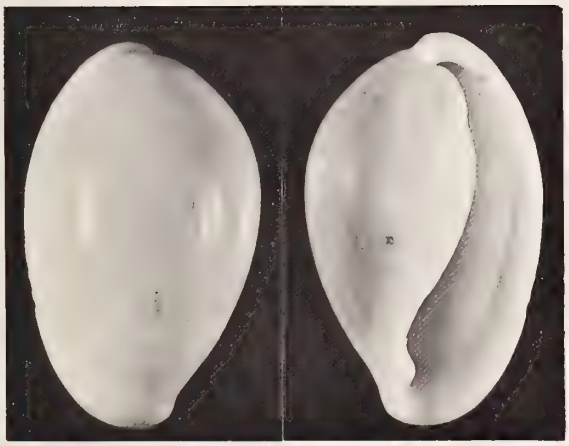


Figure *15* b
Prionovolva pudica (variant) (15)

Figure *16*
Prionovolva pudica ***wilsoniana*** (16)

Figure *16* a
Prionovolva pudica ***wilsoniana*** (16)

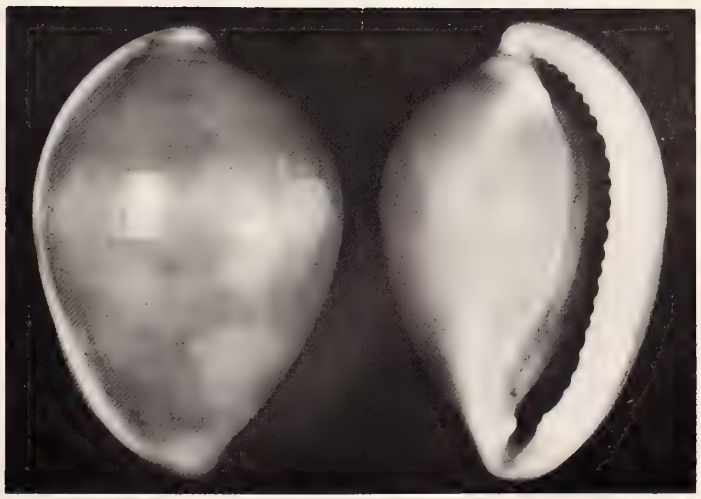


Figure *17*
Prionovolva pulchella (17)

teeth extend from the inner to the outer [lip] edge near the center of the lip [see Fig. *14a*]" (SOWERBY 1st, 1828: 152).

Measurements, type: L - 13.5; W - 8.6 mm. [approximate].

Measurements, hypotype: L - 10.5; W - 7.2; H - 6.6 mm. (Figure *14*a: C3697)

Type Locality: "I am not acquainted with its locality" (SOWERBY 1st). Here designated as Keppel Bay, Queensland, Australia (23°29'S; 151°14'E), (at or below low tide line, living on soft coral; C. Coucom, Yeppoon, Queensland).

Type: BMNH, No. 1969.131 [holotype]; CNC, C3697 [hypotype].

Discussion: Although this species is distinct, one must use caution in separating it from the white form which still retains the distinguishing pale color blotch at the adjoining base of either terminal beak as in *Prionovolva frutica frutica* (Reeve, 1865), this latter species usually having a much larger, more elongately oval shell, with a narrower outer lip edge, and a comparatively thinner shell for its size (see listing of *P. ~~frutica~~ frutica* for its identifying shell characters).

15. *Prionovolva pudica pudica* (A. Adams, 1854)

(Figure *15*a: lectotype)

1854 *Amphiperas (Ovula) pudica* A. Adams, Proc. Zool. Soc. London: 131 (Figure *15*: holotype)
1865 *Ovulum fruticum* Reeve, Conch. Icon. *Ovulum*: plt. 4, figs 16a-b (Figure *15*: holotype)
1865 *Ovulum pudicum;* Reeve, Conch. Icon. *Ovulum*: plt. 2, figs. 6a-b
1881 *Ovula fruticum*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 181; plt. 47, figs. 1, 4
1881 *Ovula pudica*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 172
1941 *Prionovolva fruticum;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1958 *Prionovolva nubeculata fruticum;* Kuroda, Venus **20** (2): 168

Description, holotype: *"Amphiperas (Ovula) pudica*—A. testa ovata, ventricosa, carnea, albo-varicosa, laevi, canalibus brevibus, vix emarginatis; apertura angusta, alba; labio postice tuberculo elevato, subacuto instructo, antice producto, angulato, ad canalem uniplicato, labro intus crenulato, margine serrato." Shell ovate, pinkish-white, back smooth, extremities rounded, scarcely emarginated, lip thickly varicose, columella callously ridged above and below, one plaited" (A. ADAMS, 1854: 131).

Measurements, lectotype: L - 9.5; W - 6.5 mm. [approx.].

Measurements, hypotype: L - 18.4; W - 11.0; H - 9.1 mm (ANSP 275439)

Type Locality: New Caledonia; here restricted to reef off Noumea, New Caledonia.

Type: BMNH, No. 1961147 [syntype; lectotype herein].

Discussion: The distributional range of this species is somewhat obscure, as many localities that have been recorded in the literature for it are known to actually belong to *~~Prionovolva~~ caledonica* (Crosse, 1872), with which this species may have been confused in the past. An ovulid specimen in the collection ANSP (No. 39423), [see Figure *15*b], is very much like *P. pudica pudica* (A. Adams, 1854); interestingly enough it shares the same New Caledonia locality with the Adams species. This unusual specimen differs by being all white (rather than the typical various shades of pink to almost lavender); it lacks the dorsal striation and the dorsal transverse angular ridges; and it is decidedly without the prominent color blotches so characteristic of *P. pudica pudica,* seen at the rear of both front and back terminal beaks. The dimensions of this shell are L - 16.7; W - 10.3; H - 7.0 mm.

16. *Prionovolva pudica wilsoniana* Cate, subspec. nov.

(Figure *16*: holotype)

1970 *Primovula fruticum* (Reeve, 1865), Azuma, Venus **28** (4): 179; fig. 3

Description, holotype: Shell small for the species; evenly ovate, somewhat thinly formed, lightweight; dorsum glossy, with numerous longitudinal growth lines, and the very faintest indication of spiral striae at the adapical terminal beak; terminals bluntly, barely produced, though clearly defined; base ovate, narrowing gradually to the front, with a white, curving carinal ridge connecting funiculum and front terminal ridge; funiculum forms left side of rear canal wall, and has a series of fairly well developed nodular projections on its summit; front terminal ridge is short, curving downward, inward; aperture very wide, becoming more so in front; outer lip barely thickened, flatly broad, almost perpendicular to base, weakly shouldered above; outer lip teeth numerous centrally, except that at either end of lip, to a greater extent abapically, teeth are absent or occasionally vaguely crenate; central lip teeth project sharply to outer lip edge (there are approximately four: Figure *16*a), a character of the genus; color: rosy-pink, with broad color banding (3) a deep rose; right margin lip callus pink; lip, teeth, termi-

nal ridge, basal carina, funiculum are white, and the characteristic deep pink color blotches are at the base of either terminal collar.

Measurements, type: L - 16.2; W - 9.8; H - 8.1 mm.

Type Locality: Kaohsiung, SW Taiwan (22°44′N; 120° 21′E); trawled from deep water.

Distribution: Ogokuda Beach, in Shionomisaki, S Kii, Japan (Shikama); Ryukyu Islands; Taiwan; Turtle Island (SW Sulu Sea off N Borneo), in 36–55 meters, ex V. Dan.

Type: ANSP, No. 275439 [holotype].

Discussion: This new subspecies appears to be geographically remote; otherwise it differs from the typical species and other related forms by having generally a smaller shell of thinner construction; by lacking the transverse dorsal angular ridges; by having a broader, more open aperture, well developed, more pronounced funiculum, sub-serrated nodules, a thinner basal callus, and a more distinctly defined, arching carinal ridge over the base; the teeth are sharper, more distinct, and in bolder relief. I am naming this new subspecies in honor of Barbara Wilson (Mrs. D. L. Wilson), who has provided me with extensive amounts of ovulid material from Taiwan for this study, including the holotype of this subspecies.

17. *Prionovolva pulchella* (H. Adams, 1873)

(Figure *17*: holotype)

1873 *Amphiperas pulchellus* H. Adams, Proc. Zool. Soc. London: 206; plt. 23, fig. 5
1885 *Ovula* var. *pulchella;* Tryon, Man. Conch. **7**: 249; plt. 3, fig. 73
1887 *Ovula pulchella;* Paetel, Cat. Conch. Samml. **1**: 325
1941 *Prionovolva pulchella;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Prionovolva) pulchella;* Allan, Cowries World Seas: 125

Description, holotype: "*Amphiperas pulchellus, sp. nov.* A. testa ovato-globosa, solidula, longitudinaliter leviter striatula, dorso liris capillaceis distantibus transversis et ad extremitates striis profundis transversis sculpta, pallide carnea, rubro variegata; apertura lineari; labio antice excavato et plica dentiformi munito; labro varicoso, sulcato, canali anteriore angusta et canali posteriore obliqua, callo circumdata, instructo" (H. Adams, 1873: 206)

Measurements, type: "Long. 10, diam. 6 mill."

Type Locality: "Hab. Mauritius (coll. Barclay)."

Type: BMNH, No. 1891.7.28.2 [holotype].

Description, holotype: Shell of medium size, globosely inflated, sub-glossy; terminals are barely produced, with right margin flaring at a barely perceptible angle from the shell side; dorsum transversely spirally incisedly striate at either end, and lined with distinct, slightly upraised angular ridges over remainder of dorsum; base ovate, smooth, layered with callus, and having a curving indication of ridge from funiculum to front terminal ridge (cf. *Prionovolva frutica* ***wilsoniana*** Cate, subspec. nov.); aperture broad, curving, with a large, thickened funicular projection forming the rear apertural wall; columella broad, longitudinally depressed, smooth; outer lip broad, angled in, with numerous (25) well developed teeth; flesh-colored, variegated with red, the margins and outer lip light beige.

Discussion: It should be noted that the type lot of this species contained two ovulid specimens; one seems to represent this species adequately; the second does not. Belonging to another species and genus, it had already been described elsewhere as a new species, ***Testudovolva intricata*** Cate (herein; see species 10).

18. *Prionovolva bulla* (A. Adams & Reeve, 1848)

(Figure *18*: holotype)

1848 *Ovulum bulla* A. Adams & Reeve, Voy. Samarang Moll. *Ovulum*: 21; plt. 6, fig. 5
1859 *Ovula bulla;* Chenu, Man. Conch.: 272
1941 *Prionovolva bulla;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Prionovolva) bulla;* Allan, Cowries World Seas: 125

Description, holotype: "*Ovulum bulla.* Ovul. testá ventricosá, subcylindraceá, laevi, anticè sub-acuminatá; canalibus integris; labio externo in medio sub-rotundo, intus crenulato; labio interno posticè tumorem parvum ferente, ad canalem angustato, uniplicato, intus paululum excavato" (A. Adams & Reeve, 1848: 21). [Shell pyriformly-ovate, bulbously inflated; terminals barely produced, though in a narrowed, short beak adapically; dorsum smooth, sub-glossy; base roundly inflated, tapering abruptly to the front, with a restricted plate on adapertural base; terminal ridge short, well defined, oblique; funiculum long, low, only barely elevated; aperture wide, curving; columella broad, shallowly depressed, longitudinally ridged adaxially, deepening slightly as a fossula in front; outer lip broadly thickened, rounded, shouldered above, with lip teeth exceedingly well developed (25) entire length of lip; shell color pale tawny brown throughout, except that base callus, internal ridge, lip and terminal tips are contrastingly light beige.]

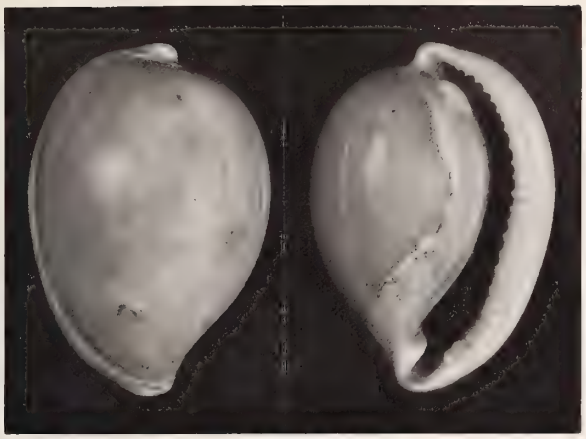


Figure *18*
Prionovolva bulla (18)

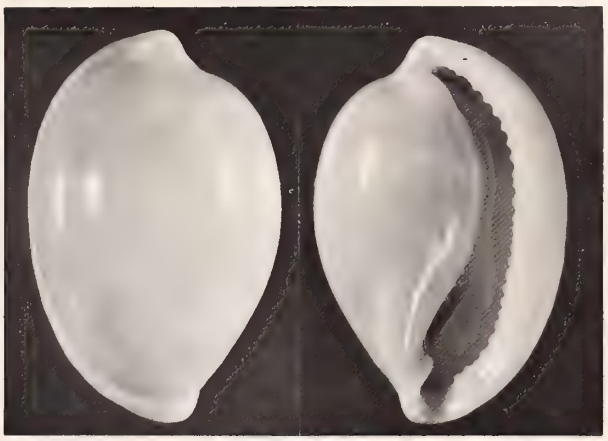


Figure *18* a
Prionovolva bulla (18)

Figure *19*
Dentiovula dorsuosa (19)

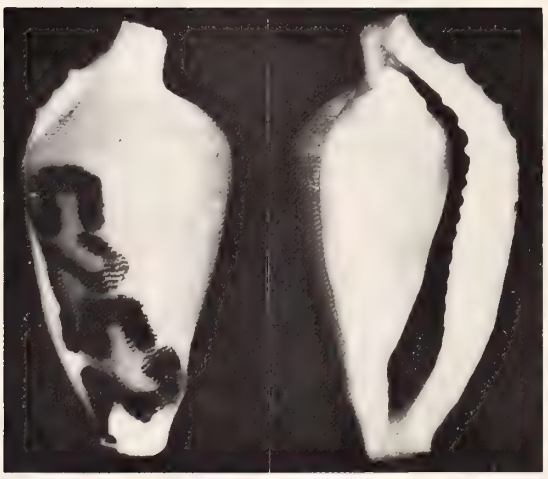


Figure *20*
Dentiovula mariae (20)

Figure *20* a
Dentiovula mariae (20)

Figure *21*
Dentiovula colobica (21)

Measurements, type: L - 8.0; W - 5+mm. [approximate].

Measurements, hypotype: L - 9.0; W - 6.0; H - 4.7 mm. (Figure *18a*: ANSP 321581).

Type Locality: "Hab. China Seas." Hypotype, "ex. Shirasaki" on ANSP label; I have been unable to find any such locality; Shirasaki could be the name of the collector.

Type: BMNH, No. 1879.2.26.238 [holotype].

Dentiovula Habe, 1961

Col. Illustr. Shells Japan 1961: 41
Type species: *Ovulum dorsuosum* Hinds, 1844 [OD]

Shells of medium size, either sub-ovate or diamond shape (rhomboid), with labial teeth, more often than not conspicuously protruding, extending beyond the periphery of adapical terminal edge and outer lip.

19. *Dentiovula dorsuosa* (Hinds, 1844)

(Figure *19*: holotype)

1844 *Ovulum dorsuosum* Hinds, Zool. Voy. Sulphur **2**, Moll.: 47; plt. 16, figs. 3, 4
1881 *Ovula dorsuosa*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 187; plt. 48, figs. 6, 7
1885 *Ovula dorsuosa* = *striatula*; Tryon, Man. Conch. **7**: 250; plt. 3, figs. 77, 78
1941 *Primovula (Primovula) dorsuosa*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1958 *Primovula dorsuosa*; Kuroda, Venus **20** (2): 169

Description, holotype. *"Ovulum dorsuosum*—Testa elongata-ovata [pyriform, sub-rhomboid, enlarged and inflated centrally], laevissime striata [finely striate throughout], utrinque subacuminata; [terminals produced (almost perpendicularly on left side adapically), beaked at the rear, squarely so in front]; dorso supra mediam rotundato, inferne attenuato; [base, with a thin coat of callus, is ovate, narrowing toward the front, where it becomes a sharply calloused, upraised edge as a broad funiculum, which forms the left wall of a tortuous canal of a projecting beak; aperture of medium width, somewhat wider abapically]; labro antice planulato, sulcato [outer lip thickened, broadly flat on ventral surface, narrowly broad on the side, acutely angled above; teeth numerous, well formed, irregularly positioned, with long, curving projections (saw-toothed) within and without the aperture]; columella inferne subexcavata, intus plica longitudinali munita. [Color basically milk-white, dorsum with cloudy pale rosy-pink formations on it, except for an obvious colorless band traversing the summit; a pale yellow line is at the angles of the marginal shoulders and extending over the terminal collars; terminal canals pale rosy-pink; lip, basal anterior ridge, thin base callus, funiculum, and upper terminal surface are milk-white]" (Hinds, 1844: 47).

Measurements, type: L - 11.0; W - 6+mm. [approximate]

Measurements, hypotype: L - 15.0; W - 8.6; H - 7.1 mm. (GIY 3791)

Type Locality: "Inhab. Straits of Malacca: in nine fathoms, among mud."

Distribution: Banka, East Sumatra; Singapore, Malaysia; Philippines; off the Kii Peninsula, Japan. Type locality here designated: off Ogokunda Beach, in Shionomisaki, S Kii, Japan (Shikama, GIY). (34°00′N; 134°48′E)

Type: BMNH, No. unassigned, [syntype]: lectotype herein.

Discussion: The syntype is apparently the specimen Reeve figured (Conch. Icon., plt. 6, figs. 27a-b). Hinds gave no measurements for his holotype, a shell that seems not to have been so designated.

20. *Dentiovula mariae* (Schilder, 1941)

(Figure *20*: holotype)

1941 *Primovula mariae* Schilder, Arch. Molluskenk. **73** (2/3): 107; plt. 9, fig. 37

Description, holotype: *"Primovula mariae* nov.—Zwei Sch. von 'Providence, Cargados, 50 fth.' (leg. Stanley Gardiner, col. Tomlin): 7.(49)19: + (Typus) und 7.5(49) 18: +, birnfömig, mit schwachem Querkiel, dicht gestreift, 2. AZ. grob, lang, am AR. als Sägzähne wieder erscheinend (beim Paratypus in ganzer Länge der AL!); TZ.-Spuren quer, Funiculum schwach gesägt, 2. HK. tiefer als der 1. HK., Co.-Furche bis hinten deutlich; hellrosa, R, mit Orange-farbiger Linie umsäumt und mit 2 ebensolchen Querlinien wie bei *Diminovula cristallina* (S. 32A), Querkiel, E, und Funiculum weisslich; Z. und Farbe trennen diese schöne Art von allen ihren Verwandten" (Schilder, 1941: 118) [the capital letters refer to descriptive detail; see Schilder 1941: 114].

Description, hypotype: Shell small, rhomboid, with a transverse acutely elevated angular ridge sub-centrally over dorsum; terminals squarely produced, with protruding digital teeth (approx. 4) thereon, teeth more pronounced adapically; margin on right side slightly flanged; dorsum dull, transversely striate over all; base inflated, partially striate, partially thinly calloused, narrowly rhomboid, with thickened, pinched ridge longitudinally to the front; base faintly constricted abapically; a slightly knobbed funiculum projects rather starkly on rear base;

columella base and columella thinly calloused, the latter narrowly depressed, gently deepening to the front as a fossula, a longitudinal carinal wall within defining both; aperture narrow; outer lip broad, flat, slanting inward; lip teeth mostly weakly formed throughout, the stronger lengthening beyond the inner and outer lip edge; shell color pale orange-beige dorsally, with base, outer lip, teeth, and shell interior off-white; terminal canals are deep rose.

Measurements, type: "Length, 7.5; width, 49" [average relative breadth as a percentage of the length].

Measurements, hypotype: L - 8.3; W - 4.1; H - 3.4 mm (Figure *20a*: C3886).

Type Locality: Cargados, Providence Island, NNE of Madagascar, a dependency of the Seychelles.

Distribution: USNM, Smithsonian Exped. Sta. 5192, in 58 meters, on green sand (USNM 280956); deep water, off Kii Peninsula, Japan (CNC C3886).

Type: FAS, No. 5252 [holotype].

Discussion: A noticeable shell character in this species is the dull, roughened shell surface, due to striation. There is some similarity to *Dentiovula dorsuosa* (Hinds, 1844); however, this latter species is broader at the side angles, and the striation is much finer; the shell outline is more rounded at the sides as well. The measurements of the USNM specimen are: L - 8.0; W - 4.0; H - 3.4 mm.

21. *Dentiovula colobica* (Azuma & Cate, 1971)

(Figure *21*: holotype)

1971 *Primovula colobica* Azuma & Cate, The Veliger **13** (3): 263; fig. 6

Description, holotype: Shell fairly large, sub-bulbously rhomboid, angularly elevated sub-centrally, with numerous transverse incised striae (these are disturbed centrally on the type due to a shell wound); terminals acutely produced, blunt in front, squarely beaked in back, with three protruding tooth processes; base inflated, ovate, faintly striate, tapering sharply to the front; funiculum on rear base is thickened, triangular, an undulating eruption of nacreous callus; columella is wide, only slightly depressed, faintly striate, then deepening, with the aid of an interior wall, to form a significant fossula; aperture fairly narrow (distorted in this specimen), curving gently; outer lip is narrowly thickened, with numerous large, weak teeth most of its length; shell color is light beige (ivory) over all, except that dorsum and base are variably three-banded with bright orange; terminal canals are deep orange.

Measurements, type: L - 10.6; W - 5.0; H - 4.3 mm.

Type Locality: Off Kirimezaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in from 55–91 m; leg. Azuma, 1970.

Type: MA, No. 14848 [holotype].

Discussion: This species carries some resemblance to *Dentiovula mariae* (Schilder, 1941), and may, upon discovery of additional series of shells, be considered subspecific to it. However, despite the mutilation of the type specimen of *D. colobica* it seems to differ from the Schilder species in the following respects: it has a more pyriform outline of the shell; the outer lip teeth are not so lengthened; it has a more rigid, elevated and narrowed abapical base; it has a broader, more flattened fossular inner wall flange; and a much more colorful shell.

22. *Dentiovula tadashigei* Cate, spec. nov.

(Figure *22*: holotype)

Description, holotype: Shell small, rhomboid, sub-glossy dorsally, acutely humped and angled transversely; terminals narrowly produced, squarely so adapically, arch-like, rounded in front; dorsum tapers rather steeply to either end, is densely transversely striate over all; right lateral side margin broad, thick, extending over both terminal tips; base rhomboid, convexly rounded, smooth, glossy, narrowing thickly as a longitudinal ridge abapically, parallel to a weak terminal ridge; a triangular, upraised funicular projection is transversely denticulate (6); columella fairly narrow, striate, deeply depressed, becoming broader and deepening as a fossula in front, both columella and fossula longitudinally walled within; aperture narrow, curving acutely to the rear; outer lip fairly broad, edge rounded, weakly shouldered above; lip teeth numerous (38), rather fine, but distinctly formed, though less prominently so centrally, front ⅔ barely reaching center of lip, rear teeth (approx. 10) extending to peripheral edge of lip, some protruding slightly beyond; shell color milk-white over dorsum, outer lip, base, funiculum a contrastingly lighter shade of white; both terminals and adapical canals are orange.

Measurements, holotype: L - 10.5; W - 5.5; H - 4.8 mm.

Type Locality: Sagami Bay, Japan (35°17′N; 139°41′E); *ex* His Majesty, Emperor of Japan, Hirohito coll.

Type: NSMT, No. 10. [holotype].

Discussion: This new species appears similar to *Dentiovula dorsuosa* (Hinds, 1844), but differs from it by lacking the projecting teeth on the terminal edges; by having a more complex funicular form and dentition; by more

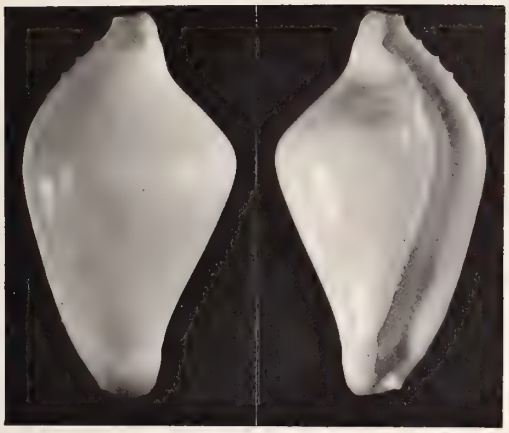


Figure 22
Dentiovula ***tadashigei*** (22)

Figure 23
Dentiovula ***masaoi*** (23)

Figure 23 *a*
Dentiovula ***masaoi*** (23)

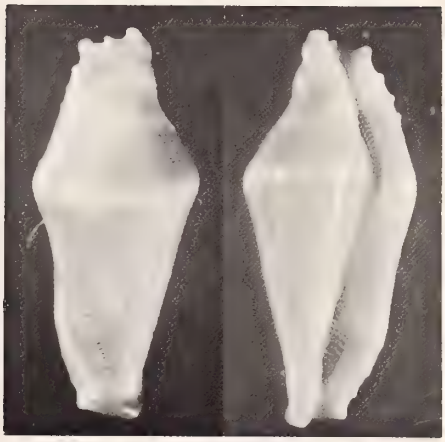


Figure 24
Dentiovula ***takeoi*** (24)

Figure 25
Dentiovula ***saturnalia*** (25)

Figure 26
Dentiovula ***eizoi*** (26)

numerous, more finely formed outer lip teeth; and by a much broader shell. This new ovulid species is named to honor Dr. Tadashige Habe, NSMT, for his outstanding contributions to malacology.

23. ***Dentiovula masaoi*** Cate, spec. nov.

(Figure *23*a: holotype)

Description, holotype: Shell small, sub-rhomboid, broadest sub-centrally, where an angled shoulder transverses dorsum; dorsum slopes abruptly adapically, gradually toward front terminal; dorsum heavily, incisedly, transversely striate over all; terminals are produced and square at ends, coarsely protruding posteriorly, arched and with or without slightly protruding teeth in front; terminal canals short, open at either end; base almost triangular, transversely angled at rear, heavy nacreous callus on base obscures continuation of dorsal striae; columella broad, distinct, flatly depressed, with an elevated longitudinal carinal wall within; funiculum large, thickly formed, knobbed; aperture almost straight, faintly constricted abapically; terminal ridge on front base nearly absent; outer lip fairly broad, angled inward, more obscurely centrally; a few large teeth at front end of outer lip; shell color basically milk-white to lavender-red over all, with a very faint yellow blush; pale yellow deepens to bright yellow at edge of side margin, often encircling shell at shoulder of margin; at the terminal callus suture, under magnification three exceedingly pale yellow bands can be observed traversing dorsum; adapical terminal canal deep rose, abapical channel paler rose, and adaxial carinal ridge white; a broad band of beige crosses dorsum on crest of shoulder.

Measurements, holotype: L - 12.0; W - 6.0; H - 5.1 mm.

Measurements, paratype: L - 8.3; W - 4.1; H - 3.4 mm.

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 40-50 m of water.

Type: MA, No. 15605 [holotype]; paratype: MA, 14974 [Figure *23*].

Distribution: Off Bantayan Island, Philippines (USNM sta. 5192: No. 280956).

Discussion: This new species is named to honor Masao Azuma, who has contributed much to our knowledge of new Japanese ovulid fauna.

Distribution may be in error Japan and Type locality is Cate did not return any more from Philippines

24. ***Dentiovula takeoi*** Cate & Azuma, spec. nov.

(Figures *24*, *24*C: holotype)

Description, holotype: Shell small, narrowly rhomboid, acutely angled at sides and on dorsum; terminals squarely projected, somewhat flattened in front, with curiously spread, short, broad digitation on rear terminal edge; dorsum slopes concavely away from sub-central angular ridge; dorsum coarsely, numerously, transversely incisedly striate over all; base elongately diamond-shaped, striate, converging narrowly to the front with a multi-knobbed funicular ridge on rear base; terminal canals open straight out; columella slightly flattened, striate, broadening deeply abapically as a fossula; columella and fossula outlined within by an upraised carinal wall; aperture narrow, wavy; outer lip obliquely reflexed inward, narrowly flat, with numerous prominent teeth on rear third; front of lip smooth, except for some crenulations along periphery; shell color bright blood-red, with crest of dorsal angle yellow; three yellow bands cross ventral surface of outer lip; faint yellow spots near dorsal terminal margin suture; internal carinal wall off-white.

Measurements, holotype: L - 6.9; W - 2.9; H - 2.5 mm.

Type Locality: 2 - 3 km, off Kirimezaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 55 - 73 m; leg. S. Habu, 10 April 1971.

Type: MA, No. 15640 [holotype].

Discussion: These shells have some of the appearance of *Crenavolva striatula* (Sowerby 1st, 1828) in general outline, but can be easily distinguished from that species by the extraordinary formation of the rear terminal process, by the brilliantly red shell, which is decorated with yellow in an unusual manner, and by a usually smaller shell form. This new ovulid species is named in honor of Dr. Takeo Susuki, Los Angeles, whose contributions to paleontology are well known.

25. ***Dentiovula saturnalia*** Cate & Azuma, spec. nov.

(Figure *25*: holotype)

Description, holotype: Shell of medium size, rhomboid, broad and angular sub-centrally; thin, translucent, almost transparent in places; terminals squarely produced, slightly recurved, especially abapically, with projecting digital teeth on edges of both terminal openings; dorsum inflatedly humped, transversely angled; numerously, deeply transversely incisedly striate over all; base inflatedly rhom-

boid, roundly angled sub-centrally, with a continuation of dorsal striae over base thinly covered with transparent nacre; base pinched in front, thickened, sharply upraised, with a low, thick, heavily formed funicular projection on rear base; columella broad, faintly depressed, broadening, widening in front to form fossular area; a low, massive upraised carinal wall outlines both within; aperture narrow, acutely curving; outer lip broad, slanting inward, with front of lip surface smooth, except for 3 lengthened teeth at front canal opening; glossy, the rear third with 5 or 6 loosely placed, large, heavily formed teeth, which continue up and around peripheral edge of adapical terminal; shell color a festive combination of gold-beige, orange-red, and light beige; a spot just to the rear of adapical terminal end is light beige, as are the terminal peripheral teeth; front base ridge, adaxial carinal wall, and the outer lip teeth are a slightly lighter beige.

Measurements, holotype: L - 11.3; W - 5.9; H - 5.1 mm.

Type Locality: 2 - 3 km, off Kirimezaki, Kii Peninsula, Japan; in 40 - 50 m; (34°00′N; 134°48′E) leg., M. Azuma, 30 March 1970.

Type: MA, No. 14974A [holotype].

Discussion: This new ovulid may be only an exaggerated variation of *Dentiovula* ***masaoi*** Cate, but there are several noteworthy visible differences; this species has a smaller, more delicate form; it has more recurved terminals; the shell is roundly inflated, rather than rigidly straight-lined; the aperture is broader and curved, rather than rigidly straight; many small differences are visible in the shells themselves; and their combinations of shell color are entirely different from one another. The name is suggested by the festive, bright coloring of the species, and is taken from the Latin word of the same spelling, meaning riotously merry.

26. *Dentiovula eizoi* Cate & Azuma, spec. nov.

(Figures *26*, *26*C: holotype)

Description, holotype: Shell small, inflatedly rhomboidly-ovate, roundly humped sub-centrally, acutely declivous, declining sharply to either end; terminals sub-cylindrically, narrowly beaked, with complex, numerous curious digitations at both terminal openings; dorsum thickly, deeply striate over all (in fresh shells with a sub-glossy appearance from the reflection of the interstices); both terminal collars faintly twisted; base pyriformly ovate, smooth, with base a long, narrow, solidly thickened callus; a knife-like ridge to the front, where a terminal ridge is lacking; a triangular multi-knobbed funiculum at rear base; columella rounded, smooth, glossy, flattening and deepening abapically to form a significant fossula; columella and fossula lined within by a long, low carinal wall; aperture evenly narrow, undulating; canals curiously, deeply formed (especially in front), open at both front and back; outer lip fairly broad, reflecting inward, with a limited number (approx. 5) of large, rudimentary knob-like teeth at the back; inner lip of adapical canal also crudely dentate; shell color basically pale grey overall, with three uneven, cloud-like broken bands of rich mulberry color; funiculum and internal carinal wall off-white.

Measurements, type: L - 8.1; W - 3.1; H - 3.0 mm.

Type Locality: 2 - 3 km off Kirimezaki, Kii Peninsula, Japan; in 30 - 40 m; (34°00′N; 134°48′E) leg. Eizo Azuma, 3 January 1971

Type: MA, No. 15608 [holotype].

Discussion: This new species is named by Masao Azuma for his son Eizo, who is credited with collecting these shells. This shell form, because of its peculiar protruding teeth at the terminal ends, brings to mind the ovulid species *Dentiovula colobica* Azuma & Cate, 1971. Otherwise, this new form differs from it by having the digital denticulation at the abapical terminal end as well; by being transversely roundly humped, rather than acutely angled dorsally; by having more numerous dorsal striae; by having fewer teeth of a different type on the outer lip; and by having an unusual shell color. The shells of this genus are remarkably alike morphologically, their differences less striking than in most other genera.

Margovula Iredale, 1935

Type species: *Ovula pyriformis* Sowerby 1st, 1828 [OD]

Shells are broad to the rear, margined, narrowing rather abruptly toward the front, becoming typically pyriform. The name appears to be derived from the Latin word, *margo,* for border, having a border, margin. Iredale commented, "This group is easily separated from either *Diminovula* or *Prionovolva* by its shape and the columellar features."

27. *Margovula pyriformis* (Sowerby 1st, 1828)

(Figures *27*: holotype; *27*C: C3565)

1828 *Ovulum pyriformis* Sowerby 1st, Zool. Journ. 4: 151; (Sowerby, 1830: figs. 21, 22 & 25)

1854 *Amphiperas pyrulinus* A. Adams, Proc. Zool. Soc. London: 131 (Figure *28* :lectotype herein)

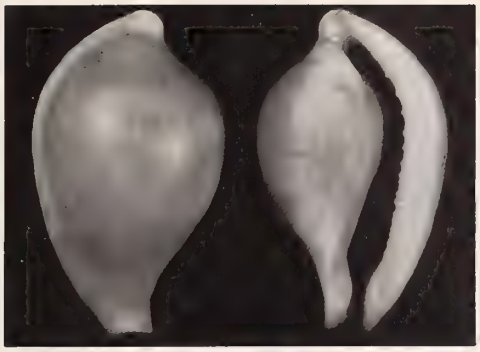


Figure 27
Margovula pyriformis (27)

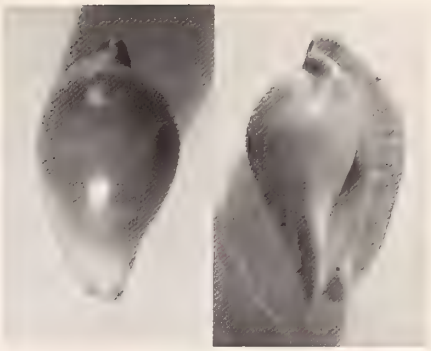


Figure 27 a
Margovula pyriformis (27)

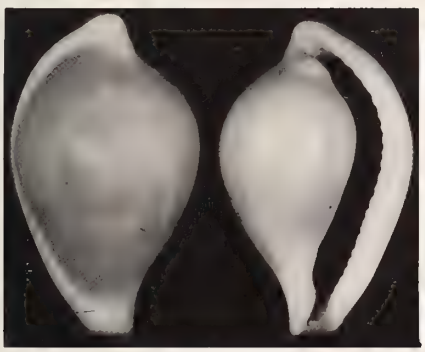


Figure 28
Amphiperas pyrulina (27)

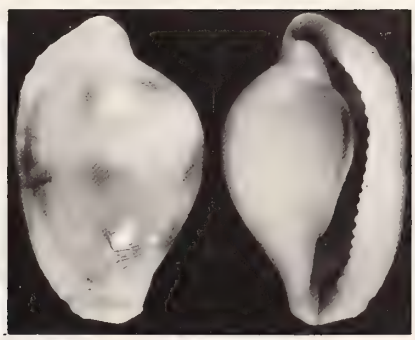


Figure 29
Margovula kosugei (28)

Figure 29 a
Margovula kosugei (28)

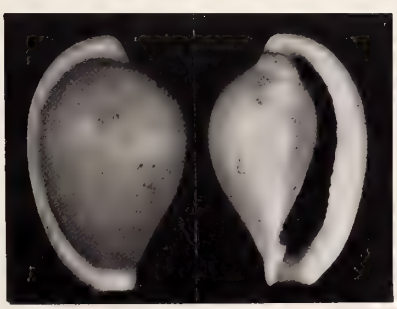


Figure 30
Margovula bimaculata (29)

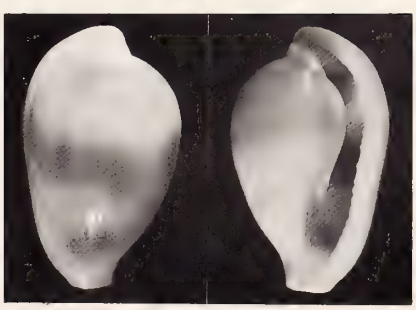


Figure 30 a
Margovula bimaculata (29)

1859 *Ovula pyriformis*; Chenu, Man. Conch.: 272
1865 *Ovulum pyrulinum*; Reeve, Conch. Icon., *Ovulum*: plt. 4, figs. 19a, 19b
1881 *Ovula pyrulina*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 181; plt. 47, figs. 1, 2
1935 *Margovula pyriformis*; Iredale, Austral. Zool. 8 (2): 103
1941 *Pseudosimnia (Diminovula) pyrulina*; Schilder, Arch. Molluskenk. 73 (2/3): 107

Description, holotype: *"Ovulum pyriforme*—Shell pear-shaped [humped to the rear, lightweight in form, though strong], whitish [shell varies from white, pinkish, to coffee brown, and is weakly, almost obscurely two-banded at times], with a pale flesh colored tinge; back ventricose, [numerously, distinctly] transversely striated [over all]; lower [abapical] canal straightish, slightly reflected [aperture narrow; both base and outer lip constricted in front, curving aperture and lip angle sharply at the rear; central base swollen, narrowing quickly, and distinctly longitudinally ridged to the front, with a heavily formed triangular funiculum on rear base, whose surface is faintly dentate], columella with an excavated [longitudinal] depression within, near base [broadening in front to the terminal ridge as a fossula; both columella and fossula smooth, outlined adaxially by a modified carinal ridge], and a strong pliciform tooth [funiculum] at the upper end; outer lip sloping from edge [margin] inwards, inner edge plico-denticulated [inner edge of outer lip is numerously, sharply denticulate, with variously sized teeth], rather depressed at the lower part [fossula].—Of this elegantly formed and rare species a few specimens were received from New South Wales by Mr. G. Humphrey." (SOWERBY 1st, 1828: 151) [these shells are rarely found south of Moreton Bay, Queensland today].

Measurements, type: "long. 17/20, lat. 5/10, poll."

Measurements, hypotype: L - 16.5; W - 9.7; H - 7.9 mm. (Figure 27a: C3565)

Type Locality: "Hab. ad littora Novae Cambriae Meridionalis [N.S.W.]." Here designated, in what now appears to be a more accurate locality: below low tide mark, Mackay, Queensland (C. Coucom, Yeppoon).

Type: BMNH, No. 1969135 [presumed holotype].

Distribution: Clairview; Keppel Bay; Port Denison; Townsville; Bowen; Lizard Island, Queensland; Torres Strait and eastern shores of Gulf of Carpentaria, NE Queensland.

Discussion: This species is now considered to be fairly common, with a general distribution along the northern Queensland coast, and at some of the adjacent coastal islands. The animal is dark, almost black-brown; the color is uniform, including the numerous papillae on the mantle, the proboscis, and the antennae; the foot is somewhat short, and seems wide for its length. This description of the animal was taken from a color transparency, kindly sent by Donald Byrne, Rockhampton, Queensland.

A. Adams says of his *Amphiperas pyrulina,* "A neat pyriform species very much resembling *A. bimaculata,* but the interior of the beaks wants the orange spots seen in that species, and the general form of the shell is pyriform and constricted anteriorly." Adams seems not to have been aware of *Margovula pyriformis* (Sowerby 1st, 1828) at this time; it is true that Sowerby had previously thought his species rare.

28. *Margovula kosugei* Cate, spec. nov.

(Figure 29: holotype)

1941 *Pseudosimnia (Diminovula) pyriformis*; Schilder, Arch. Molluskenk. 73 (2/3): 107
1956 *Primovula (Diminovula) pyriformis*; Allan, Cowries World Seas: 123
1958 *Pseudosimnia (Margovula) pyriformis*; Kuroda, Venus 20 (2): 168

Description, holotype: Shell fairly large, broadly ovate, inflatedly humped sub-centrally; terminals protrude roundly abapically, somewhat pointedly so in back; dorsum smooth, though finely incisedly striate over all; base smooth, glossy, inflatedly ovate, narrowing as a sharp, longitudinal ridge to the front, where it merges with an oblique terminal ridge; a multi-knobbed, lengthened funicular callus forms wall of adapical canal, which opens to the side in back; columella very broad, concavely depressed, widening even more in front, forming a fossula; both columella and fossula lined within by an upraised carinal ridge; aperture very wide, almost straight; outer lip ventral surface broad, numerously dentate (19), many teeth both front and back, extending beyond periphery of outer lip edge; color pale grey over all dorsally, upon which are six brown spots in two longitudinal rows of three; outer lip, terminal beaks, base off-white; and there is a very pale pink blush of color in terminal canals.

Measurements, holotype: L - 10.5; W - 6.4; H - 5.2 mm.

Measurements, hypotype: L - 12.0; W - 7.5; H - 6.9 mm. (Figure 29a: MA15446)

Type Locality: 2 km SSW of Jogashima, Sagami Bay, Japan (35°20′N; 139°20′E); in 65 - 67 m of water; *ex* His Majesty, Emperor of Japan, Hirohito coll.

Distribution: in 37 - 55 m, off Minabe, Kii, Japan; leg. M. Azuma, 6 December 1970.

Type: NSMT, No. 6 [holotype].

Discussion: This new species appears to resemble *Margovula pyriformis* (Sowerby 1st, 1828), but differs from it by being smaller; by being much more finely striate dorsally; by having: a less flatly inflected plane of the outer lip abapically; larger, more heavily formed outer lip teeth; a more narrowly formed shell in front; and an entirely different combination of shell colors, with dorsal banding included. Although their shell morphology seems to agree in most detail, the color and pattern of the hypotype (Kii) differs from that of the type in the following manner: shell color is basically deep, rich orange-beige, over which are three broad, irregular dorsal bands of reddish-brown; base and outer lip beige; interior carinal ridge off-white.

This interesting species is named to honor Dr. Sadao Kosuge, NSMT, whose contributions to Japanese malacology are well known.

29. *Margovula bimaculata* (A. Adams, 1854)

(Figures *30*: holotype; *30*C: C3546)

1854 *Amphiperas bimaculata* A. Adams, Proc. Zool. Soc. London 22: 131
1865 *Ovulum bimaculatum*; Reeve, Conch. Icon., *Ovulum*: plt. 3, figs. 11a, 11b
1872 *Amphiperas ovoideus* H. Adams, Proc. Zool. Soc. London: 10, plt. III, fig. 4 (Figure *37*: holotype)
1881 *Ovula bimaculata*; Weinkauff, Mart. & Chem. Syst. Conch. Cab.: 176; plt. 46, figs. 1, 4
1887 *Ovula ovoidea*; Paetel, Cat. Conch. Samml. 1: 325
1941 *Pseudosimnia (Diminovula) bimaculata*; Schilder, Arch. Molluskenk. 73(2/3): 107
1956 *Primovula (Diminovula) bimaculata*; Allan, Cowries World Seas: 123

Description, holotype: "*Amphiperas bimaculata*—A testa ovali, subpyriformi, albida, fusciis tribus pallide fuscis, transversis ornata, ad extremitates vix producta, transversim striata, canalibus intus aurantico tinctus; apertura angusta, labio postice callo crenato instructo, labro intus crenulato" (A. Adams, 1854: 131).

Description, hypotype: Shell lightweight in form; shell color pale grey dorsally, with clouded, irregularly dispersed, sub-banded (though uniformly patterned) pale brown areas superimposed thereon; despite dorsal striation surface is sub-glossy; there is bright orange color within the terminal channels; outer lip, margins, terminal collars, teeth, funiculum, pale ivory; aperture fairly broad; anterior terminal ridge straight, well formed; outer lip thickened, shouldered above, with numerous (34) well defined denticles within; columella barely depressed, with fossula scarcely excavated and carinate within adaxially; base narrowly, convexly ovate, becoming narrow and sub-pointed in front, with a long, narrowly thickened, crenate funicular projection at the rear, which forms the left wall of the adapical canal.

Measurements, type: approx. L - 12+; W - 8.0 mm.

Measurements, hypotype: L - 14.7; W - 9.0; H - 7.4 mm. (Figure *30*a: C3546)

Type Locality: "Hab. New Caledonia. Mus. Cuming." Here limited to Clairview, Queensland (T. Neilsen, Yeppoon, Queensland).

Type: BMNH, No. 1961146 [holotype].

Distribution: Keppel Bay to Moreton Bay, Queensland.

Discussion: This species is quite distinct, and is fairly common. I have been unable to verify the New Caledonia locality. The east Australian form hypotype C3546 (Figure *30*a) is included here with *Margovula bimaculata,* but may eventually be considered a separate subspecies as it seems to exhibit certain minor morphological differences.

30. *Margovula emilyreidae* Cate, spec. nov.

(Figure *31*: holotype)

Description, holotype: Shell small, ovate, sub-pyriform, bulbously humped, sub-glossy; terminals short though prominent, squarely terminated in front, recurved and dully pointed in back; dorsum very finely transversely incisedly striate over all; base sub-glossy, inflated, sub-pyriform, narrowing abruptly to the front, terminating parallel to a short terminal ridge; a fairly large, three-sectioned, three-knobbed funiculum on rear base; columella broad, curving with aperture, depressed, and longitudinally half calloused and half depressed and striate; fossula deepens in front, is adaxially, elevatedly walled within by a carinal ridge that recedes in height to outline columella as well; aperture wide, curving at the rear; outer lip thick, broad, with numerous (21) very large, thick, boldly formed teeth thereon, most of which protrude beyond the periphery of ventral outer lip edge; shell color ivory-white dorsally, with outer lip, base, and teeth contrastingly china-white, and there are two or three scattered, very pale, almost obscure light brown spots on dorsum.

Measurements, type: L - 9.9; W - 6.3; H - 5.3 mm.

Type Locality: Off Ogokuda Beach in Shionomisaki, S Kii, Japan. (34°00′N; 134°48′E)

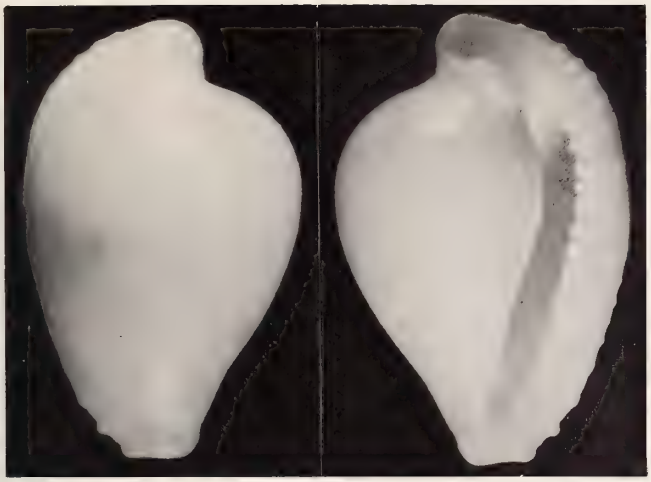


Figure *31*
Margovula ***emilyreidae*** (30)

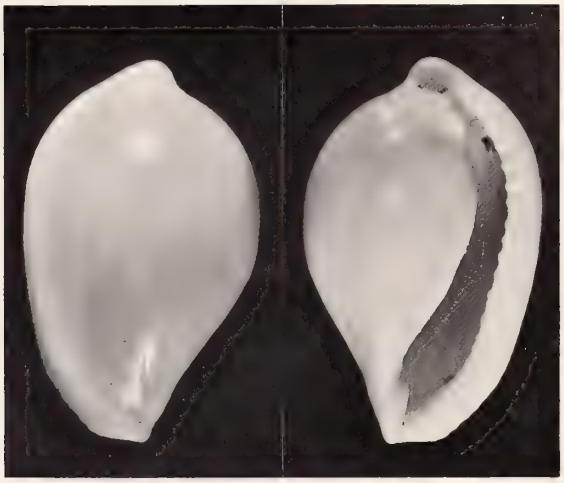


Figure *32*
Margovula ***schilderorum*** (31)

Figure *33*
Margovula ***tinctilis*** (32)

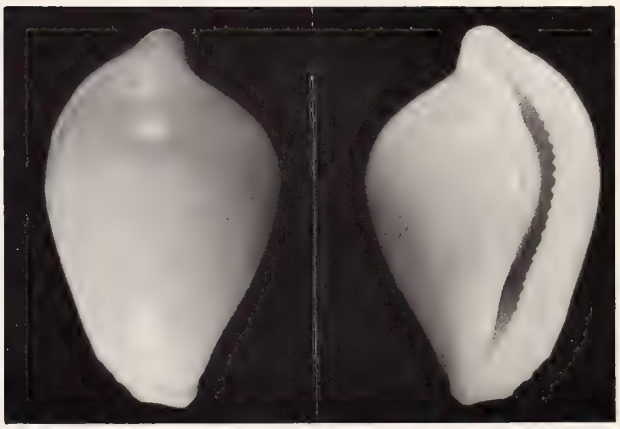


Figure *34*
Margovula ***aboriginea*** (33)

Figure *35*
Lacrima lacrima (34)

Figure *36*
Lacrima simulans (35)

Type: CAS, No. 133323 [holotype].

Discussion: This shell was one of a lot of three shells brought to me by Dr. Shikama, GIY, for this work; all were from the type locality given here; the other two specimens were typical *Pseudosimnia* (*Diminovula*) *punctata* (Duclos, 1831). The shells of this new species approach, in a very general way in the dorsal outline, those of *Margovula bimaculata* (A. Adams, 1854) but are distinct in practically every other aspect: *M. emilyreidae* differs principally by being a smaller species; by lacking the typical dorsal coloring of the Adams species; by having a straighter aperture, without the abapical base and lip constriction, and by having the larger, peculiarly formed lip teeth, many of which protrude beyond the periphery of the outer lip edge.

The name of this new ovulid species is proposed in honor of Emily Reid, Department of Zoology, University of California, Berkeley, whose contributions to malacology are outstanding, and whose artistry is on permanent record in the molluscan literature.

31. ***Margovula schilderorum*** **Cate, spec. nov.**

(Figure *32*: holotype)

Description, holotype: Shell of medium size for the genus, pyriformly ovate, thin, translucent, roundly inflated; terminals restrictedly produced, somewhat pointed adapically; dorsum sub-glossy, slightly roughened by very fine, irregular longitudinal growth lines, otherwise wavy, transverse, incised striae cover entire dorsum, though becoming less distinct centrally; base inflated, ovate, narrowing and constricting to the front; with a broad, thickened, knobby upraised funiculum at the rear base; columella smooth, shallowly excavated, deepening in the fossula area, with an upraised, adaxial ridge outlining both; aperture wide, almost straight; outer lip thick, broad, rounded, with numerous (23) well developed teeth on the inner half of lip; color translucently grey-white, lighter beige-white on the outer lip and terminals, with a golden line over both terminal collars, and along right marginal sulcus.

Measurements, type: L - 12.4; W - 7.5; H - 6.2 mm.

Type Locality: USNM, Smithsonian Sta. 155; Minhow = (Foochow, Fuchau). China; (26°05'N; 119°12'E) *ex* C. Ping, Amoy University, Amoy, Fukien Prov., China.

Type: USNM, No. 333976 [holotype].

Discussion: 1970 marked the 50th anniversary year that the late Dr. Franz Alfred Schilder and Dr. Maria Schilder, Halle-Saale, German Democratic Republic, have worked with the Cypraeacea. I am naming this new ovulid species in their honor on this occasion.

These shells, without having been formally identified, have been erroneously referred to as a "dwarf" form of *Pseudosimnia* (*Inflatovula*) *marginata* (Sowerby 1st, 1828); however, the morphological differences between the two species are so marked that a comparative description will not be attempted here. This new species is, in fact, more closely allied in form to *Margovula pyriformis* (Sowerby 1st, 1828), but differs from it by being a smaller species, with less narrowly projecting terminal processes; by having a wider aperture; by having more fully developed lip teeth, particularly on the front portion of the outer lip, and by having a much lighter, thin, translucent shell.

32. ***Margovula tinctilis*** **Cate, spec. nov.**

(Figure *33*: holotype)

Description, holotype: Shell large, inflatedly pyriform, of lightweight construction, narrowing acutely to the front, sub-glossy; dorsum faintly, incisedly striate over all, striation widely separated, with some shells almost smooth centrally; base ovate, convexly swollen, narrowing as a thick ridge abapically, with a long, thin, blade-like funicular projection at the rear base; columella curves sharply, is depressed, and becomes excavated as a fossula in front; outer lip thickened, angled inward, with numerous (20) sharp, rregular teeth within; aperture evenly, fairly widely, curving in back; terminal ridge short, almost straight (perpendicular to canal opening), and terminates in fossula; basic shell color beige-white, with clouded, irregularly applied, light fleshy-brown patterns, sub-banded at times; right margin, terminals, part of base, columella, and outer lip stark white.

Measurements, type: L - 19.5; W - 12.4; H - 10.1 mm.

Type Locality: Off Kaohsiung, SW Taiwan; collected by trawlers.

Distribution: Siasi Island, Sulu Sea, in 80 feet of water (22°44'N; 120°21'E) (V. Dan).

Type: CAS, No. 13685 [holotype].

Discussion: This new species is trawled quite abundantly from deep water off SW Taiwan (Kaohsiung), in the Formosan Strait and N China Sea; except for a single specimen from Siasi Island, Sulu Sea sent by Victor Dan, little is known about its distribution otherwise. The name is derived from the Latin word meaning dyed or painted. The cloudy coloring of this species is a constant factor, and is one of its most notable characters. This new species ap-

pears in its general morphology to resemble *Margovula pyriformis* (Sowerby 1st, 1828), with which it is often mistaken, but it differs in many distinct ways: the shell of *M. tinctilis* is noticeably larger; it is much thinner, lightweight, almost translucent; it is much more rounded and inflated; also it differs by having a more sharply curving adapical aperture, and the rear terminal has noticeable changes in it; further, there is no central dorsal transverse striation, instead there are widely spaced, upraised, transverse dorsal ridges over the smooth dorsal surface; and it differs further by having a very distinctive pale-brown cloudy color pattern distributed over a basic pale grey shell color (in *M. pyriformis* the shell colors are usually solid over all, varying from solid off-white to deep coffee-brown).

33. *Margovula aboriginea* Cate, spec. nov.

(Figure *34*: holotype)

Description, holotype: Shell large for the genus, pyriform, strongly constructed, semi-glossy; dorsum somewhat inflated, very finely transversely, incisedly striate over all; terminals weakly produced, with adapical end very small, rounded; base convexly ovate, narrowing to a point in front, with a long, thickened, sharply-edged, calloused funiculum projecting from the left wall of rear terminal canal, obscurely crenate; aperture straight, except for curving abruptly at the rear; outer lip thickened, scarcely shouldered above, with numerous (30) well defined teeth within; columella smooth, depressed, deepening in front to form a fossula; shell color milk-white over all, with three rows of large, very pale yellow spots that seem to merge with one another transversely; pale yellow coloring blotched above the adapical terminal, and faintly tinted within the terminal canals.

Measurements, type: L - 11.5; W - 7.2; H - 5.9 mm.

Type Locality: Geralia, Exmouth Gulf, Western Australia (approximately 49 miles SE of Vlaming Head Light, North West Cape; 22°00′S; 114°15′E).

Distribution: Limited to Exmouth Gulf.

Type: WAM, No. 67 - 70 [holotype].

Discussion: Only in recent years have the Australian aborigines moved inland from this still rather wild area. This new species is named in their honor. These shells belong to the large group of species (such as *Pseudosimnia alabaster* (Reeve, 1865), *P. punctata* (Duclos, 1831), etc.) having a shell with a punctate dorsal surface, but seem to differ from them all by having a very much larger shell form; by having much more fully developed labial teeth; by having a more pyriform rather than bulbously-ovate shell; by having larger, less distinct, pale-colored dorsal punctations, as well as coloring above the rear terminal and in the rear terminal canal; and finally, by being distinctly isolated geographically from their congeners. It may be compared with another previously described species, *Margovula tinctilis* Cate (herein), because of the apparently similar adapical terminal beak; however, the similarity ends there. It differs by having a differently formed rear terminal, a narrower aperture, finer, more numerous teeth on the outer lip, and by being a smaller ovulid species, with a shorter, broader terminal process abapically.

Lacrima Cate, gen. nov.

Type species: ***Lacrima lacrima*** Cate, spec. nov. [herein]

This ovulid group possesses a very unusual morphology; the shells are small, roundly inflated at the main body whorl, with stem-like projection at the front part of the shell; the appearance of the shell form is reminiscent of an inverted tear drop. The genus name is derived from the Latin *lacrima,* meaning a tear.

34. *Lacrima lacrima* Cate, spec. nov.

(Figure *35*: holotype)

Description, holotype: Shell small, sub-pyriform, tear-shaped, inflated sub-centrally, with a perceptible reflection of the long, drawn out abapical terminal collar area; terminal short, squat, semi-pointed adapically, arched and squared in front; dorsum numerously, very deeply, incisedly transversely striate over all, with a cancellate pattern caused by the intersection of numerous longitudinal growth lines and striae; dorsum otherwise sub-glossy; base ovate, elongately so abapically, in the manner of a tear drop; base sub-glossy, densely striate over all; front base broad, without terminal ridge, rear base with a very low, curving, narrow funicular projection; columella rounded, striate, without depression; aperture very broad, gently curving; outer lip thick-edged, rounded, sub-crenate; shell color pale straw, with lip and terminal beaks a lighter off-white.

Measurements, type: L - 7.2; W - 4.0; H - 3.2 mm.

Type Locality: Jogashima, W 5 km; 110 - 150 m depth; Sagami Bay, (35°17′N; 139°41′E) Japan; known only from type locality.

Type: HNSM, No. 2 [holotype].

Discussion: This new ovulid is compared with its nearest relative under the following species, ***Lacrima simulans.*** The shape of the shell suggests a tear drop, from which its Latin name is derived.

35. ***Lacrima simulans*** Cate, spec. nov.

(Figure *36*: holotype)

Description, holotype: Shell small, narrowed, elongately ovate, with a tapering, drawn-out front dorsal area, sub-pyriform, like a tear drop in shell outline; terminals produced, broadly, strongly, sub-pointed adapically, narrow in front due to constriction of outer lip; dorsum rough, sub-glossy, with widely spaced, deeply incised, transverse striae over all; right side margin and terminal tips broadly, thickly calloused; base long, narrow, ovate, striate, with long narrowed extension to the front; a short, elevated, thickened, isolated funiculum at the rear base; columella rounded, smooth; fossula not apparent; aperture broad, gently curving; outer lip broad, thickened, shouldered above, with lip-plane slanting inward, upon which are numerous fairly well developed teeth (approx. 18); teeth extend to periphery of outer lip, a few extending beyond the edge; shell (holotype) is a dead shell; grey in color over all.

Measurements, type: L - 7.5; W - 4.0; H - 3.1 mm.

Type Locality: Jogashima, WSW 4 km; D - 100 m; Sagami Bay, Japan. *ex* His Majesty, Emperor of Japan, Hirohito coll. (35°17′N; 139°41′E).

Type: HNSM, No. 1. [holotype].

Discussion: This new species may be compared with the preceding, ***Lacrima lacrima*** Cate, but it appears to have enough differentiating shell characters to separate it; it differs by having a curiously narrower shell form, more well-developed outer lip teeth, a differently constructed and situated funicular process, and a differently constituted adapical terminal beak. The Latin word *simulans,* meaning imitating, imitative, seems an appropriate name for this new ovulid form.

Globovula Cate, gen. nov.

Type species: ***Globovula spatiosa*** Cate, spec. nov. [herein]

Shells nearly as broad as long, humped, inflated, usually edentate, with terminals barely produced. The name for this new genus is derived from the Latin, *globus,* for ball, globular, spherical.

36. ***Globovula cavanaghi*** (Iredale, 1931)

(Figure *38*: holotype)

1931 *Diminovula cavanaghi* Iredale, Rec. Austral. Museum, (2/3): 107

1941 *Prionovolva cavanaghi,* Schilder, Arch. Molluskenk. 73 Sydney, 18: 222; plt. 22, figs. 13, 14

1956 *Primovula (Prionovolva) cavanaghi,* Allan, Cowries World Seas: 123

Description, holotype: *"Diminovula cavanaghi*—Shell small, subglobose [globularly ovate; sub-pyriform, bulbously inflated, solidly formed], pale pink above, white below [pale pinkish-mauve, with whitish-beige outer lip, terminals, terminal ridge, and thin basal callus; a pale orange blush in terminal canals and on inner surface of outer lip]. The dorsal surface is smooth [glossy, though numerous fine, longitudinal growth lines are visible] save for very fine radial growth lines, while very subdued concentric distant keeling can be detected with a lens. [Base convexly ovate, transparently calloused, narrowing to a point, thickened ridge in front, with a small, thick funicular projection forming the left wall of the posterior canal; columella smooth, faintly, concavely depressed, becoming a broad, shallow fossula in front; terminal ridge a continuation of a low, adaxial carinal ridge within; aperture gently curving and broad]. Ventrally the outer lip is well curved [thickened, rounded on the edge, barely shouldered above, with very faint crenulations along inner edge], advancing over the depressed spire in a sweep and opposed by a raised ridge [funiculum] on the body whorl, a minute posterior canal being formed. Anteriorly the narrow canal is succeeded by a notable tooth [terminal ridge], a depression [fossula] following, the inner lip being a little sinuate. The outer lip is internally rounded ridged" (IREDALE, 1931: 222).

Measurements, type: L - 18.0; W - 11.0 (approx.).

Measurements, hypotype: L - 11.2; W - 8.3; H - 7.0 mm. (Figure *38*a: C3695)

Type Locality: "Rare in Sydney Harbour. New South Wales"—IREDALE, 1931.

Distribution: Mackay (in soft coral); Port Curtis; Gladstone; Brisbane (Moreton Bay), Queensland. The species is also found on the West Australian coast: Geralia, Exmouth Gulf (C3695); Red Bluff (80 miles N of Carnarvon, on the N Quobba Station boundary line). Leg. L. Figgis, Geralia; leg. H. Firns, Red Bluff.

Type: AM No. C.57754 [holotype].

Discussion: SCHILDER (1932: 52) reports semi-pellucid, but otherwise similar shells in the Ph. Dautzenberg col-

lection, Brussels Museum, that were from Hong Kong and Mauritius. I have seen this species only from Australian waters; not having seen the Dautzenberg shells, I can only conclude that their locality is in error, or, they may be specimens of *Prionovolva bulla* (A. Adams & Reeve, 1848), which slightly resemble the Iredale shells, but inhabit the east coast of China (and not known from Mauritius, it seems). The hypotype (C3695) is the largest specimen of ***Globovula cavanaghi*** I have seen; all of the Queensland-New South Wales specimens seen have been smaller than the dimensions given by Iredale.

37. ***Globovula tripolia*** Cate, spec. nov.

(Figure *39*: holotype)

Description, holotype: Shell roundly ovate, inflated, solid; dorsum with one or two transverse, semi-circular lines, and widely spaced, weak, angular ridges crossing the dorsal surface as well. Dorsum covered with a semi-smooth, light brown periostracum; base roundly, inflatedly convex, narrowing to the front, terminating as a peculiar, calloused, blunt plait; terminal ridge short, funiculum a broad, low, triangular callus which forms the left wall of adapical canal; aperture somewhat narrow, broadening noticeably in front; outer lip thickly, roundly, smoothly formed, narrowly shouldered above, and barely crenate; dorsum pale greyish-beige, lip, terminals and funiculum, pale grey.

Measurements, holotype: L - 13.8; W - 9.2; H - 8.1 mm.

Type Locality: Gulf of Oran, NW Algeria, North Africa. 35°45′N; 00°38′W).

Type: NMW, No. 70.25 Z.1 [holotype].

Discussion: The species is unusual in its outward appearance due to the light brown periostracum, a character seldom seen in the Ovulidae. At the present time little is known about this species; additional field work will be needed to understand its distributional range and living habits. It appears to be distinct, and only vaguely approaches ***Globovula cavanaghi*** in general morphology; it differs by being more globose in outline; by having a thick, rounded outer lip without any semblance of denticulation, and by having a more acutely recurved and lengthened adapical terminal beak.

The species name is derived from the general North African area that was once a Phoenician colony.

38. ***Globovula spatiosa*** Cate, spec. nov.

(Figure *40*: holotype)

Description, holotype: Shell large, pyriformly globose, lightweight though strong; dorsum smooth, dull; evenly spaced, transverse ridges terminate at margins; base bulbously smooth; terminals short in back (merely an extension of outer lip); the front terminal thinly, delicately formed, sharply recurved; aperture wide, abruptly curved to the left rear; outer lip thickened, recurved adaxially, acutely angled at margin, constrictedly flattened to front; lip crenulate almost throughout; columella broad, concavely depressed; fossula fairly well developed, broad, deep, longitudinally adaxially ribbed; funiculum rises gradually from base, sharply edged, becoming perpendicularly flattened adaperturally; color milk-white, except margins, terminals, funiculum, and lip which are light beige.

Measurements, type: L - 21.1; W - 15.7; H - 12.9 mm.

Type Locality: At low tide, between Cottesloe Beach and Leighton, WSW Australia (31°47′S; 116°00′E) (about one mile S of Cottesloe Beach; leg. H. Firns, Bunbury).

Type: WAM, No. 68-70 [holotype].

Discussion: The shell was collected by Mr. Harry Firns, Bunbury, WSW Australia, in beach drift. Perhaps the most closely related species is ***Globovula tripolia*** Cate herein; however, the West Australian shell differs by being much larger and more thinly constructed; by its heavier and more angular side margins; by having a broader, flatter outer lip abapically; by a wider shell, tapering more abruptly to the front; by its milk-white dorsum (rather than greyish-beige), and the rich beige-colored ventral area.

The name is derived from the Latin word for roomy, large, commodious.

39. ***Globovula sphaera*** Cate, spec. nov.

(Figure *41*: holotype)

Description, holotype: Shell fairly large, globosely ovate, broad, solid; dorsum glossy, without striation, often transversely angularly ridged, thus forming flat-appearing surface bands across the shell; terminals short, twisted left adapically, though barely produced; base pyriform, broader at the rear, tapering to a point in the front; aperture fairly narrow, almost a semi-circular curve; long, upraised, sharply defined funiculum forms rear columellar wall; columella broad, depressed, smooth; fossula smooth, but more deeply excavated; abapical terminal

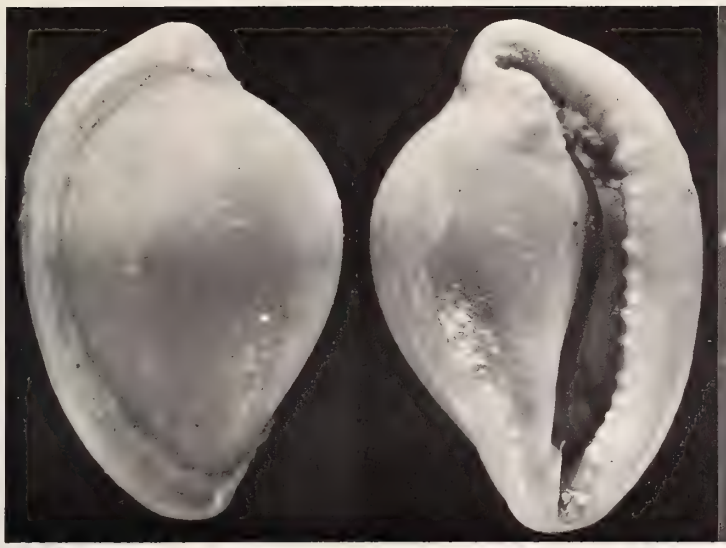


Figure *37*
Amphiperas ovoideus (29)

Figure *38*
Globovula cavanaghi (36)

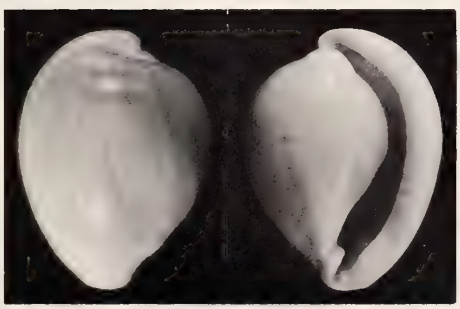


Figure *38* a
Globovula cavanaghi (36)

Figure *39*
Globovula tripolia (37)

Figure *40*
Globovula spatiosa (38)

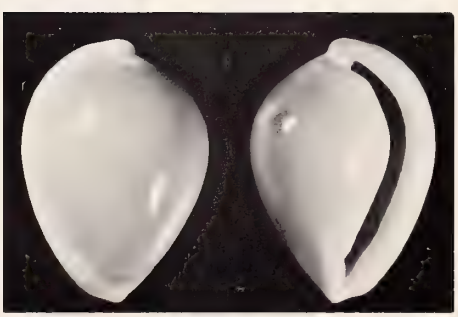


Figure *41*
Globovula sphaera (39)

ridge very short, boldly distinct, curving inward adaxially; outer lip broadly thickened, vaguely crenate, with a flat, unangled marginal band above; terminal canals very short; dorsum grey-white, may be covered with a light brown, periostracum-like cover; base, funiculum, terminals, and outer lip, contrastingly brilliant white.

Measurements, type: L - 19.6; W - 12.9; H - 11.1 mm.

Type Locality: Deep water, off Kaohsiung, Taiwan (by trawlers), (22°44′N; 120°21′E).

Type: CAS, No. 13321 [holotype].

Discussion: This new species perhaps most closely resembles ***Globovula*** *bulla* (A. Adams & Reeve, 1848). It differs by being larger, more globose, tapering acutely to the front; by sometimes having light brown periostracum-like dorsal markings; and, perhaps most prominently, by having an edentate outer lip. This new species also appears to approach ***Globovula*** *cavanaghi* (Iredale, 1931) in form, but differs from it by being a generally larger species; by having a narrower, straighter, less recurved aperture; the adapical terminal beak is less acutely recurved and projecting, and it has a less crenate outer lip surface.

The name is adopted from the Latin word for sphere, ball.

40. ***Globovula cottesloensis*** Cate, spec. nov.

(Figure *42*: holotype)

Description, holotype: Shell short, broad, sub-pyriform, humped, globose, solidly formed; terminals barely produced; dorsum smooth, glossy, without angular dorsal transverse ridges; base smooth, glossy, broadly ovate, narrowing to the front, where it gently constricts, forming a terminal ridge; a low, oblique, thickened, crescent-shaped funiculum is on the rear base; columella smooth, broadly depressed, defined adaxially by a low, longitudinal, carinal ridge, which becomes elevated in front to form a shallow fossular depression; aperture broad, curving, semi-circular; outer lip broad, semi-circular, reflexed, slightly crenulate; color pale grey to very pale grey-mauve.

Measurements, type: L - 11.6; W - 9.0; H - 7.4 mm.

Type Locality: One mile south of Cottesloe Beach between Cottesloe and Leighton, Western Australia (31°47′ S; 116°00′E).

Type: WAM, No. 69-70 [holotype].

Discussion: This new species somewhat resembles many other species, but it appears to be closest to ***Globovula sphaera*** Cate (herein) in general appearance, differing from it, however, by being a much smaller species; by having a shorter, broader shell for its size; by having a wider, more open aperture, with the base more inflated and the fossula faintly constricted in front; also, the dorsum is pale grey, rather than pale brown.

41. ***Globovula margarita*** (Sowerby 1st, 1828)

(Figure *43*: lectotype)

1828 *Ovulum margarita* Sowerby 1st, Zool. Journ., London 4: 150
1843 *Ovula margarita*; Kiener, Icon. Coq. Viv., *Ovula*, 2: 11; plt. 6, fig. 4
1848 *Ovula umbilicata* Sowerby 2nd, Proc. Zool. Soc. London: 135
1848 *Ovulum umbilicata*; Sowerby 2nd, Thes. Conch., *Ovulum* 2: 469; plt. 100, figs. 88, 89
1941 *Pseudosimnia (Diminovula) margarita;* Schilder, Arch. Molluskenk. 73 (2/3): 107
1956 *Primovula (Diminovula) margarita;* Allan, Cowries World Seas: 123

Description, holotype: "*Ovulum margarita*—Shell oval, nearly globular; obtuse at the upper [abapical] end, and slightly acuminated at the lower [adapical]; perfectly white [except that base, outer lip, funiculum, and lip teeth are a more intense white; columella broad, smooth, depressed]; lower part of the columella [fossula] depresso-concave within; edge of outer lip rounded [broadly thickened centrally], denticulate within [having numerous (27+), small, very fine, fairly well developed teeth on inner edge of lip, which lengthen onto exposed lip surface almost to outer edge], canals very short, the upper end turned to the left. [Dorsum sub-glossy, numerously transversely incisedly striate overall; base smooth, glossy, though visibly thinly calloused over basal striation, base tapering abruptly to the front into a short, weakly formed terminal ridge; a large, low, triangular crenate funicular projection on rear base; aperture fairly broad].—*Licium margarita.* G. Humphrey, MS ined." (Sowerby 1st, 1828: 150).

Measurements, type: L - 8.0; W - 5+mm (approx.).

Measurements, hypotype: L - 8.8; W - 5.8; H - 4.9 mm. (Figure *43*a: C3827).

Type Locality: "Friendly Islands". Here restricted to Tonga (20°00′ S; 175°00′W).

Type: BMNH, No. 1967613/1-5 [lectotype; 4 paratypes]

Distribution: Tonga Islands; Borongan, Samar Island, east-central Philippines; Kaimana, New Guinea; E Australia, generally, including Purdy Island, Bismarck Archipelago.

Discussion: The holotype, now apparently missing, measured: "long. 11/20, lat. 4/10, poll.", according to Mr. G. Humphrey; "all the specimens in his possession, one only excepted, were pierced and strung by the natives." Most of the specimens I have examined appear to have smaller shell dimensions than those indicated by Sowerby, so that the holotype would seem to be unusually large for the species; I would be tempted to question the shell he used for the type, preferring the now designated lectotype. According to SCHILDER (1932: 51), the type specimen of *Globovula umbilicata* (Sowerby 2nd, 1848) appears to be no more than a sub-adult form of *G. margarita*. Sowerby 2nd, 1848: 135 says, "Agreeing with *O. margarita* in general appearance, but the outer lip is thinner, the mouth wider, the upper callosity elevated and denticulated. There is also a small umbilicus behind the posterior termination of the outer lip."

Pseudosimnia Schilder, 1927

Type species: *Bulla carnea* Poiret, 1789 [OD]
Arch. Naturgesch. **91/A** (10): 81

Shell fairly small, pyriform, inflated, with unusually broad projecting terminals, and, for the most part, lacking significant dorsal and ventral incised striation.

(Pseudosimnia) Schilder, 1927

42. *Pseudosimnia (Pseudosimnia) carnea carnea* (Poiret, 1789)

(Figure *44*: C2541)

1789 *Bulla carnea* Poiret, Voy. en Barbarie, Paris **2:** 21
1807 *Ovula dentata* Fischer, Mus. Demidoff, Moscow **3:** 157
1810 *Ovula carnea*; Lamarck, Ann. Mus. Hist. Nat. Paris **16:** 111
1817 *Bulla nucleus* Dillwyn, Cat. Rec. Shells **1:** 473
1817 *Bulla lepida* Dillwyn, Cat. Rec. Shells, London: 474
1817 *Ovula cepula* Schumacher, Essai Nouv. Syst.: 259
1823 *Ovula nucleus*; Mawe (*nom. nud.*), Linn. Syst. Conch. London: 100
1848 *Ovula rosea* Requien (*nom. nud.*), Cat. Coq. Corse (Avignon): 85
1848 *Ovulum carneum*; Sowerby 2nd, Thes. Conch. *Ovulum* **2:** 471; plt. 101, figs. 74 - 77
1856 *Ovulum carnea*; Hanley, Index Testa: 91
1856 *Ovulum lepida*; Hanley, Index Testa: 91
1875 *Ovula albida* Monterosato, Nat. Conch. Mediterr., Palermo: 45
1883 *Ovula rubra* Bucquoy, Dautzenberg & Dollfus, Moll. Mar. Roussillon, Paris, **2:** 134
1883 *Ovula pallida* Bucquoy, Dautzenberg & Dollfus, Moll. Mar. Roussillon, Paris, **2:** 134
1883 *Ovula alba* (Scacchi); Bucquoy, Dautzenberg & Dollfus, Moll. Mar. Roussillon, Paris, **2:** 134
1885 *Ovula lepida* Dill. = *triticea* Lamk.; Tryon, Man. Conch. **7:** 248
1885 *Ovula triticea* Costa = *carnea*; Tryon, Man. Conch. **7:** 248
1890 *Ovula rufula* Mollerat, Bull. Soc. Mal. France **7:** 105
1900 *Ovula major* Pallary, Journ. de Conchyl. **48:** 300
1900 *Ovula minor* Pallary, Journ. de Conchyl. **48:** 300
1900 *Ovula obtusula* Pallary, Journ. de Conchyl. **48:** 300
1900 *Ovula globosa* Pallary, Journ. de Conchyl. **48:** 300
1900 *Ovula elongata* Pallary, Journ. de Conchyl. **48:** 300
1900 *Ovula violacea* Pallary, Journ. de Conchyl. **48:** 300
1913 *Amphiperas carneum*; Buchner, Schrift. Lehrer Ver. für Naturk. (29): 111
1941 *Pseudosimnia (Pseudosimnia) carnea*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1941 *Pseudosimnia (Pseudosimnia) triticea*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1941 *Pseudosimnia (Pseudosimnia) hordacea*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Pseudosimnia) carnea*; Allan, Cowries World Seas: 124

Description, holotype: "*Bulle carnea*—Testa ovata incaranata gibba, labro arcuato incrassato, intus dentato" (POIRET, 1789: 21).

Description, hypotype: Shell pyriform, humped, solidly formed; terminals produced, somewhat pointedly adapically; dorsum smooth, glossy, although very finely transversely incisedly striate (concentrically) above each terminal, becoming almost obsolete centrally; base smooth, glossy, bulbously ovate, narrowing to a sharp, thickened ridge in front; upraised funicular ridge forms left wall of adapical canal; aperture curving, fairly narrow; columella not depressed; fossula excavated, walled adaxially by a short carinal ridge; outer lip numerously (35) sharply, finely, and irregularly dentate, outer lip thickened, broadly margined, scarcely shouldered above; color light mauve-brown, with outer lip, terminals and funiculum ivory to pale orange.

Measurements, type: "It is altogether 5 lignes in length and three in width and 2½ in depth."

Measurements, hypotype: L - 14.2; W - 8.2; H - 6.7 mm. (Figure *44:* C2541).

Type Locality: "Mediterranean Sea". Here restricted to Oran, Algeria (35°45′N; 0°38′W).

Type: Disposition unknown.

Distribution: Northern Greece; Neapolis [NE Greece]; Macedonia; Malta; W coast of Italy; W Mediterranean Sea; W coast of North Africa.

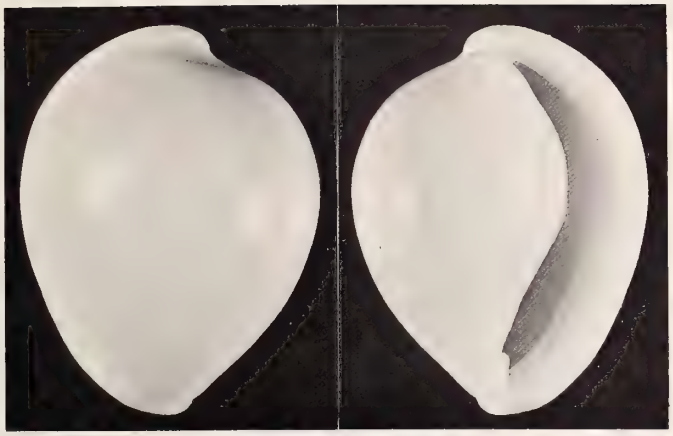


Figure 42
Globovula cottesloensis (40)

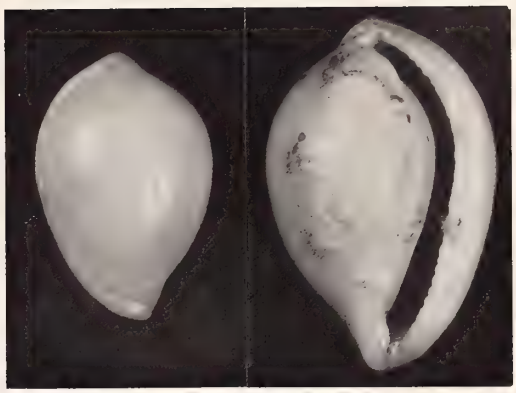


Figure 43
Globovula *margarita* (41)

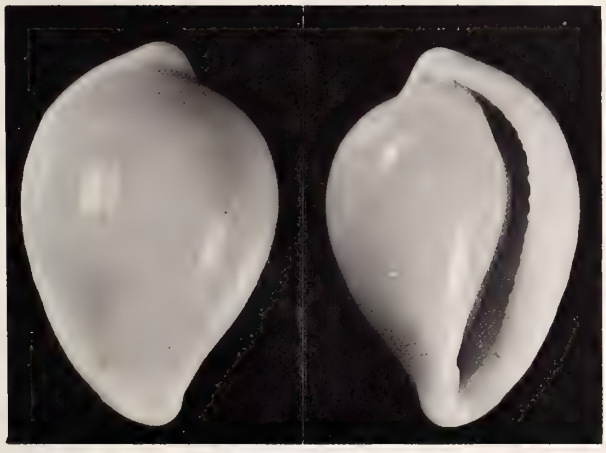


Figure 43 a
Globovula *margarita* (41)

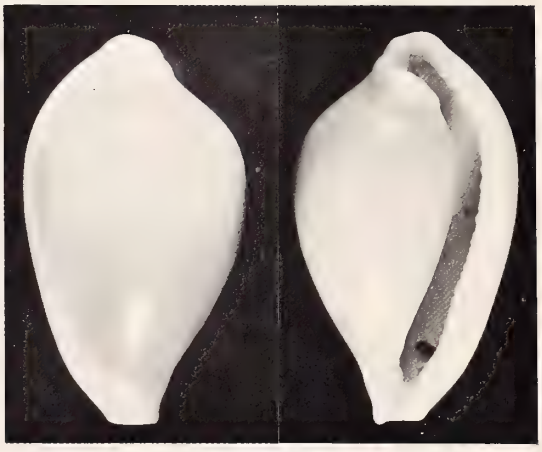


Figure 44
Pseudosimnia carnea carnea (42)

Figure 44 A
Crenavolva (Crenavolva) *borbonica* (222)

Figure 45
Pseudosimnia carnea expallescens (43)

Figure 45 A
Pseudocyphoma ***kathiewayae*** (139)

Discussion: This species has a wide range of shell colors, depending upon the locality from which it may have been collected, varying from carnelian, grey, bluish, and beige to off-white. I have been unable to locate the holotype of *Pseudosimnia carnea* (Poiret, 1789); it is not at MNHN (A.M. Testud, *in litt.*).

43. *Pseudosimnia (Pseudosimnia) carnea expallescens* Schilder, 1967

(Figure *45*: holotype)

Arch. Molluskenk. 96 (3/6): 197; fig. 2

Description, holotype: *"Pseudosimnia carnea expallescens*—The unique specimen resembles a small, almost white *Pseudosimnia carnea* Poiret with strikingly coarser labial teeth; dorsum with spiral lines towards the ends, in the center almost smooth, but with a thickened transverse inflation; outer lip thick, margined, convex, somewhat declivous on both sides, with a longitudinal depression in the anterior half, labial teeth regular, coarse, anteriorly short, posteriorly crossing more than ¾ of the lip; inner lip spirally lined, anterior terminal fold along the canal with a small knob at the proximal end, otherwise inner lip with teeth; funiculum triangularly protruding, apparently smooth but with two (2) barely perceptible transverse grooves at the apertural margin; fossula broad, arch-like, protruding, posteriorly somewhat constricted, columella with longitudinal furrow, but inside with a longitudinal fold extending to the posterior. Shell fairly solid, dorsum almost white with a tinge of yellowish, outer margin and bases pure white" (Schilder, 1967: 197).

Measurements, type: "The holotype is 7.9mm long, breadth 58% of length [4.5mm.], with 17 labial teeth."[4]

Type Locality: Dakar, West Africa, "it was probably found as an empty shell at the shore near Dakar, a more precise indication is not available"—Schilder, 1967.

Type: IFAD, No. ? [holotype].

Discussion: Schilder compared his new subspecies with *Pseudosimnia vanhyningi* (M. Smith, 1940); however, with several specimens of the Smith species at hand, it would seem to me that Dr. Schilder may have been oversimplifying the relationship of these two species (it must be said that he may have been handicapped by not having actual specimens available for comparative study).

[4] Shell dimensions as given by Schilder are: shell width is calculated by taking the average relative breadth in proportion to shell length

44. *Pseudosimnia (Pseudosimnia) vanhyningi* (M. Smith, 1940)

(Figure *46*: holotype)

1940 *Primovula (Pseudosimnia) vanhyningi* M. Smith, Nautilus 54 (2): 46; plt. 2, fig. 8

Description, holotype: *"Primovula (Pseudosimnia) vanhyningi*—Shell pale olive color; swollen in the center [pyriform, sub-rhomboid, tapering abruptly adapically, more gradually toward the front], extremities produced [roundly beaked at the rear, narrow, arcuate at the front]; shell surface covered with interrupted regularly spaced spiral lines which apparently are absent at the periphery; marginal [outer lip] teeth [approx. 20] coarse and widely spaced; [base acutely, rhomboidly pyriform, with a large, heavy, weakly formed funicular projection on rear base, weakly formed terminal ridge on the front base; columella wide, distinctly concave, outlined within and without by the angle of its excavation; fossula, a continuation of columella, is deeper, with more of an adaxial wall within]" (M. Smith, 1940: 46).

Measurements, type: "Length, 11.0; width, 7mm."

Type Locality: Off Boynton Beach, Florida, in 91m.

Type: FSM, No. UF 11079 [holotype].

Discussion: This species was named for Dr. T. Van Hyning, curator of the State Museum [Florida]. The [then] two known specimens were dredged by Frank Lyman. ~~A hypotype, USNM No. 418077, has the measurements: L 14.0; W 8.5; H 7.1mm.~~ error on p. 45

45. *Pseudosimnia (Pseudosimnia) sphoni* Cate, spec. nov.

(Figure *47*: holotype)

Description, holotype: Shell fairly large, inflated, pyriform; terminals produced, narrow in front, bluntly pointed adapically; dorsum roundly, abruptly humped centrally, tapering quickly to the front; dorsum glossy, with numerous fine longitudinal growth lines, and a limited number (6) of large, broad, distinct, transverse excavated channels (width of interstices equal to that of flat ridges) encircle adapical terminal beak; base inflatedly ovate, smooth, glossy, with a thick layer of callus; base tapers quickly to the front, where it becomes furrowed with two distinct grooves that appear to form parallel tooth-like (plicate) ridges; projecting funicular thickening on rear base; columella broad, flat, depressed, and smooth; fossular area is slightly excavated, with an adaxial wall delineating both fossula and columella; aperture

fairly narrow, straight in front, curving left at rear; outer lip thickly rounded, constricted at adapical terminal to form a narrow, projecting beak; lip sharply shouldered above, with numerous (22) strong, well developed denticles; color of shell either beige or straw colored over all.

Measurements, type: L - 14.0; W - 8.5; H - 7.1 mm.

Type Locality: USNM, Smithsonian Exped., Sta. 344; from 183 m off Key West, Florida (1916); (24°33′N; 81°47′W).

Type: USNM, No. 418078 [holotype].

Discussion: This species resembles the preceding species closely, *Pseudosimnia vanhyningi* (M. Smith, 1940), but differs from it quite markedly when the shells of the two species are compared side by side. *Pseudosimnia* ***sphoni*** is a very much larger form; it has a different adapical terminal aspect, with a curiously narrowed and projecting beak; the labial teeth are more numerous, more boldly developed; and the front base lacks the formal terminal ridge, substituting plait-like, parallel teeth.

The species is named for Gale Sphon, Curatorial Assistant of Invertebrate Zoology, LACM, who has assisted the author materially in this work.

46. *Pseudosimnia (Pseudosimnia)* ***pyrifera*** Cate, spec. nov.

(Figure *48*: holotype)

Description, holotype: Shell small, pyriform, bulbously humped centrally; terminals produced, beaked, rounded and spatulate in back; dorsum sub-glossy, numerously evenly,, transversely incisedly striate overall; base inflatedly ovate, faintly striate under a thin callus, tapering abruptly to the front, with an unusual triangular, semiconoidal funicular projection at the rear (projecting in such a manner that it is visible from the dorsal plane of the shell); columella rounded, striate, without longitudinal depression; fossula smoothly depressed, longitudinally walled within; aperture fairly broad, curving; outer lip broad, rounded, with numerous (18) well developed, heavy, thickly formed teeth, short in front, longer in back; dorsum brownish-mauve, with an indistinct pale grey central band and with almost obscure touches of gold lining in the right marginal suture; terminal channels pale yellow-orange; terminals, side margins, base, outer lip, shell interior brilliant white.

Measurements, type: L - 9.1; W - 5.1; H - 4.1 mm.

Type Locality: USNM, Smithsonian Exped., Barbados Sta. 437; from 176 m; rocky bottom; off telegraph station, Barbados (13°15′N; 59°30′W). Lesser Antilles.

Type: USNM, No. 460466 [holotype].

Discussion: This new species resembles the Mediterranean species, *Pseudosimnia carnea* (Poiret, 1789), in shell shape, but differs distinctly otherwise. The most outstanding differences are the dorsal striation in this species, the unusual funicular development, the more sharply pyriform shell, and the different shell colors and color distribution. The new name is derived from the Latin *pirum* (*pyrum*), meaning pear.

(Diminovula) Iredale, 1930

Mem. Queensland Mus. **10** (1) **2**: 85

Type species: *Diminovula verepunctata* Iredale, 1930 [OD] = *Ovulum alabaster* Reeve, 1865

Shells are small, pyriform, sub-ovate, broadly humped, dorsally incisedly striate, normally with characteristic dorsal spotting (usually 6 in groups of two) in most instances.

Discussion: On examining the species in this subgenus, it becomes apparent that it comprises a complex comparable to the cypraeid genus *Cribrarula* wherein the cowrie species all possess a common characteristic of dorsal spotting; i.e. *Cribrarula cribraria* (Linnaeus, 1758), *C. cribellum* (Gaskoin, 1849), *C. esontropia* (Duclos, 1833), *C. gaskoini* (Reeve, 1849), and *C. catholicorum* (Schilder & Schilder, 1938). In *Diminovula* the shells all have a similar pattern of color-punctations usually in varying intensities of brown. In some instances the intensity of color is deep and significant; at other times it may become almost indiscernible, on occasion with some of the shells lacking color spotting entirely. The size of the spotting, where present, may vary.

47. *Pseudosimnia (Diminovula) alabaster* (Reeve, 1865)

(Figure *49*: holotype)

1843 *Ovula cristallina* Kiener, (auctt.), Icon. Coq. Viv., *Ovula*: plt. 4, fig. 3 (Figure *50*: type)
1865 *Ovulum alabaster* Reeve, Conch. Icon., *Ovulum*: plt. 5, figs. 23a, 23b
1881 *Ovula alabaster*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 183; plt. 47, figs. 9, 12
1885 *Ovula lactea* Tryon, Man. Conch. **7**: 247
1930 *Diminovula lactea*; Iredale, Mem. Queensld. Mus. **10** (1) 85 (Figure *51*: holotype)
1941 *Pseudosimnia (Diminovula) cristallina* = ***alabaster***; Schilder, Arch. Molluskenk. **73** (2/3): 107
1941 *Pseudosimnia (Diminovula) verepunctata*; Schilder, Arch. Molluskenk. **73** (2/3): 107

Figure *46*
Pseudosimnia vanhyningi (44)

Figure *47*
Pseudosimnia sphoni (45)

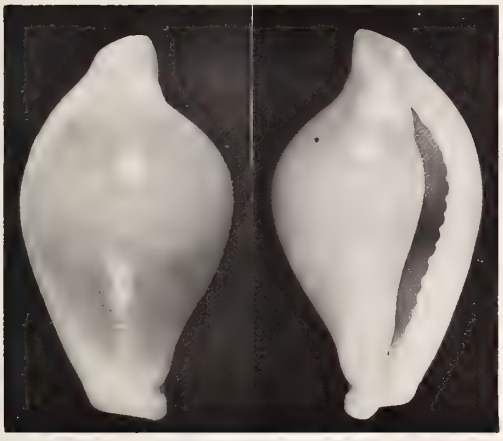


Figure *48*
Pseudosimnia pyrifera (46)

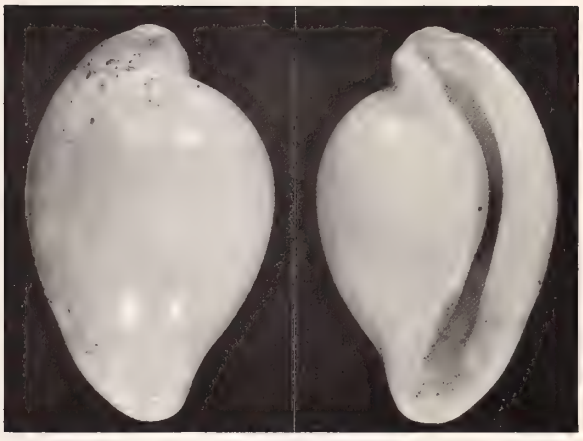


Figure *49*
Pseudosimnia (Diminovula) alabaster (47)

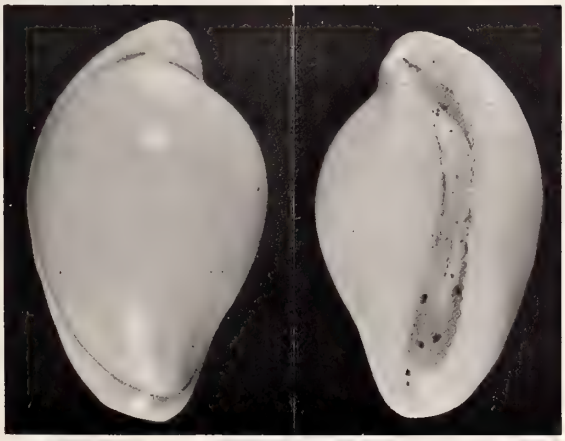


Figure *49* a
Pseudosimnia (Diminovula) alabaster (47)

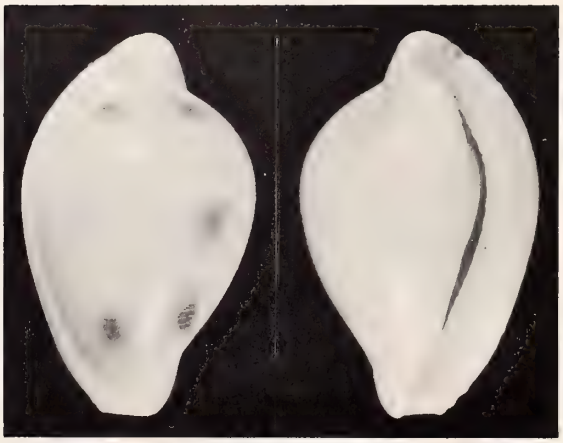


Figure *49* b
Pseudosimnia (Diminovula) alabaster (47)

1956 *Primovula (Diminovula) verepunctata;* Allan, Cowries World Seas: 123
1956 *Primovula (Diminovula) cristallina;* Allan, Cowries World Seas: 123

Description, holotype: "*Ovulum alabaster*—Shell somewhat pyriformly ovate [small, narrowly humped], transparent white [milk-white to a very pale grey, with a distinct golden line encircling shell at marginal suture, and dorsum may be punctate; often there are six uniformly arranged pale brown spots, although punctation may be entirely absent], back transversely incisely striated [dorsum inflatedly humped, sub-glossy; base dull, convexly ovate, narrowing toward the front, abapical terminal ridge may be weak or it may be well defined], extremities rather produced [with a peculiar projection and curvature at the rear terminal beak], aperture curved [wide], columella callously ribbed at the upper part [a triangular funicular projection, crested with 3 or 4 heavy crenulations, which defines left wall of adapical canal], excavated at the lower [columella smooth, very broad, depressed, becoming deeper in front to form fossula], scarcely plaited [longitudinally carinate within; outer lip broad, curving, convexly edged; numerously but weakly denticulate, with teeth seeming longer at either end of lip]" (Reeve, 1865: "fig. 23").

Measurements, type: not known.

Measurements, hypotype: L - 7.5; W - 4.5; H- 4.1 mm. (Figures *49*a–b: C3700)

Type Locality: "Hab. Senegal—Reeve." New type locality here designated as Geralia, Exmouth Gulf, West Australia (22°00′S; 114°15′E); this species appears to be unknown from West Africa.

Type: BMNH, No Acc. no.-1829, lectotype herein; there are two shells in the type lot, the second a paratype.

Distribution: Moreton Bay, Queensland; East Indies, New Guinea to Singapore; Malaysia to India; Sulu Sea; Philippines; Taiwan; Ryukyu Islands; Japan (Kii-Tosa, off Kii Peninsula).

Discussion: *Ovula cristallina* Kiener, 1843, has been alluded to by authors as identical with this species; it has also been compared with *Diminovula verepunctata* Iredale, 1930. *Pseudosimnia verepunctata* and *P. alabaster* differ distinctly from the Kiener species by having a constant, different shape, transversely incised dorsally (striation is unusually clearly evident even on well worn shells). In describing his shell Kiener (1843) was careful to say, "La surface est lisse." Kiener's species, questionable at best, becomes even more obscure since he cited no type locality for the shell. Schilder (1932: 51) says, in regard to the Kiener species, "The type specimen preserved in the Paris Museum is now worn and calcified—the description and figure seem to fit only a pellucid *alabaster;* besides two shells labeled as *cristallina* in the coll. of the late Dr. Dautzenberg, correspond to *alabaster,* Reeve." It should be noted that Reeve (1865) designated the type locality of *alabaster* as Senegal [West Africa], which, as we understand the distribution of the species today, appears to be erroneous. I do not consider the Kiener species valid.

48. ***Pseudosimnia (Diminovula) aurantiomacula*** Cate & Azuma, spec. nov.

(Figure *52*, *52*C: holotype)

Description, holotype: Shell small, ovate, thin, sub-translucent; side margins converge abruptly to form subpointed terminal projections at either end, more so adapically; dorsum inflatedly humped, transversely striate over all; base evenly ovate, very finely striate, sub-glossy; a weak terminal ridge may be seen abapically, with a long, low funicular thickening at rear base; columella flattened, barely concave, with a broad shallow fossula in front, and a low adaxial longitudinal carinal wall outlining both; aperture is broad, with an even, gentle curvature; outer lip broad, reflexed convexly inward with widely spaced, fairly well developed teeth (16) along inner edge; shell color basically pale glassy-grey, with a pale lemon to butter-yellow shade superimposed, over which are three bands of bright orange color blotches; a bright orange line encircles right side of shell, extending over terminal beaks.

Measurements, type: L - 6.3; W - 3.8; H - 3.3 mm.

Type Locality: 2 km off Kirimezaki, Kii Peninsula, Japan (34°00′N; 134°48′E); at 55 - 91 m; leg S. Habu, March 1971.

Type: MA, No. 15643 [holotype].

Discussion: This new species seems to approach *Pseudosimnia alabaster* (Reeve, 1865) in overall shell outline, but differs from it in several ways: it is a slightly smaller, more delicate form; it has considerably fewer teeth on the outer lip, a more conservative funicular projection on the rear base, and it lacks the crenulation seen in the Reeve species. It also has a noticeably smaller, more rounded anterior canal opening and a peculiar orange dorsal color spotting.

The name is derived from a combination of Latin words *aurantium,* meaning orange and *macula,* meaning spotted.

49. *Pseudosimnia (Diminovula) caledonica* (Crosse, 1872)

(Figure *53*: holotype)

1872 *Ovula caledonica* Crosse, Journ. de Conchyl. **20**: 62; plt. 2, fig. 1
1885 *Ovula pudica* Tryon, Man. Conch. **2**: 247; plt. 2, figs. 29 - 31
1941 *Prionovolva caledonica;* Schilder, Arch. Molluskenk. **73** (2/3) : 106
1956 *Prionovolva brevis* Allan, Cowries World Seas: 125

Description, holotype: *"Ovula caledonica*—Coquille ovale-piriforme [somewhat narrowly elongated, large for the genus], atténuée et brièvement sub-rostrée aux deux extrémités, peu luisante, paraissant à peu près lisse, à l'oeil nu, mais présentant en réalité, vue à la loupe, de petites stries transverses, croisées par de petites lignes longitudinales, peu nombreuses et peu apparentes. [Base smooth, glossy, ovate, becoming constricted in front, with a fairly sharp mostly smooth funicular ridge in back.] Coloration d'un rose très-clair [or white], avec les extrémités blanches, et quelques petites taches peu visibles et d'un brun clair, au sommet de la parties dorsale. Ouverture étroite [openly wide, more so in front], arquée et d'un rose claire, à l'intérieur. Péristome d'un blanc de lait; bord columellaire muni, à sa partie supérieure; d'un forte callosité, et sensiblement excavé, à sa partie inférieure; bord externe [thickened, roundly formed] obscurément denticulé et d'un blanc lacté uniforme, des deux cotés." (Crosse, 1872: 62)

Measurements, type: "Plus grand diamètre de la coquille 13 millimètres, plus petit 8, hauteur totale 7." [L - 13.6; W - 8.6 mm, approx.]

Type Locality: "Arnède islet," at the lighthouse, near Noumea, New Caledonia [22°14′ S; 166°30′ E].

Type: MNHN, presently without No. [holotype].

Discussion: Crosse made the following observations in regard to this species: "Several specimens have been collected with the animal by the aid of a dredge (E. Marie). This species is very close to *O. margarita* Humphrey [sic] and *O. pyrulina* Adams, but it is distinguished by its rosy coloring, by the light brown specks on its dorsum, and by the system of little striae, which intersect each other. Moreover, the first of those spp. is a clear white and the second a livid white, whereas ours is a rosy color. The 3 spp. have, further, much resemblance among them in general form, all three that peculiarity where, with respect to the spire, the outer lip extends well beyond the inner lip."

This Crosse species, it appears, may easily be only a variety of *Pseudosimnia alabaster* (Reeve, 1865), seeming to vary mostly in the make-up of the rear apertural-canal-terminal area, and shell size. I have seen only the photographs, not the type specimen itself; therefore I am separating the Reeve and Crosse species provisionally.

50. *Pseudosimnia (Diminovula) incisa* Azuma & Cate, 1971

(Figure *54*: holotype)

1971 *Pseudosimnia (Diminovula) incisa* Azuma & Cate, The Veliger **13** (3) : 262; fig. 3

Description, holotype: Shell small, solid, narrow, ovate; terminals produced, blunt in front, rounded in back; dorsum sub-glossy, with evenly rounded, numerous transverse incised striae overall; base ovate, smooth, sub-glossy, narrowing thickly to the front; a thick, multi-knobbed funiculum covers end of adapical base; columella broad, deep, curving, deepening into a long concave fossula, both columella and fossula outlined adaxially by a thick longitudinal carinal ridge; aperture broad, curving; outer lip broad, roundly shouldered above, with numerous large, though weakly formed teeth; dorsum light grey overall with irregularly sized large diffused punctations of bright orange; base light grey; adaxial carinal wall, funiculum, outer lip and teeth milk-white; terminal canals orange.

Measurements, type: L - 5.2; W - 2.7; H - 2.4 mm.

Type Locality: 3 - 4 km off Hinomisaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 91 - 128 m, living on the host, *Solenocaulon chinense* Kükenthal; leg. Azuma.

Type: MA, No. 14843 [holotype].

Discussion: This species may be compared with *Pseudosimnia punctata* (Duclos, 1831), but it differs from it by being a much more slender shell with more elongate terminal processes, a straighter aperture, a crenate funiculum, and its teeth at the rear of the outer lip project beyond the periphery of the lip; also, the dorsal spotting of *P. incisa* is less distinct than that of *P. punctata.*

51. *Pseudosimnia (Diminovula) striola* Cate, spec. nov.

(Figure *55*: holotype)

Description, holotype: Shell small, ovate, evenly proportioned; dorsum semi-glossy, deeply traversed with incised grooves throughout; terminals curiously produced, gently recurved adapically, semi-beaked and square in front; base bulbously ovate, with a thickened nacreous callus over most of base, base narrowing sharply in front parallel to terminal ridge; a broad, many-sectioned funiculum curves perpendicularly to rear shell base to form

Figure *50*
Ovula cristallina (47)

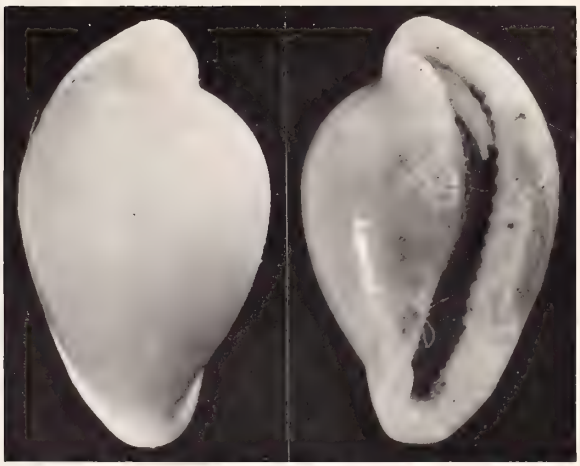


Figure *51*
Diminovula verepunctata (47)

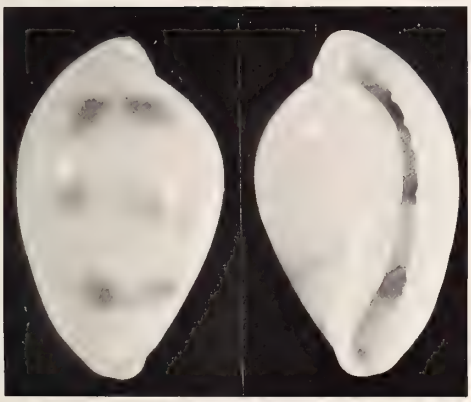


Figure *52*
Pseudosimnia (Diminovula) aurantiomacula (48)

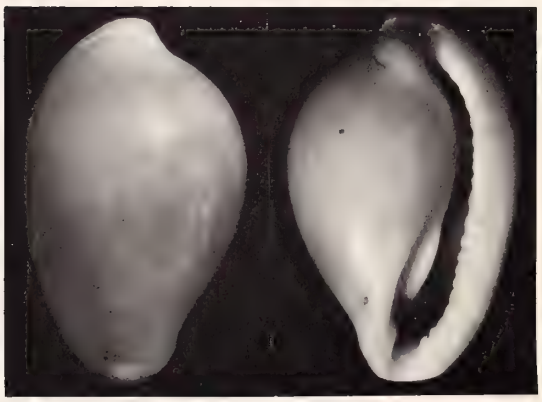


Figure *53*
Pseudosimnia (Diminovula) caledonica (49)

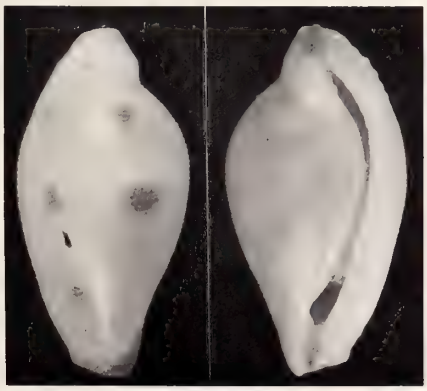


Figure *54*
Pseudosimnia (Diminovula) incisa (50)

Figure *55*
Pseudosimnia (Diminovula) striola (51)

an unusual terminal beak projection; aperture wide, curving; outer lip broad, flattened inwardly, sutured and shouldered above, and heavily denticulate on inner edge of outer lip, forming bumps and some irregularity on outer edge; color pale beige-yellow, with teeth, outer lip side margin, base callus and terminals a contrasting milk-white.

Measurements, type: L - 4.0; W - 2.1; H - 2.0 mm.

Type Locality: Int. Indian Ocean Exped., Anton Bruun Sta. 36A (13°00′N; 97°41′E), March 30, 1963; 68 m; mud, shell; 35 mi. W of Tavoy Id., Andaman Sea, south Burma.

Type: ANSP, No. 292804 [holotype].

Discussion: The name of the new species is derived from the Latin, and is suggested by the dorsal striation seen on the shell. It vaguely resembles *Pseudosimnia (Diminovula) incisa* (Cate, 1971) in general outline, but differs from it markedly otherwise: it has a much heavier, coarser dorsal striation, differently formed terminal processes, fewer and larger outer lip teeth, and lacks the dorsal color spotting. The type of *P. **striola*** is damaged by a hole on the left rear dorsum.

52. *Pseudosimnia (Diminovula) **perilla*** Cate, spec. nov.

(Figure *56*: holotype)

Description, holotype: Shell small, somewhat inflated, though narrowly pyriform; rear terminal produced, beaked, narrower and blunt in front; dorsum transversely incised, grooved throughout; base roundly inflated, narrowing sharply to the front, mostly smooth from thin nacreous layering; front terminal ridge straight and well formed; rear funicular projection very thickly, triangularly formed, crenate, lengthening to form the terminal beak on the left side at an oblique angle with the outer lip; aperture curving, becoming wider abapically; columella broadly depressed, with a longitudinally thickened carina forming the inner wall; fossula long, deep, and sharply angled with the base; outer lip broad, thickened, rounded, and shouldered above, with fairly well developed, widely separated teeth that cross the lip; color is milk-white overall.

Measurements, type: L - 5.0; W - 2.5; H - 2.4 mm.

Type Locality: Int. Indian Ocean Exped., Anton Bruun Sta. 19; in 42 m, sandy mud; 25 miles NNW of Phuket Island, Andaman Sea, West Thailand (08°29′N; 97°59′E); 23 March 1963.

Type: ANSP, No. 291499 [holotype].

Discussion: Another specimen, USNM No. 280946A, from the Smithsonian Exped. Sta. 5192, was taken from 32 fathoms in green sand off SE Bantayan Island, Philippines. This new species seems to be somewhat like the preceding species, *Pseudosimnia (Diminovula) **striola*** Cate, but on close inspection it exhibits more numerous, much finer transverse dorsal striations; it has less tortuous and recurved adapical terminal beaks, and the front terminal end is more delicately formed; it has a smoother, more continuous funicular ridge on the rear base, and noticeably fewer teeth on the outer lip. The name is derived from the Latin *perillus*, honoring an Athenian metallurgist, Πέριλλος, who cast a brazen bull in which criminals were to be shut up and roasted, and who was the first to suffer death by it.

53. *Pseudosimnia (Diminovula) punctata* (Duclos, 1831)

(Figure *57*: C3694)

1831 *Ovula punctata* Duclos, Mag. Zool. 1083: 7; plt. 7, figs. 2, 3
1848 *Ovulum punctatum*; Sowerby 2nd, Thes. Conch., *Ovulum* 2: 471; plt. 101, figs. 90 - 92
1941 *Pseudosimnia (Diminovula) punctata*; Schilder, Arch. Molluskenk. 73 (2/3): 107
1956 *Primovula (Diminovula) punctata*; Allan, Cowries World Seas: 122

Description, holotype: *"Ovula punctata*—O. testa ovato-oblonga [shell fairly large for this group], inflata [bulbously pyriform], alba [shell color mostly porcelain white, with a golden line encircling the shell at angle of the side-margin suture and over the terminal beaks], utrinque subrosata [broad sub-centrally], striata [dorsum finely transversely striate (striations may be almost obscure on the central dorsum)], rubro-punctata [with three transverse rows of fairly large orange-brown spots on dorsum (usually two spots to a row, widely spaced)]; labro marginato [outer lip numerously, though weakly dentate]; columella anterius concava" (Duclos, 1831:7) [fossula fairly deep]; [terminals pointedly produced, well formed; base smooth, bulbously-ovate, tapering abruptly to form a straight terminal ridge in front; an evenly formed funicular projection provides the left rear canal wall; columella smooth, broad, concave, with a longitudinal carinal ridge outlining it adaxially; aperture narrow, curving left adapically].

Measurements, type: "Long. 7 mill."

Measurements, hypotype: L - 10.0; W - 6.5; H - 5.8 mm (Figure *57*a: C3694).

Type Locality: "Habite l'île Bourbon. Ma collection. Duclos. Septembre 1828"; [= Reunion Island, Indian Ocean (21°06′S; 55°36′E)].

Type: Location apparently unknown. I have been unable to locate the Duclos specimen; since his collection of shells was sold indiscriminately (see DANCE, 1966: 201) it is probable the type has become lost.

Distribution: Cabcaben, Bataan, Manila Bay, Philippines; Mackay, Queensland, east Australia.

Discussion: Of this species, Duclos commented: "This little shell of rare elegance is remarkable in a particular manner, by the fineness of its striae and its dorsal punctation, description of which no one seems to have mentioned in the different species which comprise the genus *Ovula*. It is oval-oblong, inflated, white, the back ornamented with six round points [spots] of a reddish color, placed two by two in a uniform manner; the right border margin [lip] is finely denticulate in the interior; the left or columella is very smooth and concave, in the form of a gouttière [fossula]. This species is one of the most beautiful of the genus."

Many localities have been cited for this species (SCHILDER 1941: 107), but since the identifications are uncertain it will be necessary to reevaluate its distributional range; those collecting stations listed in this work have been verified. (Figure 57: orig. illustr.).

54. ***Pseudosimnia (Diminovula) whitworthi*** **Cate, spec. nov.**

(Figure 58: holotype)

1970 *Prionovolva brevis* (Sowerby, 1828), Azuma, Venus **28** (4): 179; text fig. 2

Description, holotype: Shell small, pyriform, well proportioned; terminals prominent, roundly pointed adapically; dorsum humped, roundly inflated, very finely, numerously striate throughout; base ovate, smooth, narrowing to the front as a thickened upraised ridge; terminal ridge short, inconspicuous; funiculum wide in front, narrowing as a series (3) of knobs, to become left wall of adapical terminal canal; columella wide, depressed, outlined adaxially by a ridge, and finely, transversely striate, striation encompassing the broad, deep, well formed fossula; outer lip broad, roundly thickened, shouldered above, numerously denticulate (18) with well formed teeth; aperture moderately wide throughout; shell color basically pale grey, with three transverse bands of rose, upon which are superimposed six large, diffused spots of deep rose (cf. *punctata* for comparable arrangement); base pale beige-white, faintly pale rose-banded; columella and fossula depression medium rose color; terminal canals pink; outer lip, terminals, basal ridge, and funiculum off-white.

Measurements, type: L - 8.3; W - 5.3; H - 4.4 mm.

Type Locality: Ogokuda, Kii; Ogokuda Beach in Shionomisaki, South Kii, Japan (34°00′N; 134°48′E).

Type: CAS, No. 13322 [holotype].

Discussion: The species is a small one, but very beautiful, and probably is not very distant from *Pseudosimnia punctata* (Duclos, 1831). It differs from it, however, by being a generally smaller form, more numerously and distinctly striate; by being more ovate in outline, less angularly pyriform; by being smaller, less inflated on the base; by having more highly developed labial teeth; by a much less conspicuous basal ridge and by the outstanding color and pattern.

(Inflatovula) **Cate, subgen. nov.**

Type species: *Ovulum marginatum* Sowerby 1st, 1828

Shells are solid, well formed, inflatedly pyriform, with a bulbous body whorl; the outer lip is usually dentate. The name for this new subgenus is derived from the Latin word, *inflatus*, for puffed up, swollen.

55. ***Pseudosimnia (Inflatovula) marginata*** **(Sowerby 1st, 1828)**

(Figure 59: holotype)

1828 *Ovulum marginatum* Sowerby 1st, Zool. Journ. London **4**: 151
1843 *Ovula marginata*; Kiener, Icon. Coq. Viv., *Ovula* **2**: 7; plt. 3, fig. 1
1887 *Ovula adamsi*; Paetel, Cat. Conch. Samml. **1**: 325
1941 *Prionovolva marginata*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Prionovolva) marginata*; Allan, Cowries World Seas: 126

Description, holotype: "*Ovulum marginatum*—Shell of a rather oblong oval form [shell large, inflated, sub-pyriformly ovate, sub-glossy, lightweight in construction], and obtuse at both extremities [terminals weakly produced], white, particularly in front [milk-white over all]; the back with a number of slightly raised transverse lines [low angular ridges, which may not always be readily apparent; dorsum also very closely, finely, transversely, incisedly striate overall; base smooth, glossy, convexly ovate]; border of the outer lip rounded, denticulated on the inner edge [unevenly thickened overall, weakly shouldered above], depressed and plicato-denticulated [teeth length-

Figure *96* C *Primovula (Adamantia) rutherfordiana* (91)

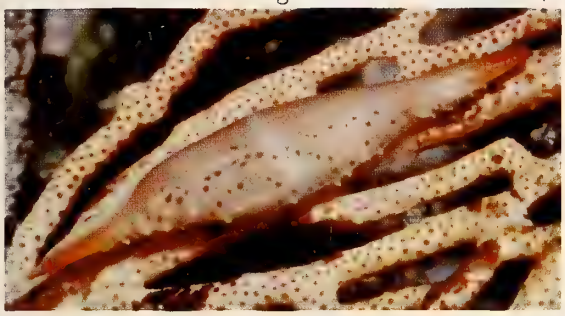


Figure *242* C *Phenacovolva (Calcaria) tokioi* (211)

Figure *103* C *Crenavolva (Crenavolva) renovata* (100)

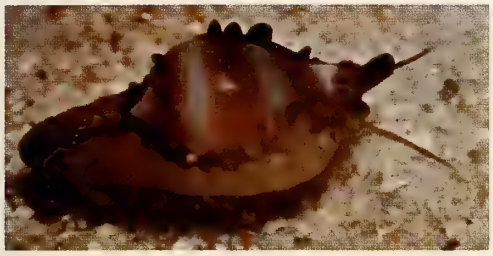
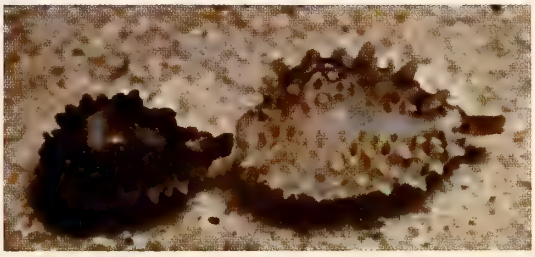


Figure *30* C *Margovula bimaculata* (29)



M. bimaculata (29) Figure *96* C *P. rutherfordiana* (91)

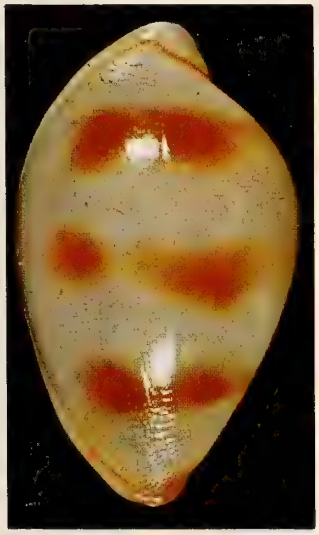


Figure *52* C
Pseudosimnia (Diminovula) aurantiomacula (48)

Figure *107* C
Crenavolva (Crenavolva) rosewateri (101)

Figure *101* C
Crenavolva (Crenavolva) striatula striatula (96)

ened like folds] near the lower [abapical] end; upper [adapical] part of columella with a strong pliciform tooth [funiculum]; columella flatly depressed, near the base it is depressed [into a shallow fossula], and below it has a prominent fold or tooth [terminal ridge]; outer border of the lips with an orange line [a golden line encircles shell prominently, in the outer suture of the lip; front terminal ridge is a continuation of a longitudinal carinal ridge which outlines columella and fossula within; aperture fairly straight, curving gently to the rear, wide, becoming more open to the front]." (SOWERBY 1st, 1828: 151)

Measurements, type: "long. 17/20, lat. 5/10, poll."

Measurements, hypotype: L - 23.1; W - 13.7; H - 12.0 mm (Figure *59*a: C3572).

Type Locality: Not given. Here designated as Carigara Bay, Leyte, E Philippines (11°20′N; 124°40′E).

Type: BMNH (Taylor, *in litt*), No. 1969138 [presumed holotype].

Distribution: Malabar, India; New Caledonia; Taiwan; Ryukyu Islands, and Japan.

Discussion: This species is only fairly common, with the center of distribution evidently in the Philippines area. It should be noted that the shells of this species are quite variable in their morphology from one locality to another. Some of these variations are illustrated in the figures of the type and hypotype shown here. As seen in the type figure, dorsal striation is almost absent [Sowerby mentioned only "—the back with a number of slightly raised transverse lines [angular ridges]—"]. The shells from the Taiwan area seem to agree most closely with the holotype [according to the Sowerby observation], particularly in outline, and the dorsal transverse angular ridges. The shells from the Philippines, as illustrated here by the hypotype, vary considerably both in outline and in dorsal striation, and lack the angular ridges. No attempt will be made here to separate these variants.

56. *Pseudosimnia (Inflatovula) coroniola* Cate, spec. nov.

(Figure *60*: holotype)

Description, holotype: Shell subfossil, fairly large, inflated, sub-glossy, pyriformly-ovate, rather highly humped sub-centrally; terminals somewhat produced, almost sharply so in back; dorsum smooth, without dorsal striation, except that a few very faint concentric lines emanate from the rear beak (seen only under high magnification); base convexly ovate, tapering abruptly to the front to form a narrow callus ridge that ends obliquely on a very short terminal ridge; in back a three-sectioned funicular projection forms left wall of rear terminal canal; columella smooth, wide, depressed, deepening in front to form fossula; both columella and fossula are adaxially defined by an elevated longitudinal carinal ridge; aperture somewhat wide, curving left adapically; outer lip thickened, rounded, subreflexed, with short, sharp, very highly developed teeth (24); shell color autumnal-rose, with large diffused spots irregularly distributed over dorsum; marginal callus (left side) pale rose; base, funiculum, and teeth pale ivory; interstices pale yellow; interior of shell and terminal canals bright rose.

Measurements, type: L - 13.9; W - 10.0; H - 7.4 mm.

Type Locality: Off the Kii Peninsula, Kii, Japan (34° 00′N; 134°48′E)

Type: ANSP, No. 244834A [holotype].

Discussion: This new species seems quite distinct from any other form. The holotype was trawled in deep water and is apparently unique. This species is smaller than the preceding form, *Pseudosimnia marginata* (Sowerby 1st, 1828), and differs from it by being mostly without dorsal incised striation and upraised angular ridges, except for a few limited concentric lines emanating restrictedly from either terminal; by the lack of a heavy adaxial carinal wall at the fossula; by having a weaker, poorly developed front terminal ridge; and by having a beautiful combination of shell colors, a condition never seen in *P.* (*Inflatovula*) *marginata.*

The name is derived from the Latin word for autumnal rose color.

57. *Pseudosimnia (Inflatovula) sinensis* (Sowerby 3rd, 1874)

(Figure *61*: C3598)

1874 *Ovulum sinensis* Sowerby 3rd, 1874, Proc. Zool. Soc. London: 599; plt. 72, fig. 1
1887 *Ovula sinensis;* Paetel, Cat. Conch. Samml. **1**: 325
1941 *Prionovolva sinensis;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Diminovula) sinensis;* Allan, Cowries World Seas: 123
1958 *Pseudosimnia (Margovula) sinensis;* Kuroda, Venus **20** (2): 168

Description, holotype: "*Ovulum sinense*—Shell [sub-] pyriform, ventricose, somewhat attenuated posteriorly, slightly beaked at both ends, rather thin, semi-transparent, white [milk-white], encircled with an orange line at the margin [there are also four large, diffused, widely spaced, pale brown spots, two at either end of shell away from ter-

minal collars], very obscurely decussated [dorsum is uneven, sub-glossy, with very fine incised, transverse striation overall, decussated longitudinally with numerous fine growth lines, both of these are crossed by widely spaced, transverse, slightly upraised, angular ridges, which parallel fine dorsal striae, and cover entire dorsum; base inflatedly ovate, glossy, thinly layered with transparent callus, permitting visibility of transverse striation and angular ridge beneath; base tapers quickly to a short terminal ridge curving inward and downward in front]; aperture rather wide, arched [curving], milk-white within; columella with a thickened ridge [funiculum] at the upper part [funiculum long, low, sub-serrated], somewhat excavated below [columella fairly broad, shallowly depressed, deepening, and with the aid of an adaxial wall, forms a broad, shallow fossula], with a strong plait [terminal ridge] at the [abapical] canal; outer lip denticulate [roundly thickened, hardly shouldered above, and with numerous (24) fairly well developed teeth]." (Sowerby 3rd, 1874: 599)

Measurements, type: "long. 30, lat. 19, alt. 13. mill."

Measurements, hypotype: L - 21.0; W - 13.7; H - 11.4 mm. (Figure *61:* C3598)

Type Locality: "Hab. Hongkong (Cuthill, two specimens)."

Type: I have been unable to locate the holotype. The figured hypotype, however, appears to be almost an exact likeness of the Sowerby specimen.

Distribution: Kaohsiung, Taiwan (trawlers); Ryukyu Islands; Southwest Seas of Japan.

Discussion: Sowerby mentioned that there is a specimen of this species in the British Museum, which was placed with "*O. adriaticum,*" from which he says it differs considerably in form and structure, being much stronger and more ventricose. It must also be compared with *Pseudosimnia marginata* (Sowerby 1st, 1828), from which it differs by having more numerous, evenly formed teeth on the outer lip; by its rounder, more inflated form; by the less produced, lengthened terminal processes; by the basal callus, and the more uneven, poorly developed funiculum.

58. *Pseudosimnia (Inflatovula) kandai*
Cate & Azuma, spec. nov.

(Figure *62*: holotype)

Description, holotype: Shell large, inflated, pyriformly ovate; terminals produced, curiously reflected, especially abapically; dorsum smooth, glossy, with limited concentric striation emanating from adapical beak, hardly any or none at all from the front terminal; base large, roundly ovate, smooth, glossy, with a narrow thickening of base to the front, where it joins an acutely curving, oblique terminal ridge; a large, heavily calloused, triangular funiculum on rear base; columella broadly depressed, deepening as a fossula abapically, with an adaxial carinal wall outlining both; aperture broad, gently curving, becoming wider abapically; outer lip broad, edge rounded, with numerous (28) well developed teeth; color pale beige overall, with large, irregularly placed pale brown blotches on both dorsum and base.

Measurements, type: L - 12.0; W - 8.9; H - 6.2 mm.

Type Locality: 2 km off Kabae, Oita Prefecturate; in 2 - 37 m (33°14'N; 131°35'E); leg. M. Kanda; *ex* M. Azuma.

Type: MA, No. 15641 [holotype].

Discussion: This new species may be compared with the Philippine *Pseudosimnia marginata* (Sowerby 1st, 1828), from which it differs by having a much smaller shell; by having a broader, more curving aperture; the outer lip has more fully produced teeth; the dorsum lacks the bold striation seen in *P. marginata;* it also is a more colorful species, with a characteristic surface ornament, and it lacks the circumferential golden line at the margin seen on the Sowerby species. The name of this species honors Mr. Masato Kanda, Kyusyu, Japan, a friend and coworker of Masao Azuma.

59. *Pseudosimnia (Inflatovula) translineata*
Cate, spec. nov.

(Figure *63*: holotype)

Description, holotype: Shell sub-pyriform, inflated, subglobose, bulbously humped; terminals barely produced, pointed adapically, less so in front; dorsum glossy, with widely separated transverse incised grooves throughout; base globosely ovate, incisedly grooved, becoming a subterminal ridge in front, with a long, upraised, curving funicular ridge that forms the left rear terminal canal wall; columella broadly depressed, incisedly grooved, becoming deeper in front to form a distinct fossular cavity, having an upraised ridge within; outer lip broad, thickly, heavily formed, with large well developed teeth (26); color ivory-grey throughout.

Measurements, type: L - 9.3; W - 5.6; H - 4.8 mm.

Type Locality: Ostheimer, Orr, Powell Expedition; Sta. 511, in 15 m of water; ½ mile off Kaipoeri Village, Koero-

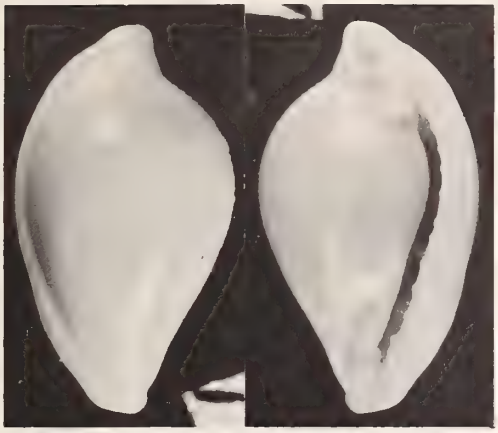


Figure 56
Pseudosimnia (Diminovula) ***perilla*** (52)

Figure 57
Pseudosimnia (Diminovula) punctata (53)

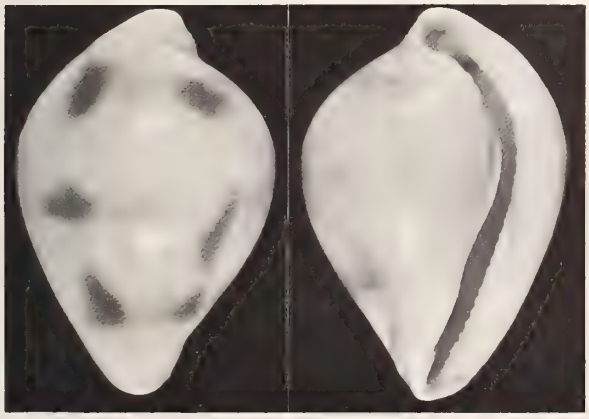


Figure 57 a
Pseudosimnia (Diminovula) punctata (53)

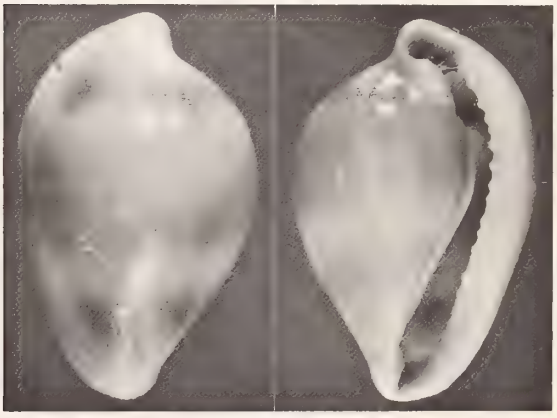


Figure 58
Pseudosimnia (Diminovula) ***whitworthi*** (54)

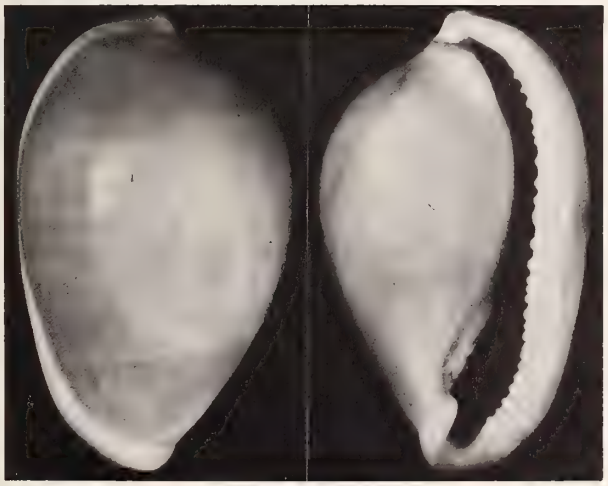


Figure 59
*Pseudosimnia (**Inflatovula**) marginata* (55)

Figure 59 a
*Pseudosimnia (**Inflatovula**) marginata* (55)

edoe Island, Geelvink Bay, New Guinea (02°30′S; 135° 30′E); 10 February 1956.

Type: ANSP, No. 277971 [holotype].

Discussion: Although distinct as a species, I have chosen to compare it with another new taxon, ***Aperiovula jeanae*** Cate; their only resemblance is in their shell outline. ***Pseudosimnia translineata*** differs from ***A. jeanae*** by being a much smaller species; by having a colorless, very pale grey appearance; by having fairly well developed teeth on the inner edge of the outer lip; by having the adapical terminal less produced, less beaked; and by having a more conservative front terminal, without any reflection. This new species name is derived from the compounding of two Latin words: *trans,* meaning over, across and, *lineatus* meaning geometrical lines, a physical feature very apparent in this species.

60. *Pseudosimnia (Inflatovula) culmen* Cate, spec. nov.

(Figure *64*: holotype)

Description, holotype: Shell fairly large for this group, glossy, globosely pyriform; terminals produced, projecting in a narrow, lanceolate manner adapically; dorsum numerously incisedly transversely striate away from either end, with more widely spaced, angular semi-carinal ridges crossing the central dorsum; base smooth, glossy, inflatedly ovate, tapering toward the front to become a sharp callus ridge, ending on a short terminal ridge; a low, elongate funicular projection forms the rear canal wall; columella slightly thickened, flattened, hardly depressed, deepening in front to form a broad shallow fossula, the latter defined adaxially by a carinal wall; aperture curving, narrow in back, becoming more open at constriction of outer lip; outer lip roundly thickened, somewhat reflected, and dentate with numerous (22) fairly well developed teeth, whose broad interstices often possess rudimentary teeth; shell color rosy-grey over all, with medium sized irregular light brown dorsal punctations dorsally (7 on the type), and a bright golden-orange line encircling the periphery of the shell at the sides and over terminal beaks; terminal canals, outer lip interstices orange.

Measurements, type: L - 13.1; W - 8.3; H - 7.0mm.

Type Locality: Off the Kii Peninsula, Kii, Japan (34° 00′N; 134°48′E).

Type: ANSP, No. 244834 [holotype].

Discussion: This new species appears to resemble most closely the species *Pseudosimnia* ***coroniola*** Cate, (herein); however, it differs markedly by being more inflated, more pyriform; by having distinct dorsal striae and central angular ridges; by having a narrow, tightly formed rear terminal beak and canal opening; by possessing a different kind of dorsal spotting, and the rich rose color seen in the shell interior, side margins, and in the terminal canals.

The transverse angular dorsal ridges are the basis for this species' name; it is taken from the Latin word *culmen,* meaning a ridge.

(Labiovolva) Cate, subgen. nov.

Type species: *Ovulum nubeculatum* A. Adams & Reeve, 1848

The shells in this group are characterized by having very thin, semi-developed, corded outer lip edges. The name is derived from the Latin, with emphasis placed on the peculiarity of the lip.

61. *Pseudosimnia (Labiovolva) nubeculata* (A. Adams & Reeve, 1848)

(Figure *65*: holotype)

1848 *Ovulum nubeculatum* A. Adams & Reeve, Voy. Samarang, Moll., *Ovulum*: 23; plt. 6, figs. 12a, 12b, 12c
1859 *Ovula nubeculata;* Chenu, Man. Conch.: 272
1941 *Prionovolva nubeculata;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Prionovolva) nubeculata;* Allan, Cowries World Seas: 126
1958 *Prionovolva nubeculata fruticum* Kuroda, Venus **20** (2): 168

Description, holotype: *"Ovulum nubeculatum*—Ovul. testá ventricosá, subpyriformi, pallidè rubro vel fulvo nubeculato [Latin: a little cloud]; dorso obscurè costellato; canalibus brevibus, vix emarginatis; aperturá angustá, labio externo intus crenulato, prope medium subcomplanato; labio interno tumorem elevatum crassum ferente, ad canalem breve et recedente, anticè tumido, intus excavato, ad canalem sub-uniplicato." (A. Adams & Reeve, 1848: 23)

Measurements, Type: L - 19.0; W - 11.0mm (approx.)

Type Locality: "Hab. Isle of Basilan." [among a group of islands SW of Mindanao, Philippines (06°35′N; 122° 00′E).]

Type: BMNH, No. 1879.2.26.180 [holotype].

Discussion: Not much seems to be known at present about this species; I have examined nearly all of the major collections in North America, and have never seen it represented. Additional knowledge will depend upon further field work.

62. *Pseudosimnia (Labiovolva) nubila* Cate & Azuma, spec. nov.

(Figure *66*: holotype)

Description, holotype: Shell fairly large, sub-pyriform, inflated; terminals produced, roundly narrowly arched in front, small, sub-spatulate adapically; dorsum glossy, though numerously incisedly transversely striate overall, except that lines become almost obsolete centrally; base inflatedly ovate, semi-glossy, very slightly striate; front base constricted adaperturally, thickly narrowing (wedge-like) abapically to merge with a very short terminal ridge; a long, low, curving funicular callus thickening on rear base; columella broad, barely visible, though deepening to the front to become a fossula; aperture very wide, gently curving; outer lip very narrowly thickened, cord-like, sub-crenulate; color basically pale beige-grey, with three bands of pale cloudy pinkish-brown crossing dorsum transversely; terminal tips, funiculum, front base wedge, and outer lip edge off-white.

Measurements, type: L - 11.1; W - 6.3; H - 5.5 mm.

Type Locality: In 55 - 91 m, off Hinomesaki, Kii, Japan (34°00′N; 134°48′E); leg. S. Habu, March 1971.

Type: MA, No. 15642 [holotype].

Discussion: This unusual new species somewhat resembles the preceding species, *Pseudosimnia nubeculata* (A. Adams & Reeve, 1848), only by having a similar shell outline, but differs distinctly from it in many other ways: by being very much smaller; by being numerously transversely striate overall, though not transversely angularly ridged as seen in the Adams & Reeve species; by having differently formed terminals; and by having different colors and surface ornament.

The name is derived from the Latin *nubilus,* meaning cloudy.

Xandarovula Cate, gen. nov.

Type species: *Bulla patula* Pennant, 1777

The species in this new genus are, for the most part, fairly large, often thinly constructed, lightweight, broadly bulbous shells with wide apertures and with a rather thin lip callus, or there may be no callus at all. The type species of the genus normally seems immature in its lip construction.

This generic name was derived from the Greek *Xandros,* a fabulous sea monster.

63. *Xandarovula patula* (Pennant, 1777)

(Figure *67*: holotype)

1777 *Bulla patula* Pennant, Brit. Zool., London, ed. 4: 117; plt. 70, fig. 85
1825 *Bulla haliotidea* [Renier] Gerville, Mem. Soc. Linn. Calvados: 203
1835 *Bulla virginea* Cantraine, Bull. Acad. Roy. Sci. Bruxelles 2: 10
1843 *Ovula patula*; Kiener, Icon. Coq. Viv., *Ovula* 2: 6; plt. 3, fig. 4
1848 *Ovulum patula;* Sowerby[2nd], Thes. Conch., *Ovulum* 2: 478; plt. 101, figs. 105, 113
1847 *Ovula pennantiana* Leach, Ann. Mag. Nat. Hist. 20: 209
1847 *Ovula blainville* Leach [em. syn.], Ann. Mag. Nat. Hist. 20: 269
1853 *Simnia patula;* H.& A. Adams, Gen. Rec. Moll. III: plt. 29, fig. 2
1860 *Ovulum patulum;* Reeve, Elem. Conch. 1: 36
1875 *Calpurna patula*; Woodward, Man. Moll.: 234
1885 *Ovula adriatica* Tryon, Man. Conch. 7: 247; plt. 1, figs. 16, 18
1885 *Bulla virginea = patula;* Tryon, Man. Conch. 2: 247
1887 *Ovula virginea = adriatica;* Paetel, Cat. Conch. Samml. 1: 326

Description, hypotype: Shell fairly large, elongately ovate, thinly formed; dorsum sub-glossy, except that faint longitudinal growth lines mar the surface, and there are faint transverse lines over either terminal area, more obscurely on the dorsum, but quite distinct on the narrowly ovate base; base narrows sharply in front, with a curious sub-fossular excavation; adapical terminal process tortuously twisted; no funiculum is present; aperture flaringly open, broad; outer lip thin, seemingly unfinished; columella and adaxial fossular ridge stark white, remainder of the shell off-white to greyish-white.

Measurements, hypotype: L - 22.8; W - 11.1; H - 7.9 mm (C3789).

Type Locality: "England." Here designated as Dover, England.

Type: Whereabouts unknown.

Distribution: British Isles: Scotland; Ireland; Shetland Islands; off N Scotland; S English coast; E English coast; and Wales.

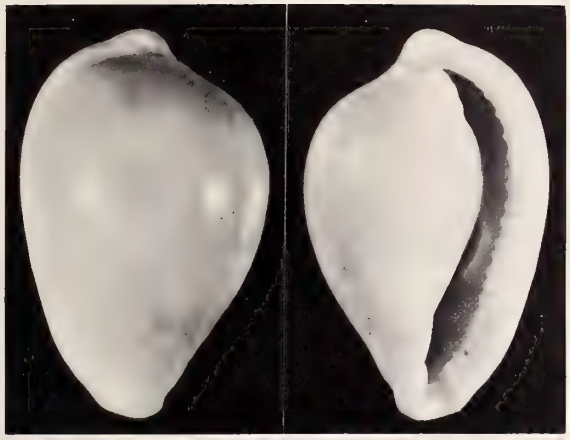


Figure *60*
Pseudosimnia ***(Inflatovula) coroniola*** (56)

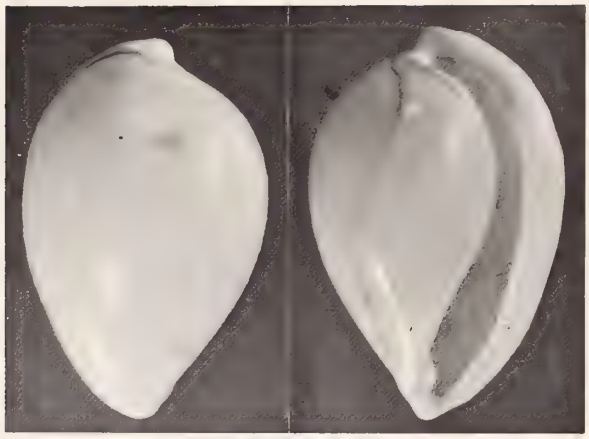


Figure *61*
Pseudosimnia ***(Inflatovula)*** *sinensis* (57)

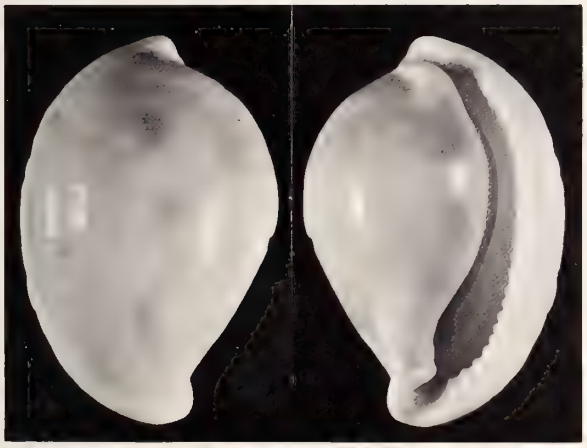


Figure *62*
Pseudosimnia ***(Inflatovula) kandai*** (58)

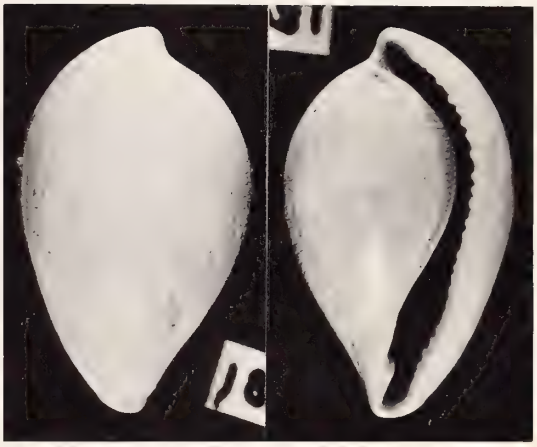


Figure *63*
Pseudosimnia ***(Inflatovula) translineata*** (59)

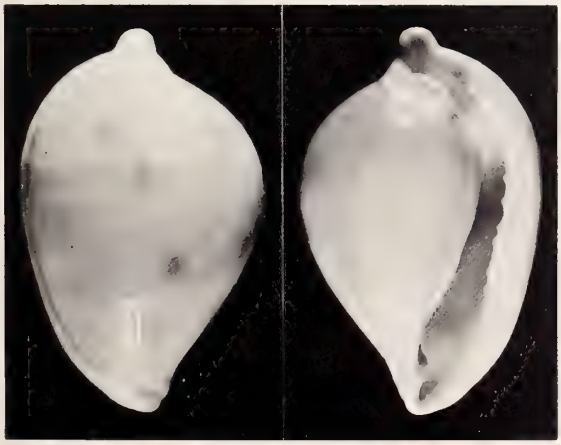


Figure *64*
Pseudosimnia ***(Inflatovula) culmen*** (60)

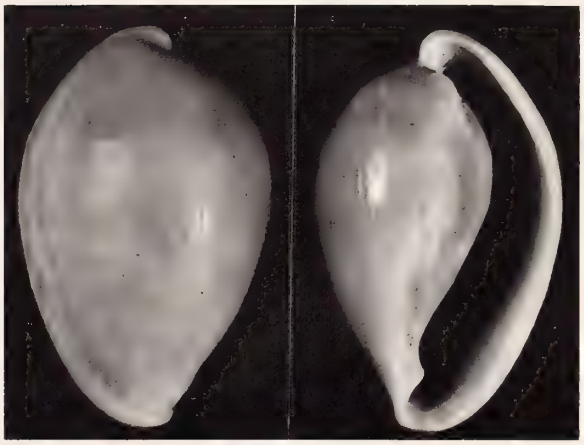


Figure *65*
Pseudosimnia ***(Labiovolva)*** *nubeculata* (61)

Discussion: An important reference to the Pennant molluscan collection is that of EDGAR A. SMITH (Journ. Conch. London (1913–1915) **14:** 38–41) in which are listed his types along with his figured specimens. The ovulid species, *patula,* does not appear therein. It seems significant, therefore, to quote Smith in this regard: "Pennant does not definitely state whether the species described and figured were in his own or some other collection, but occasionally they are said to be from that of the Duchess of Portland." Many of the cowries species in the Portland sales (1786) were without labels; many had the labels rearranged or the specimens were without labels. (Figure *67*a: C3917; Figure *67*b = Reeve, 1865, figured specimen).

64. *Xandarovula xanthochila* (Kuroda, 1928)

(Figure *68*: C3798)

1928 *Simnia* (?) *xanthochila* Kuroda, Venus **1**: 78; plt. 1, fig. 5 [1929]
1932 *Neosimnia hirasei* Schilder, Proc. Malacol. Soc. London **20** (1): 54

Description, holotype: *"Simnia* (?) *xanthochila*—Shell large for genus; cylindrical, thin and fragile; semi-translucent, white; with a border of sulphur yellow about 1 mm. in width at the margin of the outer lip, and also a suffusion of the same color on the parietal wall as on both anterior and posterior rostrations, that on the parietal wall broadly spreads over, but gradually fades off towards the left side of the body; posterior axis tortuous, with a spiral ridge at the point of insertion, and terminated by a spout shaped canal which is obtusely bordered by a sulphur colored callus; columella straight, with a white somewhat sinuous, axial ridge of callus, deeply seated on the columella; outer portion of the ridge is covered by a sulphur-colored, somewhat heavy callus-deposition; canal wide, with the margin abruptly recurved and widened at its edge; axis pervious; aperture rather broad, lunate, widened anteriorly; outer lip narrowly calloused, margin on the outside, its posterior two-thirds feebly involved; inside of the outer lip with a smooth callus of very pale rosy tint. Surface roughened by axial sculpture, which consists of rather rugose, irregular incremental striae, as well as of microscopically fine but distinct spiral threads, which are interrupted at the mesial [sic] portion of the body; the reticulations are conspicuous at before and behind, except on the anterior canal which is never spirally sculptured, but with a trace of a feeble fasciole." (KURODA, 1928: 78.)

Measurements, type: "long. 28.6, diam. 13.8, width of aperture, anteriorly, 5.3, posteriorly, 2.5 mm."

Measurements, hypotype: L - 23.5; W - 13.6; H - 10.9 mm (Figure *68:* C3798).

Type Locality: "Central Japan" [east]. Type locality here designated as: in 146 m, off Tosa, Japan (33°20′N; 133° 45′E).

Type Disposition: Mr. Chien Ishibashi coll., Japan.

Distribution: Deep water off the central east coast of Japan: Kii and Tosa.

Discussion: Kuroda adds the following comment: "The type, the only specimen that I know belongs to Mr. Chien Ishibashi's collection. It has a narrower aperture and a more elongate body than the European *S. patula* (Pennant), to which this species seems to bear the nearest relation, though the generic position of the present species is yet in doubt. This species is remarkable for its rather rugose surface and yellow lips."

65. *Xandarovula pagoda* Cate, spec. nov.

(Figure *69*: holotype)

Description, holotype: Shell elongately-ovate, thin, lightweight construction, translucent, though strong; dorsum and base unevenly smooth, roundly inflated; aperture very wide, gently curving left; terminals not produced, though peculiarly formed adapically in relation to the posterior base and outer lip—abruptly terminated, flaringly open abapically; outer lip thin-edged, without callus or thickening; base comparatively small, roundly, bulbously, convexly inflated; color greyish-white overall.

Measurements, type: L - 21.7; W - 12.4; H - 9.7 mm.

Type Locality: In 183 m, off Tosa, Japan (33°20′N; 133°45′E).

Type: ANSP, No. 277515 [holotype].

Distribution: deep water, off the Kii Peninsula, east Japan.

Discussion: This beautiful, delicate, and very deep water species has an unusual appearance which has suggested its Oriental name. In describing this as new, thought was given to the possibility of its being a varietal form of *Xandarovula xanthochila* (Kuroda, 1928), but the visible difference in the shells suggests their separation, at least on a provisional basis. The new form has a more heavily embossed dorsal striation; a more distorted shell outline, with an irregular outer lip line whose edge is more thinly terminated; its body whorl is more sub-globularly developed, and it lacks the yellow tinting of the Kuroda species (Figure *69*a: C3683).

66. *Xandarovula figgisae* Cate, spec. nov.

(Figure *70*: holotype)

Description, holotype: Shell obese, thin textured, subtranslucent, lightweight; dorsum longitudinally finely marked with growth lines, otherwise, dorsum and base numerously transversely lined with evenly spaced, upraised, thread-like cords; terminals effuse, not extending beyond length of outer lip; adapically, left side of terminal is a narrow cylindrical column, a peculiar extension of the columellar base; outer lip is an even crescent curve, edge is thin, often irregularly finished and incomplete, and lacks teeth; rear base short, abruptly bulbous, roundly inflated, with front base narrowing sharply, with a twisting ridge forming the outer perimeter of a semi-smooth fossular area; color milk-white overall.

Measurements, type: L - 24.9; W - 13.0; H - 9.8 mm.

Type Locality: In a tide pool on a reef just off the northern tip of North West Cape, Western Australia (21°50′S; 114°10′E).

Type: WAM, No. 1454-70 [holotype].

Discussion: The possibility exists that this may be only an intermediate growth form of *Ovula ovum* (Linnaeus, 1758) (see Figure *139*b); future field work will be necessary to determine its correct status. It appears quite distinct, but may be compared with ***Xandarovula*** *patula* (Pennant, 1777), from which it differs by having a much broader shell shape, less narrowly ovate; by having a differently formed adapical terminal process; by having a larger, more roundly inflated base; and by having more numerous transverse dorsal striae.

The new species name honors Mrs. Leslie Figgis, Exmouth, West Australia, who first found the shell.

Aperiovula Cate, gen. nov.

Type species: *Ovulum adriaticum* Sowerby 1st, 1828

Shells are fairly large, thin, often translucent, broad of aperture, with minimal thickening of the outer lip. The wide, open aperture in these shells suggests the Latin word *aperio,* open.

67. *Aperiovula adriatica adriatica* (Sowerby 1st, 1828)

(Figure *71*: lectotype)

1825 *Ovula haliotidea* (Renier) Blainville, *in* Cuvier: Dict. Sci. [err.] Hist. Nat. Strasbourg **37**: 131

1828 *Ovulum adriaticum* Sowerby 1st, Zool. Journ. London **4**: 150

1843 *Ovula adriatici*; Kiener, Icon. Coq. Viv., *Ovula* **2**: 9; plt. 2, fig. 4

1848 *Ovula oblongata* Requien, Cat. Coq. Corse: 84

1848 *Ovula elongata* Requien, Cat. Coq. Corse: 84

1859 *Ovula adriatica*; Chenu, Man. Conch.: 272

1885 *Ovula oblonga* [err.] = *O. intermedia*; Tryon, Man. Conch. **7**: 251

1941 *Pseudosimnia (Pseudosimnia) adriatica;* Schilder. Arch. Molluskenk. **73** (2/3): 251

1956 *Primovula (Pseudosimnia) adriatica*;Allan, Cowries World Seas: 124

Description, holotype: "*Ovulum adriaticum*—Shell oblong-oval [large, thin, translucent, sub-glossy], rather ventricose; somewhat acuminated at both extremities [terminals prominent, tapering, narrowly drawn out, subspatulate in front]; pale flesh color, hyaline [dorsum and base grey-white, outer lip, terminals, funiculum, terminal channels contrastingly white]; margin of the outer lip narrow, denticulated on the inside [shouldered above, entire outer lip numerously (approx. 38), minutely denticulate, teeth fairly well advanced in their development]: upper end of the columella with one oblique plait [funiculum, sub-funicular callus barely projecting; columella is smooth without longitudinal depression; a short carinal wall adaxially delineates a pseudo-fossular area]; lower end somewhat flattened, with a thick internal margin (terminal ridge); base inflatedly ovate, thickening and narrowing sharply to the front, terminal ridge straight and separate; dorsum very faintly, almost obscurely, transversely striate throughout, but with more incised definition approaching either terminal and with numerous widely spaced, transverse, upraised angular ridges on dorsum; aperture wide, evenly broad throughout]." (Sowerby 1st, 1828: 150.)

Measurements, type: "long. 9/10, lat. 5/10, poll."

Measurements, hypotype: L - 24.6; W - 13.0; H - 10.9 mm. (Figure *71*a: C2561).

Type Locality: "Hab. in mari adriatico; communicavit Dr. Goodall." Type locality here designated, Melilla, Spanish Morocco, Mediterranean Sea (C2561) (35°23′N; 03°00′W).

Type: BMNH, without register number [lectotype herein] is the shell figured by Reeve (1865; plt. 2, fig. 7) (Way, BMNH, *in litt.*).

Distribution: Adriatic coast of Italy; Sardinia; Sicily; SE coast of Spain; NW coast of Africa.

Discussion: In outline this species is peculiarly rhomboid-ovate, with a long, tapering, drawn-out appearance.

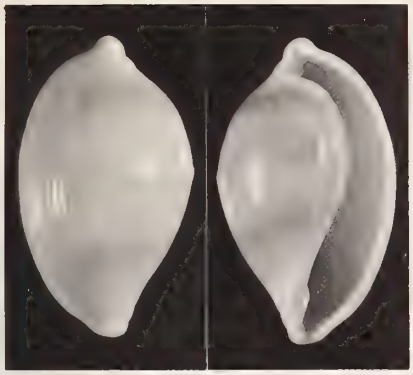


Figure *66*
Pseudosimnia (*Labiovolva*) ***nubila*** (62)

Figure *67*
Xandarovula patula (63)

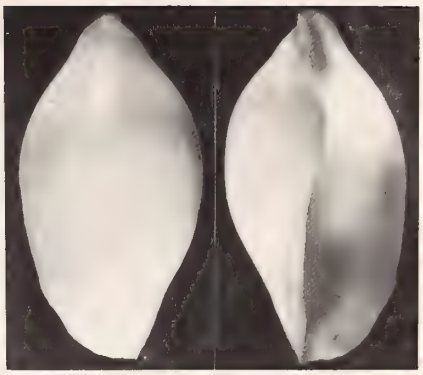


Figure *67* a
Xandarovula patula (63)

Figure *67* b
Xandarovula patula (63)

Figure *68*
Xandarovula xanthochila (64)

Figure *69*
Xandarovula pagoda (65)

Figure *69* a
Xandarovula pagoda (65)

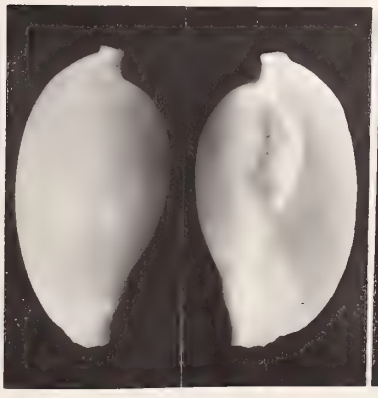


Figure *70*
Xandarovula figgisae (66)

Figure *71*
Aperiovula adriatica adriatica (67)

68. ***Aperiovula adriatica iberia*** Cate, subspec. nov.

(Figure 72: holotype)

Description, holotype: Shell small, pyriformly ovate, lightweight in texture, sub-glossy; terminals produced, pointedly so in back, narrowly square abapically; dorsum roundly inflated sub-centrally, with distinct transverse incised striae overall; base ovate, striate, narrowing constrictedly to the front, with a low, narrow funicular projection on rear base; aperture broad, gently curving, canal opening to the side adapically; columella rounded, with depression, and striate; fossula a narrow furrow, striate; outer lip fairly thick, roundly folded, very weakly, numerously (24) dentate; color milk-white overall, sometimes the color may vary to pale straw.

Measurements, type: L - 14.2; W - 8.0; H - 6.3 mm.

Type Locality: Bay of Cadiz, SW Spain (36°33′N; 06°12′W).

Type: LACM, No. 1607 [holotype].

Discussion: This new subspecies appears to represent the Eastern Atlantic extension of the familiar Mediterranean form of the nominate species. The Strait of Gibraltar may have some isolating influence upon this animal; the shell is much smaller than that of ***Aperiovula adriatica adriatica,*** and differs from it quite distinctly by having conspicuous dorsal striae and lacking transverse dorsal ridges; by being more distinctly dentate on the outer lip; by being broader in shell outline, less narrowly elongate; by having consequently a more curving aperture; and by having a more well developed funicular projection.

The name of this subspecies is derived from the proximity of the type locality to the Iberian Peninsula.

69. ***Aperiovula jeanae*** Cate, spec. nov.

(Figures *73*, *73*C: holotype)

Description, holotype: Shell fairly large, ovate, thin, subtranslucent; terminal produced, somewhat beaked and pointed adapically; dorsum weakly transversely incised with striation emanating from either end; smooth, glossy centrally; base ovate, narrowing abapically into a thickened, upraised, callus ridge, with transverse striation on rear half of base; a curving, thickened funicular projection forms the left rear wall of adapical canal; aperture of medium width, curving gently; columella without significant character, except that a dull white, thickened longitudinal ridge outlines the adaxial limits of columellar area; fossula shallowly depressed; outer lip broad, thick, dentate (27), and very weakly shouldered above; color deep, rich pinkish-rose over pale grey dorsally, sometimes beautifully banded with clouds of deep rose, barely shading into a pale orange at the sides, and a short sutural orange line over either terminal beak; outer lip, margins, adaxial ridge, and part of base a contrasting bright white.

Measurements, type: L - 16.1; W - 8.7; H - 6.8 mm.

Measurements, hypotype: L - 14.3; W - 8.4; H - 6.6 mm (C3649).

Type Locality: Ensyunada, in the sea between the Izu Peninsula and Ise Bay, Honshu, Japan (34°00′N; 139° 30′E).

Type: LACM, No. 1187 [holotype].

Distribution: Sagami Bay; 146–183 m off Tosa; deep water off Kii Peninsula, Japan.

Discussion: This new species resembles the eastern Atlantic species, ***Aperiovula adriatica iberia*** Cate (herein), but differs from it by being more colorful and larger; by having less distinct dorsal striation, limited to either end; by having a more refined, serrated funicular process; and by having a broader outer lip surface, with a greater number of lip teeth.

This new species is named in honor of Jean Cate, whose contributions to malacology and her work with "The Veliger" are well known.

70. ***Aperiovula shikamai*** Cate, spec. nov.

(Figure *74*: holotype)

Description, holotype: Shell fairly large, inflatedly ovate, translucent; dorsum roundly inflated, sloping and narrowing to the front; very fine, distinct, wavy transverse lines cross dorsum and base throughout; both terminals are prominent, almost beaked adapically, narrow and abrupt anteriorly; base convex, ovate, narrowing thickly and angularly to join terminal ridge; funicular projection (shorter in relation to outer lip projection) forms inner wall of terminal canal; columella without depression, conforming to contour of base; fossula formed by upraised, distinct adaxial carinal ridge within; aperture fairly wide; outer lip thickened, rounded, barely shouldered above, with well developed teeth (19) within its edge; dorsum pale grey with a pale beige cast, outer lip, funiculum, terminal ridge and adjoining basal ridge, adaxial carina, and terminal ends contrastingly white, with a very pale yellow blush on each terminal collar.

Measurements, holotype: L - 17.7; W - 9.7; H - 7.7 mm (C3784).

Measurements, hypotype: L - 15.2; W - 8.8; H - 6.9 mm (C3691).

Type Locality: Ensyunada, in the sea between Izu Peninsula and Ise Bay, Japan (34°44′N; 136°44′E).

Type: CAS, No. 13324 [holotype].

Distribution: Along central east coast of Honshu, generally.

Discussion: This new species rather resembles a Mediterranean species, ***Aperiovula emersoni*** Cate (herein), but differs from it by being smaller and more solid; by possessing more numerous transverse dorsal striation; by being distinctly denticulate on the outer lip, rather than weakly crenate; and by lacking the bright orange color in the terminal channels. ***Aperiovula shikamai*** appears to be most closely allied to ***A. jeanae*** Cate, but differs from it by being dorsally striate throughout; by having a straighter outer lip periphery adapically, without constriction; by having a narrower outer lip, with fewer teeth; by having a wider aperture; and being a far less colorful shell, mostly grey hued.

This new species is named in honor of Professor Dr. Tokio Shikama, GIY.

71. *Aperiovula meyeriana* Cate, spec. nov.

(Figure 75: holotype)

Description: Shell fairly large, sub-glossy, oblong-ovate, subcylindrical, almost translucent; terminals protruding, narrow, rounded, spatulate adapically, narrow, blunt, with a peculiar callus on left side above front terminal opening; dorsum inflated, subcylindrical, with fine transverse incised striae emanating from either end, smooth over greater central surface; base ovate, thinly overlaid with nacre, tapering to a narrow, thick, constricted base-ridge abapically; an unusually shaped thick, twisting, cordlike funiculum attached to rear terminal beak; columella almost without depression, smooth, terminating adaxially at a very low, blunt carinal ridge, which also defines a sub-fossular area; aperture broad, open, curving; outer lip thin, with a very fine, delicate, cord-like edge which is reflexed inward, with numerous weak teeth that lengthen into denticles; color pale mauve to milk-white overall, outer lip and funiculum a contrasting bright white, canals and terminal openings pale rose.

Measurements, type: L - 19.0; W - 9.6; H - 7.6 mm.

Type Locality: Mikawa Bay, Honshu, Japan (34°40′N; 137°00′E).

Type: LACM, No. 1186 [holotype].

Discussion: This species is quite distinct in its shell morphology, but, viewed from above, it has an adapical terminal form similar to that of ***Aperiovula shikamai*** Cate (herein); it differs, however, by being a larger species; by being more narrow, elongate; by having more distinct denticulation on the outer lip; by having a more fully developed, heavier formed funiculum; and by having a narrower, straighter aperture with a constriction of the outer lip abapically.

I have named this new species in honor of Maude and Harvey Meyer of Captiva Island, Florida, who have contributed so much to malacology in so many different ways, and who provided the specimens for this study.

72. *Aperiovula takae* Cate, spec. nov.

(Figure 76: holotype)

Description, holotype: Shell small, glossy, oblong-ovate; terminals strong, produced, sub-spatulate adapically; dorsum mostly smooth, with a limited number of concentric incised striae emanating from either terminal collar; base narrowly ovate, weakly striate, sub-glossy, tapering and narrowing to the front as a thick, solid, constricted wall; abapical terminal ridge very weakly formed; columella smooth, glossy, rounded, without depression; a long shallow fossula is formed in front by the presence of a low, longitudinal, adaxial carinal wall which is peculiarly subdentate, with about 4 rudimentary tooth projections visible; at rear base is a thick, heavily formed funiculum, with a lower, sub-serrated canal wall which connects to terminal beak; aperture wide, becoming more open in front; outer lip surface rounded, with numerous (19+) teeth, some better developed than others: lip shouldered above; color straw yellow to mahogany-red, axial carinal wall within white; terminals, funiculum, and outer lip beige-colored.

Measurements, type: L - 9.4; W - 4.7; H - 3.6 mm.

Type Locality: Off Tosa, Japan (33°20′N; 133°45′E) in 73-91 m; leg. M. Azuma, 30 March 1965.

Type: MA, No. 14973 [holotype].

Distribution: 2 - 3 km off Kirimezaki, Kii Peninsula, Japan.

Discussion: The species is most like ***Aperiovula meyeriana*** Cate (herein), but differs from it by being much smaller; by having a less complex adapical terminal beak; by having heavier concentric striae on the terminal collars; having fewer and stronger outer lip teeth, a broader aperture, and the peculiar pseudo-teeth on the columellar carina in front.

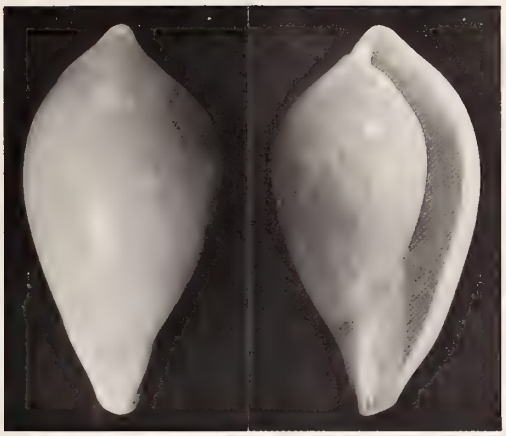


Figure *71* a
Aperiovula adriatica adriatica (67)

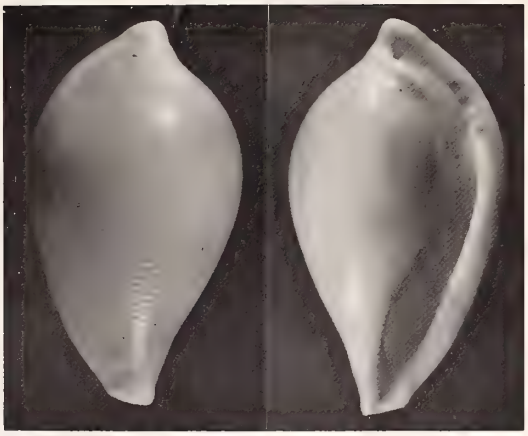


Figure *72*
Aperiovula adriatica iberia (68)

Figure *73*
Aperiovula jeanae (69)

Figure *74*
Aperiovula shikamai (70)

Figure *75*
Aperiovula meyeriana (71)

Figure *76*
Aperiovula takae (72)

This new species is named for Mrs. Taka Azuma, who assisted Masao Azuma in collecting these animals.

73. ***Aperiovula robertsoni*** Cate, spec. nov.

(Figure 77: holotype)

Description, holotype: Shell of medium size, evenly ovate; terminals extended, somewhat pointed adapically; dorsum transversely incisedly striate over either terminal collar, but smooth and glossy centrally; base narrowly ovate, becoming narrower to the front, merging into a weakly formed terminal ridge, transversely grooved toward the rear, with a thickened funicular projection separating striation from rear terminal beak; aperture wide, almost straight; outer lip smooth, roundly thickened, shouldered above, and especially angled above centrally due to recurvature of shell side; color milk-white throughout, except that terminal beaks, canals, and outer lip are lemon yellow.

Measurements, type: L - 13.5; W - 6.5; H - 5.1 mm.

Type Locality: Off Tosa, Japan (33°20′N; 133°45′E).

Type: ANSP, No. 305022 [holotype].

Discussion: This new ovulid species perhaps most closely resembles ***Aperiovula shikamai*** Cate (herein); it differs, however, by being a smaller species, by having a distinctive, though less tortured beak adapically; by lacking teeth on the outer lip, and by having a significant lemon yellow color on a large portion of the shell. It differs from ***A. jeanae*** Cate (herein); by being smaller, less bulbously humped; by being less transversely striate dorsally; by being edentate; and by having an unusual shell coloring. The holotype is from the Alvin R. Cahn collection, 1965.

This species is named in honor of Dr. Robert Robertson, Curator, Department of Mollusks, ANSP.

74. ***Aperiovula abbotti*** Cate, spec. nov.

(Figure 78: holotype)

Description, holotype: Shell large, somewhat inflated, lightweight, though strong; terminals produced, rather pointedly so adapically; dorsum dull (from exposure, beach-collected), though semi-glossy, with transverse angular dorsal ridges (8) from lip to columellar base; base broadly ovate, narrowing adapically to form terminal ridge; a strong, spiral, funicular cord separates base from left terminal canal wall; aperture curving, flaringly open and wide; outer lip smooth, thinly rounded, vertically, broadly, concavely flattened against right side of shell; color pale whitish-beige.

Measurements, type: L - 26.8; W - 15.0; H - 11.1 mm.

Type Locality: Mustang Island, western Gulf of Mexico (27°45′N; 95°05′W).

Type: ANSP, No. 301668 [holotype].

Distribution: South Padre Island; deep water off SE coast of Texas.

Discussion: This new species may be compared with the preceding species, ***Aperiovula robertsoni*** Cate, by having a much larger shell, by having a golden line above the adapical terminal beak, a much broader aperture, a more evenly curving outer lip, and a more uneven, less smooth dorsal surface.

This new species is named in honor of Dr. R. Tucker Abbott, DMNH, who collected the shell on the beach.

75. ***Aperiovula emersoni*** Cate, spec. nov.

(Figure 79: holotype)

Description, holotype: Shell fairly large, bulbous, ovate, sub-pyriform; terminals somewhat produced, fairly sharp adapically, barely attenuate in front; dorsum glossy, with very fine longitudinal growth lines; transverse incised striae emanate restrictedly from either terminal, central dorsum without striae, except for approximately 6 transverse, angular ridges; base glossy, inflatedly ovate, longitudinally lined, tapering abruptly in front to coincide with a short terminal ridge; a long low funicular projection angles left to form a rear canal wall; columella rounded, smooth; a short adaxial carinal wall in front outlines a shallow fossula; aperture gently curving in front, somewhat acutely so to the rear; outer lip thickened, ventral surface somewhat flat, angled inward, with numerous very fine, almost obscure teeth; dorsum and base pale rosy-brown, ventral canal interiors orange to rosy-orange, outer lip, funiculum and fossula, beige-white; a golden line above rear terminal beak.

Measurements, type: L - 20.4; W - 11.3; H - 9.3 mm.

Type Locality: Catania, Sicily, Mediterranean Sea (37° 31′N; 15°04′E).

Type: NMW, No. 70.25 z.2 [holotype].

Distribution: Melilla, Spanish Morocco; W Mediterranean Sea.

Discussion: This new species resembles two other species: ***Aperiovula adriatica*** (Sowerby 1st, 1828), with which it

shares the distributional range; and the more distantly removed, ***A. meyeriana*** Cate (herein), living in Japanese waters. However, ***Aperiovula emersoni*** differs from ***A. adriatica*** by being more ovate, less rhomboid in outline; by having a recurved, sharp terminal beak adapically, blunt and square in front, rather than spatulate; by having transverse dorsal ridges; by having a thicker, more curving outer lip; and by having a rich dorsal coloring, with rosy-orange canals. It differs from ***A. meyeriana*** by having a broader, larger, more inflated shell; by having transverse angular dorsal ridges; by having a more obscure funicular process, which does not spiral upward to expose the terminal beak dorsally; and by having a different sort of apertural opening.

This new species is named in honor of Dr. William K. Emerson, Department of Living Invertebrates, AMNH.

Primovula Thiele, 1925

Handb. d. Zoologie 5/1: 88

Type species: *Amphiperas beckeri* Sowerby 3rd, 1900 [OD]

"Schale klein, birnförmig, Mündung schmal, Mundrand deutlich verdickt und gezähnelt, Funiculum deutlich ausgebildt." [Shell small, pyriform; aperture narrow; outer lip distinct, thickened, denticulate; funiculum distinct, fully developed.] [THIELE, 1925: 88.]

(Primovula) Thiele, 1925

Shells in this subgenus are generally fairly small, subrhomboid in outline, with blunt terminal beaks adapically, and they may or may not be dorsally striate.

76. *Primovula (Primovula) beckeri* (Sowerby 3rd, 1900)

(Figure *80*: holotype)

1900 *Amphiperas beckeri* Sowerby 3rd, Proc. Malacol. Soc. London 4: 5; plt. 1, fig. 13
1915 *Amphiperas beckeri* Smith [err.]; Bartsch, Bull. U. S. Nat. Mus. 91: 96
1841 *Primovula (Primovula) beckeri*; Schilder, Arch. Molluskenk. 73 (2/3): 107

Description, holotype: "*Amphiperas beckeri*—testa elongato-pyriformis, rosea, fascia carnea cincta, antice acute producta postice breviter acuminata, undique transversim punctato-sulcata; apertura angusta, utrinque latior; columella antice tenuiter callosa, uniplicata, callo postico crasso, verruca crassa, rugosa intructo; labrum crassum, intus obtuse serratum, postice sinuatum, rugose plicatum." (SOWERBY 3rd, 1900: 5.)

Description, hypotype: Shell small, angularly pyriform, dorsal area thin, sub-translucent; dorsum very finely striate throughout; terminals produced, weakly pointed adapically, more broadly rounded in front; aperture fairly narrow, gently curving; base terminates in back at a thick, multi-ridged, serrated funiculum; base a rounded, striate continuation of dorsal surface; columella without special character, though a well formed fossula is present, with a short, upraised carinal ridge defining it within; outer lip fairly straight, thickened, rounded, recurving inward; lip teeth numerous, though very weakly so centrally; color of shells examined is milk-white overall. (Just received live-collected shells from NM show the shell color to vary from off-white to bright rosy-red, and having two broad dorsal bands of deeper rose color traversing front and back third of dorsal surface; the terminal tips are orange, the canals a paler orange.)

Measurements, type: "Long. 7, diam. 3.25 mm."

Measurements, hypotype: L - 5.5; W - 2.9; H - 2.5 mm (Figure *80a*: C3750).

Type Locality: "Pondoland". Type locality here restricted to Port Alfred, Union of South Africa (33°35′S; 26°55′E).

Type BMNH, No. 1900.5.22.73 [holotype].

Distribution: SE Africa: Jeffrey's Bay; Algoa Bay; East London; Richard Bay; and the coast of Natal, generally.

Discussion: Of this species, Sowerby says, "A very well defined species, smaller and narrower in proportion than *A. carnea,* acutely beaked at the posterior extremity, with a very prominent rough tubercle [funiculum] above the columella. The whole surface of the shell is transversely punctate [incised]-striated."

77. *Primovula (Primovula)* ***narinosa*** Cate, spec. nov.

(Figure *81*: holotype)

Description, holotype: Shell small, narrowly ovate; terminals broadly produced, beaked adapically, bluntly broad in front; dorsum fairly broad sub-centrally, numerously transversely striate throughout; base glossy, ovate, becoming very narrow toward the front to merge with a weak terminal ridge; funiculum thickened, though obscurely formed, barely projecting and forming the left wall of posterior canal; aperture wide, curving; columella glossy, concave, deepening in fossular area; outer lip

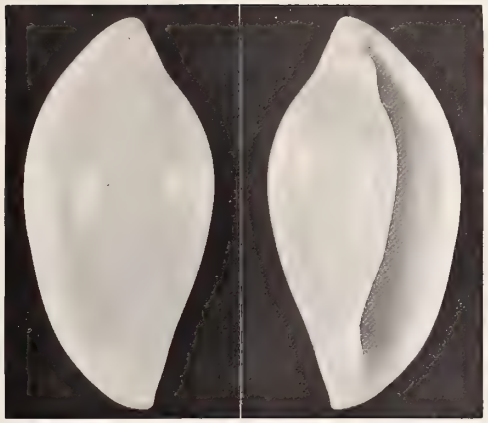


Figure 77
Aperiovula robertsoni (73)

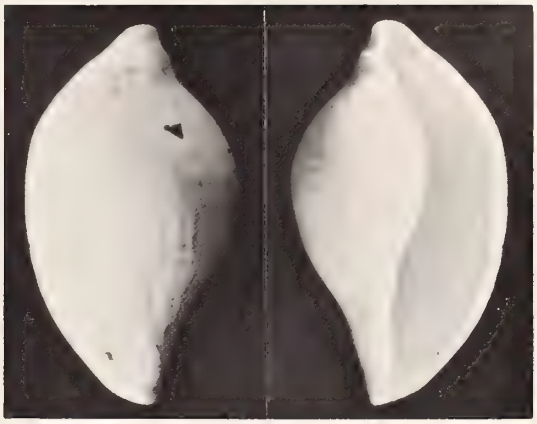


Figure 78
Aperiovula abbotti (74)

Figure 79
Aperiovula emersoni (75)

Figure 80
Primovula beckeri (76)

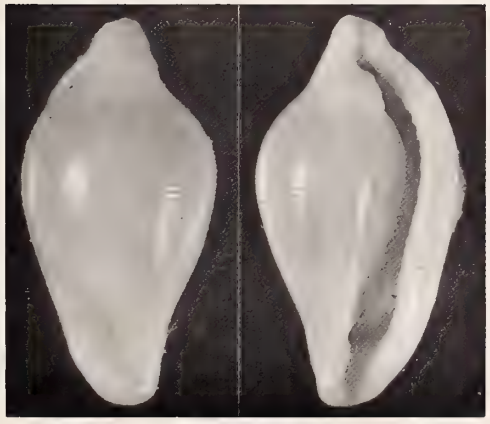


Figure 80 a
Primovula beckeri (76)

Figure 81
Primovula narinosa (77)

glossy, thickened, very minutely furnished with pseudo-teeth; color off-white, with irregular light brown clouding over dorsum; terminal canal openings are pale rosy-brown.

Measurements, type: L - 7.1; W - 3.6; H - 3.0 mm.

Type Locality: Ostheimer, Orr, Powell Exped. (13 Feb. 1956); Sta. 521, in 18 - 29 m, gravel and silt; about one mile S by E of Cape Dgaroewawoffi, Japen Island, Geelvink Bay, Dutch New Guinea (02°30′S; 135°30′E).

Type: ANSP, No. 276602 [holotype].

Discussion: The morphology of this new species appears quite distinct, although its near form seems to be *Primovula beckeri* (Sowerby 3rd, 1900). It differs from the Sowerby species by being usually larger; by having a more flattened, blunt, sub-spatulate adapical terminal beak; by having longer, fewer, larger outer lip teeth; by lacking the serrated funiculum, it being much larger and thicker in *P. **narinosa;*** and by having different combination of shell colors.

The new name is derived from the Latin *narinosus,* meaning broad-nosed.

78. ***Primovula (Primovula) singularis*** Cate, spec. nov.

(Figure *82*: holotype)

Description, holotype: Shell small, sub-rhomboid; terminals produced, pointed and twisted adapically, more open and blunt in front; dorsum glossy, though numerously transversely striate over all; base ovate, narrowing to the front, incisedly striate, with a thick triangular funicular projection at the rear; columella broad, faintly striate, barely depressed, deepening shallowly as a fossula in front; aperture fairly wide, broadening somewhat abapically; outer lip broad, somewhat flattened, angling inward, with numerous fairly well developed teeth (19), only the last 4 denticles reach the outer periphery of lip; color milk-white, underside of terminals pale beige-brown.

Measurements, type: L - 6.9; W - 2.8; H - 2.5 mm.

Type Locality: Shroud Island, China Democratic Republic (27°38′N; 121°03′E) = Tung-Kua Hsü (Rosewater, USNM).

Type: USNM, No. 363933 [holotype].

Discussion: This species appears to be related to *Primovula **narinosa*** Cate (herein), but differs by the shells being considerably more angularly ridged above the adapical terminal beak at the collar, with the terminal projection itself being more pointed, more irregular in form ventrally; the funiculum is more ponderous, bulky, supporting the left rear canal wall; and there is a stronger development of teeth on the outer lip.

The name for this species is derived from the Latin word of the same spelling, meaning, singular, solitary.

79. ***Primovula (Primovula) bellica*** Cate, spec. nov.

(Figure *83*: holotype)

Description, holotype: Shell small, angularly ovate, transversely humped dorsally; terminals produced, pointedly so adapically; dorsum numerously incisedly transversely striate in a wavy pattern, with a light colored callus swelling on left side of posterior terminal beak; base smooth, semi-glossy, ovate, narrowing pointedly to the front, there serving as a pseudo-terminal ridge; thick, projecting, weakly crenulate, triangular funiculum forms left wall of adapical canal; aperture straight, of medium width; low longitudinal adaxial ridge outlines shallow columellar depression, with fossula area somewhat deeper; outer lip broad, angling concavely, with heavy teeth on rear portion, the last four or five teeth projecting to outer lip edge, front half of lip very weakly knobbed, subcrenulate; color pale lemon yellow throughout, except that outer lip margin and terminal beaks are a deeper yellow shade; terminal canals pale orange.

Measurements, type: L - 8.6; W - 4.3; H - 3.6 mm.

Type Locality: Bataan, Manila Bay, Philippines (14°40′ N; 120°25′E).

Type: LACM, No. 1189 [holotype].

Distribution: Cabcaben; Corregidor; Manila Bay, Philippines.

Discussion: This new species appears to be quite distinct, but may be compared with *Primovula **platysia*** Cate (herein); however, it differs by being more broadly ovate; by having a straighter columellar base, with less narrowing toward the front; by having a less constricted outer lip abapically; by having a more distinctly crenulate funiculum; and by lacking the rich lavender coloring within.

The species derives its name from the Latin *bellicus,* of war, military; the seemingly obscure choice for this name refers to the infamous Death March of World War II which took place near this type locality.

80. *Primovula (Primovula) tropica* Schilder, 1931

(Figure *84*: holotype)

1931 *Primovula beckeri tropica* Schilder, Bull. Zool. France **56**: 364; fig. 5
1941 *Primovula (Primovula) tropica* Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: "Testa *Primovulae beckeri* Sow. similis, differt statura multo minore, dorso regulariter convexo, carina transversa destituto, colore roseo paulo pallidiore." (Schilder, 1931: 364) [I have not been able to examine the type shells personally, and for this reason will not attempt to interpret the original author's description of the species, but will rely upon Schilder's statistics and notes for clarification.]

Measurements, type: L - 4.2; W - 2.0; H - 1.8 mm.

Measurements, paratype: L - 3.5; W - 1.6; H - 1.5 mm.

Type Locality: "Amirante Islands, Seychelles".

Type: IRSN, without catalogue number [holotype]. (Figure *84*a: paratype).

Distribution: Cambay, Bombay, Goa, India; Hormuz, Persia; Makran (Mekran), Baluchistan (Schilder, 1931: 364).

Discussion: From a loose translation of Schilder's comments accompanying his new species we learn that he compared it with *Primovula beckeri* Sowerby, because of the fine serrate lines of the dorsum, and by all the essential characters of "gutters" [probably aperture], of labial teeth, of the anterior terminal fold [ridge] and the posterior funiculum of the columella [rear base], and of the internal dimples (fossette internes) [fossula]; but inasmuch as it attains only half the length, and since it was found in a much colder part of the Indian Ocean, it certainly represents a tropical race of *P. beckeri* Sowerby, which lives in the less cold seas of the Cape [of Good Hope] between Port Alfred, Pondoland, and Port Shepstone; a similar reduction in the dimensions has been observed in the tropical races of other species of Cypraeacea.

A year later, Schilder (1932: 51) refuted the above opinion: "After describing *tropica* as a subspecies of *beckeri*, I received four other specimens from J. R. le B. Tomlin: they were collected at Bombay by Townsend and Peile, and prove to be a species allied to *dautzenbergi* and *striatula*."

81. *Primovula (Primovula) dautzenbergi* Schilder, 1931

(Figure *85*: holotype)

1931 *Primovula dautzenbergi* Schilder, Bull. Soc. Zool. France 56: 366; figs. 1 - 4
1941 *Primovula (Primovula) dautzenbergi* Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: *"Primovula dautzenbergi*—Testa minima, subfasiformis, subgibbosa, sed carina transversa omnino destituta; dorso inciso-striato, striis satis remotis (On compte 26 à 35 lignes transverses sur le dos); latere dextro incrassato-marginato; apertura angusta, regulariter arcuata, canali anteriore valde inciso, circulo calloso circumdato, canali posteriore duplicato, sed parum impresso; labro longitudinaliter carinato, carina acuta, antice et postice margineum attingente, intus planato, valde declivi, 17–19 dentibus pliciformibus satis grosis ornato; columella antice longitudinaliter carinata, carina callosa, acuta, saepe interrupta, qua incisione plica terminalis anteriore columellae separatur; columella postice plicis duabus obliquis saepe confluentibus (vel funiculo tri-dentato) ornata; fossula interiore lata, excavata, saepe ut dorsum striata, intus carina callosa laevi instructa.—Pallide fulva (Les coquilles ont été trouveés un peu calcifiées à la plage." (Schilder, 1931: 366)

Measurements, type: L - 2.7; W - 1.4; H - 1.25 mm.

Type Locality: "Mers de Chine, leg. Morlet."

Type: IRSN, without catalogue number (W. Adam, IRSN).

Distribution: Not much is known about ecology and range of the species.

Discussion: In a loose translation Schilder (1931: 366) says this about the species: *"P. dautzenbergi* is allied with *P. beckeri* Sow. of the Cape [of Good Hope]; it is distinguished by its very small size, by the regular convex top [dorsum], by the much less numerous transverse [dorsal] lines, by the carina and the large teeth on the outer lip, by the two plaits on the rear columella, which are bound to the right side of the posterior aperture, and by the yellowish color." There were apparently four shells in the Dautzenberg collection; also, "un paratype a été dedié à l'auteur par M. Dautzenberg."

82. *Primovula (Primovula)* ***platysia*** Cate, spec. nov.

(Figure *86*: holotype)

1935 *Ovula formosa* Verco, Comb. So. Seas: 150; plt. 11, fig. 14

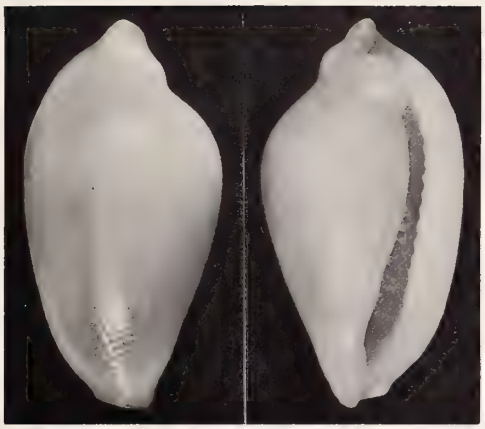


Figure 82
Primovula singularis (78)

Figure 83
Primovula bellica (79)

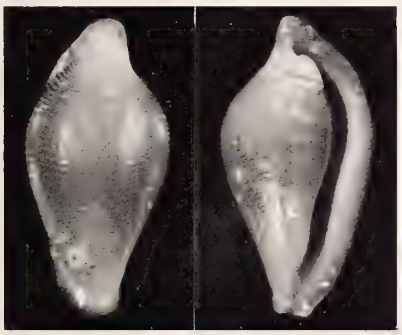


Figure 84
Primovula tropica (80)

Figure 84 a
Primovula tropica (80)

Figure 85
Primovula dautzenbergi (81)

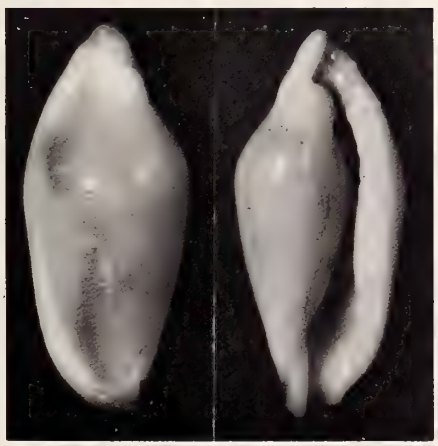


Figure 86
Primovula platysia (82)

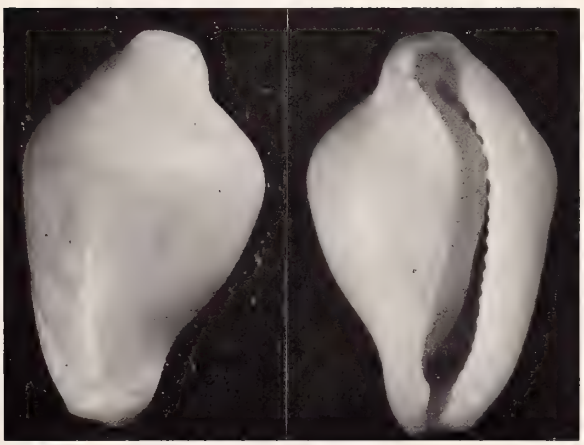


Figure 87
Primovula (Adamantia) sinomaris (87)

Description, holotype: Shell small, elongate, narrowly ovate, broadly flattened, sharply attenuate adapically, less so in front; dorsum evenly, finely transversely striate throughout; sides thickened, right side conspicuously so and semi-flanged, sub-reflexed; base, columella, fossula and abapical terminal smooth and thickened; rear base largely, broadly, bulbously funiculate in a manner that distorts left rear terminal and dorsal areas; aperture fairly wide, curving, openly constricted in front, opening to left adapically; outer lip irregularly, semi-obscurely dentate, with odd teeth protruding beyond marginal lip-edge; forward lip area without teeth; color off-white, with a very faint pinkish tinge throughout, except that terminal tips are deep yellow, adapical canal rich lavender within, becoming paler on the columella.

Measurements, type: L - 9.3; W - 4.2; H - 3.3 mm.

Type Locality: Dingo Beach, Proserpine, Queensland, Australia (20°30′S; 149°00′E).

Type: AM,No. C.75280 [holotype]

Distribution: Shoalwater Bay (approx. 50 miles N of Rockhampton); Townsville; Central Queensland.

Discussion: The dorsal aspect of the shell is reminiscent of the small animal, *Platypus* (*Ornithorhynchus* = 'duck-mole'), of SE Australia, from which I derive this name. This new species from eastern Australia vaguely resembles *Primovula* ***bellica*** Cate (herein), but differs by having deeper and heavier dorsal striation, a broader aperture, larger, fewer, cruder teeth on the outer lip, and by having a constant, completely different combination of shell colors.

83. *Primovula (Primovula)* ***habui*** Cate, spec. nov.

(Figure *88*: holotype)

Description, holotype: Shell small, narrowly rhomboid, elongately diamond-shaped, thin, translucent, angularly humped sub-centrally; terminals extended, narrowing evenly to a beak, pointed adapically, sharply square in front; dorsum sub-glossy, with numerous fairly widely spaced, shallowly incised, transverse striae over all; base elongate, angularly ovate, translucent, transversely striate, striation traversing slightly flattened columella to adaxial longitudinal ridge, ridge acutely elevated in front to form a long, narrow fossula; aperture fairly wide, especially in front due to constriction of outer lip and base; outer lip varies in ventral surface width, is smooth and curvingly reflected inward; there are no outer lip teeth; color glassy, transparent dorsally, with an off-white thickening of the shell's interior at both ends; both terminal beaks rich butter-yellow color.

Measurements, type: L - 8.3; W - 3.4; H - 2.8 mm.

Type Locality: 2 - 3 km off Tomida, Kii, Japan (34°00′N; 134°48′E); depth, 40 - 50 m; leg. S. Habu, 31 January 1971.

Type: MA, No. 15606 [holotype].

Discussion: This new species perhaps most closely resembles the preceding species, *Primovula* ***platysia*** Cate, but differs in many significant respects; the shell is much more fragile in construction, more triangular in outline, more angularly humped dorsally; it differs further by having no outer lip teeth, and the shell differs in many other minor ways.

The species name is derived from that of the collector, Shingo Habu, who is also responsible for many other ovulid discoveries.

84. *Primovula (Primovula)* ***heleneae*** Cate, spec. nov.

(Figure *89*: holotype)

1932 *Pellasimnia verconis* Cotton & Godfrey, So. Austral. Nat. **13**: 46; plt. 1, fig. 15

Description, holotype: Shell small, elongate, evenly ovate, somewhat thinly formed, dorsally rounded; terminals tapering, produced, roundly pointed adapically, less so in front; dorsum weakly transversely incised, striate overall, becoming smoother centrally; striae at rear third of dorsum prominent, wrinkled, irregular; base smooth, narrow, elongately ovate, hardly constricted in front, with a large, heavily formed, uneven funicular projection at the rear; aperture gently curving, almost straight, of nearly even breadth throughout, opening obliquely left adapically; columella and fossula barely depressed, both outlined adaxially by a low longitudinal ridge; outer lip thick, rounded, evenly, numerously (approx. 20) dentate; shell colorless, except for a brownish tint at terminal extremities.

Measurements, type: L - 10.0; W - 3.5 mm.

Type Locality: S end of St. Vincent Gulf, South Australia (Verco), (34°55′S; 138°10′E).

Types: SAM, No. D.954 [holotype].

Discussion: This new species seems most closely to approach *Primovula* ***platysia*** Cate (herein) from the Queensland coast. Their differences appear to be clearly distinct, however, with *P.* ***heleneae*** being less sharply terminated adapically and less conspicuously striate dorsally; it

further has a more evenly extended aperture, with far less constriction of the base and outer lip abapically; a less reflected outer lip, fairly well developed teeth, greater in number, the entire length of outer lip, and a brownish coloring at the terminal ends, which is lacking in *P. platysia*.

This new species is named in honor of Dr. Helene Laws, Senior Curator, South Australian Museum; it was she who first noticed the confusion (see discussion, *Primovula verconis* (Cotton & Godfrey, 1932), species No. 103 herein, between this specimen and another in the SAM collection including a curious shuffling of catalogue numbers.

(Adamantia) Cate, subgen. nov.

Type species: *Ovulum concinnum* A. Adams & Reeve, 1848

Shells of this group are roughly diamond-shaped, rhomboid, with a general outline of rounded extensions of the shell periphery. The name for this new taxon is taken from the Latin *adamanteus*, of a diamond, like a diamond.

85. *Primovula (Adamantia) concinna* (A. Adams & Reeve, 1848)

(Figure *90*: lectotype)

1848 *Ovulum concinnum* A. Adams & Reeve, Voy. Samarang, Moll.: 22; plt. 6, fig. 8
1850 *Ovula cumingi* Mörch, Cat. Conch. Kierulf, Copenhagen: 11; fig. 11
1854 *Ovula margarita* A. Adams, Proc. Zool. Soc. London: 130
1859 *Ovula concinna*; Chenu, Man. Conch.: 272
1941 *Pseudosimnia (Diminovula) concinna*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Diminovula) concinna*; Allan, Cowries World Seas: 123

Description, holotype: *"Ovulum concinnum*—Ovul. testá parvá [angularly ovate, sub-rhomboid, solid, though almost translucent], ventricosá, angulata, albá vel roseá [often milk-white over all, except that an even whiter band of contrast traverses sub-central hump (C3828)], minutissimè striatá [throughout], dorso tumido, anguloso; canalibus brevibus obtusis [bluntly produced], integris; aperturá angustá [curving]; labio externo intus denticulato, in medio anguloso, labio interno posticè tumorem angulosum crenulatum ferente, internè longitudinaliter sulcato, anticè agusto, ad canalem posticum recedente, ad canalem anticum prominente, angustato sub-uniplicato; [base smooth, glossy, ovate, tapering to the front, with a thick, crenulated funicular projection at the rear; aperture curving; columella smooth, broadly depressed, deepening into a fossula abapically]." (A. Adams & Reeve, 1848: 22.)

Measurements, type: L - 7+; W - 4+ mm. (approx.)

Measurements, hypotype: L - 8.3; W - 4.7, H - 4.0 mm (Figure *90*a: C3828)

Type Locality: "Isle of Capul, Philippines."

Type: BMNH, No. 1879.2.26.183 (there are two syntypes at BMNH, with the specimen illustrated here designated as the lectotype).

Distribution: Mindanao to Luzon, Philippines; Swatow, Amoy, Chinese Republic mainland coast; Pescadores; Taiwan coast; Tosa Bay, Japan; Purdy Island, Bismarck Archipelago; Loyalty Islands; New Caledonia; Proserpine, Queensland, Australia.

Discussion: This small white species may best be recognized by the broad angular shoulders; it should not be confused with *Pseudosimnia (Diminovula) alabaster* (Reeve, 1865), as many workers seem to have done in the past. The Reeve species is always more bulbously, inflatedly pyriform, less rhomboid, and *P. concinna* never has dorsal color punctation.

The animal (description taken from a color transparency by Neville Jennings, Proserpine, Queensland), is white overall, with numerous elevated, large white pustules visible on the mantle (as it envelops the shell); the foot is smooth, elongate, seemingly narrow due to its relative length; fine brown lines, widely spaced, radiate to the foot margins at either side from the dorsal longitudinal median ridge of the foot; numerous small light brown spots irregularly mark the mantle surface between the elevated white pustules; the antennae vary from white to light brown, the tips and base of antennae may be lavender or white.

86. *Primovula (Adamantia) solemi* Cate, spec. nov.

(Figure *91*: holotype)

Description, holotype: Shell rhomboidly pyriform, solidly formed; dorsum abruptly elevated, sharply angled to the rear, more gradually so to the front, dorsum exceedingly finely transversely, numerously striate; terminals broadly, bluntly, roundly produced, well defined; aperture fairly narrow; base smooth, bulbously inflated, angled centrally; columella wide, depressed, becoming deeper in front to form a fossula that is supported within by an adaxial carinal wall; outer lip thick, broad at margins, subshouldered above, outer lip denticulate (19), teeth large, widely spaced, well formed; margins, lip, terminals, and

Figure *88*
Primovula ***habui*** (83)

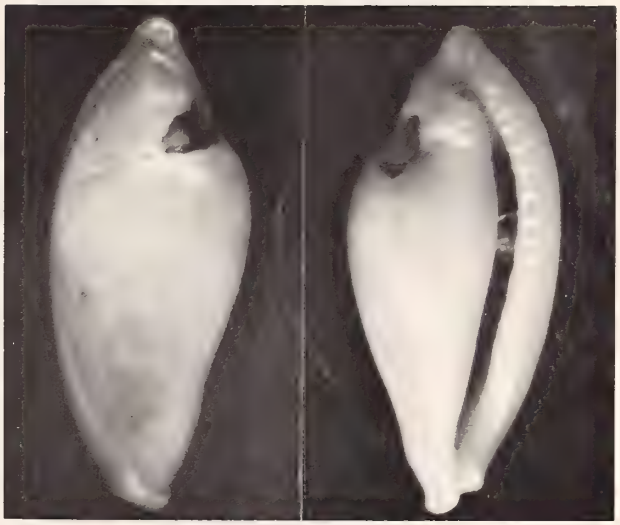


Figure *89*
Primovula ***heleneae*** (84)

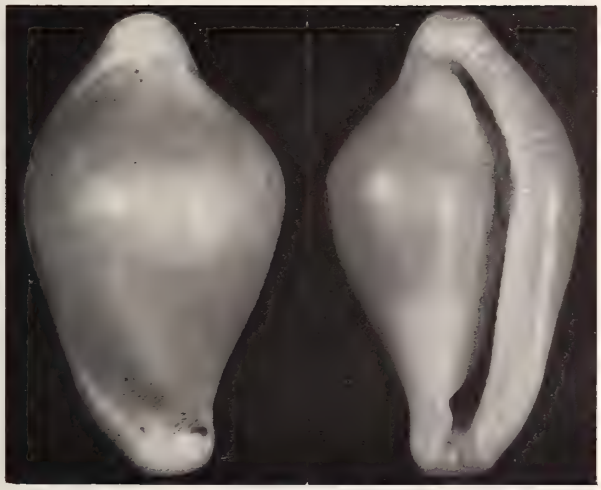


Figure *90*
Primovula ***(Adamantia)*** *concinna* (85)

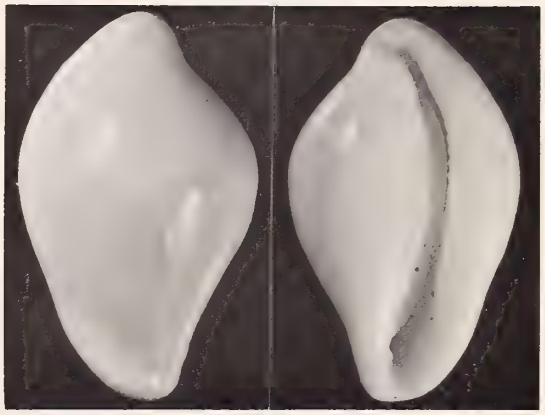


Figure *90* a
Primovula ***(Adamantia)*** *concinna* (85)

Figure *91*
Primovula ***(Adamantia) solemi*** (86)

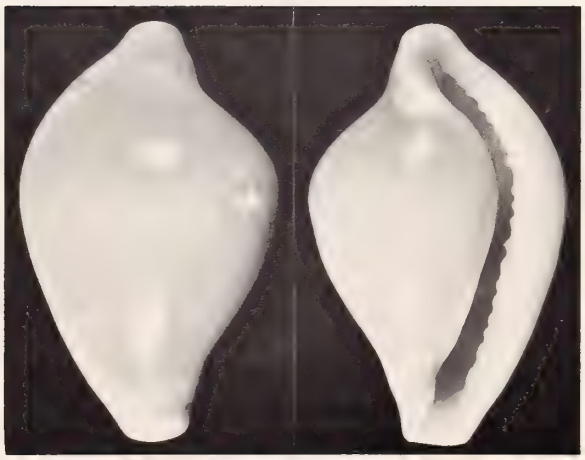


Figure *91* a
Primovula ***(Adamantia) solemi*** (86)

teeth whitish-beige, terminal canal interiors light orange, with a faint blush of same color within shell and lip interstices.

Measurements, type: L - 8.6; W - 5.1; H - 4.3 mm.

Type Locality: Off Boynton Beach, Florida (26°31′N; 80°03′W).

Type: FMNH, No. 78278 [holotype]; (Figure *91*a: USNM 418077).

Distribution: Lake Worth, Florida, in 183 - 731 m.

Discussion: The shells of this new species look a great deal like the preceding species, *Primovula* (*Adamantia*) *concinna* (A. Adams & Reeve, 1854), but differ from that species by being almost obscurely dorsally striate; by having a more blunt, rounded, and more spatulate adapical terminal beak; by having much larger, better developed, and fewer teeth on the outer lip. This name honors Dr. Alan Solem, Curator of Invertebrate Zoology, FMNH.

87. ***Primovula (Adamantia) sinomaris*** Cate, spec. nov.

(Figure *87*: holotype)

Description, holotype: Shell small, compact, rhomboidly ovate; terminals blunt, squarely produced, dorsum subglossy, somewhat angularly humped sub-centrally, with distinct transverse incised striae over all; base smooth, glossy, rhomboid, convex, narrowing slightly, constrictedly in front; a crenate funicular ridge in back forming left wall of adapical canal; columella very broad, depressed, smooth, with an interior longitudinal ridge that rises in front to outline a depressed fossular area; aperture very broad, almost straight, becoming wider abapically due to slight constriction of both base and outer lip; aperture opening somewhat squarely enclosed adapically, with an oblique siphonal canal opening to the left; outer lip very broad, somewhat recurved, with short, large teeth to the rear, more numerous, finer and longer toward the front; color and surface ornament varied: basic shell color pinkish-yellow, with two discontinuous, undulating red lines longitudinally either side of dorsum; outer lip pure yellow to lemon-yellow, front and rear terminal canals and openings bright pinkish-red, extending restrictedly up onto beaks; four large, pale pink punctations on base.

Measurements, type: L - 8.2; W - 4.9 mm.

Type Locality: Shirahama, Wakayama Prefecture, Japan 34°00′N; 134°48′E).

Type: GIY, without catalogue number [holotype].

Discussion: I am comparing this new species with *Primovula (A.) dubia* Cate (herein), with which it seems to agree most closely: it differs from it by being more rhomboid in general outline; by having a constriction of the base at the front terminal ridge; a wider, straighter aperture; the outer lip teeth more confined to the inner edge; the base rhomboid, less inflated; a much broader, deeper columellar depression, with fossula larger, deeply excavated, and adapical terminal canal peculiarly, squarely enclosed.

88. ***Primovula (Adamantia) roseomaculata roseomaculata*** (Schepman, 1909)

(Figure *92*: holotype)

1909 *Amphiperas roseomaculata* Schepman, Siboga Exped., Leiden: 142; plt. 11, fig. 10
1941 *Primovula (Primovula) roseomaculata;* Schilder, Arch. Molluskenk. 73 (2/3): 107

Description, holotype: *"Amphiperas roseomaculatum*— Shell small, pyriform, strongly angular on the back, the extremities elongate, thin, transparent white, with rose colored, irregular spots, arranged in three bands, one near the spire, one near the center before the angle, the third near the anterior part, moreover the extremities are rose tinted. Sculpture consisting of rather broad, waved, impressed striae, which are shallow, but at least half as broad as the lirae, they are crossed by fine growth-striae, which are partly stronger, so as to render the surface here and there cancellated; the angle is placed on the posterior half, the shell is rapidly contracted towards the posterior part, regularly contracted towards the anterior part. Aperture narrow, angular, with a short canal at both extremities; outer margin thickened, with numerous fine teeth on the front part, much stronger towards the spire, where they cross the thickened margin and render it crenulate on its external margin, being visible in the dorsal view; columellar margin with a crenulate callus behind, a fold [terminal ridge] borders the front canal, this margin is excavated internally [as a fossula]; a thin layer of enamel covers the columellar side of the shell." (Schepman, 1909: 42).

Measurements, type: "Long. 8¾, lat. 5 mill."

Type Locality: Siboga Station 98 (06°09′N; 120°21′E), Sulu Sea; 350 m, sand; one specimen taken.

Type: ZMA, without catalogue number (Coomans) [holotype].

Distribution: Halmahera Sea (Neth. Indies); Sta. 164 (01°42.5′S; 130°47′E); in 32 meters, sand, small stones and shells; 1 spec.

Discussion: Schepman says of this species: "This species is nearly allied to *A. concinnum,* but differing in many particulars, the shell is stronger angulate, more rapidly contracted towards the spire, a line from the angle of the back towards the spire being nearly straight in *A. concinnum,* strongly excavated in the new species, the striae are much coarser, the lirae narrower, the teeth at the outer margin are stronger, the shell is thinner and different in color. The specimen from Sta. 164 is still young, the teeth on the thinner margin are not yet developed."

89. ***Primovula (Adamantia) roseomaculata florida*** (Kuroda, 1958)

(Figure *93*: holotype)

1958 *Pseudosimnia (Diminovula) florida* Kuroda, Venus **20** (2): 172

1971 *Pseudosimnia (Diminovula) fulguris* Azuma & Cate, The Veliger **13** (3): 267; fig. 15

Description, holotype: "*Pseudosimnia (Diminovula) florida*—Shell pyriform, with extremities well produced, dorsum at one-third posteriorly, bluntly but strongly gibbous; surface uniformly striated with flat-topped striae and much narrower interstitial grooves; fleshy white, on the dorsum, with two very strongly wavy zigzag slender orangy [sic] pink lines in the adaxial directions and three rows of indistinct spots of pale orangy pink. Aperture rather narrow, outer lip strongly thickened and incurved with about 31 teeth; callus of the peristome of a pink sulphur yellow; inner lip with a strong anterior blunt ridge which terminates inferiorly [weakly] with an arcuated oblique ridge [terminal ridge] and a sinus above it; posterior funiculum strong and high, dilated below triangularly, somewhat stoutly bordered the posterior outlet above, with 6 transverse ridges; columellar sulcus and fossula are distinctly excavated, the inner border of the latter is of white callus, both extremities tinted with bright pink." (Kuroda, 1958: 172).

Measurements, holotype: L - 9.1; W - 6.0; H - 5.35 mm.

Type Locality: Shiono-misaki, Kii Peninsula, Japan (34° 00′N; 134°48′E); leg. Chikage Morishima.

Type: NSM, without catalogue number (Kosuge) [holotype].

Distribution: Tanabe; Shirasaki; Kirimezaki; Kii coastline, Japan.

Discussion: Kuroda (1958), does not illustrate this species; however, Dr. Kosuge, NSM, and Dr. George Davis, ANSP, have made it possible to obtain photographs of the type. It was this lack of information about the type of *Primovula (Adamantia) florida* (Kuroda, 1958) and its whereabouts, that led to the misidentification of *P. (A.) fulguris* (Azuma & Cate, 1971). In spite of their incredible similarity, one may yet see slight differences in their morphology. In *P. (A.) fulguris* one may observe a broader outer lip, with larger and longer teeth; these are now considered only variations in the species. The shells of the Japanese subspecies are different in many minute ways, but seem especially different by being shorter and broader; by having a shortened adapical terminal beak; by having heavier, though very weakly developed outer lip teeth; by having curious lightning-like streaks of color in addition to the large brown spots mentioned by Schepman in his species *P. (A.) roseomaculata roseomaculata* and by seeming to live in a fairly isolated geographic situation.

90. ***Primovula (Adamantia) dubia*** Cate, spec. nov.

(Figure *95*: holotype)

Description, holotype: Shell small, solid, pyriform, globularly humped; terminals somewhat narrowly produced, broadly square at the ends, thickened over terminal collars; dorsum roundly inflated, sub-glossy, numerously transversely incisedly striate overall; base mostly smooth, covered with callus, ovate, narrowing toward the front as a thickened, longitudinal ridge, paralleled at the front by a straight terminal ridge; funiculum large, long, numerously crested with nodules forming left wall of adapical canal (funicular crenulation extends restrictedly onto the base); columella broad, depressed, striate, becoming deeper abapically to form large fossula; aperture somewhat narrow, gently curving; outer lip thick, very broad, somewhat flattened, reflected inward, distinctly and obliquely so in front, boldly, numerously dentate (25) throughout, about 10 teeth extending beyond exterior periphery of outer lip; color milk-white overall, except for irregular clouds of almost imagined darker color ornamentation on dorsum and a brownish tint within terminal openings.

Measurements, type: L - 6.8; W - 4.2; H - 3.8 mm.

Type Locality: Voyage *Albatross,* U.S. Bureau Fisheries: Station 5192; SE off Bantayan Island, Philippines (11°09′ N; 123°50′E); at 32 fms., bottom of green sand.

Type: USNM, No. 281027 [holotype].

Discussion: This new species is very similar to *Primovula (A.) roseomaculata florida* (Kuroda, 1958), but differs from it enough to suggest tentative specific recognition. *Primovula (A.) dubia* has a more ponderous, continuous

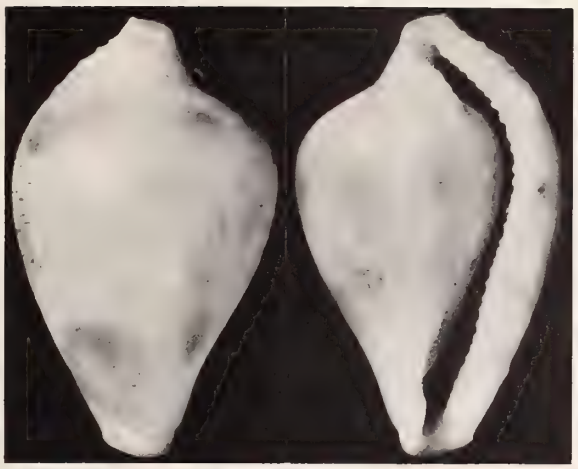


Figure 92
*Primovula (**Adamantia**) roseomaculata roseomaculata* (88)

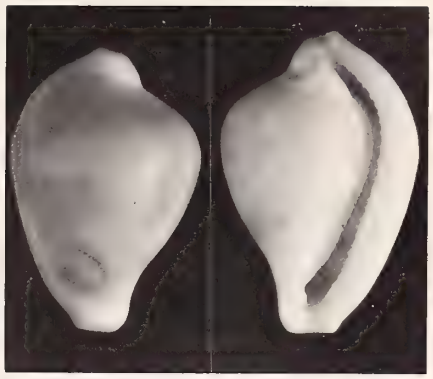


Figure 93
*Primovula (**Adamantia**) roseomaculata florida* (89)

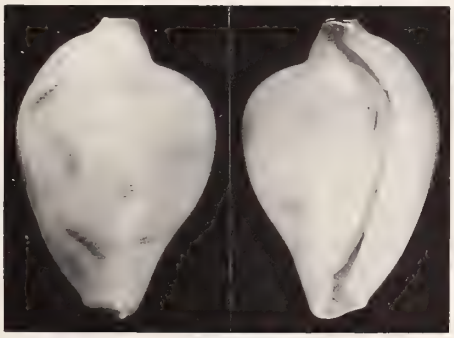


Figure 94
*Primovula (**Adamantia**) fulguris* (89)

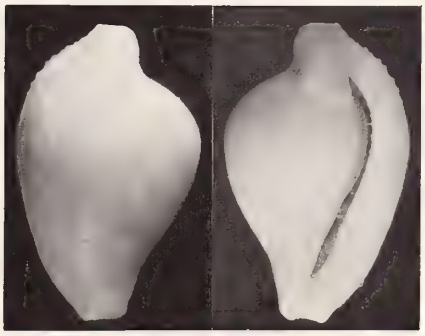


Figure 95
*Primovula (**Adamantia**) **dubia*** (90)

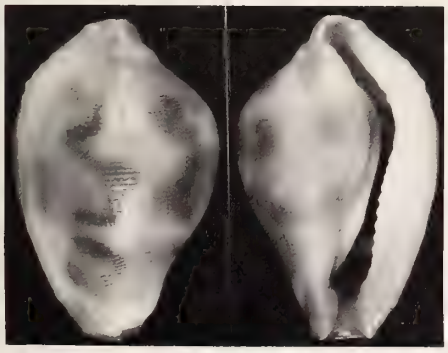


Figure 95 A
*Primovula (**Adamantia**) **kurodai*** (219)

Figure 96
*Primovula (Adamantia) **rutherfordiana*** (91)

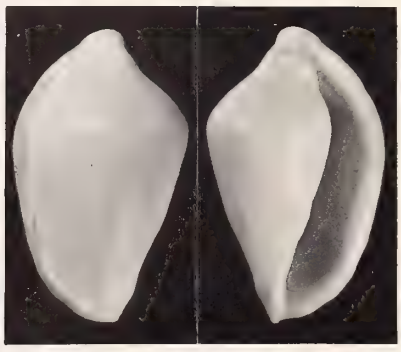


Figure 97
Stohleroma stohleri (92)

funicular-terminal wall, a more narrow aperture, a broader, more flattened outer lip surface, a more distinctive set of highly developed teeth on the outer lip, many of which lengthen beyond the periphery of the lip edge; it lacks the color pattern seen in the other related species, and it is geographically isolated.

The name is derived from the Latin *dubius,* meaning uncertain, wavering.

91. ***Primovula (Adamantia) rutherfordiana*** Cate, spec. nov.

(Figures *96*, *96*C: holotype)

Description, holotype: Shell fairly large, rhomboidly ovate, evenly and solidly formed; dorsum very finely transversely striate; dorsum sharply elevated into an acutely angled transverse ridge sub-centrally, with shell surface tapering gradually to the front, abruptly, adapically; aperture straight, sharply angled to the rear, constricted abapically; outer lip ventrally flattened, numerously denticulate and heavily calloused; outer edge rounded, angularly shouldered above; base, left margin thickened, sub-convex; columella and fossula smooth, the latter formed mostly by a prominent adaxial carina which outlines both within; triangular funiculum on rear base forms one side of canal wall; color off-white to very pale beige, with a fine golden line completely encircling the peripheral shell margins and terminal callus.

Measurements, type: L - 12.8; W - 7.0; H - 5.8 mm.

Type Locality: Townsville, Queensland, E Australia (19°14′S; 146°45′E).

Type: AM,No. C.75281 [holotype].

Distribution: Rockhampton; Slade Point, Mackay; Central Queensland shores generally.

Discussion: This new species is clearly distinguishable from ***Crenavolva*** *striatula* (Sowerby 1st, 1828), with which it has often been confused, as it has a larger, broader, more rhomboid, less conspicuously striate shell, more evenly formed (rather than openly flaring), shorter terminal beak, the outer lip is evenly denticulate throughout, it has a more acute transverse dorsal ridge, and an apparently constant off-white shell coloring, with a distinct encircling golden line of color.

Although Sowerby 2nd (1848; plt. 101, fig. 85) apparently confused this new species with *Crenavolva striatula* (*op. cit.;* fig. 84), it is seemingly distinct. The color of this species is an important character in its identity and Sowerby mentioned its white color.

The animal, as seen in a color transparency by Donald Byrne, is a basic pale ivory; the mantle is thickly covered with papillae of different lengths and dimensions (some being only slightly more than pustules, others well elevated); round brown spots of varying color intensity are interspersed among the papillae, with the bases of some papillae often of a brownish texture; their tips, however, are always ivory to white; the foot is almost circular, very pale ivory, and has very fine, short lines of light brown terminating at the margin, with the heaviest concentration of lines and color at the rear of the foot; the proboscis and antennae are medium brown.

This new species is named in honor of Lorraine Rutherford of Rockhampton, who has contributed most of the east Australian material used in this study.

Stohleroma Cate, gen. nov.

Type species: ***Stohleroma stohleri*** Cate, spec. nov. [herein]

Shells of this group are fairly large, broad, sub-rhomboid, humped, transversely sub-angled dorsally; terminals are usually blunt, though short and roundly pointed adapically; aperture is broad and open.

The new genus name is chosen to honor Dr. Rudolf Stohler, Editor of The Veliger.

92. ***Stohleroma stohleri*** Cate, spec. nov.

(Figure *97*: holotype)

Description, holotype: Shell fairly large, angularly pyriform, sub-rhomboid, lightweight in form; dorsum finely transversely striate throughout, angularly humped across widest breadth of shell; terminals bluntly pointed adapically, broadly truncate in front; base angularly ovate, dorsal ridge continuing over base to columella; funicular projection forms left wall of posterior canal; columella rounded, striate, with a peculiar thick, undulating, off-white upraised adaxial ridge, the front extension of columella; aperture wide; outer lip unevenly thickened, smooth, with an uneven sharply angled shoulder above; color pale orange overall, except that outer lip callus, funiculum, terminal ends, and canals are richer, deeper orange.

Measurements, type: L - 11.6; W - 7.0; H - 5.3 mm.

Type Locality: Ogokuda Beach, in Shionomisaki, South Kii, Japan (34°00′N; 134°48′E).

Type: LACM, No. 1188 [holotype].

Discussion: This new species may be compared with ***Aperiovula takae*** Cate (species No. 72 herein); however, these shells are wider and larger, they are finely striate overall, their funicular processes have a different form, and the outer lip is edentate.

This new name, like that of the new genus, honors Dr. Rudolf Stohler, Editor of The Veliger.

93. *Stohleroma asiaticum* Cate, spec. nov.

(Figure *98*: holotype)

Description, holotype: Shell of medium size, angularly ovate, sub-pyriform, rather humped, somewhat transversely angled; terminals produced, fairly sharply adapically, more so in front; dorsum sub-glossy (semi-fossil); base pointedly ovate, tapering sharply abapically to terminal ridge with a thick, smoothly surfaced funicular projection in back; aperture unusually broad, open, straight; columella flattened, barely depressed, becoming shallow, concavely grooved in fossular area; outer lip thickly formed, with a weak dorsal shouldering above; teeth fairly heavily formed throughout, except adjacent to anterior canal; color of holotype very faintly brown, three-banded dorsally, with yellow enveloping the rear terminal beak, remainder of shell beige to off-white.

Measurements, type: L - 11.1; W - 6.5; H - 4.9mm.

Type Locality: Between Hayama and Kamakura, Sagami Bay, Japan (35°02'N; 139°20'E).

Type: ANSP, No. 251993 [holotype].

Discussion: This new species appears quite distinct from other presently known forms, but perhaps most closely approaches *Primovula* (***Adamantia***) ***rutherfordiana*** Cate (Species No. 91 herein), in general size and outline; ***Stohleroma asiaticum*** differs, however, by lacking dorsal striae, by having a narrower aperture, a less complex funiculum, and greater amount of color. ***Stohleroma asiaticum*** Cate may also be compared with ***S. stohleri,*** but differs from that species by lacking the dorsal striation; by having teeth on the inner edge of the outer lip; and by having a different adapical terminal process with the added funicular swelling at the rear terminal collar, and the terminal is less roundly spatulate.

The name is derived from the Latin *asiaticus,* meaning ornate.

94. *Stohleroma fumikoae* (Azuma & Cate, 1971)

(Figure *99*: holotype)

1971 *Primovula fumikoae* Azuma & Cate, The Veliger **13** (3): 268; fig. 16

Description, holotype: Shell of medium size, pyriformly rhomboid, humped, angled centrally; terminals somewhat pointed, less so in front; dorsum sub-glossy, though very faintly lined with longitudinal growth lines; fine transverse incised striae extend restrictedly from either end, central dorsum smooth; base narrow, rhomboidly ovate, glossy, tapering abruptly and thickly to the front; thick, low, spiralling funiculum outlines the oblique canal opening; columella smooth, noticeably flat, broad, deepening narrowly, concavely to form a shallow fossula, which is defined by a short adaxial ridge; aperture broad, open, curving rather acutely front and back; outer lip edge roundly thickened, shouldered above, numerously, finely dentate within; dorsal color very light beige-brown, with a lighter, almost off-white band over angle of dorsum; base, outer lip, teeth and canals off-white; a short bright orange line extends over the margin of both terminal collars.

Measurements, type: L - 13.0; W - 7.0; H - 5.8mm.

Type Locality: Off Tosa, Japan (33°20'N; 133°45'E); in 80 - 100 fathoms; leg. Fumiko Azuma.

Type: MA, No. 1036 [holotype].

Distribution: East-Central Japan.

Rotaovula Cate & Azuma, gen. nov.

Type species: *Rotaovula hirohitoi* Cate & Azuma, herein

The name of this new genus is derived from the Latin *rota,* meaning round, wheel-like, rotary, as suggested by the curious series of rotary knobs transversely positioned as an angular dorsal hump; the shell also has an arch-like, open, flaring terminal canal, with extending tooth-like processes protruding beyond; the shell is sub-rhomboid, the squared terminal ends providing the rhomboid modification; the dorsal shell surface is also very deeply incised with transverse lines.

95. *Rotaovula hirohitoi* Cate & Azuma, spec. nov

(Figures *100, 100*C: holotype)

Description, holotype: Shell minute, sub-rhomboid, transversely angularly humped dorsally; terminals pro-

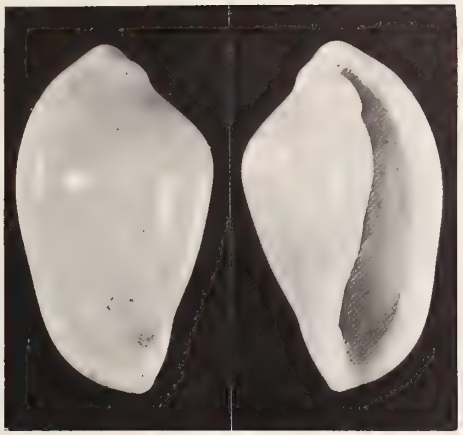


Figure *98*
Stohleroma asiaticum (93)

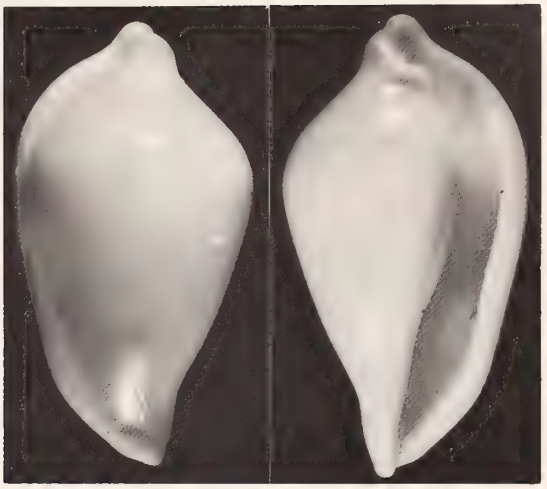


Figure *99*
Stohleroma fumikoae (94)

Figure *100*
Rotaovula hirohitoi (95)

Figure *101*
Crenavolva (Crenavolva) striatula striatula (96)

Figure *101* a
Crenavolva (Crenavolva) striatula striatula (96)

Figure *102*
Crenavolva (Crenavolva) striatula traillii (97)

duced, blunt, with protruding digital appendages at both terminal openings; dorsum numerously, deeply incisedly striate overall, with a series of narrow longitudinal gear-like knobs (8), having equidistant, fairly broad interstices traversing rear dorsum; base sub-rhomboid, striate overall, with a continuation of the dorsal knobbing over base to the narrowly depressed columella; fossula narrow, deepened because of upraised adaxial carinal wall; aperture narrow, broadening in front, curving and narrowing to the rear where it nearly closes over adapical canal channel; funiculum on rear base multi-knobbed (5); outer lip curves gently centrally but angles sharply to either terminal; outer lip smooth within, with three large digitations at either end; shell color is complex, with basic color a deep rich lemon-yellow overall, excepting the dorsal knobs and some of the teeth which are off-white; a wide, transverse, glassy-translucent band extends over forward area; interstices between dorsal knobs are lavender; terminal canals yellow-beige.

Measurements, type: L - 5.3; W - 2.6; H - 2.3 mm.

Type Locality: 2 - 4 km off Hinomezaki, Kii, Japan (34° 00'N; 134°48'E); 91 - 128 m; leg. Shingo Habu, April, 1971.

Type: MA, No. 15644 [holotype].

Discussion: Although exceedingly small as a species, this is perhaps the most singularly exquisite and interestingly formed shell in the Ovulidae. Since it is so drastically unlike any other presently known ovulid form, no attempt will be made to compare it; the species of *Dentiovula* Habe, 1961, only vaguely approach this unusual shell in appearance, and then only because of the peripheral digitation.

The name of this new species honors His Majesty, Emperor Hirohito of Japan, who is an ardent patron of malacology.

Crenavolva Cate, gen. nov.

Type species: *Ovulum striatulum* Sowerby 1st, 1828

Shells for the most part small, narrow, centrally angled at the sides, often transversely sub-angled dorsally, sub-rhomboid; terminal ends usually blunt, terminals usually of equal, tapering projection; they are most often dorsally striate, as well. The name is derived from the Latin *crena.* meaning notched, rounded projection.

(Crenavolva) Cate, subgen. nov.

Type species: *Ovulum striatulum* Sowerby 1st, 1828

The shells of this new subgenus are narrowly elongate, narrowly diamond-shaped, sub-rhomboid, often with blunt, truncated terminal endings.

96. *Crenavolva (Crenavolva) striatula striatula* (Sowerby 1st, 1828)

(Figures *101*: lectotype; *101*C: original illustration)

1828 *Ovulum striatulum* Sowerby 1st, Zool. Journ., London, **4:** 155
1839 *Ovula tuberculosa* J. E. Gray & Sowerby 2nd, Zool. Beecheys Voy., Moll., London: 133
1840 *Ovula nigerina* Dufo, Ann. Sci. Nat., Paris **14:** 186
1848 *Ovulum nigerinum*; Sowerby 2nd, Thes. Conch., *Ovulum* **2:** 482
1848 *Ovulum striatulum* = *rutherfordiana*; Sowerby 2nd, Thes. Conch., *Ovulum*: 472; plt. 101, fig. 85
1881 *Ovula striatula*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 186; plt. 48, figs. 2, 3
1885 *Ovula nigerrima*; Tryon [err.], Man. Conch. **7:** 256
1887 *Ovula striata*; Paetel [err.], Cat. Conch. Sammlg. **1:** 325
1887 *Birostra nigerina*; Paetel, Conch. Sammlg. **7:** 327
1941 *Primovula (Primovula) striatula*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula tuberculosa*; Allan, Cowries World Seas: 121

Description, holotype: "*Ovulum striatulum*—testa oblongata, dorso transversim striato et gibboso, albicante; labio externo planulato, intus denticulato; labio columellari superne calloso, infra depresso; extremitatibus subacuminatis, abtusiusculis."
"Desc. Shell oblong, back transversely striated and gibbous, whitish; outer lip flattened on the edge, denticulated on the inside; columellar lip callous at the upper end, depressed at the lower; extremities rather acuminated, but obtuse." (Sowerby 1st, 1828: 155).

Measurements, type: "long. 4/10, lat. 2/10, poll." = [L - 10.0; W - 4.7; H - 3.0 mm (approx.)].

Type Locality: "Hab. ad littora Oceani Indici."

Type: BMNH, No. 1969137 [lectotype]; one of 7 in type lot.

Discussion: The holotype appears to be missing. There are 7 syntypes at BMNH; the specimen illustrated is designated the lectotype. There is much uncertainty surrounding this species, due to the loss of the holotype. The lectotype appears to be very wide for the species as we know it from a wide range of specimens under consideration for this study. Because of an obscure living locality and the absence of a holotype, plus the unusual shell width, and the apparent lack of sharply distinct dorsal striation, it seems advisable to question the identity of the

species (*spec. dubium*) until further field work and shell specimens can definitely authenticate it. SOWERBY 2nd (1848: 84; fig. 84) = (Figure *101*a: orig. illustr.) illustrated his previously described new species, and added the following comments: "A very small East Indian species, much resembling *O. Frumentum* in general shape and characters, and differing from it only in color and in being transversely striated. From the East Indies according to Mr. G. Humphrey." The large, long, well defined teeth on the outer lip at both ends (at least 7) are unusual and are lacking in most specimens of this species I have seen.

Animal: *Ovula tuberculosa* of J. E. Gray and Sowerby 2nd, 1839, is described as follows: "*Ovula tuberculosa*—The animal like the cowrie; the tentacles rather blunt; mantle edges reflexed, smooth, with small oval brown dots. Foot large, crumpled on the edges, pale brown, black dotted; penis large, low down."

97. *Crenavolva (Crenavolva) striatula traillii* (A. Adams, 1855)

(Figure *102*: lectotype)

1855 *Amphiperas (Ovulum) traillii* A. Adams, Proc. Zool. Soc. London: 222
1865 *Ovulum traillii*; Reeve, Conch. Icon. *Ovulum*: plt. 8, figs. 38a, 38b
1887 *Ovula dentata* Angas, Proc. Zool. Soc. London: 186
1881 *Ovula trailli*; Weinkauff, Mart. & Chem., Syst. Conch. Cab. 194; plt. 49, figs. 9, 12
1941 *Primovula (Primovula) formosa* Schilder, Arch. Molluskenk. **73** (2/3) 107
1968 *Primovula striatula, sensu* Cernohorsky, The Veliger **10** (4): 361; plt. 50, fig. 8

Description, holotype: "A. testa elongata, in medio angulata, carnea, albo marginata, lineis transversis, impressis, obsoletis, cincta; apertura angusta, canalibus brevibus, valde emarginatis; labio intus laevi, sulco longitudinali instructo, postice tumido: labro in medio recto, transversim sulcato, extus albi-varicoso." (A. ADAMS, 1855: 222).

Description, hypotype: Shell small, rectangularly ovate, strongly formed; dorsum finely striate, transversely elevated, sub-angularly centrally, tapering gently to front and rear; terminals prominent, squared at ends, crescent-shaped at openings; terminals thickened, flaring distortedly outward, outlined with a fold of callus; left rear terminal edge frequently projecting beyond that of right side (see Figure *103*), both terminal openings sub-beaked; aperture narrow, straight, hardly curving toward the rear (adapically), weakly constricted in front; outer lip ventrally flattened, lip-surface angled inward; outer lip weakly denticulate to crenate on rear portion, crenulation nearly absent on front; outer lip heavily calloused above, rounded, angularly shouldered above; base and left margin thickened; base sub-convex, smooth; columella very finely striate; fossula smooth, shallow, with a sharply elevated longitudinal carinal ridge adaxially within; funicular callus on adapical base has four short, blunt knobs; color varies from deep rose, red-brown to nearly white, with peripheral shell margin and base a lighter, deeper rose color.

Measurements, type: not recorded (lectotype not available).

Measurements, hypotype: L - 10.0; W - 4.7; H - 3.0mm; (Figure *102*a: C3705)

Type Locality: "Hab. Malaca (Dr. Traill)." Locality here designated as off Corregidor, Manila Bay, Philippines (14°22'N; 120°35'E).

Type: BMNH, No. 19686 [lectotype herein].

Distribution: Coast of Queensland, Australia; Sulu Sea; East Indies; Central Pacific to Taiwan, Ryukyu Islands, and Japan.

Discussion: This subspecies appears to have a much narrower shell than the species in the strict sense. Adams made the following comparison: "This is an elongated species, somewhat angulated on the back, of a pale flesh-tint in some varieties, and of a deeper pink in others, and with the varix of the outer less white. In form it resembles, most closely, *O. formosum,* Sow., but that species is crossed with punctate, spiral lines."

98. *Crenavolva (Crenavolva) striatula tinctura* (Garrard, 1963)

(Figure *104*: holotype)

1963 *Neosimnia tinctura* Garrard, Journ. Malacol. Soc. Austral. **7**: 45; plt. 7, figs. 5, 6

Description, holotype: "*Neosimnia tinctura*—Shell elongated and roughly cylindrical in shape, with carinated angle above the center, extremities blunt, outer lip thickened and calloused; aperture widens anteriorly; fossula smooth and prominent, forming a distinct keel or columella; fairly strong labial teeth at posterior end, becoming weaker and disappearing entirely at anterior end; dorsal surface entirely covered with fine wavy striations; general coloration fawn, with narrow whitish band encircling the carination; further indistinct whitish bands towards either end, the extremities themselves tipped

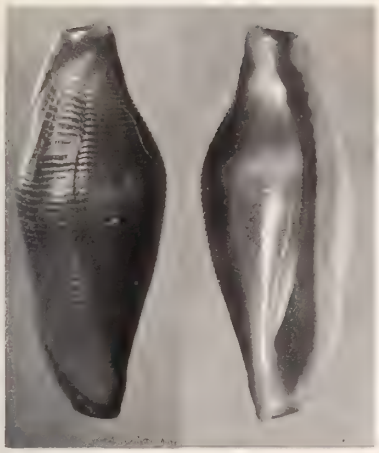


Figure *102* a
Crenavolva (Crenavolva)
striatula traillii (97)

Figure *103*
Crenavolva (Crenavolva)
renovata (100)

Figure *104*
Crenavolva (Crenavolva)
striatula tinctura (98)

Figure *104* a
Crenavolva (Crenavolva)
striatula tinctura (98)

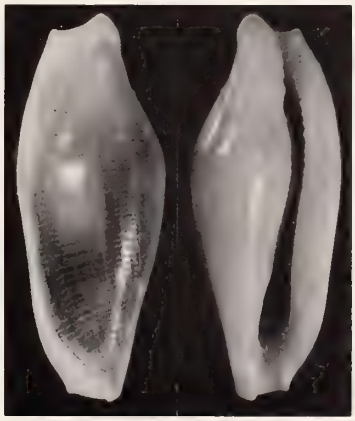


Figure *105*
Crenavolva (Crenavolva)
striatula ***hesperia*** (99)

Figure *105* a
Crenavolva (Crenavolva)
striatula ***hesperia*** (99)

Figure *106*
Ovula dentata (100)

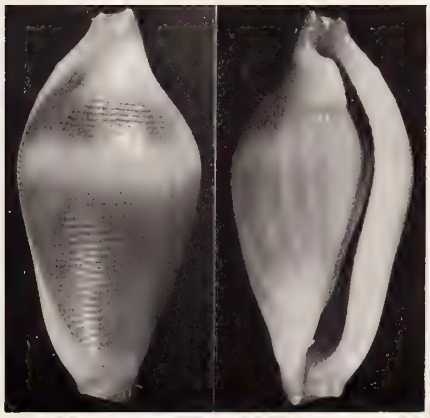


Figure *107*
Crenavolva (Crenavolva)
rosewateri (101)

Figure *108*
Crenavolva (Crenavolva) *virgo* (102)

with bright reddish-orange, outer lip bright yellow, fossula bright pink." (GARRARD, 1963: 45).

Measurements, type: L - 9.0; W - 4.0 mm.

Type Locality: Moreton Bay, Queensland; living on the alcyonarian *Mopsella,* in 23 - 26 m.

Type: AM No. C. 64070 [holotype].

Discussion: These animals live on the narrow branches of gorgoniae and small types of coral (according to Garrard, 1963). The species has a distributional pattern north to Yeppoon and near Burnett Heads, Queensland. It has also been reported from Hervey Bay (between Frasier Island and the mainland); another specimen from off Tangalooma Point, Moreton Bay, Qld., collected from 20 - 30 fathoms, measures: L - 7.8; W - 4.0; H - 3.0 mm; (Figure *104*a: C3704).

99. *Crenavolva (Crenavolva) striatula hesperia* Cate, subspec. nov.

(Figure *105*: holotype)

Description, holotype: Shell fairly small, narrowly elongate, solidly formed though almost translucent; terminals square, truncated, broadly open, crescent-shaped adapically; dorsum glossy, with numerous transversely incised striae forming a weak, wavy, cancellate pattern with faint longitudinal growth lines; base smooth, glossy, elongately ovate, longitudinally ridged and flattened, with a crenulate plait on a long, slightly upraised funiculum; aperture straight, widening at both ends; columella concave, excavated, smooth, hardly deeper in the fossula area; outer lip rounded, somewhat flattened, reflexed, with heavy, elongate teeth near rear terminal, becoming weaker toward the front, then obsolete on front half of lip, acutely sutured and shouldered above; dorsum a pale yellow, remainder of shell milk-white.

Measurements, type: L - 9.1; W - 3.3; H - 2.8 mm.

Measurements, hypotype: L - 6.0; W - 2.5 mm (approx.); (Figure *105*a: ANSP 277758).

Type Locality: 2 mile W of Ankifi, 7 miles S of Nossi Bé, NW of Madagascar (13°15′S; 48°15′E); in 9 fathoms; bottom, mud and sponge.

Type: ANSP, No. 260880 [holotype].

Discussion: This new subspecies seems to be isolated geographically, and differs from ***Crenavolva* (*Crenavolva*)** *striatula traillii* (A. Adams, 1855) and ***C.* (*C.*)** *striatula tinctura* (Garrard, 1963), by being noticeably shorter and broader, with even shorter and broader terminal beaks; the shell is much more thinly formed; it is a nearly colorless shell, with only a pale yellow to butter-yellow on the dorsum; and it is much less dentate. A hypotype, ANSP: 277758, is shown in Figure *105*a.

The name is derived from the Latin *hesperia,* meaning land [ocean] of the west.

100. *Crenavolva (Crenavolva) renovata* (Iredale, 1930)

(Figures *103, 103*C: C3616)

1848 *Ovulum dentatum* A. Adams & Reeve, Voy. Samarang, Zool., *Ovulum,* London: 21; plt. 6, fig. 4 (Figure *106*: holotype)
1881 *Ovula dentata*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 189; plt. 48, figs. 13, 16
1899 *Calpurnus (Ovula) dentata*; Horst & Schepman, Cat. Syst. Moll. (2): 190
1930 *Prosimnia renovata* Iredale, Mem. Queensland Mus. **10** (1): 85
1941 *Primovula (Primovula) renovata;* Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: "Ovul. testá parvá, oblongá, subangulatá, minutè striatá; pallidè roseá, fusco rubescente variegatá; canalibus sub-productis, emarginatis; aperturá angustá; labio externo breviusculo, complanato, intus et ad extremitates usque ad margineum dentato; labio interno laevi, intus longitudinaliter sulcato, posticè tumorem elevatum crenulatum ferente, ad canalem recedente; anticè angustato, tumido; ad canalem sub-uniplicato." (A. ADAMS & REEVE, 1848: plt. 6, fig. 4) [Shell small, oblong, sub-angled, finely striate; pale rose, becoming different shades of red; canals barely produced, emarginate; aperture narrow; outer lip narrow, flat, at the extremity teeth extend to the margin; internal left lip, longitudinally furrowed, elevated rear projection almost crenulate, canal curving (recedente), front narrow, swollen; canal within sub-uniplicate.]

Measurements, type: L - 11.0; W - 5.0 mm (approx).

Type Locality: Caramata Passage, near Singapore (01°14′ N; 103°55′E).

Type: BMNH, no presently assigned Register No. (K. Way, *in litt.,* BMNH).

Discussion: I have not personally inspected this shell; however, the authors commented as follows: "Not so angular as *O. striatulum*. The teeth of the outer lip extend to the outer margin at the upper extremity where they form denticulations. The color is pale rose, strengthened at the ends with two longitudinal waved bands at the back."

The species name, *Ovula dentata* (non *O. dentata* Waldheim & Fischer, 1807), the type of which is here illustrated (Figure *106*), was originally proposed for this species by A. Adams & Reeve, 1848.

101. *Crenavolva (Crenavolva) rosewateri* Cate, spec. nov.

(Figures *107*, *107*C: holotype)

Description, holotype: Shell small, sub-rhomboid, humped, transversely angled at widest point; terminals produced, solidly formed; longitudinally open at adapical end; dorsum sub-glossy, with numerous clearly distinct transverse incised striae throughout; base angularly ovate, narrowing and thickening toward the front, with a large, layered, thickened funicular projection at the rear; thin layer of white callus covers most of base, almost obscuring striae that originate on dorsum; columella semi-striate, almost smooth, broad, depressed, and defined by a longitudinal, adaxial carinal ridge which forms a fossular area with the deepening toward the front; aperture fairly wide, broadening more abapically; outer lip broad, thickened, flattened, more so toward the front, with a faint crenulation along inner edge; large, distinct, though weakly formed teeth adorn rear quarter of lip surface; dorsal color rich rose, with a wide, pale grey transverse band over angle of dorsum; terminals are a deep, rich orange; side margins, lip, and base are white.

Measurements, type: L - 9.3; W - 4.5; H - 3.9 mm.

Type Locality: U.S. Bureau of Fisheries, for U.S. Nat. Mus.; Station 5559; off Cabalian Point, Jolo Island, Philippines; at 24 m (06°00′N; 121°10′E); Sulu Sea.

Type: USNM, No. 238979 [holotype].

Discussion: This taxon seems to approach *Dentiovula dorsuosa* (Hinds, 1844) in a vague sort of way, but differs from it by being narrower; by having shorter teeth on the outer lip; by lacking any funicular swelling dorsally, and by having a different combination of shell colors.

This new species is named in honor of Dr. Joseph Rosewater, Curator, Division of Mollusks, United States National Museum, Washington, D.C.

102. *Crenavolva (Crenavolva) virgo* (Azuma & Cate, 1971)

(Figure *108*: holotype)

1971 *Primovula virgo* Azuma & Cate, The Veliger **13** (2): 262; fig. 4

Description, holotype: Shell large for the genus, elongate, broadening sub-centrally, where it is angularly shouldered; terminals blunt, open, narrowing gently to the front and back; dorsum sub-glossy, with numerous transverse incised striae over all; base rhomboidly ovate, smooth, glossy, narrowing constrictedly to the front; a large thick crenular funiculum covers entire adapical triangle of base; columella smooth, broad, depressed, with a long low longitudinal ridge adaxially which outlines a deepened fossular area; aperture straight, widening in front; outer lip broad, thick, rounded, with very weak teeth along two-thirds of its length, some of which are lengthened to reach outer lip edge in back; shell color milk-white over all.

Measurements, type: L - 14.2; W - 5.5; H - 4.4 mm.

Type Locality: 3 - 4 km off Hinomisaki, Kii Peninsula, Japan (34°00′N; 134°48′E); living on a host capitulum of *Solenocaulon chinense* Kükenthal; in 91 - 128 m.

Type: MA, No. 14841 [holotype].

Discussion: The holotype was collected by Mr. Shingo Habu, 20 March 1970, in deep water dredging off the Kii Peninsula, Japan.

103. *Crenavolva (Crenavolva) verconis* (Cotton & Godfrey, 1932)

(Figure *109*: holotype)

1932 *Prosimnia verconis* Cotton & Godfrey, Austral. Naturalist **13**: 46; plt. 1, fig. 15
1935 *Ovula formosa* Verco, Comb. So. Seas, Adelaide: 150; plt. 11, fig. 14
1935 *Pellasimnia verconis;* Iredale, Austral. Zool. **8** (2): 105
1941 *Primovula (Primovula) verconis;* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Neosimnia (Pellasimnia) verconis*; Allan, Cowries World Seas: 130

Description, holotype: "*P.* [*Prosimnia*] *verconis.* Not *Ovula formosa* Adams & Reeve (Borneo). Shell small, solid, convolute, produced at both ends; white, with dorsum rose, and faint fuscous tint at both extremities; transverse incision-striae, close set, well marked over posterior third, and crinkled by somewhat irregular growth lines; aperture posteriorly slightly curved to left ending in a lateral notch, anterior two-thirds nearly straight, continued into a well marked sub-effuse notch; outer lip somewhat thickened dorsally, acutely, widely, flatly inflected, dentate ventrally, slightly excavated behind anterior notch, then continued obliquely as a subacute ridge beyond the end of the spire of four whorls, slightly

Figure *109*
Crenavolva (Crenavolva) *verconis* (103)

Figure *110*
Crenavolva (Crenavolva) *frumentum* (104)

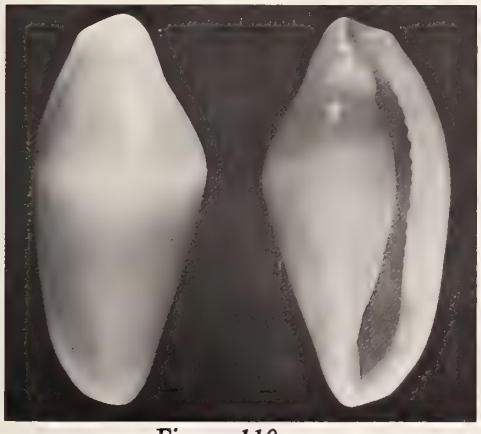


Figure *110* a
Crenavolva (Crenavolva) *frumentum* (104)

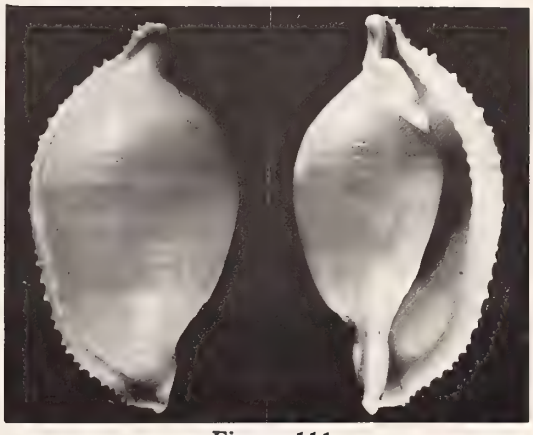


Figure *111*
Crenavolva (Serratovolva) *dondani* (105)

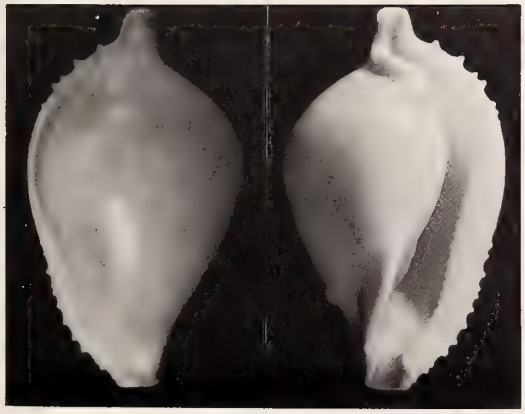


Figure *112*
Crenavolva (Serratovolva) imitabilis (106)

Figure *113*
Crenavolva (Cuspivolva) cuspis (107)

convex, completely covered with cal- (sic) [from Cotton's hand written notes:] "to margin [of] the notch and join a bifid callosity in front of the back of the inner lip, in front of notch; inner lip wide, spread over base of body-whorl which is flatly rounded in upper half, and flatly excavated in lower half." (COTTON & GODFREY, 1932: 46).

Measurements, type: L - 11.0; W - 4.5 mm.

Type Locality: Off St. Francis Island, South Australia; in 64 m.

Type: SAM, No. D.13476 (D.10174 = err.) [holotype].

Discussion: The type lot of ***Crenavolva*** *verconis* consists of 2 specimens, one designated as holotype and the other a well marked paratype. Since these two shells came from different dredge-hauls and are obviously different species, I have retained Cotton's holotype to represent ***C. verconis*** and have used his so-called paratype as the holotype of ***C. heleneae*** (herein).

104. ***Crenavolva (Crenavolva) frumentum*** (Sowerby 1st, 1828)

(Figure *110*: lectotype)

1828 *Ovula frumentum* Sowerby 1st, Zool. Journ. London **4**: 155
1848 *Ovulum frumentum*; Sowerby 2nd, Thes. Conch., *Ovulum* **2**: 474; plt. 101, figs. 103, 104
1887 *Birostra frumentum;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Primovula (Primovula) frumentum*; Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula (Primovula) trailli*; Allan, Cowries World Seas: 121
1958 *Primovula frumentum*; Kuroda, Venus **20** (2): 169

Description, holotype: "O. testa ovato-oblonga, dorso transversim gibboso; rubescent, transversim albido-inifasciata; labio externo margine planulato, intus denticulato; labio columellari superne calloso, infra depresso; extremitatibus sub-acuminatis, obtusiusculis." (SOWERBY 1st, 1828: 155)

Description, hypotype: Shell small, elongately sub-rhomboid, almost rectangular, convolute, solid; terminals open, roundly blunt, somewhat broad; dorsum transversely humped, sub-centrally angled, glossy, with numerous bold, incised lines overall, continuing onto and across base and columella, except that a thin, narrow basal callus obscures striae along central base; a large, thick, uneven, swollen triangular funiculum embellishes adapical terminal base; aperture fairly wide, almost straight, broadening to the front; columella broad, striate, barely depressed, though concave in fossular area; outer lip broad, angling inward, with large thick irregular teeth on adaxial edge; margins and terminal ends broadly, smoothly calloused; dorsum and base deep rose; margins, terminal ends, transverse dorsal hump, funiculum, outer lip, teeth, and base callus off-white.

Measurements, type: L - 6.5; W - 3.0 mm.

Measurements, hypotype: L - 8.7; W - 4.2; H - 3.3 mm; (Figure *110*a: ANSP 219359A)

Type Locality: Here designated: Off Tosa, Tosa Bay, Japan (33°20'N; 133°45'E).

Type: BMNH, No. 1969128 [one of two syntypes (one broken); illustrated (Figure *110*), designated lectotype herein].

Distribution: presently known only from east coast of Japan; and Goa, W India (C3611).

Discussion: SOWERBY (1828) commented about the species: "One of the smallest species I know; I have only seen two or three specimens, and I am unacquainted with its locality." Though very badly worn, the lectotype is adequate for conclusive identification.

(Serratovolva) Cate, subgen. nov.

Type species: *Primovula (Diminovula) dondani* Cate, 1964

Shells are usually roundly ovate to sub-rhomboid, and have characteristic, projecting teeth on the peripheral edge of the outer lip, often on the outer edge of the adapical canal opening as well. The name is derived from the Latin word *serratus,* for toothed like a saw.

105. ***Crenavolva (Serratovolva) dondani*** (Cate, 1964)

(Figure *111*: holotype)

1964 *Primovula (Diminovula) dondani* Cate, The Veliger **7** (2): 102; plt. 19, figs. 1 - 3

Description, holotype: Shell medium-sized, elongately ovate; aperture curving, narrow adapically, broadening, abruptly constricted in front; terminal ridge a continuation of inflated base, straight, sharp, converging with inner fossular ridge; both front and rear terminals produced, adapically more so and narrow; first funiculum prominent, V-shaped, superimposed on base at adaxial margin of posterior columella; first posterior outlet separates the smaller second funiculum; terminal canals narrow, semi-enclosed; central transverse dorsal surface

somewhat flattened, bordered on either side by a vague angular line; irregularly curved margin strongly developed, tubular, crossed by unevenly spaced, variously lengthened serrated teeth the entire length; terminal ridge straight, sharply ridged by eight weak serrated teeth; entire shell surface finely ridged with numerous transverse lines, crisscrossed laterally front to back with equally numerous very fine growth lines; body whorl is grey-white, darker on the base; margins, teeth, terminals, terminal ridge, fossular ridge and funiculum are white; interior of terminal canals very pale pink.

Measurements, type: L - 23.0; W - 11.6; H - 10.0 mm.

Type Locality: Carigara Bay, Samar, Philippines (11° 20'N; 124°40'E).

Type: PNM, No. N.M. CO 07287 [holotype].

106. ***Crenavolva (Serratovolva) imitabilis*** Cate, spec. nov.

(Figure *112*: holotype)

Description, holotype: Shell fairly large, pyriform, bulbously inflated sub-centrally, solid though translucent; terminals produced, narrowly and evenly spatulate, perpendicularly wedge-shaped adapically, truncate in front; dorsum transversely finely incisedly striate overall, though shell surface is smoothly, evenly rounded; base acutely pyriform, roundly inflated, thinly calloused, narrowing quickly, vertically to the front, with 4 small nodular teeth; a long, low, evenly elevated, curving funiculum at rear base, crenate at summit; front terminal ridge distinct, oblique: columella rounded, slightly longitudinally furrowed at adaxial carinal wall within; fossula large, shallow, broad, outlined adaxially by elevated extension of internal carina; aperture fairly straight, curving posteriorly; outer lip broad, flat, shouldered above, with numerous long teeth, many of which protrude beyond periphery of inner and outer lip edge except at central lip area; color milk-white overall, except for a straw-colored line in shoulder suture of outer lip and over terminal beaks.

Measurements, holotype: L - 15.0; W - 8.5; H - 7.2 mm.

Type Locality: Ogokuda Beach, Shionomisaki, S Kii, Japan (34°00'N; 134°48'E).

Type: LACM, No. 1608 [holotype].

Discussion: This new species was at first thought to be a specimen of ***Crenavolva*** (***Serratovolva***) *dondani* (Cate, 1964), but a subsequent evaluation of the two forms seems to indicate that they are two different species; for this reason I provisionally separate them ***Crenavolva*** (***S.***) ***imitabilis*** seems to differ in many respects; it is a much smaller form; it is acutely pyriform, rather than roundly ovate; it is much more finely, evenly striate overall, rather than coarsely, wavily striate with widely spaced angular dorsal ridges; the outer edge peripheral lip teeth do not extend to the end of the adapical terminal beak, terminating before reaching the base of the beak; it has a narrower, spatulate, ventrally-wedged terminal extension adapically, and it has a different narrowing process of the abapical base. However, proof of their apparent close relationship may be seen in the comparable nodular aspect of the abapical base. I have used the Latin word *imitabilis,* meaning imitate because of the similarity of this species to ***Crenavolva*** (***Serratovolva***) *dondani* (Cate, 1964).

(Cuspivolva) Cate, subgen. nov.

Type species: *Crenavolva (Cuspivolva) cuspis* Cate, herein

Shells are usually small, broad, pyriform, inflated, evenly rounded at shoulder, with a closed, pointed adapical terminal process (opening usually to left of beak, rather than straight to rear); shells most often dorsally striate. The name is derived from the Latin word *cuspis,* a pointed end.

107. ***Crenavolva (Cuspivolva) cuspis*** Cate, spec. nov.

(Figure *113*: holotype)

Description, holotype: Shell fairly small, angularly ovate, transversely angulate over dorsum; terminals produced, pointed adapically, truncate in front; dorsum glossy, though transversely incisedly striate over all, except central striation almost obscure; base smooth, glossy, angularly ovate, tapering to a point paralleling terminal ridge in front, with a heavy crenular funicular projection adapically; aperture of medium width, straight; columella broad, smooth, depressed, with fossula not conspicuously developed; outer lip broad, thickly formed, with well developed, heavily formed teeth on rear half of lip, some protruding as pustules on rear outer lip edge, weak, almost indistinct in front; outer lip broad, weakly shouldered on right side of shell; dorsal color deep lavender-mauve, with an almost pale grey band transversely over dorsal angle; lip margins, terminals, and base yellowish beige.

Measurements, holotype: L - 9.4; W - 4.5; H - 3.6 mm.

Figure *114*
Crenavolva (Cuspivolva) *indica* (108)

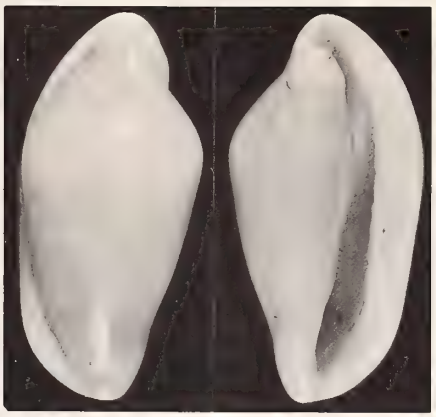


Figure *115*
Crenavolva (Cuspivolva) baltea (109)

Figure *116*
Crenavolva (Cuspivolva) draperi (110)

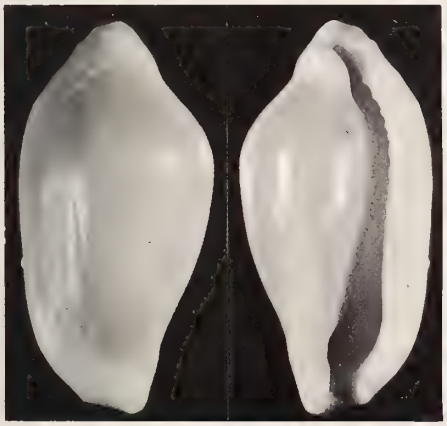


Figure *117*
Crenavolva (Cuspivolva)
tigris (111)

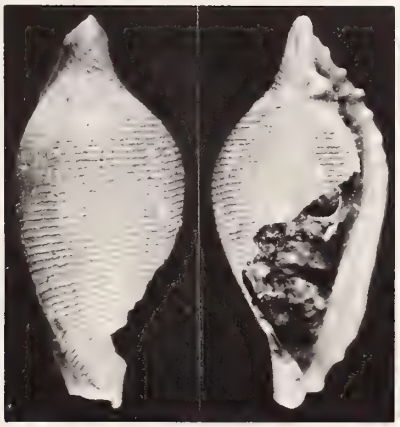


Figure *118*
Crenavolva (Cuspivolva)
curiosa (112)

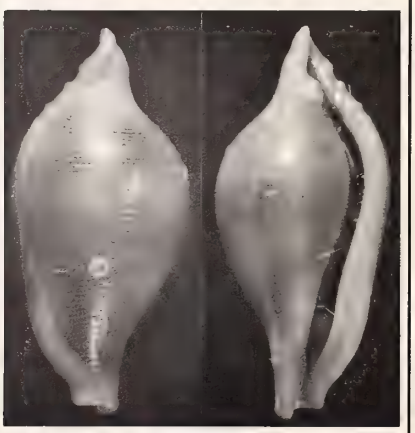


Figure *119*
Crenavolva (Cuspivolva)
azumai (113)

Figure *120*
Crenavolva (Cuspivolva) *mucronata* (114)

Figure *121*
Crenavolva (Cuspivolva) *myrakeenae* (115)

Type Locality: Off Kii, Kii Channel, Japan (34°00'N; 134°48'E).

Type: ANSP, No. 244835 [holotype].

Discussion: This new species may be compared with *Delonovolva formosa* (A. Adams & Reeve, 1848), but differs from it by having a shorter, broader form; by being much less heavily striate dorsally; by having a different sort of adapical terminal area; and by having more pronounced teeth on the outer lip.

108. ***Crenavolva (Cuspivolva) indica*** (Reeve, 1865)

(Figure *114*: holotype)

1865 *Ovulum indicum* Reeve, Conch. Icon., *Ovulum*: plt. 11, figs. 14a, 14b
1881 *Ovula indica;* Weinkauff, Mart. & Chem., Syst. Conch Cab.: 208; plt. 52, figs. 13, 16
1887 *Birostra indica*; Paetel, Cat. Conch. Samml. 1: 327
1941 *Pellasimnia indica*; Schilder, Arch. Molluskenk. 73 (2/3): 109
1956 *Neosimnia indica;* Allan, Cowries World Seas: 127

Description, holotype: "*Ovulum indicum*—Shell narrowly ovate [small, angularly ovate], ivory-white, shining, back angularly gibbous round the upper part, [with widely spaced transverse incised striae emanating from either terminal collar, central dorsum smooth], extremities short [pointed adapically, roundly truncated in front] callously emarginated [shouldered above], lip thickened [broadly convex, with fairly large well developed and numerous teeth], columella slightly excavated [with a short, straight terminal ridge in front, and a large thickly formed funiculum on the rear columellar-base]." (Reeve, 1865: plt. 11, fig. 47).

Measurements, holotype: L - 5.0; W - 2.5 mm (approx.).

Type Locality: "Bombay" [India].

Type: BMNH, No. 1969136 [holotype].

Discussion: Reeve mentions: "A small shining-white species, of which Mr. Cuming possesses two specimens from the coast of Bombay. Scarcely differing from *O. secale* [Sowerby 1st, 1828], except in being transversely striated at the back."

109. ***Crenavolva (Cuspivolva) baltea*** Cate, spec. nov.

(Figure *115*: holotype)

Description, holotype: Shell small, narrow, angularly ovate, sub-rhomboid; terminals somewhat produced, almost pointed adapically; dorsum numerously incisedly transversely striate, striation becoming somewhat obscure centrally, dorsum also sub-angularly inflated near center; base weakly striate, narrow, elongately ovate, tapering thickly abapically, with a sub-funicular callus thickening forming the rear canal wall; aperture straight, narrowing centrally, widening in front to constriction of outer lip; columella somewhat flattened, striate, deepening slightly as a furrow in front fossular area, both columella and fossula faintly defined longitudinally within by a ridge; outer lip broad, angularly reflexed inwardly, with numerous irregular, weak teeth; side margins flatly thickened, flange-like, flared; color ivory-white throughout.

Measurements, holotype: L - 10.0; W - 5.1; H - 4.0 mm.

Type Locality: Goa, W India (15°15'N; 74°00'E).

Type: USNM, No. 442947 [holotype]. There are several paratypes.

Discussion: This species was first considered only a variant of ***Crenavolva (Cuspivolva) indica*** (Reeve, 1865). However, since their morphological differences seem too numerous I am separating them specifically. ***Crenavolva baltea*** is a larger form; it has more of a rhomboid outline, a straighter aperture, a narrower, rhombic base with a broad, heavy longitudinal narrowing of the base ventrally which seems to connect one end of base to the other; the inner edge of the outer lip is crenate, rather than distinctly denticulate, and it has a curiously flanged thickening of the marginal callus. The name is derived from the Latin word *balteus,* meaning flanged, girdle, border, edge.

110. ***Crenavolva (Cuspivolva) draperi***
Cate & Azuma, spec. nov.

(Figure *116*: holotype)

Description, holotype: Shell small, rhomboidly-oblong, solidly formed, transversely angled sub-centrally; terminals well developed, almost spatulate, though somewhat pointed as well adapically; dorsum dull due to overall incised striation; marginal callus substantially formed, encircling terminal ends; base narrow, sub-rhomboid, smooth, slightly glossy (dorsal striae visible under thin surface callus); no terminal ridge in front; solid funicular callosity on rear base; aperture broad, open in front, undulating to rear; columella broad, slightly flattened, with a longitudinal, upraised carinal wall delineating columella within, forming fossula in front; outer lip broadly reflected inward, smooth ventrally, with a hint of crenulation on inner edge; color basically beige, with very faint pale brown clouding dorsally; base pale beige, with

pale brown on ventral lip surface; terminal ends pale brown.

Measurements, holotype: L - 7.7; W - 3.5; H - 3.0 mm.

Type Locality: Off Nada, Kii Province, Japan (34°00′N; 134°48′E); in 55 - 73 m; leg. Shingo Habu, 2 April 1971.

Type: MA, No. 15637 [holotype].

Discussion: This new species may be compared with *Crenavolva* (C.) *striatula traillii* (A. Adams, 1855), because the shells may have distorted adapical terminal construction, but it differs markedly by having a sub-pointed rear terminal beak, the adapical canal open to the side, rather than straight to the rear, an edentate, undulating ventral outer lip; and a differently formed, smooth funiculum; transverse dorsal angle is also more acutely formed in this species.

The species is named in honor of Mr. Bertram Draper, who, among many other contributions to conchology, has done much of the photography for this present work.

111. *Crenavolva (Cuspivolva) tigris* Yamamoto, 1971

(Figure *251*: holotype; Figure *117*: hypotype)

1971 *Primovula (Primovula) tigris* Yamamoto, Publ. Seto Mar. Biol. Lab. **19** (4): 191 - 195; figs. 1a - 1c; plt. 8, figs. 1 - 4

Description, holotype: *"Primovula (Primovula) tigris*— The shell is cylindrically fusiform and thick. The outer lip is flattened, thickened, declivous towards the aperture, and curved rather abruptly in the anterior one-fourth and somewhat gently in the posterior one-third, while the middle range between these curves is nearly straight. The denticulation of the outer lip is somewhat irregular and indistinct in the anterior half, though there are 15–16 teeth, attaining the adaxial edge of lip, in the posterior half from about the middle to the posterior end. The base is inflated, elongate ovate, and narrowing abruptly posteriorly and gradually anteriorly; extremely faint striae on the surface. The columella is carinate, widened about the anterior one-fourth rather abruptly and then gradually posteriorly to the posterior one-third where it is widest. Thus, the aperture is narrow in the posterior part, least in the breadth at the posterior one-third, then widened gradually anteriorly to the anterior one-fourth where it is enlarged abruptly. The edge of the anterior outlet is never acute, but rather truncate obliquely. The first funiculum is distinct, but insignificant, with two extremely faint crenulations on it. The second funiculum is defined but very indistinctly. The first posterior outlet is well marked, but the second is much less remarkable. The fossula is very short. The dorsum is inflated and with the rounded carina; about 120 fine transverse striae over the surface, except for the wide peripheral callus along the outer lip. The dorsal side is wholly orange yellow, especially darker in the peripheral callus along the outer lip. The base is orange brown, with the callus and the outer lip paler, especially the former becomes whitish towards the columellar edge." (Yamamoto, 1971: 192).

Measurements, type: L - 14.9; W - 7.5; H - 6.2 mm.

Measurements, hypotype: L - 11.0; W - 5.6; H - 4.7 mm.

Type Locality: in 17 m of water off Sirahama, Wakayama Prefecture, Japan (leg. Torao Yamamoto, March 31, 1961, on gorgonid octocoral *Euplexaura*).

Type: Depository unknown; presumably in the collection of the author of this new species. Hypotype MA, No. 15073-B.

Discussion: The hypotype was collected 27 December 1970; in 55 - 73 m; leg. M. Azuma off Minabe, Tanabe Bay, Kii Peninsula, Japan. I am indebted to both Dr. Tadashige Habe and Dr. Torao Yamamoto for information and photographs of this recently published new ovulid species, which is illustrated in color and black and white in its original publication.

112. *Crenavolva (Cuspivolva) curiosa* Cate, spec. nov.

(Figure *118*: holotype)

Description, holotype: Shell small, somewhat narrowly ovate, with dorsal elevation almost central; terminals produced, curiously beaked adapically, rocket-shaped; dorsum numerously, evenly, deeply, transversely grooved throughout, cord-like; base equally grooved, inflatedly ovate; aperture mostly straight; funiculum a bubble-like projection which is the terminus of a perpendicular, calloused wall forming left side of posterior canal; outer lip flat, broadening to the front, somewhat reflexed; denticles heavily formed (approx. 8), distant, projecting beyond periphery of rear lip edge, with remainder of lip surface to the front without teeth; color beige to pale yellow.

Measurements, type: L - 6.4; W - 2.7; H - 2.5 mm.

Type Locality: 18 miles SE of Vizagapatnam, Bay of Bengal, SE India (17°35′N; 83°25′E); *Anton Bruun* Sta. 90; dredged from 79 m; sand and shell bottom; Internat. Indian Ocean Exped., 28 April 1963.

Type: ANSP, No. 294553 [holotype].

Discussion: The unique holotype is an injured specimen, but enough of it remains to represent this new species. The serriform dental projections and the construction of

Figure *122*
Crenavolva (Cuspivolva) ostheimerae (116)

Figure *123*
Crenavolva (Cuspivolva) rostella (117)

Figure *124*
Delonovolva formosa (118)

Figure *125*
Delonovolva serrula (119)

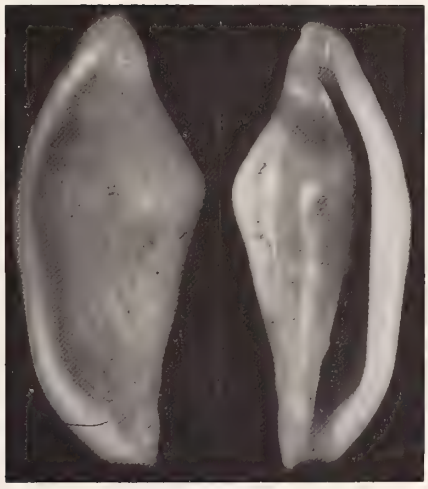


Figure *126*
Delonovolva smithi (120)

Figure *127*
Delonovolva aequalis aequalis (121)

Figure *127* a
Delonovolva aequalis aequalis (121)

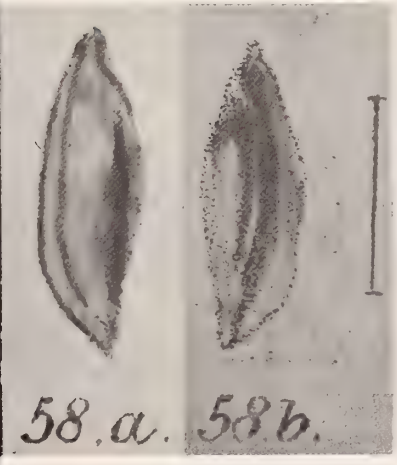


Figure *128*
Ovulum arcuatum (121)

Figure *129*
Ovulum neglectum (121)

the adapical terminal beak place it in this genus. This new shell form appears distinct from the following species, ***Crenavolva* (*Cuspivolva*) *azumai*** (Cate, 1971), because of its unusual adapical terminal features, by its shell outline, by the less numerous, deep and very prominent dorsal striation, by the peculiar funicular fold on the rear base, and by the unusual teeth on the outer lip. The name for the species is derived from the Latin word *curiosus*, meaning odd, strange.

113. ***Crenavolva (Cuspivolva) azumai*** (Cate, 1970)

(Figure *119*: holotype)

1970 *Primovula azumai* Cate, The Veliger **13** (2): 181; fig. 1

Description, holotype: Shell of medium size for the genus, ovate, thinly formed, sub-translucent; terminals well produced, sharp, pointed in back, square in front (truncate); dorsum roundly inflated centrally, sloping sharply to either terminal, saddle-like; dorsum numerously, very distinctly, transversely incisedly striate; base inflatedly ovate, narrowing abruptly and thickly abapically; short, elevated, dual-knobbed funiculum at the rear base; base striate, with a longitudinal narrow callus the length of central base; columella fairly broad, striate, weakly depressed, deepening toward the front, becoming a well developed fossula; a well formed adaxial carinal ridge outlines both columella and fossula; aperture narrow, slightly curving; outer lip thick, rounded, semidentate, with large poorly formed teeth; color a deep, rich honey-yellow to yellow-brown, with adaxial carinal ridge, tip of funiculum, and teeth a lighter color.

Measurements, holotype: L - 9.6; W - 4.4; H - 3.9 mm.

Type Locality: 1 - 2 km off Kirimesaki, Kii Peninsula, Japan 34°00′N; 134°48′E); in 37 - 55 m; leg. Azuma, 13 February 1970.

Type: MA, No. 14826 [holotype].

Discussion: The species most closley resembles the preceding species, ***Crenavolva* (*Cuspivolva*) *curiosa*,** but differs from it by being a larger form; by having fewer and smaller teeth on the outer lip, and by being more numerously, more finely striate dorsally.

114. ***Crenavolva (Cuspivolva) mucronata***
(Azuma & Cate, 1971)

(Figure *120*: holotype)

1971 *Primovula mucronata* Azuma & Cate, The Veliger **13** (3): 264; fig. 8

Description, holotype: Shell small, angularly ovate, thin, translucent; terminals sharply produced, especially adapically; dorsum smooth, glossy, except for transverse incised striae emanating restrictedly from either terminal, with more numerous lines at the rear; base ovate, with striae more numerous than on dorsum, covering most of the ventral surface; funiculum a narrow, thickened, uneven elevation on rear base; columella rounded, striate, without depression; fossula only barely recognizable; aperture long, curving; outer lip rounded, thickened, with numerous large, short, weak teeth on inner edge; color basically light grey-white over all, with large red-brown, elongate clouds of reddish-brown, especially on right side; both terminal beaks are yellow, except tip of adapical beak is white; terminal channel yellow in front, brown in back.

Measurements, holotype: L - 9.7; W - 4.2; H - 3.6 mm.

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); living at a depth of 55 - 91 m; leg. Azuma, 20 March 1969.

Type: MA, No. 14845 [holotype].

Discussion: This species may be compared with ***Crenavolva* (*Cuspivolva*) *azumai*** (Cate, 1970), but it is a more narrowly ovate and elongate form; it lacks the central dorsal striae; it has a straighter and more even aperture, simpler terminal beaks, more numerous teeth on the full length of the outer lip, which lacks the angles and constrictions present in *C. azumai;* the basic color of this shell is different and so, also, is the color pattern.

115. ***Crenavolva (Cuspivolva) myrakeenae***
(Azuma & Cate, 1971)

(Figure *121*: holotype)

1971 *Primovula myrakeenae* Azuma & Cate, The Veliger **13** (3): 263; fig. 7

Description, holotype: Shell small, bulbously inflated, rhomboidly pyriform, thinly formed, sub-translucent; terminals extended, somewhat pointed in back, blunt in front; dorsum glossy, although having very fine wavy, transversely incised striae over all, intercepted longitudinally by incremental growth lines; base pyriformly ovate, roundly inflated, tapering sharply, narrowly adapically, transversely striate to adaxial edge within; a small subcircular, upraised multi-knobbed funiculum on rear base; aperture fairly broad, curving; columella follows natural curve of base, striate, though faintly outlined by a ridge within, with a deepening in the fossula area; outer lip somewhat thickened, rounded, with large, rudimentary, widely separated teeth on rear half of lip edge, front half

without teeth; color bright red-brown with three bands of light grey, and a yellowing of the red-brown on adapical terminal beak.

Measurements, holotype: L - 9.7; W - 5.2; H - 4.4 mm.

Type Locality: Off Nada, Kii Peninsula, Japan (34°00′N; 134°48′E); in 55 - 91 m; leg. Azuma.

Type: MA, No. 14847 [holotype].

Discussion: This species is rather closely related to ***Crenavolva* (*Cuspivolva*)** *azumai* (Cate, 1970), but differs in having a much broader, more bulbous form, less tortuous terminal beaks, and it is much less prominently striate dorsally; it has a wider, more curved aperture, less developed outer lip with finer, weaker teeth, and the color patterns of the two species are different.

116. ***Crenavolva (Cuspivolva) ostheimerae*** Cate, spec. nov.

(Figure *122*: holotype)

Description, holotype: Shell small, ovately pyriform; terminals projecting, beaked, with a distorted appearance adapically, sharp and semi-tubular in front; dorsum glossy, rounded, numerously transversely incisedly grooved throughout; base smoothly thickened, calloused over faint incised sculpturing, with base narrowing in front to coincide with terminal ridge; funicular projection at the rear a thick, crenate, lateral projection of the base, extending into a curiously elevated thickening to rear outer lip termination; aperture fairly wide; columella sharply depressed, faintly and numerously lined adapically; fossula deep, wide, lined with a high, thick, longitudinal carinal wall within; outer lip thick, rounded, shouldered above, with well developed teeth projecting beyond periphery of outer lip in back; color basically whitish-grey, except that dorsum appears to be broadly three-banded with deep rose, terminal tips stained with yellow.

Measurements, holotype: L - 6.4; W - 3.6; H - 3.0 mm.

Type Locality: 18 - 29 m; coarse gravel and silt; about 1 mile S by E of Cape Dgaroewawoffi, Japen Island, Geelvink Bay, Dutch New Guinea (02°30′S; 135°30′E); Ostheimer, Orr, Powell Expedition; Sta. 521; 13 February 1956.

Type: ANSP, No. 277760 [holotype].

Discussion: This new species may be compared with ***Crenavolva* (*Cuspivolva*)** *myrakeenae* Cate, 1971 from which it differs by being more ovate in form; by having larger, less numerous, and deeper dorsal striae; by having a more hooked, less sub-spatulate adapical terminal beak; by having a much thicker, more ponderous funicular projection on the rear base; and by having a broader outer lip, with more fully developed denticulation.

The species is named in honor of Ruth Ostheimer, Field Associate, ANSP, whose work has contributed so much to malacology.

117. ***Crenavolva (Cuspivolva) rostella*** Cate, spec. nov.

(Figure *123*: holotype)

Description, holotype: Shell small, elongately ovate; terminals produced, pointed, sub-spatulate adapically, truncate in front; dorsum sub-glossy, numerously finely transversely striate overall; right margin almost flanged in front, with protruding teeth on rear flange; base striate, inflated, ovate, tapering sharply abapically, becoming a narrow, straight terminal ridge; a large, bulky, crenulate funicular projection forms a rear twisting canal wall; columella broad, striate, distinctly depressed, channeling deeply to form fossula in front with a longitudinal, heavily formed carinal wall; aperture almost straight; outer lip broad, somewhat flattened, with several irregularly developed and lengthened denticles; at rear three or four teeth protruding beyond periphery of outer lip; color milk-white over all.

Measurements, holotype: L - 4.8; W - 2.3; H - 1.9 mm.

Type Locality: (USNM) Smithsonian Station 5642; Boetoeng (Button) Island, off SE coast of Celebes Island, Dutch East Indies (02°30′S; 120°30′E); in 68 m of water, on grey mud.

Type: USNM, No. 279763 [holotype].

Discussion: This new species may be only a variation of ***Crenavolva* (*Cuspivolva*) *ostheimerae*** Cate (herein); however, their morphological differences seem numerous enough to separate them. It is a smaller species; it is more narrowly ovate; it has a narrower, straighter aperture, less tortuous adapical terminal process, with a constricted, adjoining dorsal depression, and it lacks any basic shell color. The name is derived from the Latin *rostrum*, meaning beaked.

Delonovolva Cate, gen. nov.

Type species: *Ovulum formosum* A. Adams & Reeve, 1848

The shells are of medium size, narrowly elongate, almost tubular to sub-angularly rounded centrally, with ter-

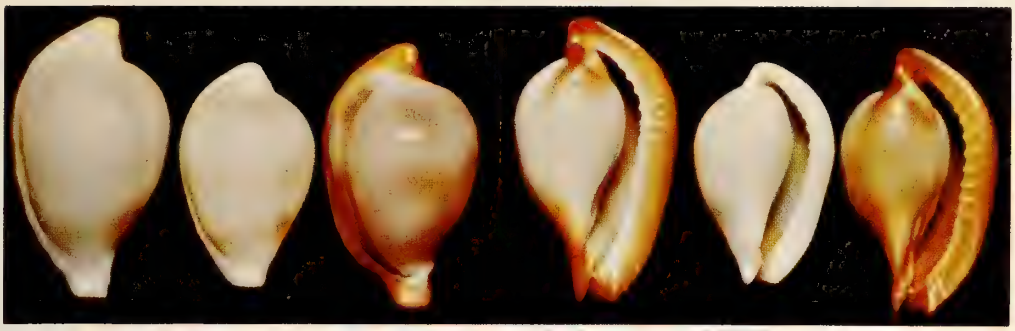


Figure 27 C *Margovula pyriformis* (27)

Figure 30 C *Margovula bimaculata* (29)

Figure 27 C *Margovula pyriformis* (27)

Figure 27 C *Margovula pyriformis* (27)

Figure 30 C *Margovula bimaculata* (29)

Figure 27 C *Margovula pyriformis* (27)

Figure *174* C ***Aclyvolva haynesi*** (154)

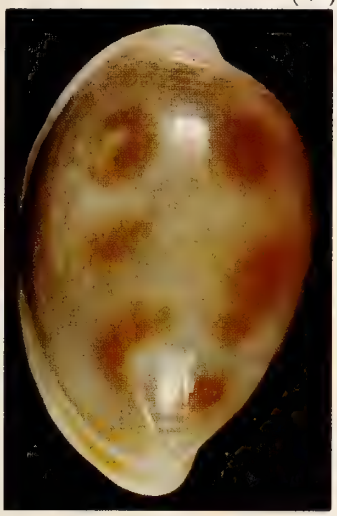


Figure *7* C ***Testudovolva nipponensis*** (7)

Figure *212* C ***Phenacovolva (Phenacovolva) rosea rosea*** (182)

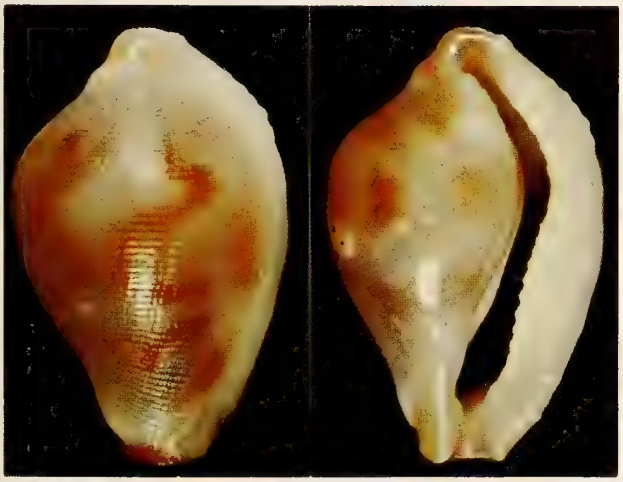


Figure *95* A C ***Primovula (Adamantia) kurodai*** (219)

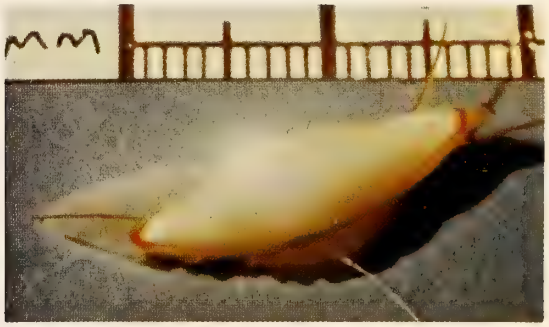


Figure *179* C ***Cymbula deflexa*** (157)

minals usually tapering evenly to either end, spindle-shaped. The name is derived from the Greek word *delonos,* meaning dagger, stiletto, or pike.

118. *Delonovolva formosa* (A. Adams & Reeve, 1848)

(Figure *124*: holotype)

1848 *Ovulum formosum* A. Adams & Reeve, Voy. Samarang, Moll., London: 22; plt. 6, fig. 6
1859 *Ovula formosa*; Chenu, Man. Conch.: 272
1887 *Birostra formosa*; Paetel, Cat. Conch. Samml. **1**: 327
1941 *Primovula (Primovula) formosa*; Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: *"Ovulum formosum*—Ovul. testá elongatá, in medio sub-angulatá, violaceá, ad extremitates fuscá, lineis puncturatis cinctá; canalibus brevibus, validè emarginatis; aperturá angustá; labio externo in medio sub-angulato, denticulato, ad extremitates brevi, posticè ad marginem externum dentato; labio interno laevi, longitudinaliter sulcato, posticè tumido, ad canalem angusto, retiusculo, anticè ad canalem rectiusculo." (A. Adams & Reeve, 1848: 22).

Measurements, holotype: L - 12.0; W - 4.0 mm (approx.).

Type Locality: East coast of Borneo.

Type: BMNH, No. 1879.2.26.151 [holotype].

Discussion: The authors commented further on the species: "Of an elongate angular form, and of a remarkably bright violet color, with yellow tips; the spiral striae are regular and beautifully punctured. The extremities rather produced, the outer lip short at the ends and denticulated, the denticulations reaching the outer margin at the posterior extremity." Taking into consideration the type locality of this species, the authors must have had in mind the Latin word *formosus,* meaning beautiful, rather than the place-name Formosa, the modern Taiwan.

119. *Delonovolva serrula* Cate, spec. nov.

(Figure *125*: holotype)

Description, holotype: Shell small, narrow, ovate yet subrhomboid, angularly transversely humped sub-centrally; terminals produced, sharply pointed, reflexed adapically, truncate in front; dorsum transversely incisedly striate overall; base elongately ovate, angularly narrow, striate under a thin callus layer, narrowing broadly to the front, with a sharply elevated triangular funicular projection behind; columella broad, striate, deepening to form a fossula in front, both columella and fossula defined adaxially by a steep longitudinal elevation; aperture straight, widening abapically due to constriction of outer lip; outer lip broad, somewhat flattened, angling inward, with large, weak, irregular teeth (7) in back, slight crenular eruptions and small weak teeth extend to the front; right side margin wide, smooth, nearly perpendicular; color beige-white overall, except that side margin is a lighter color.

Measurements, holotype: L - 5.7; W - 2.2; H - 1.9 mm.

Type Locality: Smithsonian (USNM) Exped., Station 5642; Button (Boetoeng) Strait, off SE coast of Celebes Island, Celebes Sea (02°30′S; 120°30′E); in 64 m; grey mud bottom.

Type: USNM, No. 279763A [holotype].

Discussion: This new species seems to most closely resemble ***Crenavolva* (*Cuspivolva*) *rostella*** Cate (herein), which was collected at the same station by the same expedition. It appears, however, to differ notably by having a different adapical terminal construction; by having longer, sharper lip teeth; by having a different over-all morphology and outline; and by having some definite shell color, whereas ***C. rostella*** is milk-white. The holotype is one of two specimens collected; a hole in the right rear dorsum identifies the type. The name is derived from the Latin word of the same spelling meaning saw, serrated.

120. *Delonovolva smithi* (Sowerby 3rd, 1894)

(Figure *126*: holotype)

1894 *Amphiperas smithi* Sowerby 3rd, Proc. Malacol. Soc. London **1**: 46; plt. 4, fig. 2

Description, holotype: *"Amphiperas smithi*—Testa elongata, obtuse angulata, utrinque brevirostrata, antice attenuata, postice breviter acuminata, laevis, polita, alba luteo-fusco tincta; rostrum posticum oblique biplicatum; apertura angustiuscula, antice paulo latior; canalibus brevibus, emarginatis; labrum crassiusculum, rotundatum, utrobique laeve, extus varicosum, album." (Sowerby 3rd, 1894: 46.)

Description: Shell is relatively long, obtusely angled, narrowly beaked, tapering to the front, short and pointed in back; dorsum is striate away from either end, smooth centrally; color is dark yellow and white; rear funiculum is obliquely biplicate; aperture narrow, becoming wider, more open in front; canals are short, emarginate; lip is thick, rounded, shouldered above, white.

Of this species Sowerby says, "Somewhat like *O. traillii,* A. Adams, but the mouth is narrower and the lip quite smooth without and within."

Measurements, holotype: "Long. 10, maj. diam. 4 mm." (Sowerby)

Type Locality: Mauritius.

Type: BMNH, No. 1888:1.9.71 [holotype] ('The Museum purchased this shell from Robillard in 1888'—J. D. Taylor, BMNH).

121. *Delonovolva aequalis aequalis* (Sowerby 2nd, 1832)

(Figure *127*: lectotype)

1832 *Ovulum aequalis* Sowerby 2nd, Conch. Illustr., Cypraeidae, London: 18; fig. 61
1865 *Ovulum arcuatum* Reeve, Conch. Icon., *Ovulum*: plt. 13, figs. 58a, 58b (Figure *128*: original illustration)
1865 *Ovulum neglectum* Reeve, Conch. Icon., *Ovulum*: plt. 14, figs. 62a, 62b (Figure *129*: original illustration
1881 *Ovula aequalis*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 215
1881 *Ovula arcuata*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 207; plt. 52, figs. 9, 12
1885 *Ovula uniplicata* Tryon, Man. Conch. **7:** 255; plt. 5, fig. 46
1885 *Ovula neglecta* = *O. avena;* Tryon, Man. Conch. **7:** 255; plt. 5, fig. 54
1887 *Simnia aequalis;* Paetel, Cat. Conch. Samml. **1:** 327
1887 *Birostra arcuata;* Paetel, Cat. Conch. Samml. **1:** 326
1887 *Simnia neglecta;* Paetel, Cat. Conch. Samml. **1:** 327
1935 *Neosimnia quaylei* Lowe, Trans. San Diego Soc. Nat. Hist. **8** (6): 22; plt. 3, fig. 5
1941 *Simnia quaylei;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia aequalis;* Allan, Cowries World Seas: 129
1960 *Neosimnia vidleri tyrianthina* Berry, Leaf. Malac. **1** (19): 118

Description, holotype: ("*Ovulum aequale*—Shell oblong, somewhat cylindrical, red; outer lip thickened; extremities rather obtuse; aperture rather broad, equal at each extremity; columella with a distinct internal keel" (Sowerby 2nd, 1832: 18).

Description, hypotype: Shell fairly large, elongate, ovate, cylindrically inflated; terminals pointed to sub-obtuse, more acuminate adapically; dorsum sub-glossy, with very fine longitudinal incremental growth lines and numerous transverse incised striae emanating from either end, becoming somewhat obscure on central dorsum; base smooth, widely ovate, narrowing and slightly constricting to the front; faint striae may be visible on either side of base; a spiral funicular cord on rear base forms a dual canal opening, left and to rear; columella-fossula area more or less rounded, smooth; aperture almost straight, fairly wide; outer lip edge thick, rounded, smooth, shouldered above; color seems to vary with the color of gorgonian upon which it lives: white, pink, red, lavender-red, brown, and yellowish; terminal ends are yellow to orange, as are canal interiors; funiculum, thinly coated basal callus, and outer lip edge are off-white.

Measurements, holotype: "length 0.45. breadth 0.18."

Measurements, hypotype: L - 18.4; W - 6.6; H - 5.2 mm; (Figure *127*a: C3808).

Type Locality: Panama; [locality may be erroneous]. Here suggested as 6 miles S of San Felipe, E Baja California del Norte.

Type: BMNH, No. 1966364 [lectotype herein; there are 4 syntypes, another of which is illustrated in Cate: 1969A; plt. 9, fig. 15a].

Distribution: Puertecitos to San Felipe, E Baja California; Guaymas to Bahía de Adair, Sonora, W Mexico.

Discussion: This species may vary in size and in the degree of terminal end acumination; but the yellow or orange terminal tips are constant, and are a differentiating criterion for this species.

122. *Delonovolva aequalis vidleri* (Sowerby 3rd, 1881)

(Figure *130*: original illustration)

1881 *Ovulum vidleri* Sowerby 3rd, Proc. Zool. Soc. London: 638; plt. 56, fig. 1
1885 *Ovula vidleri* = *O. avena;* Tryon, Man. Conch. **7:** 255; plt. 5, fig. 55
1887 *Birostra vidleri;* Paetel, Cat. Conch. Samml. **1:** 327
1941 *Simnia vidleri;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia vidleri;* Allan, Cowries World Seas: 127

Description, holotype: "*Ovulum vidleri*—Testa elongata, utrinque acuminata, transversim striata, cerasina, terminibus vivide aurantiacis, dorso medio gibbosiusculo, levissime angulato, laevigato vel obsolete costato; apertura angusta, antice latior; labium laeve, antice subangulatum; columella callosa, postice conspicue uniplicata." (Sowerby 3rd, 1881: 638).

Description, hypotype: Shell fairly large, rather broadly inflated centrally, sloping quickly adapically, more gradually to the front; terminals sharply pointed, especially in back; dorsum glossy, highly polished despite fine longitudinal growth lines and numerous transverse incised striae with the latter emanating boldly from either end, becoming finer and eventually obscure centrally; base convexly ovate, smooth, though faintly striate under thin, glossy callus, constricted in front, with a well formed funicular cord in back forming a dual, diagonally lateral

Figure *130*
Delonovolva *aequalis vidleri* (122)

Figure *130* a
Delonovolva *aequalis vidleri* (122)

Figure *130* b
Delonovolva *aequalis vidleri* (122)

Figure *131*
Delonovolva *labroguttata* (123)

Figure *132*
Delonovolva *senegalensis* (124)

Figure *132* a
Delonovolva *senegalensis* (124)

Figure *133*
Carpiscula *bullata* (125)

Figure *134*
Carpiscula galearis (126)

canal to the left; columella rounded, without depression; fossula formed by an upraised carinal ridge within; aperture of medium width, opening up widely abapically; outer lip edge roundly thickened, smooth, shouldered above; color varies from beige-white, pale yellow, rose, to reddish-brown (hypotype), with funiculum, base, rear base ridge, terminal canal interiors, and outer lip edge pinkish-white; dorsal surface of terminal ends orange.

Measurements, holotype: "Long. 21, diam. 7 millim."

Measurements, hypotype: L - 17.2; W - 6.7; H - 5.4 mm (C3743); however, the average length varies from 15 to 23 mm.

Type Locality: Monterey, California, west coast of America.

Type: BMNH, No. 1881.5.20.31 [holotype: Figure *130*a]; Cate 1969; plt. 9, fig. 16 = holotype); (Figure *130:* orig. illustr.; Figure *130b*: C3809).

Distribution: Laguna Beach, California, 12 - 15 m, on gorgonians (hypotype); 80 feet of water, Morro Bay (L. Thomas); San Diego to Monterey Bay, California.

Discussion: This subspecies is not only geographically isolated from ***Delonovolva*** *aequalis aequalis,* which lives in the upper half of the Gulf of California, but it seems to be a generally larger form; it seems more often to lack the orange coloring in the terminal canals, as well. SOWERBY (1881) says this about the shell: "An *Ovulum* of an elongated form, of a cherry-red colour, with bright orange extremities. The back is nearly smooth; and the ends are transversely striated. Several of the specimens brought by Mr. Vidler are smaller, smoother, and more slender than the one I have chosen as type."

123. *Delonovolva labroguttata* (Schilder, 1969)

(Figures *131*: paratype 2; *131*C: NM 4782)

1969 *Phenacovolva labroguttata* Schilder, Arch. Molluskenk. 99 (3/4): 209; figs.1, 2
1969 *Pellasimnia aurantia* Carlsson, Conch. Soc. So. Africa 107: 3

Description, holotype: *"Phenacovolva labroguttata*— Shell spindle shaped, but ends slightly protracted; shell smooth, only terminally spirally lined; right side margined; outer lip somewhat flattened, and slanting inward, anteriorly slightly curved outward; inner lip anteriorly weakly keeled, posteriorly with obsolete funiculum which has oblique folds; fossula lacking completely; columella its entire length uniformly rounded inwardly; back light rose colored, unicolored, without any kind of transverse band; outer lip white, with a row of 11 fairly rectangular, rose colored maculations, which are about as long as the spaces in between them, dorsally extending as far as the lateral groove, and basely much lighter traceable as far as the edge of the aperture, left side without maculations, base light rose color, ends yellowish-white." (SCHILDER, 1969: 209).

Measurements, holotype: L - 27.7; W - 9.7 mm.

Measurements, paratype (2): L - 23.1; W - 8.6; H - 6.8 mm.

Type Locality: Haga Haga, Cape Town, SE Africa (33° 55'S; 18°22'E).

Type: ELM, No. not known [holotype]. Figure *131c*: NM 4782).

Discussion: The specimen illustrated in this report is Paratype No. 2. It was collected on the beach by Mrs. Faulkner, Gonubie Mouth; interior of shell has minute deposits of lime. Shell is now in collection of Hazel Jeffries, Kei Mouth, Cape Province, S.A., to whom I am deeply indebted for the use of her specimen in this work. Mrs. Faulkner possesses a larger specimen that has been designated Paratype No. 3, which is said to be a clear orange color; the holotype (for illustration of holotype see Schilder 1969) is a pale pink shell. The peculiar rectangular color pattern on the outer lip margin easily identifies this species.

124. *Delonovolva senegalensis* (Schilder, 1931)

(Figure *132*: holotype)

1931 *Neosimnia spelta senegalensis* Schilder, Bull. Zool. Soc. France 56: 364; fig. 6
1941 *Simnia senegalensis;* Schilder, Arch. Molluskenk. 73 (2/3):
1950 *Simnia spelta;* Nicklès, Moll. test. mar. Côte occident. d'Afrique: 83
1956 *Neosimnia senegalensis;* Allan, Cowries World Seas: 128

Description, holotype: *"Neosimnia spelta senegalensis*— Shell is fusiform, solid, dorsum perceptibly depressed front and back, otherwise regularly convex, incisedly striate over all (4 or 5 lines per millimeter); aperture fairly narrow, dilated abapically; lip convex, with interior surface excavated, depressed; columella is sub-carinate longitudinally; funiculum on adapical base is oblique, distinct; fossula excavated, with adaxial margin slightly elevated; dorsum rose-purple, the margins pale rose, and the lip, adaxial carinal ridge pale yellowish." (SCHILDER, 1931: 364).

Measurements, holotype: L - 17.5; W - 6.3; H - 5.0 mm.

Measurements, hypotype: L - 20.0; W - 7.3; H - 5.7 mm (Figure *132*a: C3903).

Type Locality: Senegal, West Africa.

Type: IRSN, [holotype (cat. no. unknown)].

Distribution: Gorée, Dakar, and Sâo Thomé, W Africa.

Discussion: Schilder (1931: 367) compares this West African species with *Neosimnia spelta spelta* and *N. spelta illyrica,* and appears to agree that this African form differs from them by having an unusual transverse dorsal striation (sculpturing) throughout, and the brilliant shell coloring; in addition there are other differentiating characters as well, such as an unusual terminal formation at either end. I am indebted to Prof. Dr. W. Adam, IRSN, for the photograph of the type specimen. Although Schilder described the new form as a subspecies, it seems appropriate at this time to elevate it to full species status. A hypotype is in the author's collection from Gorée, Senegal, West Africa.

Carpiscula Cate, gen. nov.

Type species: *Ovulum bullatum* A. Adams & Reeve, 1848

Shells are peculiarly ovate, very strongly transversely incisedly striate dorsally, and have a remote resemblance to the appearance of a shoe. The name is derived from the Latin *carpisculus,* a kind of a shoe.

125. *Carpiscula bullata* (A. Adams & Reeve, 1848)

(Figure *133*: holotype)

1848 *Ovulum bullatum* A. Adams & Reeve, Voy. Samarang, Moll., *Ovulum*: 23; plt. 6, fig. 13
1881 *Ovula bullata;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 187; plt. 48, figs. 5, 8
1941 *Primovula (Primovula) bullata;* Schilder, Arch. Molluskenk. **73**(2/3): 107

Description, holotype: "*Ovulum bullatum*—Ovul. testá ovali-oblongá, minutè striatá; roseo tinctá, ad extremitates fusco lineatá; dorso ad marginem sulcato; canalibus sub-productis, integris; aperturá angustá, labio externo intus crenato, complanato; labio interno tumido, laevi, intus depresso, sub-sulcata, posticè bullulam prominentem crenulatum ferente, ad canalem, sub-tortuoso, anticè sub-excavato, ad canalem uniplicato." (A. Adams & Reeve, 1848: 23). Shell oblong-ovate, finely transversely striate; rosy-pink, with darker lines toward the extremities; dorsal border furrowed; terminal channels barely produced; aperture narrow, outer lip crenate within, flattened; columella swollen, smooth, depressed within, sub-furrowed, with a prominent crenate funiculum in back; rear terminal twisting, winding, somewhat excavated in front, with a single cord evident.

Measurements, holotype: L - 8.3; W - 4.0 mm.

Type Locality: "Caramata Passage, near Singapore."

Type: BMNH, No. 1879.2.26.152 [holotype].

Discussion: The name for this species is likely to have been taken from the Latin word *bullatus,* meaning blistered.

126. *Carpiscula galearis* Cate, spec. nov.

(Figure *134*: holotype)

Description, holotype: Shell small, narrow, sub-pyriform, helmet-shaped; terminals produced, somewhat pointed adapically, truncate, broad in front; dorsum broader to the rear, narrowing toward the front, numerously, irregularly and unevenly transversely striate overall, with longitudinal growth lines forming a cancellate pattern; base incisedly grooved except for columellar surface, which is smooth due to a thin nacreous layering; base narrows pointedly, becoming weakly grooved as it approaches straight terminal ridge abapically; base flattens perpendicularly adapically, with a series of funicular projections (4) that terminate rear columella base; a column, perpendicular to the flattened base, joins rear lip to form a shallow, grooved terminal opening; columella flat, smooth, defined adaxially by a thick carinal wall, which becomes elevated in a weakly depressed fossular area; outer lip broad, flattened, angling gently inwardly; lip smooth, edentate except for very rudimentary denticles which become weakly pointed projections at either end of lip; outer lip is distinctly thickened, shouldered above; color milk-white over all.

Measurements, holotype: L - 5.9; W - 3.9; H - 2.5 mm.

Type Locality: 25 miles NNW of Phuket Island, W Thailand, Andaman Sea (08°29′N; 97°59′E); ANSP *Anton Bruun* Sta. 19; in 42 m of water; sandy mud bottom. Dredged 23 March 1963.

Type: ANSP, No. 291498 [holotype].

Discussion: This species is perhaps most closely related to *Carpiscula bullata* (A. Adams & Reeve, 1848), but differs most notably in the formation of adapical aspects of the shell, where it is more squarely shouldered, with the rear

Figure *135*
Calpurnus (Calpurnus) verrucosus (127)

Figure *135* a
Calpurnus (Calpurnus) verrucosus (127)

Figure *136*
Radius gibbus (127)

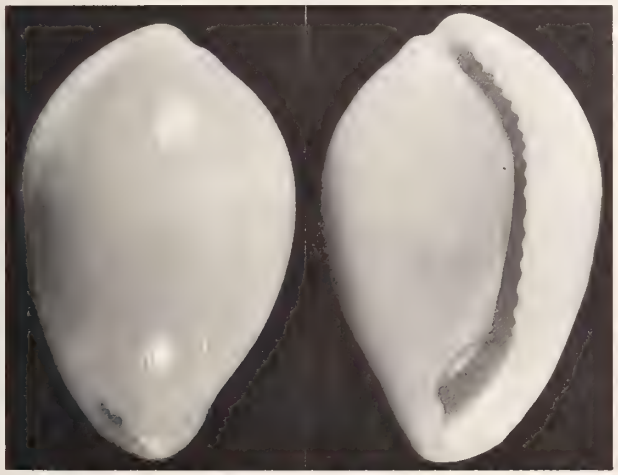


Figure *137*
Calpurnus (Procalpurnus) lacteus lacteus (128)

Figure *137* a
Calpurnus (Procalpurnus) lacteus lacteus (128)

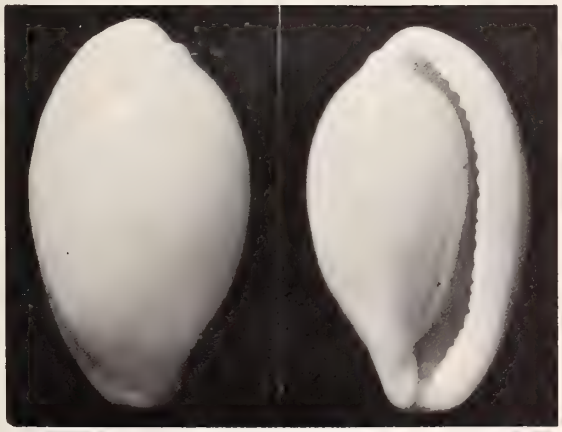


Figure *138*
Calpurnus (Procalpurnus) lacteus semistriatus (220)

Figure *138* a
Calpurnus (Procalpurnus) lacteus semistriatus (220)

terminal shorter, more pointedly beaked; it has coarser and more numerous dorsal striation. The name is derived from the Latin *galea,* meaning a helmet.

Calpurnus Montfort, 1810
Conchyl. Syst., Paris, 2: 639

Type species: *Bulla verrucosa* Linnaeus, 1758 [OD]

Syn.: *Cypraella* Swainson, 1840
Treat. on Malac. (*in*: Lardner's Encyclop., London): 325
Type species: *Bulla verrucosa* Linnaeus, 1758 [M]
Conch. Manual, ed. 2. p. div. London
: *Cypraela* Sowerby 2nd, 1842[err.]

Shell pyriformly ovate, acutely humped centrally, with an angled transverse ridge on the dorsum, and a peculiar, knob-like protuberance at either end, above the canal openings.

(Calpurnus) Montfort, 1810

127. *Calpurnus (Calpurnus) verrucosus* (Linnaeus, 1758)

(Figure *135*: holotype)

1705 *Radius gibbus* Rumphius, Amboin. Rariteit. Cab., Amsterdam: 114; plt. 38, fig. H (Figure *136*: original illustration)
1758 *Bulla verrucosa* Linnaeus, Syst. Nat. ed. 10: 726
1798 *Ovula perla* Röding, Mus. Bolten., Hamburg: 22
1825 *Ovula verrucosa*; Sowerby 1st, Gen. Shells II: plt. 260, figs. 2, 3
1840 *Cyprella verrucosa;* Swainson, Treat. Malac.: 325
1842 *Ovulum verrucosum*; Sowerby 2nd, Conch. Man., ed. 4: 226
1842 *Calpurnus verrucosus;* H. & A. Adams, Gen. Rec. Moll.: plt. 28, fig. 7
1856 *Ovulum verrucosa*; Hanley, Index Test.: 91
1899 *Calpurnus (Ovula) verrucosa;* Horst & Schepman, Cat. Syst. Moll. (2): 190
1931 *Calpurnus (Calpurnus) verrucosus;* Thiele, Handb. Syst. Weichtierk.: 272

Description, holotype: *"Bulla verrucosa*—B. testa transverse angulata, aucta utrinque puncto osseo." (Linnaeus, 1758: 726).

Description, hypotype: Shell rhomboidly formed, humped, transversely angled and ridged at highest elevation, thick, strong; terminals curiously umbilicate, with projecting knobs within; outer lip and base margins thickened, sharply angled, outer lip fairly strongly denticulate; aperture somewhat wide, gently curving left, slightly constricted abapically; base convex; columella and fossula smooth, the latter almost obsolete; color milk-white, with a fine brown line encircling the terminal umbilical knobs, and a faint touch of pink at terminal ends.

Measurements, holotype: L - 23.5 mm.

Measurements, hypotype: L - 30.0; W - 19.3; H - 16.2 (Figure *135*a: C3658).

Type Locality: "Habitat in India Oriental"; here designated as Tanga, Tanzania (Tanganyika), East Africa (6° 00′S; 34°30′E).

Type: LSL, number unknown [holotype].

Distribution: Amboina, Netherlands East Indies; from Timor Island to the Philippines; Melanesia; Indonesia; Queensland, Hayman Island to Great Barrier Reef; Fiji Islands; Eastern Sumatra to Singapore; Malay Peninsula, Ceylon, SE India, to East Africa.

Discussion: According to Peter Dance (personal communication), *"Bulla verrucosus*—Hanley [Dance 1966: 183] has isolated an unmarked shell of the *Calpurnus verrucosus* of authors. It did not come from a marked box." The holotype was without label. The hypotype here illustrated was collected alive at Tanga, Tanzania, East Africa, living on a spreading, unidentified green alga; the animal was white, covered with black dots.

(Procalpurnus) Thiele, 1939
Handb. Syst. Weichtierk., Jena: 272

Type species: *Ovula lactea* Lamarck, 1810

Shell relatively small, ovately pyriform, sub-cypraeiform, with some wide transverse striation, some angled ridges dorsally at times, and an absence of any knob-like protuberances at either end of shell.

128. *Calpurnus (Procalpurnus) lacteus lacteus* (Lamarck, 1810)

(Figures *137*, *137*a)

1810 *Ovula lactea* Lamarck, Ann. Mus. Nat. Hist., Paris, **16:** 111
1840 *Ovulum album* Dufo, Ann. Sci. Nat., Paris, **14:** 186
1848 *Ovulum lacteum*; Sowerby 2nd, Thes. Conch. **2:** 468; plt. 100, figs. 67 - 69
1885 *Ovulum alba;* Tryon, Man. Conch. **1:** 256
1887 *Ovula lactea* Cost. = *carnea* Paetel, Cat. Conch. Samml. **1:** 325
1931 *Calpurnus (Procalpurnus) lacteus*; Thiele, Handb. Syst. Weichtierk.: 272

1935 *Procalpurnus lacteus*; Iredale, Austral. Zool. **8** (2): 103
1968 *Calpurnus (Procalpurnus) lacteus* (Lamarck, 1811 [err.]); Cernohorsky, The Veliger **10** (4): 359; plt. 50, fig. 4

Description, holotype: *"Ovule lactée. Ovula lactea*—O. Ovata, laevis, exius intusque candida; labro dentato; columella basi compressa." (LAMARCK, 1810: 111).

Description, hypotype: Shell relatively large, broadly ovate, often sub-pyriform, strong, well formed; terminals not produced; dorsum finely transversely striate at either end, with widely spaced, upraised dorsal ridges centrally; outer lip thickened, angled, shouldered above, and weakly, irregularly dentate; aperture fairly straight, curving left adapically, rather constricted in front; columella and fossula areas defined adaxially by a well developed, upraised carinal ridge; base convex; color milk-white.

Measurements, holotype: "16 to 17 mm."

Measurements, hypotype: L - 15.1; W - 9.6; H - 7.6 mm (Figure *137*: C3901).

Measurements, hypotype: L - 19.7; W - 12.4; H - 9.5 mm (Figure *137*a: C2598).

Type Locality: Near the island of Timor [Malay Archipelago].

Type: disposition unknown.

Distribution: Siasi Island, Sulu Sea (C2598); Mindanao to Luzon, Philippines; Central Pacific Islands restrictedly; E coast of Australia, N of Moreton Bay, Queensland, and the Netherlands East Indies.

Discussion: Lamarck made the following comment about this species: "This little shell is all white, oval, scarcely humped, terminals barely protruding, almost like the form and size of *Cypraea moniliaris* [*clandestina*], its right margin is denticulate within." (transl. Jean Cate).

Ovula Bruguière, 1789

Tabl. Encycl. Méthod., Paris, **1**: XVI

Type species: *Ovula oviformis* Lamarck, 1801 [SD]
Syst. Anim. sans Vert.: 72
(Kiener, 1843: plt. 1, fig. 1)

= *Bulla ovum* Linnaeus, 1758
Syn.: *Ovulus* Montfort, 1810 [em.]
Conchyl. Syst., Paris, **2**: 635
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Ovulum* Sowerby 1st, [em.]
Zool. Journ. **4**: 145
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Ovularia* Link, 1830 [em.]
Handb. physikal. Erd Beschr.
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Anula* Griffith & Pidgeon, 1834
Moll. & Radiata *in*: CUVIER, Anim. Kingd. 1834, suppl. ed., **12**: 70
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Semiporcellana* da Costa, 1776
Elem. Conch., div. p., London: 176; plt. 3, fig. 3
(obl., H. & A. Adams, 1854, syn. Gen. Rec. Moll.)
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Licium* Humphrey, 1797 (*nom. nud.*)
Mus. Calonn., London: 7
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Amphiperas* Gronow, 1781 (*nom. nud.*: invalid ICZN 261
Zoophyl. Gronov., Leiden **3**: 293
Type species: *Bulla ovum* Linnaeus, 1758 [SD]
: *Parlicium* Iredale, 1935
Austral. Zool. **8** (2): 101
Type species: *Ovula costellata* Lamarck, 1810

129. *Ovula ovum* (Linnaeus, 1758)

(Figure *139*: lectotype)

1758 *Bulla ovum* Linnaeus, Syst. Nat., ed. 10: 725
1798 *Ovula cygnea* Röding, Mus. Bolt.: 21
1801 *Ovula oviformis* Lamarck, Anim. s. Vert.: 72 (Figure *140*)
1811 *Ovula alba* Perry, Conch., London: plt. 53, fig. 1 (Figure *141*: original illustration)
1825 *Ovulum ovum*; Sowerby 1st, Gen. Shells **II**, *Ovula*: plt. 259, figs. 1 - 3
1828 *Ovula pygmea Sowerby* 1st, Zool. Journ. **4**: 226
1853 *Amphiperas ovum*;H. & A. Adams, Gen. Rec. Moll. III: plt. 281, fig. 1
1860 *Ovulum gallinaceum* Reeve, Elem. Conch. **1**: 36

Description, holotype: *"Bulla ovum*—B. testa ovata obtuse subbirostri, labro dentato." (LINNAEUS, 1758: 725).

Description, hypotype: Adult shells vary in size, often very large, ovate, bulbously inflated, humped, egg-shaped; strongly formed though comparatively lightweight; terminals curiously extended, bluntly, roundly beaked; outer lip large, broad, thick, sub-shouldered above, with long crenulations almost crossing ventral lip surface; aperture wide, curving, somewhat constricted abapically; columella round, conforming to basal curvature; fossula area barely impressed; shell exterior entirely glossy milk-white, except that interior varies from pinkish-brown to dark red-brown.

Measurements, lectotype: L - 72.0 mm.

Measurements, hypotype: L - 100.6; W - 62.7; H - 50.9 mm (C3885).

Measurements, hypotype: L - 55.0; W - 34.1; H - 27.0 mm (Figure *139*a: C3651).

Type Locality: "Ocean Asiatica"; here restricted to Rossel Island, E Papua, New Guinea (Tagula Island: 11°30'S;

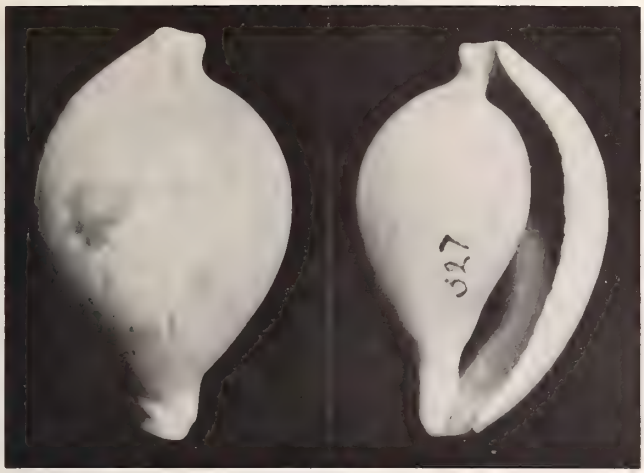


Figure *139*
Ovula ovum (129)

Figure *139* a
Ovula ovum (129)

Figure *139* b
Ovula ovum (129)

Figure *140*
Ovula oviformis (129)

Figure *141*
Ovula alba (129)

Figure *142*
Ovula costellata (130)

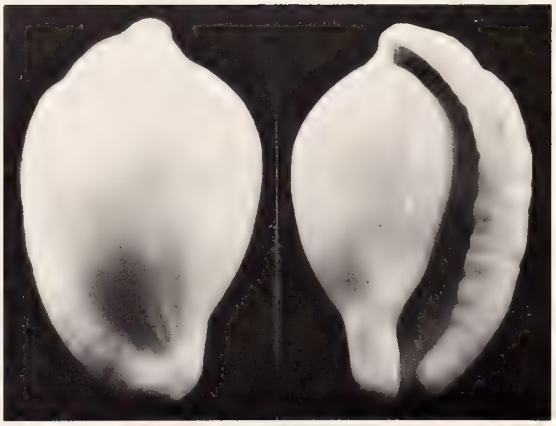


Figure *142* a
Ovula costellata (130)

153°15′E); Louisiade Archipelago (in Solomon Sea, 22 miles NE of Tagula I.).

Type: LSL, No. 327 (label) [lectotype herein].

Distribution: Malindi, Kenya, E Africa; NW Australia, Queensland to Great Barrier Reef; most of central Pacific islands; Timor I., S Malay Archipelago; Sulu Sea; Philippines; Taiwan: Ryukyu I.; Japan.

Discussion: According to Dance, NMW, (personal communication) *"Bulla ovum*—Hanley [Dance 1966: 183] has isolated two shells, one of which is marked '327'. It is the *ovum* of authors, and is an immature shell with the lip formed, but not thickened [it seems to me from the photograph of the lectotype (see Figure *139*) that the lip and shell are fully mature]. It is pale pinkish-brown interiorly, but has probably faded." The holotype of *Ovula oviformis* Lamarck, 1801, is on deposit at MNH, (see Figure *140:* holotype). Figure *139*b: (C3677), illustrates the internal structure of the shell.

130. *Ovula costellata* Lamarck, 1810

(Figure *142*: C2483)

1784 *Cypraea tortilis* Martyn [invalid], Univ. Conch.: plt. 60 (Figure *143*: lectotype herein)
(1788, Chemnitz, Neues Syst. Conch. Cab. **10:** 128)
1786 *Bulla imperialis* Solander MS, Portl. Cat.: 155, No. 3391
1810 *Ovula costellata* Lamarck, Ann. Mus. Hist. Nat. Paris **16:** 110
1817 *Ovulum imperialis*; Dillwyn, Descr. Cat. Rec. Shells **1:** 173
1822 *Ovula angulosa* Lamarck, Hist. Nat. Anim. s. Vert., Paris, **7:** 367 (Figure *144*: holotype)
1829 *Ovula columba* Schubert & Wagner, Neues Syst. Conch. Cab. **12:** 116; figs. 4043, 4044
1837 *Bulla imperialis*; Warren, Conch. (22) : 69
1848 *Ovulum angulosum*; Sowerby 2nd, Thes. Conch., *Ovulum* **2:** 467
1860 *Ovulum tortile;* Reeve, Elem. Conch. **1:** 36
1881 *Ovula tortilis;* Weinkauff, Mart. & Chem. Syst. Conch. Cab.: 169; plt. 5, figs 14, 15; plt. 44, fig. 7
1887 *Ovula imperialis = tortilis;* Paetel, Cat. Conch. Samml. **1:** 325
1887 *Ovula columba = tortilis;* Paetel, Cat. Conch. Samml. **1:** 325
1935 *Cypraea tortilis;* Iredale, Austral. Zool. **8** (2) : 102
1935 *Amphiperas costellata;* Iredale, Austral. Zool. **8** (2) : 102
1941 *Amphiperas costellatum;* Schilder, Arch. Molluskenk. **73** (2/3) : 108

Description, holotype: *"Ovula costellata*—O. Ovato-gibbosa, albida; dorso lineolis transversis costulato; labro plicis dentato; ore subviolaceo." (Lamarck, 1810: 110).

Description, hypotype: Shell fairly large, broad, humped, solid, glossy, though roughly surfaced dorsally with longitudinal growth lines and transverse, widely spaced upraised ridges; terminals prominent, somewhat beaked adapically, broad and truncate abapically; outer lip thickened, rounded, sub-shouldered above, heavily crenulate below; aperture wide, curving, flaring openly abapically; base convex, faintly funiculate at rear; columella smooth; fossula depression almost absent; color white at margins and terminals, dorsum white though darker, reflecting pink color from within.

Measurements, holotype: "Length 3 to 4 centimeters".

Measurements, hypotype: L - 40.0; W - 25.7; H - 21.0 mm (Figure *142:* C2483).

Type Locality: "l'Océan des Grandes Indes"; here restricted to Zanzibar, E Africa (05°30′S; 39°30′E).

Type: whereabouts unknown; it may be an unmarked shell in the Lamarck collection at Geneva. Holotype of *Ovula angulosa* Lamarck, 1822, is at MHN, Geneva.

Distribution: East Africa (Zanzibar); Queensland to Great Barrier Reef; Aitape, Vitiaz Strait, Astrolabe Bay, Huon Peninsula coast [SE coast of NE New Guinea], Finschafen, New Guinea; E Australia to Fiji Islands; Sulu Sea [Siasi Island], Philippines to Japan.

Discussion: The lines [my interpretation] referred to by Lamarck in his original description must be the upraised ridges seen on the dorsum of the hypotype (see Figure *142*a: C2559); the fine transverse lines so often observed on the upper surface of other ovulid species are entirely lacking.

131. *Ovula ishibashii* (Kuroda, 1928)

(Figure *145*: holotype)

1928 *Amphiperas isibasii* [sic] Kuroda, Venus **1** (3) : 77; plt. 1, figs. 3, 4
1941 *Prionovolva ishibashi;* Schilder, Arch. Molluskenk. **73** (2/3) : 107
1958 *Pseudosimnia (Margovula) isibasii* [sic]; Kuroda, Venus **20** (2) : 168

Description, holotype: *"Amphiperas ishibasii* [sic]—Shell pyriform, pinkish white; both anterior and posterior extremities produced, each having a round, oblique spiral ridge, which terminates at the end of the canal, the posterior one coiled abruptly and very prominent; the portions just above and below the ridges grooved. Surface

glossy, malleated, sculptured by very fine, microscopic, but irregular incremental lines; the back with 7 or 8 obscure irregularly-spaced spiral keels, and with very many indistinct spiral striae; both ends, including the canals, are provided with many spiral linear grooves of irregular intervals, they are 12 on the anterior, 14 on the posterior, and then fading away toward the body. Columella tortuous, with 2 heavy axial callus-deposits, one is deeply in the aperture, tortuous anteriorly and narrowly extended posteriorly over the body, then fading away; the other in front of the former and erect, the top rounded, the interval between both calli fattish. Posterior axis has a raised callus, of which the posterior is transitive to the posterior end of the spiral ridge stated above. Parietal wall thinly enameled. Outer lip as well as both rostra bluntly calloused and bordered on the outside, involved inside with a toothed folded edge for the entire length of the outer lip. Aperture narrow, as long as the length of the shell, arcuate, a little dilated anteriorly." (KURODA, 1928: 77).

Measurements, holotype: "Long., 32.5, diam., 19.7 mm."

Measurements, hypotype: L - 33.5; W - 21.3; H - 16.8 mm (Figure *145*a: GIY 3793).

Type Locality: Kii [Japan].

Type: NSMT, where it is presently without number [Kosuge].

Distribution: Deep water, east coast of Japan.

Discussion: Of this species, Kuroda makes the following comment: "This species is not so much different from *Ovula pyriformis* Sowerby [*cf. Margovula* ***tinctilis*** Cate (herein), which has been called *O. pyriformis* by authors; the Sowerby species s.s. does not appear in Japanese waters] from New South Wales, which is also recorded from Satano [Cape Satano, S tip of Kyushu I., Japan] (92.5 meters) by A. Adams, but the former seems to differ from it by having a much larger shell, with peculiar ridges on both extremities, and thinner appearance. *O. sinensis* Sowerby is almost similar in size, but it is separable from the present species by its obtuse rostra."

Cyphoma Röding, 1798

Mus. Bolten.: 21
Type species: *Bulla gibbosa* Linnaeus, 1758 [M]

: *Ultimus* Montfort, 1810
Conchyl. Syst. Paris: 2643
Type species: *Bulla gibbosa* Linnaeus, 1758 [OD]
: *Binvoluta* Schluter, 1838
Kurzgef. syst. Verz. Conch. Samml., Halle: 24
Type species: *Bulla gibbosa* Linnaeus, 1758 [M]
: *Carinea* Swainson, 1840
Treat. on Malac. (*in*: Lardner's Encycl.): 326
Type species: *Bulla gibbosa* Linnaeus, 1758 [M]
: *Cyphonia* Gray, 1847 (err.)
Proc. Zool. Soc. London **15:** 143

Shell fairly large, oblong, often heavily calloused, with broad terminal ends and a characteristic, usually exaggerated transverse angular dorsal ridge.

132. *Cyphoma gibbosum* (Linnaeus, 1758)

(Figure *146*: holotype)

1758 *Bulla gibbosa* Linnaeus, Syst. Nat. ed. 10: 726
1798 *Cyphoma dorsata* Röding, Mus. Bolten.: 21
1811 *Ovula pharetra* Perry, Conchol. London: plt. 53, fig. 2; (Figure *147*: original illustration)
1840 *Ovula gibbosa*; Schumacher, Essai Nouv. Syst.: 258
1840 *Carina gibbosa*; Swainson, Treat. Malac.: 326
1842 *Ovulum gibbosum*; Sowerby 2nd, Conch. Man., ed. 4: 226
1853 *Cyphoma gibbosa*; H. & A. Adams, Gen. Rec. Moll.: plt. 28, fig. 8
1856 *Ovulum gibbosum*; Hanley, Index Test.: 91
1885 *Ovula pharetra* = *O. gibbosa*; Tryon, Man. Conch. **7:** 250
1885 *Ovula dorsata* = *O. gibbosa*; Tryon, Man. Conch. **7:** 250
1887 *Cyphoma pharetra*; Paetel, Cat. Conch. Samml. **1:** 326
1897 *Cyphoma precursor* Dall, Proc. U. S. Nat. Mus. **19:** 318; plt. 29, figs. 2, 3 (Figure *148*: original illustration)
1899 *Cyphoma (Ovula) gibbosa*; Horst & Schepman, Cat. Syst. Moll. (2): 187

Description, holotype: *"Bulla gibbosa*—B. testa angulata: cingulo elevato." (LINNAEUS, 1758: 726).

Description, hypotype: Shell oblong, sub-ovate, thickly formed; dorsum glossy, with a large, bold upraised angular ridge traversing central dorsum; terminals and side margins enveloped in thick, heavily formed callus; base glossy, with continuation of dorsal ridge flattening out on base; a thickly formed funicular ridge may also be buried in callus on rear base; columella is merely an inward extension of base, fossula absent; aperture wide, becoming much broader in front; outer lip thickly rounded; colors vary from beige-orange to rosy pink on marginal girdle, base and dorsal surface milk-white to pale yellow.

Measurements, holotype: L - 23.0 mm.

Measurements, hypotype: L - 37.3; W - 18.2; H - 13.3 mm (C3569).

Type Locality: Brazil; here restricted to Key Largo, Florida Keys (25°10'N; 80°20'W).

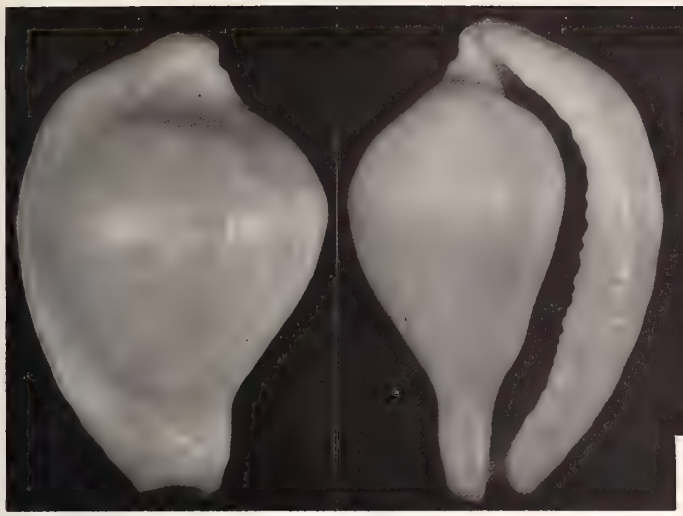


Figure *143*
Ovulum tortile (130)

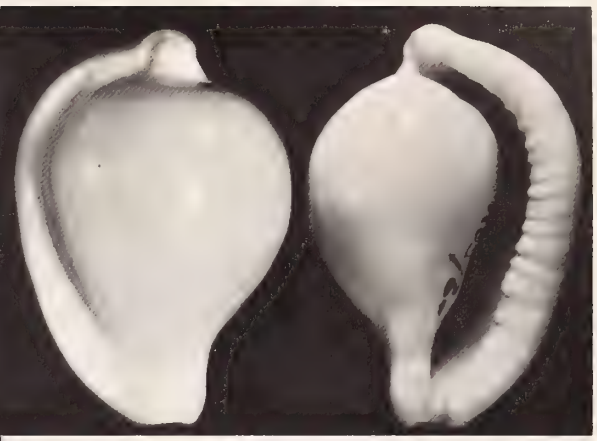


Figure *144*
Ovula angulosa (130)

Figure *145*
Ovula ishibashii (131)

Figure *145* a
Ovula ishibashii (131)

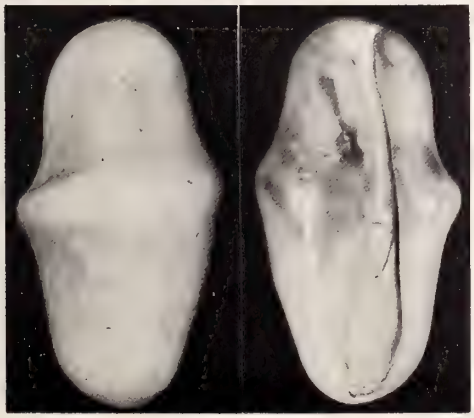


Figure *146*
Cyphoma gibbosum (132)

Figure *147*
Ovula pharetra (132)

Figure *148*
Cyphoma precursor (132)

Type: LSL, [neotype]. It is a dead, bleached shell, with only a trace of its original pinkish-orange color remaining; there are three other colorless shells in the type lot. (Figure *149:* C3815, C3878).

Distribution: Florida Keys, from Key Largo to Key West; Jamaica; Cuba; East Florida coast to Lake Worth, Florida; north on west coast to Naples.

Discussion: The live animal of this species is a very pale pinkish-white flesh color; upon the body surface are numerous, very closely arranged black rings with yellow-orange centers; the rings are irregular in shape, often squarish in outline; the edge of the foot is yellow-orange, with a black peripheral border and median line, with detached, irregular black lines radiating toward foot-margins. The siphonal outer rim is also lined with black.

133. *Cyphoma mcgintyi* Pilsbry, 1939

(Figure *150*: C3609)

1939 *Cyphoma mcgintyi* Pilsbry, Nautilus 52: 108; Nautilus 53 (1): plt. 1, figs. 3, 3a, 11, 12

Description, holotype: *"Cyphoma mcgintyi*—The shell is long and narrow, with a high median ridge. Back cinnamon-buff to ivory yellow, the marginal callus white to ivory yellow, more definitely limited than in *C. gibbosa,* with an oblique fold from the inner lip across the front, posteriorly, more or less lost in the callus thickening. Interior vinaceous with a white median spot. Mantle closely spotted." (Pilsbry, 1939: 108).

Description, hypotype: Shell medium large, solid, thickly formed, especially at margins and terminal ends, almost squarely ovate, widest centrally, with terminals widely rounded, sub-truncate; a distinct upraised transverse angular ridge across dorsum; lateral callus thick, broad, [though unlike that of *Cyphoma gibbosum*], rolled cord-like, extending over and around terminal tips; dorsum glossy, smooth, elongate, angularly ovate, with a continuation of dorsal ridge present, though to a lesser degree of elevation; an adapical spiral funicular cord twists upward and left, becoming lost in thick terminal callus; columella smooth, glossy, without depression; fossula long, very narrow, slightly concave; aperture broad, fairly straight; outer lip thickly rolled, smooth, sharply shouldered above; color usually stark white over all.

Measurements, holotype: L - 23.7; W - 11.4 mm.

Measurements, hypotype: L - 33.2; W - 16.2; H - 13.5 mm; (Figure *150:* C3609).

Type Locality: "On gorgonian in 1 - 2 m, south of Boynton Inlet of Lake Worth, Florida."

Type: ANSP, No. 174045 [holotype]; a possible paratype is at AMNH, No. 87430: (Figure *150*a).

Distribution: Sombrero Key, off Marathon, Vaca Key; Looe Key; 220 feet of water, off Dry Tortugas; Molasses Key; Palm Beach; and from Belle Glade Rock Pit (Pleistocene), leg. M. Kennedy; mostly the east coast of Florida, including the waters around the Keys. A specimen has also been dredged by J. Moore, Bradenton, Florida, off Cape San Blas, NW Florida (personal communication).

Discussion: The species appears to be clearly distinct, even though it shares much of the same living range of *Cyphoma gibbosum* (Linnaeus, 1758). The shells appear to differ mostly by having somewhat narrower, more crisply thickened marginal and terminal callus; by having a constant milk-white shell color with no hints of beige or orange to yellow as seen in other similar species; and by having a distinct color pattern on the mantle of the living animal consisting of numerous widely dispersed, fairly small, dark brown punctations upon a very pale ivory (almost colorless) mantle membrane. (see Pilsbry & McGinty 1939; plt. 1: figs. 3 - 3a). This color pattern in the mantle is one of the primary factors in separating these otherwise morphologically similar species of *Cyphoma.*

134. *Cyphoma alleneae* Cate, spec. nov.

Figures *151*, *151*C: holotype)

Description, holotype: Shell somewhat narrow, elongate, only slightly thickened at the margins and terminals; terminals taper to broad, blunt ends; dorsum smooth, sub-glossy, with fine longitudinal growth lines; upraised transverse dorsal ridge sharply angled; broad peripheral callus girdle rather thinly applied; base long, narrowly ovate, with somewhat flattened columellar base which slopes adaxially at a 45 degree angle; aperture nearly straight, fairly wide; outer lip roundly thickened, smooth; dorsal color milk-white with a hint of pink; side girdle and terminal ends orange-beige.

Measurements, holotype: L - 29.7; W - 14.7; H - 11.5 mm.

Type Locality: Missouri Key, Florida Keys; living on coral (24°40′N; 81°10′W).

Type: LACM, No. 1292 [holotype].

Discussion: At the present time there appear to be only five known specimens. In addition to the type locality it has been collected at Money Key and Pelican Shoal, all

a part of Florida Keys. The species is suggested only provisionally as it seems apparent that much work needs to be done in an effort to clarify the status of this and other members of the genus. The mantle color pattern seen in this species (Figure *151*) is the most important distinguishing character (see PILSBRY & MCGINTY, 1939, Nautilus **53** (1): plt. 1, for color pattern in other living cyphomids).

This new species is named in honor of Mrs. Allene L. Snow of Marathon, Florida, who was the first to collect specimens of this animal.

Although apparently somewhat intermediate between *Cyphoma gibbosum* (Linnaeus, 1758), and *C. mcgintyi* Pilsbry, 1939, *C. **alleneae*** has a narrower and more flattened shell; it has a less prominent orange-beige marginal callus than *C. gibbosum*, and more so than *C. mcgintyi*, the latter apparently lacking marginal callus altogether (excluding thickly rolled outer lip callus). For positive identification, however, it would seem to require an examination of the living animal.

135. *Cyphoma signatum* Pilsbry & McGinty, 1939

(Figure *152*: holotype)

1939 *Cyphoma signatum* Pilsbry & McGinty, Nautilus **53** (1): 3; plt. 1, figs. 1, 1a, 2, 2a, 9, 10

Description, holotype: "Shell is relatively longer than *C. gibbosa*, resembling *C. mcgintyi* in shape. Like that species the ends are blunt, the lateral callus is thick, relatively narrow, and on the right side there is a strong impression along its upper edge. There is a very weak crenulation of the outer lip and its callus, as in *mcgintyi* and exceptional specimens of *gibbosa*. The transverse ridge of the back is very much lower than in *C. mcgintyi*. The aperture is slightly more dilated near the anterior end than in *gibbosa* or *mcgintyi*. Color cartridge buff with some faint pale pinkish-cinnamon suffusion above and below the nearly white dorsal ridge, and a cream buff tint deep in the aperture."

Measurements, holotype: L - 35; W - 15.0 mm.

Measurements, hypotype: L - 38.7; W - 17.1; H - 13.1 mm (Figure *152*a: C3858).

Type Locality: "South Inlet of Lake Worth to Key West"; here restricted to the Looe Key, Florida (24°40′N; 81°10′W); living on sea fans.

Type: ANSP, No. 174045 [holotype].

Distribution: the Florida Keys.

Discussion: This species is difficult to differentiate from the closely related form, *Cyphoma mcgintyi* Pilsbry, 1939, if one depends upon shell morphology alone, shell size, perhaps, being the more helpful aid. The shell of *C. signatum* is generally larger, more ponderous in all proportions; the peripheral margin and terminal callus thickening seem to be smoother and less copiously applied, especially in the area of the front terminal collar (however, this is not always true). Apparently, the only positive way to identify this species is by an examination of the living animal (Figure *152*b: orig. illustr.). The mantle has an unmistakable pattern of closely knit black (sometimes diverging at the mantle edge forming small, white triangles), transverse striations, superimposed upon the very pale yellow surface of an otherwise transparent mantle membrane.

136. *Cyphoma aureocinctum* (Dall, 1899)

(Figure *153*: holotype)

1899 *Simnia (Neosimnia) aureocincta* Dall, Bull. Mus. Comp. Zool. **18** (21): 236; plt. 2

1941 *Simnia aureocincta;* Schilder, Arch. Molluskenk. **73** (2/3): 109

1956 *"Neosimnia" aureocincta;* Allan, Cowries World Seas: 135

Description, holotype: *"Simnia (Neosimnia) aureocincta* —This shell is the Antillean analogue of *S. spelta* (Linn.), and is best described by comparison with it. Its surface is almost entirely destitute of the fine spiral striations of *S. spelta;* its base is much more arched, the canals at either end are broad, blunt, and recurved, instead of pointed and straight; the color is pure white with a golden yellow band winding round the shell just behind the periphery, and a yellow brown line bordering the outer edge of the callus on each side. *S. spelta* varies from waxy white to purple, without bands or margination. On the base in the present species the body is more symmetrically fusiform, the body callus more diffused, the aperture narrower, especially in front, and the posterior fold stronger and larger. The back of *spelta* from end to end forms a low nearly uniform arch, in *aureocincta* the ends are abruptly turned up and heavily thickened with callus." (DALL, 1899: 236).

Measurements, holotype: "Max. lon. of shell, 18.5; max. lat. of shell 8.0 mm."

Measurements, hypotype: L - 19.1; W - 7.2; H - 6.0 mm (USNM).

Type Locality: U. S. Fish Commission, Station 2334, near Havana, Cuba, in 123 m, living on white gorgonian.

Figure *149*
Cyphoma gibbosum (132)

Figure *150*
Cyphoma mcgintyi (133)

Figure *150* a
Cyphoma mcgintyi (133)

Figure *151*
Cyphoma alleneae (134)

Type: USNM No. 87124 [~~holotype~~ lectotype here in MCZ 7349 (paralectotype)].

Distribution: Another specimen (~~USNM~~) was taken in 70 fathoms, off Sombrero Island [in Anegada Passage, between Anegada and Anguilla Islands, a part of the Saint Kitts-Nevis Presidency], West Indies. A specimen bearing the No. 7352, MCZ collection, was collected off Morro Light, Havana, Cuba (Blake Expedition, 1877–78) (Figure *153*a: MCZ 7352); curiously, Dall had identified it as '*Simnia uniplicata*', perhaps because the marginal and terminal calluses are not fully developed.

Discussion: There seems little doubt that this species belongs in the genus *Cyphoma* Röding, 1798. Dall, however, compared it with the Mediterranean form, *Neosimnia spelta* (Linnaeus, 1758). It would seem that before a clear determination can be made on this species, more material should be seen to eliminate the possibility of intermediate shell forms within the *gibbosum-intermedia* complex.

137. *Cyphoma emarginatum* (Sowerby 1st, 1830)

(Figure *154*: original illustration)

1830 *Ovulum emarginatum* Sowerby 1st, Spec. Conch., 1 *Ovulum*: 7; plt. 54, figs. 54, 55
1843 *Ovula emarginata*; Kiener, Icon. Coq. Viv. 2: 18; pl.t 3, fig. 4
1859 *Cyphoma marginata* [err.]; Chenu, Man. Conch.: 273
1941 *Cyphoma emarginata*; Schilder, Arch. Molluskenk. **73** (2/3): 109

Description, holotype: "*Ovulum emarginatum*—O testá oblongatá, subventricosá, medio transversim carinatá, cariná obtusá; aperturá sublineari, supra emarginatá, emarginarione validá; labio externè leviter denticulato." (Sowerby 1st, 1830: 7).

Description, hypotype: Shell small for the genus, elongately ovate, somewhat tortuously formed, solid; dorsum sub-glossy, with numerous fine longitudinal growth lines; a sharply acute, upraised dorsal angular ridge traverses the central part from right margin, then becomes obsolete on the left base; dorsal surface slopes evenly to either terminal; terminals and right shell margin grotesquely thickened, cord-like; terminal openings truncately crescent-shaped from above; right side margin longitudinally uneven due to a right angle projection; base ovate, subrhomboid, smooth, glossy, and slightly constricted in front, with a thick, almost globose funicular projection in back; aperture wide, straight; columella and fossula smooth, glossy, the latter only barely visible, both outlined within by an adaxial carinal ridge; outer lip curiously formed, flat within, rounded and thickened without, constricted abapically; dorsal color thin milk-white, with a pale cinnamon-grey showing through from underneath, terminal ends pale orange-beige, outer lip a lighter color (Figure *154*a).

Measurements, holotype: L - 20.4; W - 9.8 mm (approx.).

Measurements, hypotype: L - 21.6; W - 11.2; H - 8.7 mm (Figure *154*a: C3814).

Type Locality: Unknown. Here designated: Puertecitos, E Baja California del Norte (29°35'N; 114°25'W, approx.).

Type: whereabouts unknown.

Distribution: East coast of Baja California, Point Diggs S to Cape San Lucas; West Mexico, Guaymas S to Manzanillo.

Discussion: Of this species Sowerby remarked: "In general form this species closely resembles *O. gibbosum*, but it may be easily distinguished by its superior canal forming a distinct notch, visible from the back; the thickened outer lip is white, but the remainder of the shell is of a pale rose-colour. The only specimen of this rare species I have seen is in Mr. Bland's collection; its locality is unknown." Sowerby 2nd (1848: 479) gives the locality for the species: "Collected at St. Elena by Mr. Cuming" [St. Elena, Ecuador (02°20'S; 80°30'W, approx.)]. For an earlier report on this species see Cate (1969a: 101; plt. 8, fig. 10).

Pseudocyphoma Cate, gen. nov.

Type species: *Ovulum intermedium* Sowerby 1st, 1828

Shells fairly large, sub-acuminate, tapering to fairly sharp terminal beaks, and having an almost central transverse, sub-angled dorsal ridge. The name is derived from the Greek *pseudes*, meaning false, deceptive.

138. *Pseudocyphoma intermedium* (Sowerby 1st, 1828)

(Figure *156*: original illustration)

1828 *Ovulum intermedium* Sowerby 1st, Zool. Journ. London **4**: 158
1843 *Ovula intermedia*; Kiener, Icon. Coq. Viv., *Ovula* **2**: 23;
1887 *Cyphoma intermedia*; Paetel, Cat. Conch. Samml. **1**: 326 plt. 4, fig. 2

Description, holotype: "*Ovulum intermedium*—O. testa ovato-oblonga, utrinque subacuminata; dorso supre medium transversim subangulato; labio columellari prope extremitatum superiorem oblique uniplicato; labii ex-

terni margine interno edentulo.—Des. Shell ovate-oblong [diamond-shaped], somewhat acuminated at both ends, rather more so at the upper than at the lower; [base smooth, glossy]; back with a transverse raised rounded angle rather above the middle [smooth, semi-glossy, except for fine transverse striae above either terminal]; aperture narrow [in hypotype, rather wide] at the upper end, broader at the lower [abapical]; columellar lip with a single oblique [funicular] plait; outer lip thickened [constricted abapically, shouldered above], its inner edge smooth, without teeth, colour pale fulvous [hypotype off-white, with right marginal callus and terminal light beige]." (SOWERBY 1st, 1828: 158.)

Measurements, holotype: "long. 1 5/20, lat. 11/20, poll."

Measurements, hypotype: L - 33.0; W - 13.8; H - 10.6 mm (Figure *155:* C3817).

Type Locality: Unknown; here designated: Monte Cristi Beach, NW Dominican Republic, West Indies.

Type: whereabouts unknown; (Figure *156:* orig. illustr.).

Distribution: rather limited to the general type locality.

Discussion: Sowerby: "I have named this *intermedium* from the circumstance of the principal characters of two other species, namely the *O. gibbosum* and *O. birostre,* being combined in it. I have seen only two specimens of this, one of which is in Mrs. Mawe's and the other in my own collection."

139. *Pseudocyphoma kathiewayae* Cate, spec. nov.

(Figure *45*A: holotype)

Description, holotype: Shell short, broad, spindle-shaped, humped centrally, solidly formed; dorsum elevated centrally with a transverse angular ridge sloping abruptly downward to either terminal beak; terminal ends formed rather sharply; dorsum is decorticated, without any evidence of surface sculpturing; aperture broad, gently curving; base smooth, angularly ovate, terminating as a weak terminal ridge abapically, with a single bold spiral funicular cord in back; outer lip thickened, flattened peripherally, hardly any shouldering above; color is unnaturally grey (sub-fossil).

Measurements, holotype: L - 25.5; W - 12.5; H - 9.8 mm.

Type Locality: Off San Sebastian, NE Spain (43°19'N; 01°59'W).

Type: FMNH, No. 161588 [holotype].

Discussion: This new species may be compared with the West Indian ***Pseudocyphoma*** *intermedium* (Sowerby 1st, 1828). Besides being smaller in form and having other subtle changes in morphology, it differs by being shorter, broader, more heavily and solidly constructed generally; by having a more angular dorsal ridge, more sloping toward the terminal beaks; and by a more acutely elevated central dorsum. [Whether the animal is now living in NW Spanish waters remains problematical; much field work is needed for this species.]

This new species is named to honor Mrs. Kathie Way, BMNH, who cheerfully spent countless hours in my behalf obtaining information and photographs of the materials in the British Museum Collection.

Simniini Schilder, 1927

Arch. Naturgesch. 91/A 10: 76

Syn.: Volvini Schilder, 1932
Proc. Malacol. Soc. London 20: 47 & 54 (*nom. nud.*)

Simnia Risso, 1826

Hist. Nat. Europe Merid. 4: 235

Type species: *Simnia nicaeensis* Risso, 1826 [SD]

Syn.: *Calpurna* Fleming, 1828
Hist. Brit. Anim., Edinburgh 1828: 331
Type species: *Ovula leathesi* J. de C. Sowerby, 1825
Miner. Conch., London 5: 123; plt. 478
England, Pliocene

Shells elongate, usually fragile, of thin construction; narrowly elongate, without thickened outer lip edges, and with or without funicular cord or longitudinal carinal ridge within.

140. *Simnia nicaeensis* Risso, 1826

(Figure *157*: USNM 189409)

1826 *Simnia nicaeensis* Risso, Hist. Nat. Europe Merid. 4: 235; plt. 10, fig. 150 (SCHILDER, 1932: plt. 5, fig. 66 = holotype)
1826 *Simnia purpurea* Risso, Hist. Nat. Europe Merid. 4: 235
1826 *Ovula triticea* Payraudeau, Cat. Annel. Moll. Corse: 169; plt. 8, figs. 30 - 32
1868 *Ovula (Simnia) nicaeensis*; Weinkauff, Conchyl. Mittelm. 2: 5
1868 *Ovula (Simnia) purpurea*; Weinkauff, Conchyl. Mittelm. 2: 6
1885 *Ovula nicaeensis*; Tryon, Man. Conch. 7: 247 = *patula,* Penn.
1885 *Ovula spelta;* Tryon, Man. Conch. 7: 254
1956 *Simnia nicaoensis* [err.]; Allan, Cowries World Seas: 130; plt. 15, fig. 55

Figure *152*
Cyphoma signatum (135)

Figure *152* a
Cyphoma signatum (135)

Figure *152* b
Cyphoma signatum (135)

Figure *153*
Cyphoma aureocinctum (136)

Figure *153* a
Cyphoma aureocinctum (136)

Figure *154*
Cyphoma emarginatum (137)

Figure *154* a
Cyphoma emarginatum (137)

Figure *155*
Pseudocyphoma *intermedium* (138)

Figure *156*
Pseudocyphoma
intermedium (138)

Description, holotype: *"Simnia nicaeensis*—(Leach MS.) S. testa pellucida vitrea, tenuissima, succinea, subtilissime striata; epidermide eburnea aut succinea. Coq. très mince, vitrée, translucide, fragile, blanche ou d'une belle teinte succin, traversée de petites stries à peine apparentes." (Risso, 1826: 235)

Description, hypotype: Shell somewhat narrow, elongate, narrowing obtusely adapically, curving and truncate in front; terminals produced, rounded, spatulate in back, with practically no extension in front; dorsum smooth, semi-glossy, except for numerous very fine longitudinal growth lines covering entire dorsum; base narrowly ovate, somewhat elongate, narrowing sharply to the front, with a semi-funicular thickening surrounding rear end of base; base transversely striate just prior to funicular thickening; aperture straight, broadly open, flared to the front; outer lip edge thin; color off-white over all (animal carcass within may give base a mauve hue), with shell interior a brighter white; according to Sowerby, some specimens may have a dull reddish color.

Measurements, holotype: "long. 0,017"; (Schilder 1932; plt. 5, fig. 66).

Measurements, hypotype: L - 18.4; W - 6.0; H - 4.5 mm (Figure *157:* USNM 189409).

Type Locality: "Sej. Regions coralligenes. App. Ete." Locality here designated: Sardinia, Mediterranean Sea (40°00′N; 09°00′E).

Type: MNHN [holotype].

Distribution: Along the north coast of the Mediterranean Sea, from Spain to NW coast of Italy, including the Balearic Islands, Corsica, and the S coast of France.

Discussion: Of this species, Schilder (1932: 55) said: "The type specimen which is preserved in the Paris Museum (Galeries), is broken, but it clearly shows that *nicaeensis* cannot be a young specimen of *Neosimnia spelta.*" On the other hand, Tryon (1885: 247) associated the Risso species with that of *Xandarovula patula* (Pennant, 1777), another Mediterranean species living in the same general area. However, a close examination of the specimen illustrated here (Figure *157*) shows that it is not referable to the Pennant species either, because of the mature shell development within the aperture, especially in the terminal areas.

141. *Simnia aperta* (Sowerby 2nd, 1848)

(Figure *158*a: holotype)

1848 *Ovulum apertum* Sowerby 2nd, Thes. Conch., *Ovulum* 2: 478; plt. 101, figs. 106, 107
1868 *Ovula aperta*; Weinkauff, Conchyl. des Mittelm. 2: 6
1869 *Simnia aperta*; Chenu, Man. Conch.: 273
1885 *Ovula birostris* Tryon, Man. Conch. 7: 253; plt. 4, fig. 12
1887 *Birostra aperta* = *birostris*; Paetel, Cat. Conch. Samml. 1: 326
1887 *Simnia aperta* = *patula*; Paetel, Cat. Conch. Samml. 1 327
1932 *Primovula (Primovula) rhodia* Schilder, Proc. Malacol. Soc. London 20 (1): 52

Description, holotype: *"Ovulum apertum*—O. testá laevigatá elongato-ovali, fulvá-rufescente; canalibus breviusculis; aperturá apertá, labio externo tenui, anticè subemarginatá; labio interno posticè ad canalem sub-reflexo, anticè sub-tortuoso tenui; intùs sub-depresso." (Sowerby 2nd, 1828: 158) Shell smooth, elongately ovate, reddish-yellow, canals short; aperture open, outer lip thin, lip edge adapically lacking a border; columella slightly constricted toward abapical canal, distorted, thin adapically; columella-fossula barely depressed within.

Measurements, holotype: L - 15.5; W - 6.0 mm (approx.).

Type Locality: Unknown.

Type: BMNH, No. 1907:12:30:246 [holotype] (Figure *158:* original illustration).

Discussion: Sowerby (1848) made the following remarks about this species: "Of a form between that of *O. triticeum* [Lamarck, 1810], and that of *secale* [Sowerby 1st, 1828 = *spelta* Linnaeus 1758]; of a dull reddish-brown color. In the specimen which we have, the lip is not thickened nor reflected, although it appears to be a full grown shell; if it be so, it will form a companion to *O. patulum.*" Although this seems to me to be a distinct ovulid species, it will be necessary to withhold judgment pending further fieldwork.

142. *Simnia maesae* Cate, spec. nov.

(Figure *159*: holotype)

Description, holotype: Shell small, elongately diamond-shaped, thin, fragile, sub-translucent; terminals lengthened, taperingly produced, spatulate adapically, thinly blunt in front; dorsum almost obscurely transversely incisedly striate; dorsum transversely, sub-angularly humped centrally, sloping and tapering evenly to either end; base narrow, elongately ovate, tapering and twisting toward the front, with a barely perceptible sub-fasciole; base smooth, glossy, except that there are numerous barely visible transverse incised striae over all, which terminate indistinctly on the columella; columella otherwise smooth, glossy; no fossula is apparent; aperture openly broad, straight; outer lip edge simple, thin, centrally angled, nearly straight,

tapering evenly to either terminal beak; color milk-white over all.

Measurements, holotype: L - 18.4; W - 6.1; H - 4.3 mm.

Type Locality: At Broome, Roebuck Bay, Western Australia (17°57'S; 122°05'E). Coll.: Harvard University Expeditionary work, 20 January 1933.

Type: MCZ, No. ACC 812 [holotype].

Discussion: The two shells of this new species appear subadult except that both specimens, one a little larger than the other, exhibit almost identical texture and morphology, and the adapical terminal process seems fully mature. The upraised transverse angle of the central dorsum is reminiscent of the cyphomids.

This very interesting species is named in honor of Mrs. Virginia Orr Maes, Field Assistant, ANSP, whose contributions to malacology are many.

Subsimnia Cate, gen. nov.

Type species: *Neosimnia bellamaris* Berry, 1946

These shells are solidly formed, broad (short for their width), sub-cylindrically elongate, with a spiral funicular cord present on rear base, and a weak longitudinal white carinal ridge that defines inner edge of columella and fossula.

143. *Subsimnia smithi* (Bartsch, 1915)

(Figure *160*: holotype)

1915 *Amphiperas smithi* Bartsch, Bull.U.S.Nat.Mus. **91**: 96; plt. 10, figs. 1 - 3 (non *Delonovolva smithi* (Sowerby 3rd, 1894))

Description, holotype: *"Amphiperas smithi*—Shell irregularly elongate-ovate, purplish pink, with a moderately wide median band, and the tips and lip yellowish white. The surface of the shell is smooth, excepting fine, equally spaced and equally distributed, spiral threads which are best developed near the anterior and posterior fourth, becoming weaker as they approach center. In addition to this spiral sculpture, there are exceedingly fine lines of growth which are best seen in the spaces between the spiral threads. Aperture elongately-lunate, outer lip thick, forming a strong rounded callus at the edge; inner lip represented by a thin callus placed upon the body whorl, which becomes decidedly thickened on the anterior and posterior horns; a short distance posterior to the anterior end there is an oblique fold on the inner lip." (Bartsch, 1915: 96.)

Description, hypotype: Shell elongate, broadly oblong, sub-cylindrical, lightweight in structure, though thin and strongly formed; dorsum smooth, glossy, except that fine transverse incised spiral lines emanate restrictedly from either terminal beak; faint longitudinal growth lines also visible; terminals taperingly beaked, longer, narrower, adapically; outer lip, opening away from very broad aperture, is narrowly thickened, forming a fine cord along lip edge; columellar base convexly rounded, without depression; rudimentary white carinal ridge replaces fossula; basic shell color rosy pink, outer lip edge off-white, with a distinctive off-white transverse band of color crossing dorsum.

Measurements, holotype: L - 19.5; W - 8.1 mm.

Measurements, hypotype: L - 20.3; W - 8.5; H - 6.4 mm (Figure *160*a: C2555).

Type Locality: Port Alfred, SE Africa.

Type: USNM, No. 227715 [holotype].

Distribution: Jeffreys Bay; Algoa Bay to St. Francis Bay, SE Africa.

Discussion: Although this species may appear from the illustration to look much like *Phenacovolva* (*Turbovula*) *sowerbyana* (Weinkauff, 1881), the two species are quite distinct from one another; *Subsimnia smithi* is a larger, thinner shell, and it is a different, constant pinkish color, while *P. sowerbyana* is a lavender-grey. Seen together, there can be no mistaking their differences. The holotype of *Subsimnia smithi* appears to be a dead, thickly calloused, beach worn shell; the hypotype illustrated here (Figure *160*a) is a fresh, uncalloused, live-collected specimen.

144. *Subsimnia bellamaris* (Berry, 1946)

(Figure *161*: holotype)

1946 *Neosimnia bellamaris* Berry, Journ. Conch., London **22** (8): 180; fig. 1

1969 *Simnia bellamaris;* Cate, The Veliger **12** (1): 100; plt. 7, fig. 6

Description, holotype: *"Neosimnia bella-maris*—Shell fusiform, thin, translucent, robust, strongly swollen, at about two-fifths of the way from the apex, the maximum diameter about 45 to 50 per cent of the altitude. Surface polished and glossy; growth lines numerous, very fine, sharp, and inconspicuous, crossed by weak microscopic traces of fine spiral striation; otherwise without sculpture except for perhaps seven to nine low, obscure, rather wide

Figure *157*
Simnia nicaeensis (140)

Figure *158*
Simnia aperta (141)

Figure *158* a
Simnia aperta (141)

Figure *159*
Simnia ***maesae*** (142)

Figure *160*
Subsimnia *smithi* (143)

Figure *160* a
Subsimnia *smithi* (143)

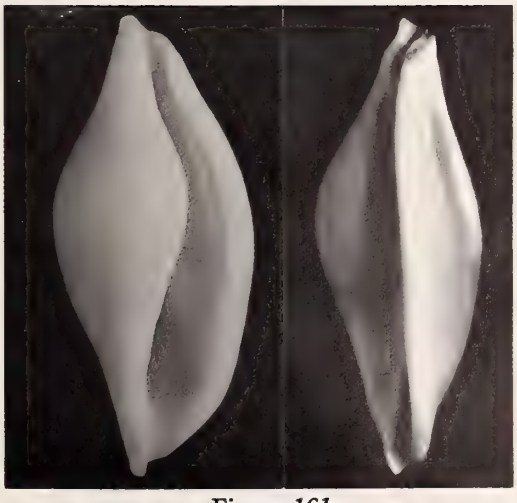


Figure *161*
Subsimnia *bellamaris* (144)

Figure *161* a
Subsimnia *bellamaris* (144)

spiral cords at the apical extremity and six to eight similar ones descending spirally from the columellar region anteriorly. Shell rather abruptly pointed at both ends, but a little more produced at the apex than basally. Outer lip strongly arcuate, thickened, whitish, medially produced, retracted at both termini; apically abruptly narrowed, emarginate, and notched; anteriorly retreating into the short, weakly reflexed canal, which is slightly exceeded by the tip of the columella. Columella twisted and pinched, its anterior extension arcuate and somewhat bent inward; columellar callus smoothing evenly over the whorl without definite outer boundary; fossula very steep, moderately excavated and with a low, nearly immersed, inner swelling or lump. Colour of body of shell brownish vinaceous with some clouding of deep brownish vinaceous, or dimly banded with two narrow paler bands and three wider ones of the deeper hue, paling abruptly to light buff or light ochraceous salmon in the zone back of the aperture, also paling to light buff terminally where it is barely tipped with mustard yellow." (Berry, 1946: 190)

Measurements, holotype: L - 24.6; W - 10.8 mm.

Measurements, hypotype: L - 17.3; W - 7.6; H - 5.8 mm (Figure *161*a: C3811).

Type Locality: in 33 m, off entrance to San Diego Bay, California.

Type: SU, No. 7846 [holotype].

Distribution: Dredgings off Point Loma, and from dredge fill, entrance to Mission Bay, San Diego, California (leg. Roy Morrison, San Diego); (Figure *161*a).

Discussion: Although a limited number of specimens exist in local collections, much field work is needed to shed further light on this species.

Prosimnia Schilder, 1927

Arch. Naturgesch. 91/A 10: 77

Type species: *Ovula semperi* Weinkauff, 1881 [OD]
= *Ovula coarctata* A. Adams & Reeve, 1848

Shell cylindrically elongate, with broadly terminal ends, transverse angular ridges over dorsum at either end of body whorl, a sub-serrated outer lip, and an uneven, subgranulose shell surface.

145. *Prosimnia semperi semperi* (Weinkauff, 1881)

(Figure *162*: original illustration)

1810 *Ovula hordacea* Lamarck [nom. dub.], Ann. Mus. Paris 16: 112

1830 *Ovulum hordaceum* Sowerby 1st, [name preocc.], Spec. Conch., *Ovulum*: 10; fig. 53

1881 *Ovula sempieri* Weinkauff, [err.], Mart. & Chem., Syst. Conch. Cab.: 190; plt. 48, figs. 14, 15

1887 *Birostra semperi*; Paetel, Cat. Conch. Samml. 1: 327

1927 *Ovula triticea* Fischer, Beitr. Plio. Faun. Seran, U. Obi (*in*: J. Wanner, Paleo. Timor 15/25: 59)

1931 *Simnia (Prosimnia) semperi*; Thiele, Handb. Syst. Weichtierk.: 271

1941 *Primovula (Prosimnia) coarctata* Schilder, Arch. Molluskenk. 73 (2/3): 108

1956 *Primovula (Prosimnia) semperi*; Allan, Cowries World Seas: 124

Description, holotype: "*Ovula sempieri* [sic]—Shell elongate, slender, almost cylindrical at both ends, but somewhat bluntly drawn out, spirally, numerously striate on the dorsum above the middle, in addition to that there is a thick transverse swelling, which sometimes is indistinctly noded, yellowish or purple colored, often with orange-yellow margins, yellow into olive green, or pure yellow colored; aperture very narrow, extending at both ends into short canals, below very wide [abapically], spindlely convex in the middle, smooth below into a long furrow, above and below narrowed, striped without plications, apertural margin moderately thickened above, with edges in the entire length notched, below mostly spinose, exteriorly margined, incisions not developed." (Weinkauff, 1881: 190)

Description, hypotype: Shell fairly small, elongate, subcylindrical, with tapering terminal collars; terminals blunt, barely protruding, beyond collars; dorsum subglossy, though surface is rough, irregularly sub-granulose, transversely incisedly striate, with occasional irregular longitudinal growth lines; base roughly surfaced, striate, cylindrical, tapering slightly to the front; funicular area crenate; aperture long, narrow, open in front due to lip constriction; columella without depression; fossular area defined with an upraised adaxial white carinal ridge; outer lip broadly flattened, with numerous weak crenulations, many protruding weakly beyond periphery of outer lip edge; color ivory to yellow to red-brown, lip and terminals a contrastingly solid, brighter color (C3706).

Measurements, holotype: "long. 11,3, diam. maj. 3,7 Mm."

Measurements, hypotype: L - 10.7; W - 4.3; H - 3.3 mm (Figure *162*a: C3706).

Measurements, hypotype: L - 10.1; W - 4.0; H - 3.2 mm (Figure *162*b: C3617 variant).

Type Locality: "Borneo" (Sowerby 2nd, 1848) [= *hordaceum*].

Type: Holotype is said to be in: "Museum Lobbeckeanum [Düsseldorf]." Hypotype is described and illustrated to better clarify the species.

Distribution: Northern half of Western Australia (Exmouth Gulf); Queensland coast of E Australia; East Indies; Central Pacific Islands; E coast of Asia, from Sulu Sea, Philippines, Taiwan, Ryukyu Islands, and Japan. Both hypotypes are from Exmouth Gulf.

Discussion: This is apparently an extremely variable species in shell morphology, seeming to vary from one population to another, frequently even within the same locality (see Figures *162*a–b). The shape of the shell, its color, size and degree of sculpture will often vary strikingly though I am provisionally suggesting two new subspecies, *Prosimnia semperi* ***boshuensis*** (taxon 146) and *P. semperi* ***draconis*** (taxon 147), until further study of their animal parts can better clarify the differences, if any, in the species. The type locality for this species is probably that of Sowerby 2nd, 1848. Weinkauff misspelled the species name *"sempieri,"* but as he dedicated this shell to Mr. O. Semper authors have emended the name to *"semperi."* The error was apparently a *lapsus calami,* as the spelling was correct in his Plate Explanation.

146. *Prosimnia semperi* ***boshuensis*** Cate, subspec. nov.

(Figure *163*: holotype)

Description, holotype: Shell small, narrow, elongate, sub-rhomboid, angularly squared at rear, with broad angular dorsal ridge traversing dorsum, becoming less prominent across base; terminals rather blunt, less so adapically; dorsum transversely incised, striate over all, with fine intercepting longitudinal lines creating a sub-glossy, beaded sculpture; base long and narrow, sub-rhomboid, slightly constricting abapically, with a succession of funicular knobs (as many as nine) set in a longitudinal line, more pronounced and even toward the rear; base and columella evenly lined and beaded; aperture fairly broad, straight, angling abruptly at rear of base; outer lip somewhat flattened, angled inward, furnished with numerous fairly well developed teeth, some of which protrude significantly beyond peripheral edge of lip; protruding teeth form vertical ridge visible from above; color varies from deep brownish-rose, yellow, orange, to white.

Measurements, holotype: L - 10.4; W - 4.1; H - 3.4 mm.

Type Locality: Boshu, Japan (locality obscure); *ex* Hirase coll.

Type: USNM, No. 342917 [holotype]..

Distribution: Mio, Kii, in 20 - 30 fathoms; Kashiwajima, Tosa, Japan.

Discussion: This new subspecies appears to differ from the nominate species not only geographically, but morphologically as well; it has more lengthened, intermittent lip teeth; it has smaller, more numerous funicular knobs; it has a narrower even tapering of the dorsum to the front, lacking a second transverse dorsal angled-ridge, as is seen most commonly in the more southerly populations; and finally, it has a finer, smoother shell surface, much less prominently granulose.

147. *Prosimnia semperi* ***draconis*** Cate, subspec. nov.

(Figure *164*: holotype)

Description, holotype: Shell long, sub-cylindrical, with a wide, elevated transverse keel at rear dorsal shoulder, and a narrower diagonal keel traversing the front dorsal shoulder; terminals open and broad, faintly recurved; dorsum rough, granular, uneven, with numerous rather deep, distinct, transverse incised striae encroaching upon the marginal callus; base long, rough, striate, sub-cylindrical, narrowing gently toward the front, becoming pinched to form the front left canal wall; eight funicular denticles on left terminal canal base; aperture long, narrow, flaring openly abapically due to constriction of outer lip; columella without specific character to the rear, with a long, narrow fossula in front, formed by a thick, longitudinal adaxial carinal ridge; outer lip surface wide, flat, depressed, angled inwardly, and covered with numerous long, weak dental ridges across breadth of lip, some of which (approx. 30) extend beyond periphery of outer lip edge; color pale lemon-yellow throughout; transverse dorsal shoulder at rear is sculptured with wide, rounded, longitudinal ridges (approx. 7), with interstices that provide a more solid concentration of color.

Measurements, holotype: L - 10.8; W - 3.4; H - 2.7 mm.

Type Locality: Palau Island, Caroline Islands (07°30′N; 134°35′E).

Type: USNM, No. 636514, [holotype]. (Figure *164*a: USNM 636515).

Discussion: This new subspecies has the characteristic morphology of the genus *Prosimnia* Schilder, 1927, yet the elongation of several teeth on the periphery of the outer lip edge also recall the characters of the genus *Dentiovula* Habe, 1961. The new subspecies appears to be distinct, and may be separated from its nearest congeners, *Prosimnia semperi* ***boshuensis*** and *P. semperi*

Figure *162*
Prosimnia semperi semperi (145)

Figure *162* a
Prosimnia semperi semperi (145)

Figure *162* b
Prosimnia semperi semperi (145)

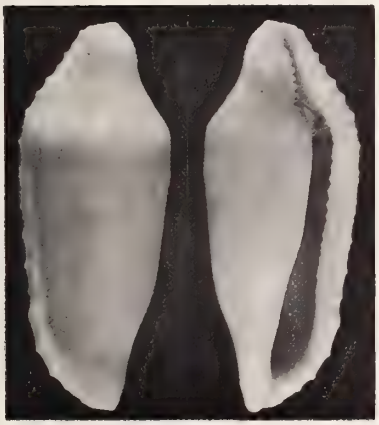


Figure *163*
Prosimnia semperi ***boshuensis*** (146)

Figure *164*
Prosimnia semperi ***draconis*** (147)

Figure *164* a
Prosimnia semperi ***draconis*** (147)

Figure *165*
Simnialena marferula (148)

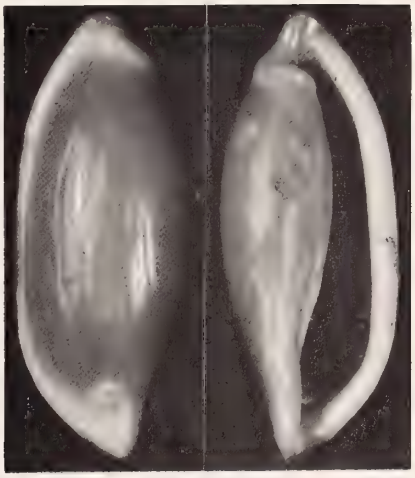


Figure *166*
Simnialena *formicaria* (149)

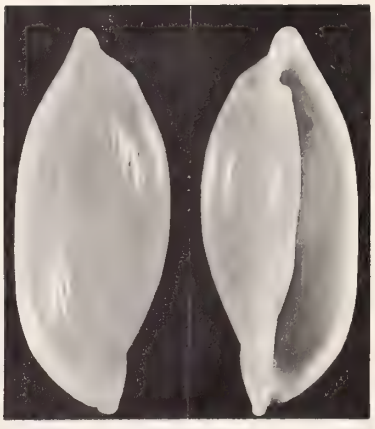


Figure *166* a
Simnialena *formicaria* (149)

semperi (Weinkauff, 1881) by its long, narrow shell; by its curious longitudinal dorsal ridges; by the long, very narrow aperture; by the open, recurved terminal beaks; and by several other minor characters. The name for the subspecies is derived from the Latin word *draco,* a fabulous lizard-like animal.

Simnialena Cate, gen. nov.

Type species: *Simnialena marferula* Cate, herein

Shells of this genus are of medium size, oblong-ovate, usually thinly formed, with thinly-rolled outer lip edges; they possess a peculiar flatly-infected, spiralling funicular cord, which distorts the adapical base, causing a suboblique angular ridge above the adapical terminal collar. The name is derived from the Greek *lenos,* a word for trough, trench.

148. *Simnialena marferula* Cate, spec. nov.

(Figure *165*: holotype)

1971 *Neosimnia uniplicata* Andrews, Sea Shells Texas Coast: 98; text fig.

Description, holotype: Shell somewhat small, broadly elongate, thin, almost transparent; terminals barely produced, rounded, sub-spatulate adapically, bluntly formed in front; dorsum smooth, glossy, with numerous irregularly incised, transverse lines covering entire dorsal area; base sub-ovate, narrowing sharply and becoming constricted in front; base finely transversely striate throughout, with a heavy parapet-like funicular development, whose rear surface becomes a spiralling groove upward to the dorsum; columella uncalloused, faintly striate; adaxial carina commences at funiculum, terminates as a shallow fossular wall abapically; aperture broad, widening even more to the front; outer lip fairly heavily, roundly calloused, outer surface uneven, sub-crenulate; color ranges from orange-yellow to medium rose.

Measurements, holotype: L - 8.4; W - 5.6; H - 3.9 mm.

Type Locality: Living on sea whips sub-tidally, Port Aransas, Texas (24°45′N; 97°50′W).

Type: LACM, No. 1293 [holotype].

Distribution: known from Padre Island and Corpus Christi, to Port Aransas, Mustang Island, Texas.

Discussion: These animals were collected living on what is locally known as 'sea-whips.' The yellow-shelled animals seemed to be living on *Leptogorgonia virgulata.* The holotype was collected by Harvey Meyer (of Captiva Island, Florida) 18 August 1968. This species is easy to identify by its numerous dorsal striae, not usually seen in the shells of the eastern range of the Gulf of Mexico and western Caribbean Sea. This new species differs from ***Simnialena uniplicata*** (Sowerby 2nd, 1848), which lives on the opposite (east) side of the Gulf of Mexico, by having a shorter, more broadly ovate form; by being more completely dorsally striate, and by having a paler combination of shell colors.

Almost too late to be considered in this work appeared Andrews, 1971: 98 (see Introduction). In that book is illustrated the ventral aspect of this new species; it is labeled *Neosimnia uniplicata.*

149. *Simnialena formicaria* (Sowerby 1st, 1828)

(Figure *166*: lectotype)

1828 *Ovulum formicarium* Sowerby 1st, Zool. Journ. London 4: 157; (1830: plt. 2, fig. 39)
1881 *Ovula formicaria*; Weinkauff, Mart. & Chem. Syst. Conch. Cab.: 204; plt. 52, figs. 1, 4
1885 *Ovula hordacea;* Tryon, Man. Conch. 7: 254; plt. 5, figs. 37, 38
1887 *Birostra fornicata* [err.]; Paetel, Cat. Conch. Samml. 1: 327
1941 *Pellasimnia formicaria*; Schilder, Arch. Molluskenk. 73 (2/3): 109
1956 *Neosimnia formicaria;* Allan, Cowries World Seas: 127

Description, holotype: *"Ovulum formicarium*—Shell white, oblong; back slightly carinated rather above the middle, outer lip without teeth, its margin rather flattened. The smallest species I have seen. From its resemblance to an ant's egg, I have named it *O. formicarium."* (Sowerby 1st, 1828: 157.)

Description, hypotype: Shell of medium size, broad, cylindrical; terminals produced, narrow and sub-spatulate, curving peculiarly in front; dorsum glossy, with very fine wavy incised transverse striae at either end, though unmarked centrally; numerous faint longitudinal growth lines are visible; base long, narrow, ovate, narrowing and thickening toward the front; semi-funicular elevation forms a wide spiral channel up to terminal beak; columella is defined by a long, low adaxial carinal wall, which becomes elevated in front to form a shallow fossula; aperture straight, fairly broad; outer lip smooth, roundly thickened, with an angular inner surface; color rose over all, deepening to yellow-rose along columella and fossula; outer lip, funiculum, funicular channel, and terminal beaks light beige.

Measurements, holotype: "long. 5/20, lat. 1/10, poll." [L - 10.5; W - 4.5 mm].

Measurements, hypotype: L - 12.5; W - 5.1; H - 3.9 mm (Figure *166*a: C3847).

Type Locality: "Eastern Seas"; here restricted to Bilatan Island, Philippines (05°00′N; 120°00′E).

Type: BMNH, No. not yet designated (K. Way) [lectotype herein].

Distribution: Banka Island and Sumatra, Netherlands East Indies; Palawan, SW Philippines to Kino-Sima, Japan (in 35 fathoms: A. Adams).

150. *Simnialena inflexa* (Sowerby 2nd, 1832)

(Figure *167*: lectotype)

1832 *Ovulum inflexum* Sowerby 2nd, Conch. Illust., *Ovulum* 18; fig. 60
1881 *Ovula inflexa*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 215
1885 *Ovula uniplicata* Tryon, Man. Conch. **7:** 255; plt. 5, fig. 49
1887 *Ovula inflexum;* Paetel, Cat. Conch. Samml. **1:** 325
1941 *Simnia inflexa;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia inflexa;* Allan, Cowries World Seas: 129
1969 *Simnia rufa*;Cate, The Veliger **12** (1): 97; plt. 9, fig. 14

Description, holotype: *"Ovulum inflexum*—Shell oblong, somewhat cylindrical, smooth, pale; posterior somewhat beaked, beak inflected; aperture rather effuse anteriorly; outer lip thickened, columellar lip keeled within, with a single plait posteriorly." (Sowerby 2nd, 1832: fig. 60)

Description, hypotype: Shell fairly large, elongate, narrow, sub-cylindrical, thinly formed, translucent; terminals are almost sharp, with adapical beak twisted; rear terminal inflected; dorsum mostly smooth, glossy, except that spiral transverse striae emanate restrictedly from either end; aperture wide, broader in front; base narrow, elliptically ovate, smooth, glossy; columella and fossula are without special distinction except that a pronounced, peculiarly formed, upraised longitudinal carinal ridge separates both from shell interior; outer lip straight, slightly angled at either end, faintly thickened along its edge; color variable from white, yellow, rose, to lavender and reddish-brown; funicular cord, interior carinal ridge, terminal beaks, and outer lip edge are off-white.

Measurements, holotype: "length, 0.7, breadth 0.25."

Measurements, hypotype: L - 17.5; W - 5.2; H - 3.8 mm (C3822).

Type Locality: "Gulf of Dulce" = [Costa Rica (Pacific)].

Type: BMNH, No. 1966368 (see Cate 1969 (1); plt. 9, fig. 14 [lectotype herein].

Distribution: Pacific coast of Central America; Gulf of California.

Discussion: This species is rather obscure, difficult to define, and may be only an exaggerated variant of ***Simnialena*** *rufa* (Sowerby 2nd, 1832).

151. *Simnialena uniplicata* (Sowerby 2nd, 1848)

(Figure *168*: C3653)

1830 *Ovulum acicularis* var. Sowerby 1st, Spec. Conch., *Ovulum* 10; plt. 6, fig. 6
1848 *Ovulum uniplicatum* Sowerby 2nd, Proc. Zool. Soc. London 135
1848 *Ovulum subrostratum* Sowerby 2nd, Proc. Zool. Soc. London: 136
1859 *Simnia uniplicata;* Chenu, Man. Conch.: 273
1877 *Ovula carolinensis* Mörch, Mal. Blätter **24:** 54
1881 *Ovula uniplicata*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 205; plt. 52, figs. 5, 8
1881 *Ovula subrostrata*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 212; plt. 53, figs. 13, 14
1885 *Ovula canadiensis* = *O. uniplicata;* Tryon, Man Conch. **7:** 255
1885 *Ovula carolinensis* = *O. uniplicata;* Tryon, Man. Conch. **7:** 255
1885 *Ovula antillarum* = *O. uniplicata;* Tryon, Man. Conch. **7:** 255; plt. 5, fig. 41
1887 *Simnia canadensis* Mörch (err.); Paetel, Cat. Conch. Samml. **1:** 327
1887 *Birostra subrostrata;* Paetel, Cat. Conch. Samml. **1:** 327
1887 *Birostra antillarum;* Paetel, Cat. Conch. **1:** 326
1865 *Ovulum subrostratum;* Reeve, Conch. Icon., *Ovulum*: plt. 14, figs. 65a, 65b
1865 *Ovulum antillarum;* Reeve, Conch. Icon., *Ovulum*: 15; plt. 14, figs. 64a, 64b (Figure *169*: BMNH No. 1969130; lectotype herein)
1941 *Simnia uniplicata;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia uniplicata;* Allan, Cowries World Seas: 129

Description, holotype: *"Ovulum uniplicatum*—Ovul. testá elongatá, subcylindricá, pellucidá, minutissimè striatá, aurantiá, seu violaceá, anticè subacuminatá, posticè subrotundatá; dorso margine distincto; aperturá subapertá; labio externo paululùm incrassato, ad extremitates recedente, anticè subangulato, ad canalem emarginato; labio interno intùs subdepresso, posticè spiraliter uniplicato, ad canal tortuo, versus externum deflecto, anticè subtortuo acuminato." (Sowerby 2nd, 1848: 135)

Description, hypotype: Shell long, narrow, sub-cylindrical, thin, nearly transparent; terminals taper gradually to

Figure *167*
Simnialena *inflexa* (150)

Figure *168*
Simnialena *uniplicata* (151)

Figure *169*
Ovulum antillarum (151)

Figure *170*
Simnialena *rufa* (152)

Figure *170* a
Simnialena *rufa* (152)

Figure *171*
Ovulum californicum (152)

Figure *172*
Ovulum variabile (152)

Figure *173*
Aclyvolva *lanceolata* (153)

Figure *173* a
Aclyvolva *lanceolata* (153)

Figure *173* b
Aclyvolva *lanceolata* (153)

the back, sharply and pointedly to the front, somewhat spatulate adapically; dorsum smooth, glossy, except that transverse, incised striae emanate restrictedly from either end; terminals produced, twisted adapically with twisted spire visible from above, due to an abnormal, for the species, funicular groove; base narrowly ovate, sub-angular vertically, constricted in front; a sharp, spiralling projecting funicular cord is the rear termination of a long, adaxially upraised carina, which outlines the inner columella-fossula area; aperture broad, flaring somewhat toward the front; outer lip thinly, roundly thickened, with weak callus shouldering above; color deep rose-brown over all, except that outer lip, front base, adaxial carina, and portions of rear terminal beak are contrastingly white.

Measurements, holotype: [no dimensions given by Sowerby 1st or Sowerby 2nd].

Measurements, hypotype: L - 20.2; W - 6.2; H - 4.6 mm (Figure *168:* C3653).

Type Locality: "Charleston, South Carolina."

Type: Whereabouts presently unknown, possibly at BMNH.

Distribution: both coasts of Florida: East coast from Virginia south possibly to Palm Beach; on the west coast from Naples north to Tampa Bay; possibly the Honduras and east coast of Central America. The species is often quite abundant at "The Rocks," Sanibel Island.

Discussion: Generally speaking, this species is larger and longer than the southeastern Florida *Cymbula acicularis* (Lamarck, 1810), and its limited dorsal striation readily identifies it; *C. acicularis* is without any dorsal striation whatever. The Sowerby and Mörch species, from the opposite Florida coasts, are almost identical in their morphological characters, so much so that it seems inadvisable to separate them, even subspecifically.

152. ***Simnialena rufa*** (Sowerby 2nd, 1832)

(Figure *170*: C3822)

1832 *Ovulum rufum* Sowerby 2nd, Elem. Conch. **1**: 36
1865 *Ovulum californicum* Reeve, Conch. Icon., *Ovulum*; plt. 11, figs. 50a, 50b (Figure *171*: lectotype herein)
1865 *Ovulum variabile* Reeve, Conch. Icon., *Ovulum,* plt. 13, figs. 60a, 60b (Figure *172*: original illustration)
1881 *Ovula rufa*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 213; plt. 53, figs. 13, 16
1881 *Ovula variabilis*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 208; plt. 52, figs. 14, 15; plt. 53, figs. 2, 3
1885 *Ovula californica* Reeve = *O. uniplicata*; Tryon, Man. Conch. **7**: 255; plt. 5, fig. 45
1887 *Birostra californica;* Paetel, Cat. Conch. Samml. **1**: 326
1887 *Simnia californica;* Paetel, Cat. Conch. Samml. **1**: 327
1887 *Simnia variabilis;* Paetel, Cat. Conch. Samml. **1**: 328
1887 *Simnia rufa;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Simnia inflexa* Schilder, Arch. Molluskenk. **73** (2/): 109
1956 *Neosimnia rufa;* Allan, Cowries World Seas: 127
1956 *Ovulum californica* = *Neosimnia aequalis*; Allan, Cowries World Seas: 129
1956 *Ovulum variabilis* = *Neosimnia inflexa;* Allan, Cowries World Seas: 129

Description, holotype: *"Ovulum rufum*—Shell oblong, acuminated at the posterior extremity; red; outer lip thickened, paler; aperture narrow, broader anteriorly; columella with a depressed longitudinal line within, and a slightly spiral posterior plait." (Sowerby 2nd, 1832: fig. 58.)

Description, hypotype: Shell of medium size, rectangularly ovate, sub-cyclindrical, narrowing abruptly from shoulders to either end; terminals sub-pointed, curiously bent and spatulate adapically; color varies from white to red-brown over all, except that outer lip margin is reddish-beige in darker shells, inner lip and funiculum are reddish-orange, interior carinal ridge is stark white; outer lip thickened; aperture straight, often fairly wide, with terminal canal gently angling; dorsum longitudinally lined with curving growth lines; dorsum otherwise smooth, glossy, except for prominent, concentrically spiralling, incised striae emanating restrictedly from either terminal collar, and a diagonal dorsal hump adapically; an upraised, narrow, callously thickened band runs along outer lip edge, continuing over front terminal ridge, around upper edge of rear terminal; base very narrow, long, cylindrically ovate; angularly pinched, with a callously thickened crest, whose sharply angled sides terminate at left side-margin on the one hand, inwardly on the other at base of an adaxial, upraised, almost perpendicular, white carinal ridge; front base exceedingly narrow, curving slightly, with a funicular cord on rear base; outer lip smooth, rather sharply edged, with plane of inner lip angling adaxially, outer plane almost perpendicular; a sharp, longitudinally angular, thickened ridge connects abapical base-lip and rear base funiculum.

Measurements, holotype: "Length 0.5, breadth 0.15."

Measurements, hypotype: L - 17.5; W - 5.2; H - 3.9 mm (Figure *170:* C3822).

Type Locality: "Bay of Caraccas" [sic]. Sowerby's locality appears to be in error. The type locality is here designated as just outside Estero Soldado, Guaymas, Sonora, West Mexico (31°55'N; 113°20'W).

Type: BMNH, No. 1966370 [lectotype herein]; there are 3 shells in the type lot.

Distribution: West coast of Mexico, Guaymas to Panama; Barra de Navidad; Puerto Vallarta; Manzanillo.

Discussion: *Simnialena californica* (Reeve, 1865), is represented by a syntype in BMNH, No. 1966370, (K. Way); (see CATE 1969: plt. 9, fig. 13a for explanation regarding the types of this species and *Simnialena rufa;* cf. (Figure *170*a: C3734).

Aclyvolva Cate, gen. nov.

Type species: *Ovulum lanceolatum* Sowerby 2nd, 1848

The shells in this new genus are unusually long, narrow, and lanceolate, with a fairly narrow aperture. The new name is taken from the Latin *aclys,* meaning a small javelin.

153. *Aclyvolva lanceolata* (Sowerby 2nd, 1848)

(Figure *173*: lectotype)

1848 *Ovulum lanceolatum* Sowerby 2nd, Proc. Zool. Soc. London: 135
1859 *Birostra lanceolata;* Chenu, Man. Conch.: 273
1881 *Ovula lanceolata;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 207; plt. 52, figs. 10, 11
1883 *Ovula rosea* Rossiter, Proc. Linn. Soc. N. S. W. **7**: 323
1941 *Pellasimnia lanceolata;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia lanceolata;* Allan, Cowries World Seas: 127

Description, holotype: *"Ovulum lanceolatum*—Ovul. testá elongatá, angustatá, minutissimè striatá, aurantio-rubescente, seu albidá, canalibus subproductis, emarginatis; aperturá angustatá; labio externo planulato crasso, breviusculo, anticè angulatim flexuoso; labio interno tumido rubro longitudinaliter marginato, posticè ad canalem producto, subtortuoso, anticè intus longitudinaliter sulcato uniplicato, ad canalem angusto, rectiusculo, acuminato." (SOWERBY 2nd, 1848: 135.)

Description, hypotype: Shell long, narrow, sub-cylindrical, lanceolate, attenuating to either end, where terminal beaks are somewhat blunt, though open; dorsum numerously transversely incisedly striate throughout; base smooth, long, very narrow, rounded, tapering abapically, constricting as it narrows sharply; there is no funicular process on rear bases; columella long, narrow, with a slight channeling, which becomes broader and deeper in front to form a fossula; fossula and columella outlined adaxially by a distinct longitudinal carinal ridge; aperture very long, narrow, curving to right adapically, opening up in front, due to constriction of outer lip; outer lip fairly broad, smooth, slightly reflexed, narrowing noticeably at lip constriction in front; color basically pink, with extremities rosy-pink, margins pinkish-yellow.

Measurements, holotype: not recorded; [lectotype approx.: L - 20; W - 3.5 mm.].

Measurements, hypotype: L - 25.1; W - 4.9; H - 3.5 mm (C3688).

Type Locality: "Sorsogon Island, Luzon" [Philippines].

Type: BMNH, No. 1969134 [lectotype herein]; there are 3 shells in type lot.

Distribution: According to SCHILDER (1941): Obi Islands, Halmahera Island, Waigeo Island, Sorong Island, Netherlands Indies (Moluccas); Mindanao to Luzon, Philippines; Aroe Islands [off SW coast New Guinea]; Merauke, S New Guinea; Amboina [E Netherlands Indies] to W India.

Discussion: Sowerby had this to say about his new species: "A remarkable shell, presenting the appearance of *O. aciculare* very much lengthened. The aperture is narrow, excepting towards the anterior, where the outer lip is bent out; the under surface is flat, the inner lip edged with a reddish line. Collected by Mr. Cuming. There is a white variety of this species from Molucca."

The two other shells in the type lot (see Figures *173*a, *173*b) resemble the lectotype of ***Aclyvolva lanceolata*** only inasmuch as their adapical terminal callus is long and broad; however, they differ considerably in the character of the dorsal striation and in their overall length. This species is rare enough that I believe more field work should be done before any decision can be made as to whether this type lot contains one, two, or three species.

154. *Aclyvolva haynesi* (Sowerby 3rd, 1889)

(Figures *174*: holotype; *174*C: C3790)

1889 *Ovulum haynesi* Sowerby 3rd, Journ. Linn. Soc. London Zoology, **20**: 397; plt. 25, figs. 1, 2
1932 *Neosimnia lamyi* Schilder, Proc. Malacol. Soc. London **20** (1): 54; plt. 4, fig. 44 (Figure *175*: holotype)
1935 *Phenacovolva haynesi;* Iredale, Austral. Zool. **8** (2): 104
1941 *Pellasimnia lamyi;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1941 *Pellasymnia haynesi;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Neosimnia lamyi;* Allan, Cowries World Seas: 127
1956 *Volva (Phenacovolva) haynesi;* Allan, Cowries World Seas: 134

Description, holotype: *"Ovulum (Birostra) haynesi*—Testa elongata, angustata albida, polita, utrinque rostrata, postice attenuata, antice subtruncato-acuminata, extremitatibus acutiusculis, lateribus leviter convexis; apertura medio angustissima, postice paulo latior, antice dilitata; columbella convexa, nitidissima, labrum incrassatum, leviter sinuosum." (Sowerby 3rd, 1889: 397)

Description, hypotype: Shell long, narrow, delicately formed though strong, sub-translucent; dorsal surface smooth, though faint growth lines appear longitudinally, with exceedingly fine spiral incised lines traversing to form a curious gridwork on either terminal collar; adapical terminal beak long, narrowly formed, inflected; terminal in front short, wedge-shaped and pointed; base long, very narrowly ovate, glossy, without terminal ridge in front, or funicular swelling in back; columella almost straight, curving slightly centrally; fossula lacking; aperture long, very narrow, except that curving of front base and constricting of front lip enlarge the aperture abapically; outer lip very narrowly thickened, almost straight, with an unusual undulating, scalloping of lip edge which creates large, rounded, often barely perceptible pseudodenticles; color usually white to milk-white, with a very faint pink blush within the aperture and body whorl.

Measurements, holotype: "Long. 34, maj. diam. 7 millim.; apert. maj. lat. 2½, min. vix, 1 millim."

Measurements, hypotype: L - 30.0; W - 5.7; H - 4.5 mm (Figure *174*a: C3790).

Type Locality: Exmouth Gulf, Western Australia.

Type: BMNH, No. 1924.3.27.17 [holotype].

Distribution: Geralia, Exmouth Gulf.

Discussion: These animals live on a brilliant golden-yellow gorgonian, which is covered with an equally brilliant carmine-red spotting, at a depth of about 20 feet of water (C3571). The Sowerby specimen was collected by Mr. J. H. Haynes, and was said to live on a "handsome white species of *Melitodes*"—"a graceful species allied to *O. philippinarum,* but larger and differing in form."

155. ***Aclyvolva clara*** Cate, spec. nov.

(Figure *176*: holotype)

Description, holotype: Shell long, narrow, lanceolate, thin, translucent; terminals long, narrow, tapering to rather sharp ends; dorsum long, narrow, sub-cylindrical, sub-angular centrally, with very fine transverse striation over all, striation somewhat oblique as it emanates from either end; base long, very narrow, very finely striate centrally, smooth on either ⅓ of base; there is no funiculum on rear inner canal lip; columella rounded, with only a hint of adaxial, longitudinal carina to indicate fossular area; aperture long, very broad, almost straight; outer lip edge roundly corded, hardly shouldered above; terminal beaks slightly recurved; color a bright, shining white.

Measurements, holotype: L - 24.9; W - 4.2; H - 3.4 mm.

Type Locality: Off Minabe, Japan (34°00′N; 134°48′E); 40 - 50 m depth; leg. S. Habu, December 1970.

Type: MA, No. 15607 [holotype].

Discussion: This new species seems most closely allied to ***Aclyvolva haynesi*** (Sowerby 3rd, 1889), of West Australia, but differs from it by being shorter and narrower; by having a thinner shell; by having a less thickened outer lip, and by lacking the undulating, scalloped outer lip.

The species name is derived from the Latin word, *clarus,* meaning bright, shining, brilliant.

156. ***Aclyvolva framea*** Cate, spec. nov.

(Figure *177*: holotype)

Description, holotype: Shell small, very narrow, very thin, fragile, translucent, long for its width, lanceolate; rear canal and shell-beak narrows angularly away from body whorl, tapering very narrowly to the back, more gradually to the front; aperture almost straight, narrow adapically, almost closed, open and exposed in front; dorsum lined longitudinally with numerous twisting, spiraling growth lines that appear to overlap; dorsum numerously transversely very finely striate with sharply distinct incised lines; base very narrow, elongately ovate, with forward base exhibiting the effect of spiral twisting, faintly constricted; columella narrow, evenly rounded, striate; no fossula or funiculum present; outer lip thin, irregularly edged due to breakage; teeth lacking; color pale grey throughout.

Measurements, holotype: L - 12.7; W - 2.5; H - 1.9 mm.

Type Locality: Broome, Roebuck Bay, Western Australia (17°57′S; 122°50′E); *ex.* Harvard University Australian Expedition, 20 January 1932; leg. H. L. Clark.

Type: MCZ, No. 276104 [holotype].

Discussion: This new species may be compared with the preceding species, ***Aclyvolva clara*** Cate & Azuma, from which it differs by being a much smaller shell; it is more narrow, thinly formed shell species; it differs further by

having a broader aperture, with a thin-edged outer lip; and by having a different surface quality on the dorsum (less glossy); the overall shell color is grey rather than white.

The name is derived from the Latin word of the same spelling, meaning javelin.

Cymbula Cate, gen. nov.

Type species: *Ovula acicularis* Lamarck, 1810

These shells are oblong, sub-cylindrate, usually thinly formed, and are without adapical umbilication. The name is derived from the Latin word of the same spelling, meaning canoe, small boat, or skiff.

157. *Cymbula deflexa* (Sowerby 2nd, 1848)

(Figures *179*: lectotype; *179*C: C3873)

1848 *Ovulum deflexum* Sowerby 2nd, Proc. Zool. Soc. London: 135
1881 *Ovula deflexa*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 206; plt. 52, figs. 6, 7
1885 *Ovula philippinarum*; Tryon, Man. Conch. **7**: 252; plt. 4, fig. 8
1887 *Birostra deflexa*; Paetel, Cat. Conch. Samml. **1**: 326
1941 *Pellasimnia deflexa*; Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia deflexa*; Allan, Cowries World Seas: 127

Description, holotype: "*Ovulum deflexum*—Ovul. testá ovali-elongatá, laevigatá, albidá, extremitatibus deflexis; aperturá angustá; labio externo crasso, lato, complanato, anticè arcuato, breviusculo; labio interno longitudinaliter tumido, complanato, posticè uniplicato, anticè ad canalem acuminato." (Sowerby 2nd, 1848: 136)

Description, hypotype: Shell of medium size, narrow, elongate, ovate, somewhat thinly formed, sub-translucent; terminals spatulately produced, rounder and deflected adapically; marginal lip on left base thickened; dorsum smooth, almost glossy, with numerous exceedingly fine, curving longitudinal growth lines laterally intercepted by equally fine, numerous, wavy transverse incised striae, lines and striae cover entire dorsum; base narrowly ovate, elongate, smooth, glossy; very thickly calloused base slants adaxially at a 45 degree angle; outer base lip faintly crenate over most of its length, and somewhat more bold and pronounced on rear half; columella long, narrowly, longitudinally grooved; fossula and columella grooved, an upraised, well developed adaxial carinal ridge adjoins base; aperture fairly narrow, evenly curving, opening moderately in front due to constriction of base and outer lip; outer lip edge thick, broad, flat, slanting inward, faintly crenulate, distinct on rear half of lip; both lips shouldered above, with outer lip on right side almost crenate along its lateral edge; dorsal shell color (C3873) is rosy-grey, with an almost white color-cloud centrally; entire base and outer lips are contrastingly off-white; there is a characteristic line of brilliant orange encircling entire shell, in the suture above outer lip shoulder at the shell margins, thus separating the coloful dorsum from the off-white base.

Measurements, lectotype: L - 16.0; W - 4.5 mm (approx.).

Measurements, hypotype: L - 19.4; W - 5.7; H - 4.3 mm (Figure *179*a: C3873).

Type Locality: "Ticao, Philippines."

Type: BMNH, presently without Register Number [lectotype herein], one of three shells in type lot.

Distribution: Dingo Beach (C3873) (Proserpine), Black Island, Queensland; Osima, Osumi, Japan. According to Schilder (1941): Philippines; W Celebes Sea; Sulu Sea; NE Borneo; Brunei; Palawan, SW Philippines; Banka; E Sumatra; Singapore; Aor; and Kii, Japan.

Discussion: Sowerby (1848) commented: "Resembling *O. aciculare,* but with a broad, flattened outer lip, and the extremities turned downwards. Brought from Ticao, Philippines, by Mr. Cuming."

158. *Cymbula bahamaensis* Cate, spec. nov.

(Figure *178*: holotype)

Description, holotype: Shell small, long, narrow, thin, translucent; terminals narrow, attenuating to either end, rounded, shovel-like in back; dorsum dull, with very prominent, curving, widely separated longitudinal incremental growth lines; base long, very narrow, glossy, without funicular swelling on rear base; aperture wide, open at either end, spoon-like adapically; columella smooth, glossy, rounded, curiously crimped in front; outer lip very thin, knife-like; color pale grey dorsally; interior milk-white; inside of outer lip, terminal canals, and columella are smoky-brown.

Measurements, holotype: L - 9.9; W - 5.2; H - 2.0 mm.

Type Locality: Massan Marine Gardens, Bahamas Islands (23°30′N; 75°00′W).

Type: MCZ, No. 276109 [holotype].

Discussion: According to an old label, dated 15 March 1893, it was collected by the "Corrosive Sub, 'Wild Duck' "; it was found crawling on gorgonian. A second shell, a paratype, measures: L - 15.5; W - 5.2; H - 3.6 mm.

Figure *174*
Aclyvolva haynesi (154)

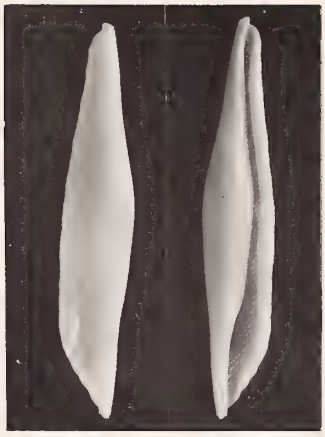


Figure *174* a
Aclyvolva haynesi (154)

Figure *175*
Neosimnia lamyi (154)

Figure *176*
Aclyvolva clara (155)

Figure *177*
Aclyvolva framea (156)

Figure *178*
Cymbula bahamaensis (158)

Figure *179*
Cymbula deflexa (157)

Figure *179* a
Cymbula deflexa (157)

Figure *180*
Cymbula bratcherae (160)

These shells may be compared with ***Cymbula acicularis*** (Lamarck, 1810), from which they differ by being smaller; by having a dulled dorsal surface thickly covered with longitudinal growth lines; and by having an evenly curved peripheral edge to the outer lip, with the edge not thickened.

There appear to be three distinct, somewhat closely related species living in the Gulf of Mexico-Caribbean Sea area. They key out rather easily in the following manner:

Shell dorsally smooth throughout, without transverse sculptural striae, of medium size, and with a long, white columellar carina, which becomes less elevated, finer to the rear .....*Cymbula acicularis*

Shell long, narrowly elongate, with dorsal striae above and restricted to the dorsal terminal collars; shell thin, with a long white columellar carina, which remains elevated and wide to the rear .....*Simnialena uniplicata*

Shell fairly short, somewhat broad, with numerous transverse dorsal striae over all, and the adaxial carina almost obsolete adapically; the funiculum spirals upward to distort the adapical terminal .....*Simnialena marferula*

The dorsal shell characters used here for purposes of identification seem to be constant in series of shells for the respective species, and there are three relatively distinct geographical areas of living range providing what would seem to be adequate separation of the species.

159. ***Cymbula acicularis*** (Lamarck, 1810)

(Figure *181*: holotype)

1810 *Ovula acicularis* Lamarck, Ann. Mus. Hist. Nat. Paris **16**: 112
1817 *Bulla secale* Dillwyn, Cat. Rec. Shells **1**: 474
1848 *Ovulum aciculare*; Sowerby 2nd, Thes. Conch., *Ovulum* **2**: 477; plt. 100, figs. 43 - 46
1859 *Birostra acicularis;* Chenu, Man. Conch.: 273
1941 *Simnia acicularis;* Schilder, Arch. Molluskenk. **73**(2/): 109
1956 *Neosimnia acicularis;* Allan, Cowries World Seas: 129

Description, holotype: *"Ovula acicularis*—O. Linearis, perangusta, coerulescens; extremitatibus subacutis; labro vix marginato." (LAMARCK, 1810: 112)

Description, hypotype: Shell varies in length (usually smaller in the Florida Keys), rectangularly oblong, narrowly elongate, tapering to semi-sharp terminal beaks; adapical terminal somewhat small, horizontally semi-circular, spatulate; dorsum smooth, glossy throughout, lacking dorsal striae; base narrow, elongate, with a thickened, semi-carinal ridge longitudinally within, and tapering sharply to the front; funicular cord spirals adapically within a concave groove; columella convex, smooth, except that an off-white, upraised longitudinal carina extends the length of columella and fossula; aperture fairly wide, straight; outer lip rather roundly thickened at edge, weakly shouldered above; color variable, from white, orange, rose, or yellow, to pale lavender-brown.

Measurements, holotype: L - 14.5 mm.

Measurements, hypotype: L - 18.2; W - 5.5; H - 4.1 mm (C3604).

Type Locality: "l'Océan américain"; here restricted to Key West, Florida (24°33'N; 81°47'W).

Type: MHN, No. 1103.63.1 [holotype] (Figure *181a*: ANSP 178890).

Distribution: Southeast Florida, south into the West Indies; Jamaica (Solander); Rio de Janeiro (Cuming). Exact limits of distribution not known at this time.

Discussion: The name appears to be from the Latin, *acicula,* a slender needle-like body; the range of the species seems to be from about Lake Worth south into the Florida Keys, apparently not entering the Gulf of Mexico; distribution south of the Keys remains obscure. The shells of this species are easily identified by the lack of dorsal striae. WEINKAUFF (Jahrb. D. Mala. Ges., 9: 178, 1882) employed the name, *canadiensis,* in error for this species.

Lamarck: "Espèce petite, mais fort remarquable, rapportée par *Mauger,* de son voyage aux Antilles. Elle paroit très-distincte des deux suivantes, dont elle se rapproche par ses rapports. Cette coquille ressemble à un grain d'avoine allongé et peu renflé. Elle est subcylindrique, grêle, d'un cendré bleuâtre, et n'offre qu'un sinus léger et oblique sur la columelle. Sa longueur est de 15 millimètres. L'individu figuré dans *Lister* étoit probablement moins grêle que ceux que je possède."

160. ***Cymbula bratcherae*** Cate, spec. nov.

(Figure *180*: holotype)

1969 *Simnia rufa,* var. *inflexa* Cate, The Veliger **12** (1): 97; plt. 7, fig. 2

Description, holotype: Shell somewhat small, elongately ovate, body whorl rather broadly inflated centrally, subcylindrical, very thin, translucent; terminals roundly pointed, not produced, evenly contoured at ends; dorsum smooth, highly glossy, essentially without dorsal striae,

except for two or three almost imperceptible spiral lines at terminal ends, base long, narrow, ovate, with a central longitudinal basal ridge that creates a 45 degree inward slope to an upraised longitudinal carinal ridge, providing for a peculiar, deep columella-fossular suture; left side of angled base curves convexly upward to side-margin; front base is slightly constricted, rear base bears a rudimentary, flat funicular callus thickening; aperture straight, wide, and open; outer lip straight, curving equally and abruptly left at either end; lip edge rather thin, flatly thickened, faintly shouldered above; color lavender-brown, with funicular callus and lip edge a lighter pinkish-beige; interior carinal wall white.

Measurements, holotype: L - 14.7; W - 5.1; H - 3.6mm (Figure *180:* C3821).

Type Locality: Pulmo Reef, SE Baja California, Mexico (23°12′N; 109°32′W); leg. Twila Bratcher, Los Angeles, April 1961.

Type: LACM, No. 1610 [holotype].

Distribution: Concepcion Bay to Santa Rosalia, E. Baja California del Sur; Bahía de Adair, Guaymas, W Mexico (Sorensen).

Discussion: This small new species almost lacks the dorsal striation commonly seen in other Eastern Pacific ovulids; it also differs from them, notably *Simnialena acicularis* (Lamarck, 1810), by possessing a more broadly ovate shell form; by having a broader, more open aperture; by having a more peculiar longitudinal basal ridge, with a columellar suture and white carinal wall within; by having enclosed shell terminals at ends; by lacking the usual distorted twist of the funiculum; by having faint transverse dorsal striae over terminal collars; and the outer lip edge is often a prominent beige-white color.

The name of this new species was chosen to honor Twila Bratcher of Los Angeles, who collected the holotype.

Spiculata Cate, gen. nov.

Type species: *Ovula loebbeckeana* Weinkauff, 1881

Shells are usually narrowly ovate, elongate, broader centrally, spindle-shaped, with terminals attenuating pointedly, especially adapically. The name of the genus is derived from the Latin word *spiculatus,* meaning sharpened to a point, spiked.

161. *Spiculata loebbeckeana* (Weinkauff, 1881)

(Figure *182*: original illustration)

1881 *Ovula loebbeckeana* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 197; plt. 50, figs. 6, 7
1885 *Ovula uniplicata* Tryon, Man. Conch. **7**: 255; plt. 5, figs. 39, 50
1887 *Simnia loebbeckeana;* Paetel, Cat. Conch. Samml. **1**: 327
1887 *Ovulum formicarium* Keep, West Coast Shells: 61; fig. 47
1956 *Neosimnia loebbeckeana;* Allan, Cowries World Seas: 128

Description, holotype: "*Ovula Loebbeckeana*—Testa elongata, extremitatibus productis, acutis, laevigata, nitida, aurantio-rubescens, extremitatibus medioque pallidior; apertura lata, intus carnea, canalibus brevibus, angustis; columella convexiuscula, utrinque acutissima, superne contorte subplicata, inferne leviter complanata, intus alba; labrum arcuatum, incrassatum, extus margininatum; sinus nulli." (Weinkauff, 1881: 197)

Description, hypotype: Shell somewhat narrow, ovate, spindle-shaped, barely inflated, narrowly elevated centrally, tapering concavely to either end; thin, translucent; terminals pointed, sharply so adapically; dorsum smooth, glossy, except for exceedingly fine longitudinal growth lines and equally fine transverse spiral striae on immediate terminal beaks; base smooth, glossy, narrowly ovate, with a narrow, thick, straight ridge in front; a broad spiralling funicular process at the back; columella roundly smooth; fossula only faintly apparent; aperture fairly wide, broadening to the front; outer lip curving, constricted abapically, lip-edge thickly rolled, smooth, shouldered above; color variable (Keep's type was pink; "rather less than an inch long"); hypotype is pale ivory-pink, with a faint greyish-white band of color traversing central dorsum, terminals and outer lip-edge are a lighter pale ivory.

Measurements, holotype: "Long. 24 diam. maj. 7 Mn."

Measurements, hypotype: L - 19.7; W - 6.6; H - 4.9mm (Figure *182*a: C3818).

Type Locality: "Vancouver-Insel — Obercalifornien"; [apparently erroneous]. Type locality here restricted to Magdalena Bay, W Baja California (24°33′N; 112°40′W).

Type: Museum Loebbeckeana, Düsseldorf; (see Dance 1966: 292; append. IV).

Distribution: San Pedro (Dall); Newport Beach (Sharon), California; Magdalena Bay, E Baja California del Sur (H.N. Lowe).

Discussion: This species has been collected at Santa Barbara and at Monterey, California, with the latter locality

Figure *181*
Cymbula *acicularis* (159)

Figure *181* a
Cymbula *acicularis* (159)

Figure *182*
Spiculata *loebbeckeana* (161)

Figure *182* a
Spiculata *loebbeckeana* (161)

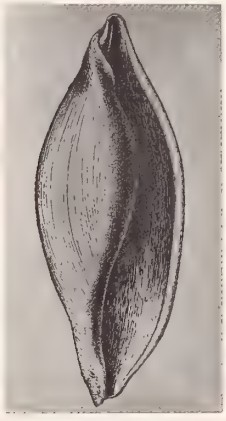


Figure *183*
Spiculata *barbarensis* (162)

Figure *183* a
Spiculata *barbarensis* (162)

Figure *184*
Neosimnia catalinensis (162)

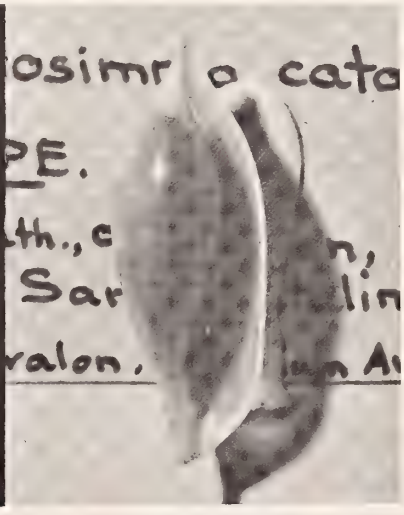


Figure *184* a
Neosimnia catalinensis (162)

Figure *185*
Spiculata michaelkingi (163)

possibly being the northern limit of its range on the west coast of America.

162. ***Spiculata barbarensis*** (Dall, 1892)

(Figure *183*: original illustration)

1892: *Ovula (Simnia) deflexa* Sby. var. *barbarensis* Dall, Proc. U. S. Nat. Mus. **15**: 206; plt. 21, fig. 1
1916 *Neosimnia catalinensis* Berry, Nautilus **30** (2): 21; plt. 5, fig. 3 (Figures *184, 184*a: holotype)
1941 *Simnia barbarensis*; Schilder, Arch. Molluskenk. **73** (2/3): 109
1941 *Simnia catalinensis*; Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia barbarensis*; Allan, Cowries World Seas: 128
1956 *Neosimnia catalinensis*; Allan, Cowries World Seas: 128

Description, holotype: *"Ovula (Simnia) deflexa* Sby. var *barbarensis* Dall—One example, one inch in length, found in San Pedro Bay, by Miss Monks. (*O. deflexa* is a southern form, but was reported by Col. Jewett from Santa Barbara. His specimen was probably the same as the form here figured, which is of a whitish color and does not seem to agree perfectly with Sowerby's figures. I therefore separate it varietally until more is known. If it prove distinct from *deflexa* the varietal name may take specific rank. W.H.D.)." (Dall, 1892: 206)

Description, hypotype: Shell large, ovate, spindle-shaped, inflated, thin, translucent; terminals pointed, sharply produced; dorsum smooth, almost glossy, with numerous visible incremental growth lines over length of dorsum and base; exceedingly numerous, very fine transverse striae emanate restrictedly from either end, the greater area of upper surface is unlined; base is sub-glossy, inflatedly enlarged, thin, almost transparent; with front base narrowing, thickened, slightly constricted, and numerously, very finely spirally striate; oblique, lateral opening in back provides the appearance of a funiculum, rear base also numerously finely spirally striate; columella-fossula area is convexly curved, without depression; aperture very broad, open, gently curving; outer lip edge minutely, narrowly thickened, scarcely shouldered above; color of body whorl appears to be light grey, almost glass-clear; front base, funicular canal area, terminal beaks and outer lip edge are ivory.

Measurements, holotype: "one inch in length".

Measurements, neotype: L - 31.8; W - 10.0; H - 8.0 mm (Figure *183*a: CAS 32437).

Measurements, hypotype: L - 23.6; W - 9.5; H - 7.3 mm (C3812).

Type Locality: "San Pedro Bay".

Type: CAS, No. 32437. Holotype was in the Monks collection, San Pedro (1892), California, now presumed to have been broken up and scattered and the type lost (Elsie Chace, Los Angeles).

Distribution: 73 - 125 m, San Pedro Bay; 91 m, off Avalon, Santa Catalina Island; Santa Barbara; Morro Bay (?), California.

Discussion: The holotype of ***Spiculata catalinensis*** (Berry, 1916), is in S. S. Berry collection, Redlands, California, No. 1224. In regard to the Dall type: Many years ago Miss Monks taught at the Los Angeles Normal School on 5th Street. Miss Monks maintained a cabin at the then "wild" San Pedro, to be used for shell collecting, etc. Among early shell collectors it is generally agreed that Miss Monks "just disappeared", that her collection was subsequently broken up, and that it seems likely the type of *Ovula (Simnia) barbarensis* has become lost, with only an illustration remaining to identify the species.

163. ***Spiculata michaelkingi*** Cate, spec. nov.

(Figures *185*, *185*C: holotype)

Description, holotype: Shell fairly large, broad, inflated, fusiform, thin, translucent; terminals attenuate gradually, evenly to either end; dorsum bulbous, smooth, glossy, except that transverse incised striae emanate restrictedly from the adapical terminal beak, in front the striae are almost obscure; base long, fusiformly, narrowly ovate, smooth, glossy, except that dorsal striae continue down onto base adapically; base in front without terminal ridge, in back a rudimentary funicular thickening, without real definition, spirals upward and back; aperture fairly broad, evenly curving; canals short, open at ends; outer lip thin, thickened on edge by a fine nacreous cord that is slightly shouldered above; color orange, with a pale, greyish-brown effect dorsally.

Measurements, holotype: L - 22.0; W - 7.1; H - 6.0 mm.

Type Locality: Deep water off south coast of Maui, Hawaii (20°45′N; 156°20′W).

Type: BPBM, No. 9734 [holotype].

Discussion: This new ovulid species appears unlike any other form presently known in Hawaiian waters. It most closely resembles the California ovulid ***Spiculata barbarensis*** (Dall, 1892). However, ***S. michaelkingi*** differs from it by having far fewer, but heavier, dorsal striae; by having a narrower body whorl, with a noticeably narrower aperture; by having a larger, more evenly ovate base, and by

having a different, constant shell color, orange rather than ivory. The name of this species honors Mr. Michael King, Lahaina, Maui, a black-coral diver, who was the first to discover this ovulid in Hawaiian waters. Mr. King also was the discoverer of *Phenacovolva carpenteri lahainaensis* (Cate, 1969) and *P. brevirostris* (Schumacher, 1817), in the same deep water off the south coast of Maui, in roughly the same locality (see CATE 1969: 364).

Dissona Cate, gen. nov.

Type species: *Primovula tosaensis* Azuma & Cate, 1971

Shells are small, narrowly rhomboid, often with a slight constricting of the outer lip centrally; having also a peculiar spiralling of the funicular cord projection, which usually forms the adapical canal opening. The name is derived from the Latin *dissonus,* meaning different, discordant, inharmonious.

164. *Dissona tosaensis* (Azuma & Cate, 1971)

(Figure *186*: holotype)

1971 *Primovula tosaensis* Azuma & Cate, The Veliger **13** (3): 264; fig. 9

Description, holotype: Shell small, long, narrow, becoming broader and enlarged sub-centrally, thinly formed, translucent, sub-glossy, with transverse, widely separated incised striae over all; terminals narrowing to front and back, almost beaked adapically; base narrow, elongately ovate, uncalloused, transversely striate; funiculum on posterior base long, thick, curiously twisting obliquely to form a second dextral canal opening; columella rounded, striate, without depression, and with a low longitudinal carinal wall adaxially; fossula long, shallowly trenched, with an upraised triangular wall within; aperture long, narrow, enlarging openly in front due to constriction of outer lip; outer lip fairly thick, rounded, only slightly crenate toward the rear; color bright light grey over all, except that funicular tip and columellar carinal wall are white; base wall of front and rear canal bright lavender-red, with bright canary yellow enveloping the terminals.

Measurements, holotype: L - 11.5; W - 4.0; H - 3.3 mm.

Type Locality: 2 km off Kirimezaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 55 - 73 m; leg. Azuma, 21 March 1970.

Type: MA, No. 14840 [holotype].

Discussion: This species seems to resemble *Simnialena inflexa* (Sowerby 2nd, 1832) in a vague sort of way, but differs from that species by being smaller, less ovate, narrower, with a less sharply formed, inflected funiculum; by having the base constricted abapically; it also has a much narrower aperture with an angled and serpentine edge to the outer lip, and is a solid grey color dorsally.

165. *Dissona aurantium* (Sowerby 3rd, 1889)

(Figure *187*: holotype)

1889 *Ovulum (Birostra) aurantium* Sowerby 3rd, Journ. Conch. **6**: 11; plt. 1, fig. 15
1941 *Pellasimnia aurantium;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva aurantium;* Allan, Cowries World Seas: 132

Since I have never seen a specimen of this species, it seems appropriate to repeat Sowerby's original description:

Description, holotype: "*Ovulum* (*Birostra*) *aurantium* n. sp.—Testa elongata, leviter inflata, polita, sub-pellucida, aurantia, utrinque acuminata; postice leviter producta, acuta; antice leviter contracta; apertura postice agusta, sinuata, antice multo latior; labrum incrassatum, utrinque leviter sinuatum." (SOWERBY 3rd, 1889; 6: 11.)

(Shell elongate, somewhat inflated, polished, sub-pellucid, orange-colored, both ends sharp; rear terminal somewhat sharply produced [and damaged], front somewhat narrow; rear aperture enlarged, curving, more broad in front; lip thickened, both sides somewhat curving.)—C. N. Cate translation.

Measurements, holotype: "Long. 23, maj. lat. 7 mill."

Type Locality: Port Elizabeth, SE Africa.

Type: BUMO [holotype].

Discussion: "A single specimen in perfect condition has been sent me by Mr. Bairstow; it is called *O. spelta,* but more elongated and of a deep orange color."—Sowerby. It is interesting that Sowerby did not recognize and mention the apparent damage to the adapical terminal beak of this species. *Dissona aurantium* should be compared with *Subsimnia smithi* (Bartsch, 1915), from the same general locality, but appears to differ from that species by the lack of a light grey band traversing the central dorsum; *S. smithi* has a broader shell, with shorter, more blunt terminal processes; and a shorter, broader aperture.

166. *Dissona maccoyi* (Tenison-Woods, 1878)

(Figure *188*: holotype)

1878 *Birostra M'Coyi* Tenison-Woods, Trans. Roy. Soc. Victoria **14**: 56
1885 *Ovula (Birostra) McCoyi;* Tryon, Man. Conch. **7**: 256
1887 *Birostra maccoyi;* Paetel, Cat. Conch. Samml. **1**: 327

Figure *186*
***Dissona** tosaensis* (164)

Figure *187*
***Dissona** aurantium* (165)

Figure *188*
***Dissona** maccoyi* (166)

Figure *189*
Dissona hasta (167)

Figure *190*
Dissona reflexa (221)

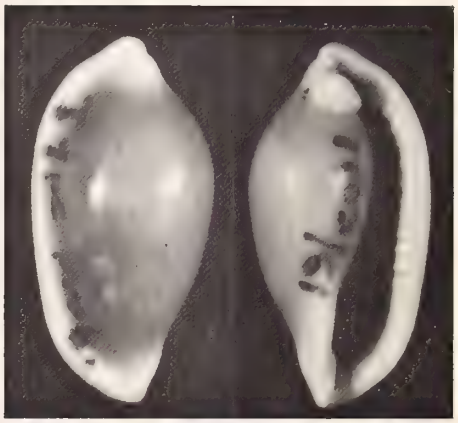


Figure *191*
***Sandalia** triticea* (168)

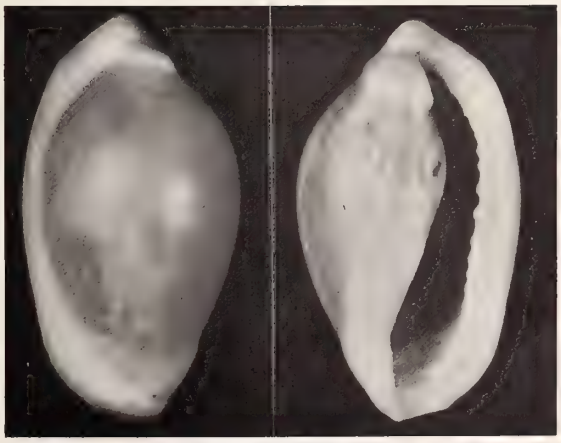


Figure *192*
***Sandalia** scitula* (168)

Figure *192* a
***Sandalia** scitula* (168)

1935 *Phenacovolva exsul* Iredale, Austral. Zool. **8** (2): 104
1941 *Pellasimnia M'coyi;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1941 *Pellasimnia exsul;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Birostra maccoyi* = *Volva philippinarum;* Allan, Cowries World Seas: 135

Description, holotype: *"Birostra M'Coyi*—B. t., parva, laevi, nitente, anguste ovata, utrimque [utrinque] attenuata, superne subarcuata, pallide refuescente, labio albida pallide lutea, conspicuo incrassato, postice dilatato, canali brevi, tenuiter curvator." (Tenison-Woods, 1878: 56.) Shell small, glossy, elongately ovate; terminals narrowly produced, somewhat bluntly so; dorsal surface smooth, except that fine transverse striae cross either terminal collar (holotype, a dead shell, has a fine deposit of lime on it); base narrowly ovate, tapering sharply to the front; little or no funicular swelling present in back; aperture straight, narrow, except flaring openly abapically from constriction of outer lip; columella-fossula area without depression; outer lip edge thickly rounded, edentate, weakly shouldered above; color light beige, somewhat paler ventrally.

Measurements, holotype: "Long. 23, Lat. 7 mill." [L - 23.8; W - 11.8; H - 5.6 mm (B. J. Smith, NMV)].

Type Locality: Waterhouse [Island], NE Tasmania.

Type: NMV, No. F448 [holotype].

Distribution: South Australian coast to 40 miles west of Eucla, W Australia. Present distribution is only vaguely understood.

Discussion: Tryon (1885: 256) spoke of this as a doubtful species; Schilder (1932: 56, note 51) suspected it might be related to *Phenacovolva philippinarum* (= *birostris* Linnaeus, 1758) (of Sowerby 2nd, 1848); in justice to both, it can be said that neither had a satisfactory photograph nor an adequate description to work from.

167. *Dissona hasta* Cate & Azuma, spec. nov.

(Figure *189*: holotype)

Description, holotype: Shell small, long, narrow, broadening at the sides centrally, sub-angled dorsally; terminals taper somewhat sharply from mid-point of shell to either end; dorsum sub-glossy, with fairly widely spaced, transverse incised striae over all, except that striation becomes almost obscure centrally; base elongate, ovate, smooth, glossy; no terminal ridge in front, nor funicular cord in back; columella broad, flat, indicated mostly by a change in nacreous color, with a deepening fossula toward the front; both are outlined within by an upraised carinal wall; aperture narrow, even more so centrally; adapical canal semi-enclosed; outer lip smooth, glossy, roundly curving inward; color dark beige dorsally, nearly off-white ventrally, with rear terminal and canal light brown.

Measurements, holotype: L - 12.4; W - 3.7; H - 3.2 mm.

Type Locality: 2 - 3 km, off Minabe, Kii, Japan (34° 00′ N; 134°48′ E); at 73 m; leg. S. Habu, 8 November 1970.

Type: MA, No. 15418 [holotype].

Discussion: This small species resembles the preceding species, ***Dissona*** *maccoyi* (Tenison-Woods, 1878) from South Australia, but differs from it by being more angularly humped centrally, more broadly angular at the sides; by having a more acutely angled outer lip in back, and it is apparently more numerously, completely striate over all dorsally. The name is derived from the Latin word of the same spelling, which means a pike, a spear.

Sandalia Cate, gen. nov.

Type species: *Ovula triticea* Lamarck, 1810

The shells of the species in this genus are conspicuous for their pointed adapical terminal beak, their peculiarly curving outer lips, and their shoe-like ventral appearance. The name for this group is derived from the Latin *sandalium,* slipper.

168. *Sandalia triticea* (Lamarck, 1810)

(Figure *191*: holotype)

1810 *Ovula triticea* Lamarck, Ann. Mus. Hist. Nat. Paris **16**: 111
1848 *Ovulum triticeum;* Sowerby 2nd, Thes. Conch., *Ovulum,* **2**: 474; plt. 100, figs. 20, 21
1854 *Amphiperas scitula* A. Adams, Proc. Zool. Soc. London **22**: 131[(Figure *192*: BMNH 1961144, lectotype herein), one of 3 syntypes]
1865 *Ovulum scitulum;* Reeve, Conch. Icon., *Ovulum,* plt. 6, figs. 29a, 29b
1881 *Ovula scitula;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 185; plt. 47, figs. 14, 15
1885 *Ovula bullata* Tryon, Man. Conch. **7**: 250; plt. 3, figs. 69, 70
1887 *Simnia triticea;* Paetel, Cat. Conch. Samml. **1**: 328
1941 *Pseudosimnia carnea* Schilder, Arch. Molluskenk. **73** (2/3): 107
1956 *Primovula rhodia* Allan, Cowries World Seas: 122

Description, holotype: *"Ovula triticea*—O. Ovato-oblonga, laevis, rubro-aurantia; labro albido denticulato; columellá anterius uniplicatá." (LAMARCK, 1810: 111)

Description, holotype: Shell small, rectangularly ovate, narrower in front; terminals somewhat produced, thickened, joined front and back with a thick marginal callus band, rear beak characteristically pointed; dorsum subglossy, smooth, with very numerous, extremely fine longitudinal growth lines, except that concentric incised striae emanate limitedly from either terminal; base semi-glossy, narrowly ovate, becoming very narrow and constricted in front; there is a large, conspicuous, tuberculated funicular projection at rear of base; columella a rounded continuation of base deepening faintly toward the front, eventually forming a funicular pit; aperture very wide, almost straight, expanding openly abapically due to constriction of outer lip; outer lip curving, angled front and back, canoe-shaped, broad, thickened, reflexed, weakly denticulate (19) throughout; color greyish-white, with side margins and terminal beaks a contrastingly lighter shade.

Measurements, holotype: "11 ou 12 Millimètres."

Measurements, paratype: L - 7.2; W - 3.6; H - 2.8 mm. (Figure *192*a: ANSP 39435).

Type Locality: New Caledonia.

Type: MHN, presently without number [Figure *191*: holotype]; paratype at BMNH, (Reeve's figure of *O. scitulum*) No. 1961144: Figure 19.

Discussion: To further clarify the synonymy of the two species, *Ovula triticea* Lamarck, 1810, and *Amphiperas scitula,* A. Adams, 1854, the original description of the latter is here quoted: *"Amphiperas scitula*—A. testa ovali, ventricosa, laevi, alba, transversim striata, ad extremitates sub-reproducta; apertura angusta, canalibus brevissimis, integris, labio postice callo spirali instructo, antice, uniplicato, labro, complanato intus et ad extremitates usque ad margineum plicato-dentato. Hab. New Caledonia. Mus. Cuming. This is a small species of white color somewhat resembling *A. concinna,* Sow., but the back is not gibbous, and is transversely striated; the striae are sometimes almost obliterated in the middle."

169. *Sandalia rhodia* (A. Adams, 1854)

(Figures *193*: lectotype; *193*C: C3795)

1854 *Amphiperas rhodia* A. Adams Proc. Zool. Soc. London: 130; plt. 28, fig. 8
1865 *Ovulum rhodia;* Reeve, Conch. Icon., *Ovulum*: plt. 4, figs. 18a, 18b
1881 *Ovula rhodia;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 180; plt. 46, figs. 14, 15
1887 *Birostra rhodia;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Primovula (Primovula) rhodia;* Schilder, Arch. Molluskenk. **73** (2/3): 107

Description, holotype: *"Amphiperas rhodia*—A. testa ventricosa, subpyriformi, rosacea, albo-varicosa, dorso subgibboso, ad extremitates subarcuata, canalibus brevibus, subproductis, integris; apertum angusta; labio laevi, tumido, postice callo producto, spirali instructo, ad canalem tortuoso, antice excavato, ad canalem obscure uniplicato, labro complanato, lirato, intus denticulato." (A. ADAMS, 1854: 130.)

Description, hypotype: Shell sub-cylindrical, elongately ovate, lightweight, thin, though strong; dorsum smooth, faintly transversely striate away from either terminal collar, smooth centrally; body whorl rounded; base roundly convex; terminals restrictedly produced, sharply so adapically, spade-like in front; outer lip thickened at edge, where it is roundly rolled, numerously, minutely, very finely denticulate; aperture wide, open, straight, more flared in front; base peculiarly funiculated, distorting the apex; base sharply elevated, thickened, twisted abapically; columella smooth, with an upraised longitudinal carina within, which develops centrally and forward to form a shallow, smooth fossula; color orange-red to rosy-pink, terminal canals orange with terminal tips, lip edge, abapical base-ridge and funiculum ivory-white.

Measurements, holotype: no dimensions given by author.

Measurements, hypotype: L - 16.1; W - 7.5; H - 5.8 mm (Figure *193*a: C3795).

Type Locality: Japan.

Type: BMNH, No. 1961143 [lectotype herein].

Distribution: Kii, Japan (hypotype); off the Kii Peninsula; Tosa; Yokohama; Hachioji, Japan.

Discussion: This northwest Pacific form has striking counterparts living in the Eastern Pacific (***Subsimnia bellamaris*** (Berry, 1946); and in the tidal waters of southeast Africa.

Hiata

Hiata Cate, gen. nov.

Type species: *Ovulum depressum* Sowerby 3rd, 1875

The shells of the species in this genus are notable for the open terminal canal endings, with little or no curving of the shell aperture; otherwise, shells are long, narrow, sub-

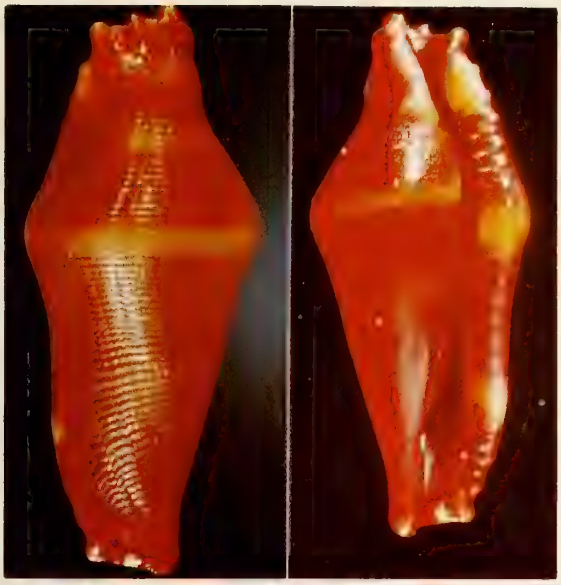


Figure *24* C
Dentiovula takeoi (24)

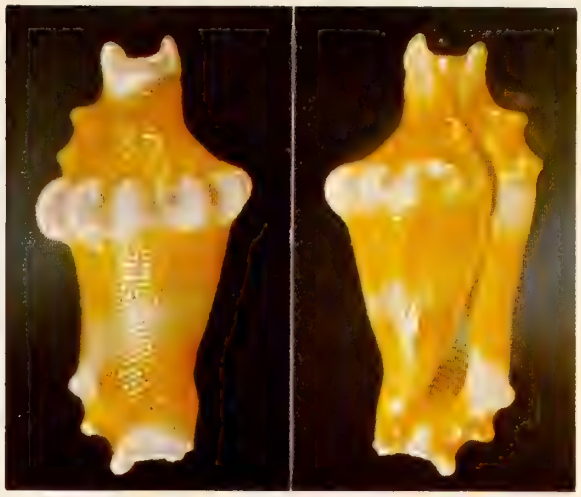


Figure *100* C
Rotaovula hirohitoi (95)

Figure *26* C
Dentiovula eizoi (26)

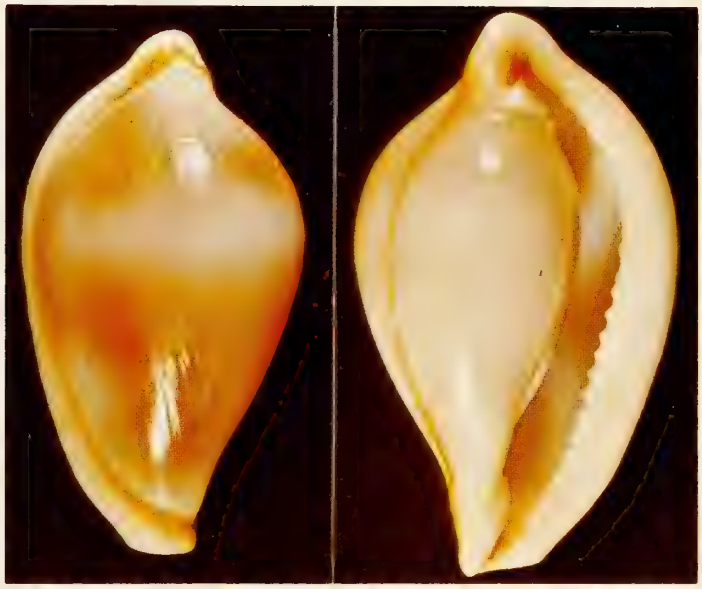


Figure *73* C
Aperiovula jeanae (69)

Figure *151* C *Cyphoma alleneae* (134)

Figure 27 C *Margovula pyriformis* (27)

cylindrical. The name is derived from the Latin *hiatus,* for opening.

170. *Hiata depressa* (Sowerby 3rd, 1875)

(Figure *194*: holotype)

1875 *Ovulum depressum* Sowerby 3rd, Proc. Zool. Soc. London: 128; plt. 24, fig. 1
1885 *Ovulum philippinarum* Tryon, Man. Conch. 7: 252; plt. 4, fig. 5
1887 *Birostra depressa;* Paetel, Cat. Conch. Samml. 1: 327
1927 *Radius gracillimus* Schilder [name preoccupied], Arch. Naturgesch. 91/A 10: 79, 133 (137); (Figure *195*: holotype)
1935 *Phenacovolva praenominate* Iredale, Austral. Zool. 8 (2): 104
1935 *Pellasimnia depressa;* Iredale, Austral. Zool. 8 (2): 105
1956 *Neosimnia (Pellasimnia) depressa;* Allan, Cowries World Seas: 130

Description, holotype: *"Ovulum depressum*—O. testa elongata, angustata, depressa, antice producta, utrinque attenuata et bicuspidata, polita, minutissime striata, alba, extremitatibus aurantiaco tinctis; busi concavo-depressa; apertura angusta, postice dilatata." (Sowerby 3rd, 1875: 128.)

Description, hypotype: Shell long, narrow, lanceolate, solidly formed; terminals tapering narrowly, gently recurved, with a peculiar recessed crescent opening; dorsum sub-glossy, narrowly transversely incisedly striate throughout; base smooth, elongate, narrowly ovate, constricted in front; columella smooth, long, narrowly depressed, with a low longitudinal, adaxial carinal wall defining it; fossular area depression almost absent; aperture very narrow, becoming broader in front due to combined constriction of base and lip; outer lip smooth, very broad, nearly closing aperture, depressing adaxially; lip broadly margined, weakly shouldered above; color milk-white throughout, except that edges of terminal ends are tinted with orange.

Measurements, holotype: "Long. 21, maj. diam. 5, min. 2 mill."

Measurements, hypotype: L - 13.3; W - 3.6; H - 2.7 mm (C3748).

Type Locality: "Northwest Australia," here restricted to Japen Island, Geelvink Bay, New Guinea (01°45'S; 136° 00'E); in 37 m of water.

Type: ANSP, No. 39445 [holotype].

Distribution: Throughout the eastern Sulu Sea; NE Borneo; Brunei Bay, NW coast of Borneo; Java.

Discussion: The type locality, "Northwest Australia," of authors for this species, appears to be an error; all the specimens I have examined in museum collections were invariably labeled as from the East Indian region. One needs only to compare these shells with those from the Samarang voyages to West Australia, to clarify the range; it was a Capt. Denicke who furnished Sowerby the NW Australia locality citation.

171. *Hiata brunneiterma* (Cate, 1969)

(Figures *196*: holotype; *196*C: hypotype)

1969 *Volva (Phenacovolva) brunneiterma* Cate, The Veliger 22 (4): 366; plt. 56, fig. 1

Description, holotype: *"Volva (Phenacovolva) brunneiterma*—Shell delicate, though strongly constructed, well formed, elongately narrow; dorsal surface smooth (except for minute, barely visible, longitudinal growth lines), otherwise untextured; funiculum absent; terminals minutely flaring; aperture exceedingly narrow, opening broadly at constriction of outer lip anteriorly; left margin not thickened, rounded; right margin without callus, lip flatly thickened adaxially, then rolling and curving upward within; fossula smooth, not impressed; primary shell color milk-white; terminal ends dark brown, with a pale brush of yellow-brown abapically the length of terminal ridge area." (Cate, 1969: 366).

Measurements, holotype: L - 20.3; W - 4.7; H - 4.2 mm.

Type Locality: Off Siasi Island, Sulu Sea (Dayrit).

Type: CAS, No. 13161 [holotype].

Distribution: Bantayan Island; Cebu, and Maru Sound, Guadalcanal (C. C. Finley).

Discussion: See Cate 1969a, for further discussion concerning this species.

172. *Hiata rugosa* Cate & Azuma, spec. nov.

(Figure *197*: holotype)

Description, holotype: Shell small, narrow, elongate, lanceolate, with weak body angles at either end of central area; terminals taper evenly to either end, with very narrow, square pointed tips; dorsum very finely transversely incisedly striate over all, which, with the intersection of numerous fine longitudinal growth lines, produces an unusual rough surface; base smooth, glossy, with a slight roughness visible; there is no funicular swelling on rear

base; columella rounded, without lateral depression, fossula outlined within by a short carinal wall; aperture long, narrow, broadening in front due to constriction of outer lip; outer lip broadest centrally, very narrow toward either end, smooth, without crenulation, and obliquely reflected inward; color brownish-red over all, but paler on base, interior carinal wall, and outer lip.

Measurements, holotype: L - 17.6; W - 4.0; H - 3.1 mm.

Type Locality: 2km off Minabe, Kii, Japan (34°00'N; 134°48'E); 40 - 50 m depth; leg. M. Azuma, 31 January 1971.

Type: MA, No. 15603 [holotype].

Discussion: This new species is comparable to ***Hiata brunneiterma*** (Cate, 1969), but differs from it in many respects, mainly by being a slightly shorter, smaller form; by being finely striate dorsally; by having a broader aperture, with canals opening straight out without constriction; and by having the solid shell color over all.

The name is derived from the Latin word *rugosus,* meaning wrinkled.

173. *Hiata horimasarui* (Azuma & Cate, 1971)

(Figure *198*: holotype)

1971 *Primovula horimasarui* Azuma & Cate, The Veliger **13** (3): 263; fig. 5

Description, holotype: *"Primovula horimasarui*—Shell long, narrow, lanceolate, with a sinistral twist of terminal area adapically, causing a low dorsal ridge in same area, in the same direction; terminals open, bluntly angled; dorsum sub-glossy, [dull], numerously finely transversely incisedly striate over all; base long, narrow, centrally ridged longitudinally, smooth, glossy, narrowing and obliquely angling right front and back; no funicular swelling [on] adapical [base]; columella without depression, a continuation of the base slanting adaxially, with only a very slight concavity in the fossula area, outlined by an interior longitudinal ridge that disappears on the columella centrally; aperture narrow, twisting, with a long widening in front due to constriction of base and outer lip; outer lip thick, broadly shouldered above, angling flatly inward; no indication of teeth; shell color milk-white over all, except that interior carinal ridge is deep pink." (Azuma & Cate, 1971: 263)

Measurements, holotype: L - 10.4; W - 2.5; H - 2.1 mm.

Type Locality: 2 - 3km off Kirimesaki, Kii Peninsula, Japan (34°00'N; 134°48'E); in 55 - 91 m; leg. Masaru Hori, 6 January 1969.

Type: MA, No. 14842 [holotype].

Discussion: This species was compared with ***Hiata depressa*** (Sowerby 3rd, 1875), but differs from it by being a smaller form, lacking in dorsal color, by being more contorted aperturally with the inner line of the outer lip more acutely angled; by possessing an angled funicular ridge on the rear base, and its terminal beaks projecting at a different angle.

174. *Hiata coarctata* (A. Adams & Reeve, 1848)

(Figure *199*: holotype)

1848 *Ovulum coarctatum* A. Adams & Reeve, Voy. Samarang, Moll., *Ovulum*: 21; plt. 6, figs. 2a, 2b
1881 *Ovula coarctata*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 188; plt. 48, figs. 9, 12
1887 *Birostra coarctata;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Primovula (Prosimnia) coarctata;* Schilder, Arch. Molluskenk. **73** (2/3): 108
1958 *Prosimnia (Prosimnia) coarctata;* Kuroda, Venus **20** (2): 169

Description, holotype: *"Ovulum coarctatum*—Ovul. testa elongata, sub-cylindracea, fulva, striata, supra medium gibbosa, ad extremitates coarctata, labio externo paululum incrassato, laevi, antice sub-angulato; labio interno intus subdepresso, ad extremitates acuminato." (A. Adams & Reeve, 1848: 21)

Description, holotype: Shell long, narrow, sub-cylindrical, sub-glossy; terminals attenuated gradually to the front, abruptly so to the rear, ends thinly edged, squarely terminated; dorsum transversely incisedly striate over all, with curious exceedingly numerous recessed punctations enveloping central dorsal surface, almost obliterating dorsal striation; base long, narrowly ovate, narrowing evenly to the front, abruptly to the rear; columella evenly rounded, striate, punctate, with a weak longitudinal carinal ridge within, which rises in an arching fashion at the fossula area; aperture curving, fairly wide, flaring openly in front, narrowing at angle of base; outer lip smooth, thinly formed, roundly curving inwardly centrally; color yellow-brown.

Measurements, holotype: L - 7.9; W - 5.8 mm.

Type Locality: "Straits of Sunda, near Java."

Type: BMNH, No. 1879.2.26.147 [holotype].

Distribution: Banka Island, NW Java (Belcher).

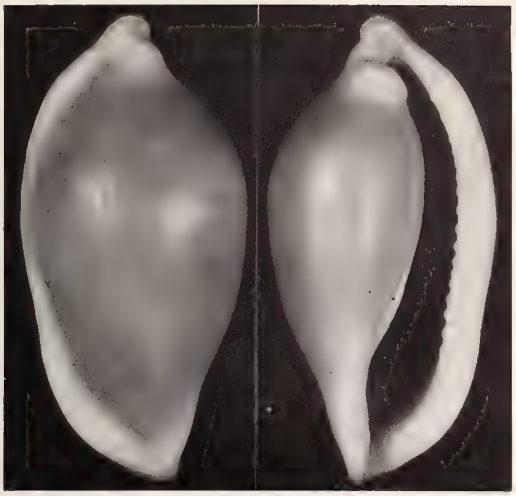


Figure *193*
Sandalia *rhodia* (169)

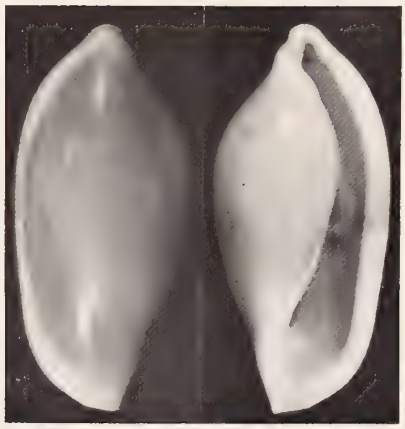


Figure *193* a
Sandalia *rhodia* (169)

Figure *194*
Hiata *depressa* (170)

Figure *195*
Radius gracillimus (170)

Figure *196*
Hiata *brunneiterma* (171)

Figure *197*
Hiata rugosa (172)

Figure *198*
Hiata *horimasarui* (173)

Figure *199*
Hiata *coarctata* (174)

Figure *200*
Kuroshiovolva shingoi (175)

Discussion: Little appears to be known about this species. The Adams & Reeve figure is misleading, as can be seen in comparing it with the photograph of the holotype. The authors themselves seem to have had some misgivings about the species: "This shell resembles *O. hordacea* [Sowerby ?; more probably Lamarck] in some degree, but is not so angular, and has the outer lip smooth. It may, however, very possibly be a young shell." It is true that this may be only a young stage of *Prosimnia semperi* (Weinkauff, 1881), however, doubt remains. It is true that *Hiata coarctata* (A. Adams & Reeve, 1848) possesses unusual dorsal punctations, a condition almost never seen in the shells of the Ovulidae. Although there remains doubt about the status of the species, it seems appropriate to include it here, especially since the name *P. semperi* presently exists for the species we have heretofore associated with *H. coarctata;* [*semperi* Weinkauff = *coarctata* auctt. (err.)].

Kuroshiovolva Azuma & Cate, 1971

Type species: *Kuroshiovolva shingoi* Azuma & Cate, 1971

Shells of this genus have more or less parallel sides, terminal ends almost squarely blunt (having the form of a razor clam); and straight apertures, open at either end.

175. *Kuroshiovolva shingoi* Azuma & Cate, 1971

(Figure *200*: holotype)

1971 *Kuroshiovolva shingoi* Azuma & Cate, The Veliger **13**(3): 266; figs. 14, 20 - 23

Description, holotype: *"Kuroshiovolva shingoi*—Shell small, long, rectangularly narrow, translucent [fragile]; terminals open, square at ends [truncated]; dorsum smooth, glossy, except that very fine longitudinal incremental growth lines are visible under the microscope (no transverse dorsal striation); base long, exceedingly narrow, rounded, smooth, glossy, with very slight constricting in front; no funicular swelling in back; columella [rounded], smooth, glossy, without other characters [depression]; fossula narrow, concave, boat-shaped; aperture straight, narrow; outer lip thickened, though very narrow and smooth; shell color milk-white over all." (Azuma & Cate, 1971: 266.)

Measurements, holotype: L - 13.3; W - 2.3; H - 1.7 mm.

Type Locality: 2 - 4 km off Hinomisaki, Kii Peninsula, Japan (34°00'N; 134°48'E); in 128 - 146 m, living on *Plumarella cristata* Gorzawski; leg. Shingo Habu, 10 February 1970.

Type: MA, No. 14839 [holotype].

Discussion: See Azuma & Cate (1971; figs. 20 - 21), for radular illustration and discussion. At the present time there are also three known paratypes:
Paratype 1. (♀); Azuma coll., 14910: L - 26.5; W - 4.0 mm.
Paratype 2. Cate coll. (*ex.* Azuma 14911); L - 11.0; W - 2.0 mm.
Paratype 3. Shingo Habu coll.: L - 17.0; W - 2.0 mm.

Neosimnia Fischer, 1884

Type species: *Bulla spelta* Linnaeus, 1758 [OD]

Shells are of medium size, well formed, solid, broad centrally, attenuating immediately, evenly, to front and back, with a funicular spiral cord on rear base; they are usually dorsally striate.

176. *Neosimnia spelta spelta* (Linnaeus, 1758)

(Figure *201*: holotype)

1758 *Bulla spelta* Linnaeus, Syst. Nat. ed. 10: 726
1810 *Ovula spelta*; Lamarck, Ann. Mus. Hist. Nat. Paris **16**: 113
1828 *Ovulum obtusum* Sowerby 1st, Zool. Journ., London **4**: 156 (Figure *202*: holotype)
1828 *Ovulum secale* Sowerby 1st, Zool. Journ., London **4**: 157 (Figure *203*: lectotype herein)
1834 *Bulla secale;* Warren, Conch. (22): 69
1859 *Birostra spelta*; Chenu, Man. Conch.: 273
1860 *Ovulum spelta;* Reeve, Elem. Conch. **1**: 36
1881 *Ovula obtusa*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 191; plt. 49, figs. 1, 4
1881 *Ovula secalis*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 210; plt. 53, figs. 6, 7
1883 *Ovula roseocarnea* Bucquoy, Dautzenberg & Dollfus, Moll. Mar. Roussillon, Paris **1**: 135
1883 *Ovula obtusa;* Bucquoy, Dautzenberg & Dollfus, Moll. Mar. Roussillon, Paris **1**: 135
1885 *Ovula sowerbyana* Tryon, Man. Conch. **7**: 253
1885 *Ovula intermedia* Tryon, Man. Conch. **7**: 251
1885 *Ovula acicularis* Tryon, Man. Conch. **7**: 253
1885 *Ovula leathesi* Tryon, Man. Conch. **7**: 254
1887 *Simnia spelta;* Paetel, Cat. Conch. Samml. **1**: 327
1887 *Birostra obtusa;* Paetel, Cat. Conch. Samml. **1**: 327
1887 *Simnia sowerbyana;* Paetel, Cat. Conch. Samml. **1**: 328
1892 *Ovula obsoleta* Locard. Coq. Mar. Côtes de France, Paris: 36
1899 *Radius (Ovula) spelta*; Horst & Schepman, Cat. Syst. Moll. (2): 189
1900 *Ovula lutea* Pallary, Journ. de Conchyl. **48**: 301

1900 *Ovula rosea* Pallary, Journ. de Conchyl. **48**: 301
1927 *Neosimnia illyrica* Schilder, Arch. Naturgesch. **91/A 10**: 78 (Figure *204*: holotype)
1931 *Simnia (Prosimnia) spelta*; Thiele, Handb. Syst. Weichtierk.: 271
1941 *Simnia obsoleta*; Schilder, Arch. Molluskenk. **73** (2/3): 108
1941 *Simnia illyrica*; Schilder, Arch. Molluskenk. **73** (2/3: 109
1941 *Pellasimnia obtusa*; Schilder, Arch. Molluskenk. **73** (2/3): 110

Description, holotype: "*Bulla spelta*—B. testa oblonga utrinque attenuata aequali, labro arcuato, margine incrassato.—Testa alba, laevis, femine Tritici duplo major, vix birostris, sed magis patula. Apertura longitudinalis, lunata cum denticulo obsoleto ad apicem columella. Spira axterna omnino nulla." (Linnaeus, 1758: 726)

Description, hypotype: Shell of medium size, ovate though somewhat spindle-shaped, smooth, sub-glossy; terminals somewhat obtusely produced, not directly open in back, more pointed in front; dorsum smooth centrally, with widely spaced incised transverse lines crossing terminal collars; base smooth, glossy, pointedly ovate, with a spiralling, thickened funicular cord curling up onto rear terminal beak; columella and fossula depressed, outlined adaxially with an upraised longitudinal ridge; aperture rather straight and wide; outer lip thick, roundly rolled, smooth, with little or no shouldering above; color ivory throughout, with outer lip, base, and terminal beaks a somewhat darker color.

Measurements, type: L - 12.5 mm; W - 7.1 mm (approx.).

Measurements, hypotype: L - 11.9; W - 5.3; H - 4.0 mm (Figure *201a*: C3689).

Type Locality: "M. Mediterraneo," here restricted to Corsica, Mediterranean Sea (42°00′N; 09°00′E).

Type: LSL, No. 372 [lectotype]. Originally, Linnaeus appears not to have designated a type specimen. In the type lot there are 6 specimens, five immature and one mature, undoubtedly the species of authors; the mature specimen has been selected as a lectotype (Dance: personal communication) by the Linnaean Society, London; the shell is bleached, almost white.

Distribution: Throughout the western Mediterranean Sea; NW African coast; Canary Islands and the Azores.

Discussion: Dance (1966: 183) says, "*Bulla spelta.* Hanley has isolated 5 immature shells and one mature. None are marked and they are not from a marked box. Pasted on the Hanley label, on the reverse of the tablet, is a worn, old label with the legend, '*Bulla* strait. Mscr.'. This label is not mentioned by Hanley. Presumably it was a part of a piece of paper in which the shells were once wrapped. The handwriting may be Solander's. The Systema [Naturae] mentions 'Logie,' which would certainly make *spelta* a Mediterranean species [Logies, see Dance 1967: 174]. The mature shell looks as though it is of a different provenance to the others and is, I believe, the *spelta* of authors. Hanley has separated this specimen from the others on the tablet, and has written against it, '? edit. 12 tantum.' There is much confusion over this species and it may be advisable to make this mature shell the lectotype of *spelta.*" Therefore, I hereby designate this mature shell the lectotype of the species.

In their listing of *Neosimnia spelta* (Linnaeus, 1758), Bucquoy, Dautzenberg, & Dollfus (1883), also listed the following "Variétés: var. ex forma 1, *obtusa* Sow. Variété très épaisse, plus courte que le type et avec le labre plus dilaté. Var. ex colore, *roseo-carnea* Monts. Ne diffère du type que par sa coloration qui est carnéolée."

177. *Neosimnia spelta sculptura* Cate, subspec. nov.

(Figure *205*: holotype)

Description, holotype: Shell of medium size, widely, obtusely ovate, sub-glossy; terminals sharply produced; dorsum transversely boldly sculptured with numerous incised striations throughout; base pointedly ovate, marked throughout with numerous transversely incised lines, except that a large portion is thinly layered with nacre, causing some obscuring of this sculpturing; rear base terminates in a diagonal funicular projection; aperture straight, fairly broad; columella very weakly depressed, fossula somewhat more so, because of adaxial longitudinal upraised thickened ridge; outer lip thick, rounded, unevenly smooth, narrowly shouldered above; color of holotype is ivory throughout (possibly due to age of specimen).

Measurements, holotype: L - 13.0; W - 6.7; H - 5.0 mm.

Type Locality: Sâo Thomé, West Africa (00°15′N; 06° 35′E).

Type: ANSP, No. 267832 [holotype].

Discussion: The shell was collected by the Congo Expedition, American Museum of Natural History, N.Y., 1915. The shell appears to be sub-fossil, which may explain the lack of distinctive shell color. One is reminded vaguely of the Mediterranean species *Neosimnia spelta* (Linnaeus, 1758), which it resembles somewhat in shell form. However, aside from geographic separation, it differs strikingly in the shell's dorsal characteristics, as well

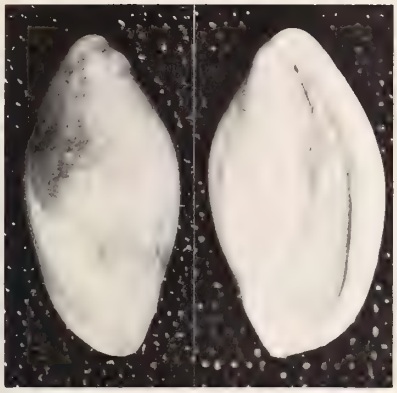


Figure *201*
Neosimnia spelta spelta (176)

Figure *201* a
Neosimnia spelta spelta (176)

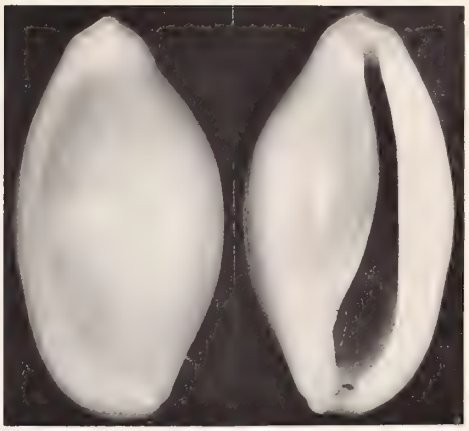


Figure *202*
Ovulum obtusum (176)

Figure *203*
Ovulum secale (176)

Figure *204*
Neosimnia illyrica (176)

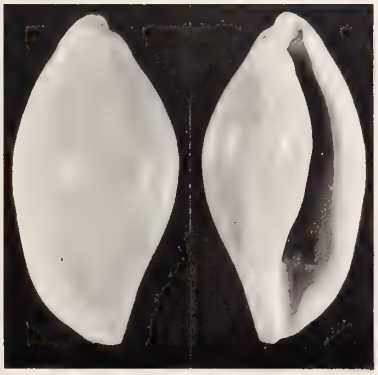


Figure *205*
Neosimnia spelta ***sculptura*** (177)

Figure *206*
Neosimnia spelta ***capitia*** (178)

Figure *207*
Neosimnia avena ***ruthturnerae*** (180)

as in other minor features. It would seem that this ovulid is more closely related to *N. spelta spelta* than to *N. spelta senegalensis* (Schilder, 1931), which I have elevated to full specific status elsewhere herein.

The new name is derived from the Latin word of the same spelling, meaning upraised work (dorsal lines).

178. *Neosimnia spelta capitia* Cate, subspec. nov.

(Figure *206*: holotype)

Description, holotype: Shell small, solid, elongately ovate, somewhat broad for its length; terminals produced, semi-pointed adapically, more obtuse in front; dorsum very finely, numerously transversely incisedly striate over all, and inflatedly humped centrally; base pointedly ovate, inflated, with a straight, acutely raised, longitudinal callus ridge the length of front half of base; a single funicular cord projection spirals up and left toward apex; columella rounded, striate; fossula long, narrow, depressed, and outlined adaxially with an upraised carinal wall; aperture of medium width, gently curving; outer lip smooth, thickly rounded, shouldered above; shell color rich rose, outer lip a lighter ivory-beige.

Measurements, holotype: L - 8.8; W - 4.1; H - 3.0 mm.

Type Locality: Off Sombrero Island, West Indies (18° 13′N; 63°00′W); [Sombrero Island is in Anegada Passage, between Anegada and Anguilla Island]. Holotype collected by Blake Expedition, 1877–78; in 128 m of water. Locality was verified by W. H. Dall.

Type: MCZ, No. 7353 [holotype].

Discussion: The main importance of this subspecies lies in its relative geographic isolation, as we know it at this time, the entire Atlantic Ocean separating it from the nominate species. Otherwise the shell differs from *Neosimnia spelta spelta* by being relatively very small; by having very fine, numerous dorsal striations; by the apparent lack of columellar depression, and by possessing a rich coloration, evidently lacking in *N. s. spelta.*

The name is derived from the Latin word *capitium,* meaning covering for the head (Sombrero Island gets its name from the Spanish word for hat).

179. *Neosimnia avena avena* (Sowerby 2nd, 1832)

(Figure *208*: lectotype)

1832 *Ovulum avena* Sowerby 2nd, Conch. Illust. London, *Ovulum*: fig. 59
1843 *Ovula hordacea* Kiener, Coq. Viv. 2: 16; plt. 6, figs. 6, 6a
1848 *Ovulum simile* Sowerby 2nd, Proc. Zool. Soc. London: 136 (Figure *209*: holotype)
1865 *Ovulum lividum* Reeve, Conch. Icon., *Ovulum*: plt. 14, fig. 63 (Figure 210: lectotype herein)
1881 *Ovula similis;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 209; plt. 53, figs. 1, 4
1885 *Ovula avena;* Tryon, Man. Conch. 7: 255; plt. 5, figs. 51 - 55
1885 *Ovula livida* = *O. uniplicata* Tryon, Man. Conch. 7: 255; plt. 5, fig. 47
1887 *Simnia avena;* Paetel, Cat. Conch. Samml. 1: 327
1887 *Birostra similis;* Paetel, Cat. Conch. Samml. 1: 327
1887 *Simnia livida;* Paetel, Cat. Conch. Samml. 1: 327
1941 *Pellasimnia similis;* Schilder, Arch. Molluskenk. 73 (2/3): 110
1956 *Neosimnia avena;* Allan, Cowries World Seas: 127; plt. 14, fig. 16

Description, holotype: *"Ovulum avena*—Shell oblong, red, extremities rather acuminated, back somewhat gibbous, very finely transversely striated; outer lip thickened, paler; aperture narrow, broader at the anterior [abapical], and notched at the posterior extremity; columella with a single plait [funiculum] posteriorly." (Sowerby 2nd, 1832: fig. 59).

Description, hypotype: Shell fairly small, ovate, subglossy, solid; terminals barely produced, crescent-like formed in back and open, almost pointed in front; dorsum centrally humped, tapering evenly to either end; numerously, finely transversely incisedly striate over all; base inflated, somewhat elongately ovate, striate, and with a lighter colored, upraised longitudinal thickening toward the front; a duplex bulbous funicular swelling on adapical base; aperture almost straight, flaring openly in front, narrowing to the back; columella evenly rounded, striate; fossula not depressed, formed only by an internal longitudinal carinal wall; outer lip broadly flattened ventrally, thick and shouldered above; there are no lip teeth; color dark rosy-mauve, with lip margins and terminal edges light brown; front base thickening and ventral lip surface are light beige; internal carinal wall almost white.

Measurements, holotype: "Length, 0.55, breadth 0.22."

Measurements, hypotype: L - 12.3; W - 5.7; H - 4.5 mm (C3810).

Type Locality: "Panama", here restricted to: Estero Soldado, Guaymas, Sonora, West Mexico (27°57′N; 110° 56′W) [approx.].

Type: BMNH, No. 1966365A [lectotype herein].

Distribution: From Guaymas, West Mexico, along west Mexican and Central American coasts south to Calito Mero, Peru; Chile; Galápagos Islands.

Discussion: Sowerby said the type was found at Conchagua in Mexico [this locality is located approximately 70 miles east-southeast of the city of San Salvador, El Salvador, Central America].

180. *Neosimnia avena ruthturnerae* Cate, subspec. nov.

(Figure *207*: holotype)

Description, holotype: Shell small, elongate, ovate, tapering evenly to either end, angularly crescent shaped at rear terminal outlet; terminals well developed, open at either end; dorsum evenly arched over all, very boldly transversely incisedly striate over all, with right side margin broadly formed, thick, longitudinally layered with growth lines; base long, narrow, smooth though faintly striate, visible through nacreous layer, convexly ovate, narrowing thickly to the front; funiculum on rear base fairly well developed; aperture almost straight, fairly wide; columella just barely flattened, weakly striate; fossula formed by elevation of internal carinal ridge; outer lip thick, rounded, smooth; dorsal color pinkish white, base, canals and interior of shell pinkish-beige.

Measurements, holotype: L - 7.4; W - 3.0; H - 2.4 mm.

Type Locality: Florida Keys; MCZ Hassler Expedition; 12 July 1872; (24°40′N; 81°10′W).

Type: MCZ, No. 48545 [holotype].

Discussion: This Caribbean ovulid seems most closely allied to the seemingly analogous Eastern Pacific *Neosimnia avena* (Sowerby 2nd, 1832), to which I assign it subspecifically; additional discovery and research may eventually prove it to be a distinct species. It differs from *N. avena avena* by being a consistently smaller form; by the crisper, larger, and heavier dorsal striae; by the better developed columellar area; and by the shell color, which appears to be constant in both subspecies, and, finally, geographical separation of the two taxa is well established.

181. *Neosimnia seminulum* (Sowerby 1st, 1828)

(Figure *211*: holotype)

1828 *Ovulum seminulum* Sowerby 1st, Zool. Journ. **4**: 157
1881 *Ovula seminulum*; Weinkauff, Mart. & Chem., Syst. Cab. 211; plt. 53, figs. 9, 12
1887 *Simnia seminulum;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Pellasimnia seminulum;* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia formicaria* Allan, Cowries World Seas: 127

Description, holotype: *"Ovulum seminulum*—O. testa oblonga, medio ventricosiuscula, carneo-rubescente; extremitatibus obtusis; labii externi margine rotundato, edentulo; labio columellari depresso." (Sowerby 1st, 1828: 157).

Description, hypotype: Shell medium sized, ovate, somewhat broad, flattened; terminals blunt, roundly produced; dorsum smooth, glossy throughout; base ovate, glossy, tapering and constricting to the front, with no terminal ridge present; funiculum very weakly formed; aperture narrow to the rear, becoming increasingly broad in front; outer lip and terminals glossy; outer lip thickened and without teeth; color delicate lavender, except that central dorsal area becomes pale grey-white; base, terminals and outer lip are white.

Measurements, holotype: "Long. 5/20, lat. 2/20, poll."

Measurements, hypotype: L - 13.1; W - 6.6; H - 5.3 mm (Figure *211*a: ANSP 39450).

Type Locality: "Friendly Islands" [Tonga]; here restricted to Port Curtis, Queensland, Australia (24°00′S; 151°26′E).

Type: BMNH, No. 1874.12.11.182 [holotype].

Distribution: Trial Bay; Moreton Bay; Lizard Island; and Port Denison (Bowen), Queensland, East Australia.

Discussion: It should be noted that the figured hypotype has only a hint of funicular development, while in other shells this area has been more fully developed. Viewing the ventral aspect of the shell, one gets the impression of flatness. Sowerby says of the species: "Shell one of the smallest species I have seen; a single specimen was preserved in Mr. G. Humphrey's collection, labelled 'Semicowry, Friendly Islands.' "

Phenacovolva Iredale, 1939

Type species: *Phenacovolva nectarea* Iredale, 1930 [OD]

Syn.: *Radius* Schumacher, 1817 [homonym]
Essai Nouv. Syst. Vers. Test., Copenhagen: 259
Type species: *Radius brevirostris* Schumacher, 1817 [M]

Shells in this genus are narrowly ovate centrally, with narrow lanceolate terminal processes at either end of shell.

Figure *208*
Neosimnia avena avena (179)

Figure *209*
Ovulum simile (179)

Figure *210*
Ovulum lividum (179)

Figure *211*
Neosimnia seminulum (181)

Figure *211* a
Neosimnia seminulum (181)

Figure *212*
Phenacovolva (Phenacovolva) rosea rosea (182)

Figure *212* a
Phenacovolva (Phenacovolva) rosea rosea (182)

Figure *213*
Phenacovolva (Phenacovolva) rosea nectarea (183)

Figure *213* a
Phenacovolva (Phenacovolva) rosea nectarea (183)

Figure *214*
Phenacovolva (Phenacovolva) rosea lahainaensis (184)

(Phenacovolva) Iredale, 1939

182. ***Phenacovolva (Phenacovolva) rosea rosea*** **(A. Adams, 1854)**

(Figures *212*a: original illustration; *212*C: hypotype)

1854 *Volva rosea* A. Adams, Proc. Zool. Soc. London: 130; plt. 28, fig. 9 (Figure *252*: original illustration)
1865 *Ovulum roseum*; Reeve, Conch. Icon., *Ovulum*: plt. 10, figs. 44a, 44b

1877 *Volva carpenteri* Dunker, Malak. Blätter **24**: 75 (DUNKER, 1882: plt. 13, figs. 1, 2)
1887 *Volva adamsi* Dunker, Malak. Blätter **24**: 75 (DUNKER, 1882: plt. 13, figs. 3, 4)
1885 *Ovula adamsii* Dunker = *O. angasi* Tryon, Man. Conch. **7**: 252; plt. 4, fig. 9
1885 *Ovula philippinarum* Tryon, Man. Conch. **7**: 252; plt. 4, fig. 2
1887 *Birostra philippinarum*; Paetel, Cat. Conch. Samml. **1**: 326
1887 *Birostra rosea*; Patel, Cat. Conch. Samml. **1**: 327
1899 *Radius (Ovula) adamsi*; Horst & Schepman, Cat. Syst. Moll. (2): 89
1941 *Pellasimnia carpenteri*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1941 *Volva (Phenacovolva) rosea*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Neosimnia lanceolata* Allan, Cowries World Seas: 127

Description, holotype: *"Volva rosea*—V. testa elongata, medio ventricosa, ad extremitates attenuata, coarctata, retiuscula, rosea, albo-varicosa, laevi, dorso fascia angusta, transversa, albida ornato, labio in medio ventricoso, ad extremitates subrecurvo, labro crasso, antice angulatim arcuato, ad canalem emarginato." (A. ADAMS, 1854: 130).

Description, hypotype: Shell fairly large, elongately ovate, strong, body whorl cylindrical; terminals narrowly attenuate, with minute transverse incised lines over both terminal extremities; central dorsum glossy, smooth, without sculpture; outer lip unevenly thickened, rounded, angled above, shouldered, and obscurely crenate within; aperture long, fairly wide; outer lip gently curving, but abruptly constricted abapically and angled adaxially; columella smoothly calloused, with a funicular welt at start of rear terminal channel, becoming obscurely crenate to the beak-end; color varies from pale rose, lavender, various hues of orange, orange-brown, to red-brown, with the right upper lip margin off-white.

Measurements, holotype: "Long. 35 mill. diam. maxima 7 mill."

Measurements, hypotype: L - 41.9; W - 10.7; H - 8.0mm (Figure *212*: C3587).

Type Locality: "China"; here restricted to Kii, Kii Channel, Japan (34°00'N; 134°48'E).

Type: Locality unknown; possibly the Berlin Museum, where many Dunker types are kept. (Humboldt Museum, East Berlin?).

Distribution: Tosa Bay; S Japan; Ryukyu Islands; Taiwan; Manila Bay, Philippines; Mainland coast of China; Sulu Archipelago, to NW Australia.

Discussion: This species is often mistaken for several other species, especially *Phenacovolva birostris* (Linnaeus, 1767) [= *P. philippinarum* (Sowerby 2nd, 1848]; however, it is quite distinct. It differs by being broader, more angular at both ends of the outer lip; by having a more distinctly developed funicular cord on the rear base; by having a more open, curving aperture, and by being generally a larger, more bulky shell. Of *Ovula rosea* A. ADAMS (1854) said: "Like *V. birostra,* but is more slender [= *brevirostris* of Schumacher, 1817], and more attenuated posteriorly, and wants the spiral fold [funiculum] on the hind part of the inner lip; the anterior beak is straight and not recurved, and the marginal varix of the outer lip is thinner." It would have been helpful if Adams had given the shell's dimensions, as his description is somewhat nebulous for comparative work. Dunker's synonymous *Volva adamsi* is described thus: "Testa angusta extensa utrinque sensim rostrata, nitida, rufescens vel alba, extremitatibus lineis transversis puncturatis sub vitre tantum conspicuis instructa; aperture rectiuscula angusta antice subdilatata utrinque subtruncata; labrum incrassatum laeve. Long. 20 mill. lat. vix 6 mill."

It seems appropriate here to point out a few details in the species complex of *Phenacovolva rosea rosea* (A. Adams, 1854), which includes *P. rosea nectarea* Iredale, 1930, *P. rosea lahainaensis* (Cate, 1969), and *P. birostris* (Linnaeus, 1767). It is apparent that these three forms have been the basis for much past misunderstanding. Part of this confusion has probably been brought about by the somewhat remarkable morphological variation to be observed in one of the subspecies, *P. rosea nectarea.* As its range extends into the Philippine ecological environment, it develops a tendency to lengthen both front and back terminal processes to the extent that they often become unusually lanceolate, even slightly recurved. It is important not to become confused by the unusual development of the shell's terminal beaks.

The Dunker and Iredale subspecies appear to be closely related, with size, color, and geography playing an important part in their sub-specific separation. *Phenacovolva rosea rosea* is almost always a much large shell form, living most abundantly in the northern waters of the Philippines, Taiwan, Ryukyu Islands, and Japan. *P. rosea nec-*

tarea is nearly always much smaller, narrower, ranging from the central Philippines south to about Moreton Bay, Queensland. Both of these subspecies have the typical narrow central transverse dorsal light color band of pale grey (sometimes this band is very faint). While *P. rosea rosea* can often be recognized by its large size, *P. rosea nectarea* and *P. birostris* are usually similar in size, smaller than *P. rosea rosea,* but they can be distinguished from one another quite readily: *P. birostris* appears to range from the central Philippines north to Japan; its most prominent difference is the absence of the transverse dorsal color band; the shell is usually of a constant (within a very minor range of color variation) brownish color; it is a noticeably narrower shell, with a very narrow, straight aperture, as well; and the outer lip, abapically, is far less constricted, leaving the front apertural opening narrower. *Phenacovolva rosea lahainaensis* is more of a geographical subspecies, although it possesses significant differences in its shell; it is very thinly formed, with a broader, shorter, more spindle-shaped outline, and it is a rich red-orange color. This subspecies seems to be confined to the Hawaiian Islands.

183. *Phenacovolva (Phenacovolva) rosea nectarea* Iredale, 1930

(Figure *213*: holotype)

1930 *Phenacovolva nectarea* Iredale, Queensld. Moll. Notes (2) **10** (1): 85; plt. 9, fig. 6
1941 *Volva (Phenacovolva) nectarea;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva (Phenacolepas) nectarea;* Allan [err.], Cowries World Seas: 134

Description, holotype: "Belonging to the *"birostris"* series but of different proportions. Shell elongate, swollen medially, extremities prolonged, mouth linear. Color pink, extremities brownish, a narrow white band around the middle. Sculpture consisting of fine striae showing in the adult on the ends only but covering the immature. The posterior canal is a little longer than the anterior and narrow; the anterior canal is also a little broader; the mouth is a little more open anteriorly though still narrow; the inner lip seen as a very fine glaze only with no posterior nodulation, and only a very slight swelling anteriorly. The columella shows a faint plication internally. The outer lip is thickened and rolled back and shows no internal noduling. *Prosimnia* [*Phenacovolva (Pellasimnia)*] *angasi* Reeve is much smaller, stouter, extremities shorter, outer lip more thickened, and carries a notable swelling medially on the inner lip." (IREDALE, 1930: 85.)

Description, hypotype: Shell of medium size, fairly lightweight, long, narrow, sub-ovate; terminals lanceolately attenuated, at times slightly reflected adapically, rather squarely open at the ends; dorsum smooth, glossy, except for widely spaced, transverse incised lines near both terminal beaks; base glossy, narrowly ovate, becoming very narrow and thick at either end; there may be a slight funicular swelling adapically; columella smooth, without depression; aperture narrows to the rear, open and wide to the front; outer lip rounded, thick at edge, abruptly constricted, angled in front, acutely shouldered above; there are no lip teeth; dorsal color caramel, red-brown, to pinkish white, with a narrow pale grey, transverse band across central surface; outer lip edge stark white; terminal beaks orange to orange-brown.

Measurements, holotype: L - 38.0 mm; W - 9.5 mm.

Measurements, hypotype: L - 22.2; W - 6.1; H - 4.7 mm (Figure *213*a: C3655).

Type Locality: "Queensland. Type dredged in 16 - 20 meters, Port Curtis."

Type: AM, No. C.57746 [holotype].

Distribution: from Keppel Bay south to Moreton Bay, Queensland; possibly as far south as Sydney, New South Wales; and north, restrictedly, into the Celebes and Sulu Seas.

Discussion: This subspecies appears to differ very little from *Phenacovolva rosea rosea* (Adams, 1854), except that the East Australian animal has a smaller, narrower shell, and appears to be restricted to Queensland waters and adjoining seas. The Iredale name is here tentatively retained to identify the animal living in the East Australian distributional range. The species varies in size; a paratype (C3896) has the following dimensions: L - 31.5; W - 13.2; H - 6.1 mm; Iredale's type is even larger.

184. *Phenacovolva (Phenacovolva) lahainaensis* (Cate, 1969)

(Figure *214*: holotype)

1969 *Volva (Phenacovolva) lahainaensis* Cate, The Veliger **11** (4): 365; plt. 56, fig. 2

Description, holotype: *"Volva (Phenacovolva) lahainaensis*—Shell narrow, elongately-ovate, subcylindrical, light in weight though strong; body whorl inflated, narrowing abruptly toward the terminals; dorsum transversely sculptured with faint, parallel, zigzag embossed lines

adapically and abapically, though lines do not zigzag anteriorly; terminals long narrow, pinched laterally, both in front and in back, more so in front; aperture narrow to the rear, widening, becoming openly constricted abapically; left margin rounded, not thickened, right margin on outer lip thickened, sharply, abruptly formed, creating a sharp angle with the body whorl, thus becoming keeled into a carina which extends entire length of outer lip; fossula primitively formed, subconcave, slightly more so centrally; columella smooth, glossy, with a bifid (almost trifid) first funiculum adapically; shell predominantly translucent orange in color, although the body whorl reflects an overtone of orange-grey; a distinct, deep, rich orange line encircles shell at the margins, broken only by terminal openings, on the right side enveloping the sharp marginal angle of the outer lip carina; without teeth, almost sharp, adaxial edge of outer lip is noticeably lighter in color in some specimens; interior of shell, fossula, columella, and interior of terminal channels rich orange color, funiculum a shade lighter." (CATE, 1969: 365).

Measurements, holotype: L - 31.2; W - 9.1; H - 7.3 mm.

Measurements, hypotype: L - 21.0; W - 7.1; H - 6.1 mm (C3804).

Type Locality: 58 m of water, off SW shore, Maui, Hawaii; "Lahaina Roads".

Type: BPBM, No. 217597 [holotype].

Discussion: This apparently geographically isolated, very deep water form appears to differ from the more western nominate species by having a very much thinner, translucent shell; by being more broad and blunt at the terminal ends, and by having a more rounded base. In Hawaii it lives apparently on black coral only.

185. *Phenacovolva (Phenacovolva) birostris* (Linnaeus, 1767)

(Figure *215*: lectotype)

1767 *Bulla birostris* Linnaeus, Syst. Nat. ed. 12, **1** (2): 1182, No. 371
1810 *Ovula birostris*; Lamarck, Ann. Mus. Hist. Nat. Paris, **16:** 113
1848 *Ovulum philippinarum* Sowerby 2nd, Proc. Zool. Soc. London: 136 (Figure *216*: C3657)
1856 *Ovulum birostris*; Hanley, Index Test.: 91
1859 *Birostra birostris*; Chenu, Man. Conch.: 273
1881 *Ovula philippinarum*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 199; plt. 51, figs. 1 - 4
1887 *Birostra philippinarum;* Paetel, Cat. Conch. Samml. **1:** 327
1941 *Volva (Phenacovolva) birostris;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1941 *Pellasimnia philippinarum = subreflexa;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva sowerbyana* Allan, Cowries World Seas: 132
1956 *Volva philippinarum;* Allan, Cowries World Seas: 133

Description, holotype: "*Bulla birostris* 371. B. testa birostri, margine extus incrassato, rostris elongatis laevibus. Testa similis B. Volvae, sed minor, magnitudine Fabae, angustior, laevis, incarnato-albida. Rostra aequalia, laevia, fere ventris testae longitudine, oblique truncata, altero parum adscendente. Margo extus longitudinalis incrassatus. Rima subaequalis, versus rostrum adscendens latior." (LINNAEUS, 1767: 1182, No. 371) (LISTER, 1757-72: plt. 711, fig. 66: "parva admodum tenuis, leviter purpurascens.")

Description, hypotype: Shell elongate, narrow, ovate, glossy; terminals attenuate, tapering lanceolately front and back; dorsum glossy, transversely incisedly striate at either end over terminal beaks, striation becoming obsolete or only very faintly so centrally; base long, narrow, ovate, with a very weak funicular elevation adapically, or the cord may be entirely absent; aperture narrow, widening to the front; columella roundly thickened, smooth, fossula faintly depressed; outer lip roundly thickened, with a faint crenulation and other irregular protrusions, and weakly shouldered above; dorsal color brownish-mauve to reddish-purple; outer lip, base, callus yellowish-beige, terminal canals are often orange.

Measurements, type: L - 28.5 mm.

Measurements, hypotype: L - 28.3; W - 6.9; H - 5.5 mm (Figure *215*a: C3657).

Type Locality: "Java"; here restricted to off Bataan, Manila Bay, Philippines (14°40′N; 120°25′E).

Type: LSL, No. 371 [lectotype].

Distribution: Philippines; Taiwan; Ryukyu Islands; and Japan.

Discussion: According to S. Peter Dance (personal communication): "*Bulla birostris.* Hanley [Sylvanus Charles Thorp (see DANCE 1966: 183)], has isolated two unmarked shells that he said came from the same box; he did not mention a marked box. Two species were present. One of these is *Ovulum longirostratum* Sowerby, as stated by Dodge [1959]. Dodge's sound argument that this is Linné's *birostris* is borne out by a study of the description. Hanley [see DANCE 1967A: 4] had already come to the same conclusion. The other specimen is the *Radius brevirostris* of Schumacher (1817: 259), and this is the

birostris of authors! It must keep Schumacher's name. The smaller shell in the box, the loose one, should be made lectotype of *birostris*. [I herewith designate this smaller specimen, No. 371, the lectotype of *birostris*—C. N. Cate.]. In the British Museum (Natural History) collection some specimens of *birostris* of authors (= *brevirostris* Schumacher) are labelled *spelta!* Both shells in the Linnaean collection are now yellowish-white in color." For an added evaluation of this species see SCHILDER (1966: 98). A syntype of *Ovulum philippinarum* Sowerby 2nd, 1848, is at BMNH, No. 1969133.

186. *Phenacovolva (Phenacovolva) tayloriana* (Azuma & Cate, 1971)

(Figure *217*: holotype)

1971: *Phenacovolva tayloriana* Azuma & Cate, The Veliger 13 (3): 265; fig. 10

Description, holotype: *"Phenacovolva tayloriana*—Shell small, long, narrow, thin, translucent; terminals thin, knife-like on edges, open, though blunt at ends, taperingly produced, narrowly so to the rear, square in front; dorsum sub-glossy, with fine, numerous transverse incised striae, which become almost obsolete centrally (except under a strong glass); base smooth, glossy, elongately ovate, narrowing considerably in front, with hardly any funicular swelling in back; columella smooth, glossy, rounded, without depression; fossula barely existent; aperture long, narrow, twisting, widening in front due to an acute angling of the outer lip; outer lip long, narrow, twisting, thick, rolled, smooth; dorsal color pale yellow-brown, darkening on the adapical terminal collar; terminal tips pale translucent grey; base and canals yellow-brown; outer lip off-white." (AZUMA & CATE, 1971: 265).

Measurements, holotype: L - 11.8; W - 3.2; H - 2.8 mm.

Measurements, hypotype: L - 17.7; W - 4.6; H - 3.8 mm (Figure *217*a: MA 15612).

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 55 m of water; leg. Azuma, 15 February 1970.

Type: MA, No. 1739A [holotype].

Discussion: This species, originally compared with *Phenacovolva improcera* Azuma & Cate, 1971, may be better compared with *Phenacovolva* (*Phenacovolva*) *recurva* (A. Adams & Reeve, 1848), but on close examination of their shells there may be seen a distinct difference in their general morphology. *Phenacovolva tayloriana* Azuma & Cate, 1971, differs by having less striation dorsally; by having an evenly rounded, more cylindrical body whorl, rather than sub-rhomboid, and angular centrally; by having less narrow, lanceolate, lengthened terminal processes; by the outer lip's being in different relationship to the base, and this species has a thinner, more translucent shell; color may be a deciding factor as well. It is the comparable acute constriction of the abapical outer lip that may bring about mistaking this for the Adams and Reeve species.

187. *Phenacovolva (Phenacovolva) recurva* (A. Adams & Reeve, 1848)

(Figure *218*: holotype)

1843 *Ovulum recurvum* A. Adams & Reeve, Voy. Samarang, Moll., London; *Ovulum*: 21; plt. 6, fig. 3
1859 *Birostra recurva*; Chenu, Man. Conch.: 173
1864 *Cyphoma elongatum* A. Adams, Proc. Linn. Soc. London **7**: 96
1881 *Ovula recurva*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 198; plt. 50, figs. 8, 10
1885 *Ovula (Cyphoma) elongata*; Tryon, Man. Conch. **7**: 256
1941 *Volva (Phenacovolva) recurva*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva recurva*; Allan, Cowries World Seas: 132
1971 *Volva longirostrata* Cernohorsky, Rec. Auckland Mus. **8**: 126

Description, holotype: *"Ovulum recurvum*—Ovul. testá elongatá, medio ventricosá, sub-angulatá; laevigatá, ad extremitates attenuatá, recurvá; labio externo crasso, anticè angulatim arcuato, ad extremitates truncato; labio in medio ventricoso, ad extremitates attenuato, recurvo." (A. ADAMS & REEVE, 1848: 21).

Description, hypotype: Shell fairly small, very narrow, oblong, lanceolate, sub-cylindrical, transparent (interior of shell clearly visible); terminals extended needle-like, abruptly truncate at either end; dorsum smooth, almost glossy, with only faint concentric striation emanating very restrictedly on each terminal beak, there is a hint of additional dorsal striation; base long, ovate, smooth, glossy with the same faint striation; no fossular cord on adapical base; columella slightly flattened, longitudinally ridged within; fossula only barely apparent; aperture long, narrow, undulating; outer lip hugging the curvature of the columellar base; constriction of outer lip opening up aperture in front; outer lip broad, curving inward, smooth, without crenulation; shell color glassy, transparent, with side margins, lip, and terminal ends off-white.

Figure *215*

Figure *215* a

Phenacovolva (Phenacovolva) birostris (185)

Figure *216*
Ovulum philippinarum (185)

Figure *217*

Figure *217* a

Phenacovolva (Phenacovolva) tayloriana (186)

Figure *218*
Phenacovolva (Phenacovolva) recurva (187)

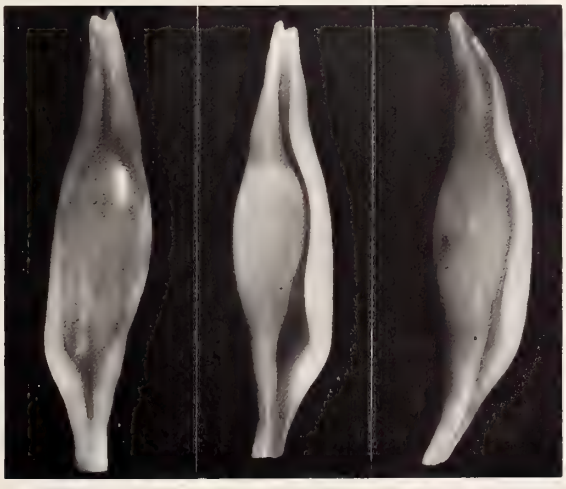


Figure *219*
Phenacovolva (Pellasimnia) ***parvita*** (188)

Figure *220*
Phenacovolva (Pellasimnia) angasi (189)

Measurements, holotype: approx. L - 22.0; W - 5.0 mm.

Type Locality: "China Seas".

Type: BMNH, No. 1879.2.26.149 [holotype].

Discussion: Of this species the authors said: "The canals are not so much attenuated as in *O. longirostrum* [sic], and the outer lip is more suddenly narrowed into the anterior canal. It is thick, and pressed closely against the body whorl at the upper part, so as to leave the aperture very narrow."

188. *Phenacovolva (Phenacovolva) parvita* Cate & Azuma, spec. nov.

(Figure *219*: holotype)

Description, holotype: Shell small, very narrowly, elongately recurved, lanceolate, body whorl thin, glassy-translucent; terminals long, narrow, needle-like, curving upward; dorsal area restricted by the approach, breadth, and position of comparatively broad side margins; dorsum exceedingly finely transversely striate; parallel, broadly thickened side margins cover a significantly large portion of upper shell surface, all of dorsal terminal beak surface, with only an incised mantle line separating right from left; terminal end roundly formed, with an arched opening adapically; base very narrow, smooth, glossy, and there is no funicular cord on inner rear lip; canals very long, almost tubular; columella faintly flattened, with only a faint carinal elevation in front to suggest a fossula; aperture long, tortuous, narrow, opening somewhat toward front canal due to constriction of outer lip; outer lip smooth, glossy, surface rounded, varying in width; color: a yellow line encircles the marginal suture above outer lip; a deep rosy blush over adapical terminal collar; base rosy beige; canals deep rose; side margins and terminal tips off-white.

Measurements, holotype: L - 10.7; W - 2.4; H - 2.0 mm.

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 30 - 40 m of water; leg. S. Habu, 7 January 1971.

Type: MA, No. D-1090 [holotype].

Discussion: This new species somewhat resembles *Phenacovolva recurva* (A. Adams & Reeve, 1848), but differs from it in many ways: it is a very much smaller form; it has a peculiar broadening, enveloping appearance of the side margins; it is somewhat more recurved adapically; and it is more numerously, finely striate over all. The name is derived from the Latin *parvitas,* meaning littleness, smallness.

(Pellasimnia) Iredale, 1931

Type species: *Ovulum angasi* Reeve, 1865 [OD]

Shells of this group are long, narrow, with ovate base, attenuating narrowly to either end; lanceolate, subsimniid in form, and with only a rudimentary funicular cord present at adapical base canal.

189. *Phenacovolva (Pellasimnia) angasi* (Reeve, 1865)

(Figure *220*: lectotype)

1865 *Ovulum angasi* Reeve, Conch. Icon., *Ovulum*: plt. 10, figs. 43a, 43b
1881 *Ovula angasi*; Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 199; plt. 51, figs. 5, 8
1885 *Ovula philippinarum*;Tryon, Man. Conch. 7: 252; plt. 4, figs. 3, 4
1887 *Birostra angasi*; Paetel, Cat. Conch. Samml. 1: 326
1935 *Pellasimnia angasi*; Iredale, Austral. Zool. 8 (2): 104
1956 *Neosimnia subreflexa* Allan, Cowries World Seas: 128

Description, holotype: *"Ovulum angasi*—Shell lanceolately ovate, rather compressed, ivory-white, shining, extremities blunt, lip and columella thickly callous, moderately sinuated at the lower part, aperture very narrow." (Reeve, 1865: plt. 10, fig. 43).

Description, hypotype: Shell fairly large, body whorl spindle-shaped, narrowly ovate, rather solidly formed, glossy-white, porcellaneous; terminals taper gradually to open-ended beaks at either end; dorsum smooth, glossy, glistening, with numerous extremely fine transverse incised striae throughout, except that striae become almost obsolete centrally, most prominent over terminal collars; base smooth, glossy, narrowly ovate, slightly constricted in front; columella smooth, narrow, flatly, shallowly depressed, with no fossular depression apparent; aperture almost straight, narrow, except that it flares somewhat openly in front due to constriction of outer lip; outer lip thickened, fairly broad, reflecting inward and downward, almost closing aperture; color shining, glistening white, interior a very pale pinkish-grey, with adapical canal a variable rose color.

Measurements, holotype: L - 19.0; W - 4.5 mm.

Measurements, hypotype: L - 32.0; W - 7.9; H - 6.4 mm. (Figure *220*a: C3681).

Type Locality: Port Curtis, Queensland, Australia.

Type: BMNH, No. 1969127 [syntype]. There are three shells in type lot.

Distribution: From Queensland, Australia, to Japan. Off Bolipongpong Island; Tapul Island, Philippines. Off the Kii Peninsula (Kii and Tosa), Japan (Figure *220*b: C2537).

Discussion: One should have little difficulty in identifying this species because of its characteristic, porcellaneous glossy white to pale beige colored shell. However, it should be mentioned that occasionally the terminal tips may be lightly colored with pale brown, particularly those taken off the Kii Peninsula, Japan, in lobster nets (leg. Azuma, 21 March 1970; 2 - 3km off Kirimesaki, Kii, in deep water). Reeve gave no dimensions for this species; those recorded here for the type are approximate, and appear to be uncommonly small for this species; all those that I have seen have been almost twice the size of Reeve's type.

190. *Phenacovolva (Pellasimnia) subreflexa* (A. Adams & Reeve, 1848)

(Figure *221*: lectotype)

1848 *Ovulum sub-reflexum* A. Adams & Reeve, Voy. Samarang, Moll., *Ovulum*, London: 20; plt. 6, fig. 10
1881 *Ovula subreflexa;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 201; plt. 51, figs. 9, 12
1885 *Ovula philippinarum* Tryon, Man. Conch. **7**: 252; plt. 4, figs. 6, 7
1887 *Birostra subreflexa;* Paetel, Cat. Conch. Samml. **1**: 327
1941 *Pellasimnia philippinarum;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Neosimnia subreflexa;* Allan, Cowries World Seas: 128
1971 *Phenacovolva kiiensis* Azuma & Cate, The Veliger **13** (3): 265; fig. 11

Description, holotype: *"Ovulum sub-reflexum*—Ovul. testá oblongá, albidá, laevigatá, sub-rostratá; dorso in medio sub-angulato; extremitatibus, sub-recurvis; aperturá angustá; canalibus sub-emarginatis; labio externo laevi, rotundato, supra medium sub-angulato, anticè sub-angulatim, arcuato; labio interne posticè tumido, ad canalem producto, recedente, intus longitudinaliter depresso, anticè ad canalem producto." "An oblong, smooth, white shell, with the extremities rather produced, blunt and turned upwards. The outer lip is smooth, round, flexuous." (A. Adams & Reeve, 1848: 20.) It should be added the dorsum is without striation; the columella is rounded, smooth, without depression; there is no funiculum adapically on the base; a faintly upraised adaxial ridge suggests a weak fossula; and the shell's color is a rich orange-beige dorsally, overlaid with a fairly broad, diffused yellow line the length of outer lip margin, which connects at either end with a line of small, solid, looping circles of yellow color over most of the central length of dorsum (all clearly visible under a microscope); base beige; funicular area and interior of shell deeper orange; outer lip edge stark white.

Measurements, holotype: Not recorded.

Measurements, *Phenacovolva kiiensis:* L - 20.9; W - 5.5; H - 4.4mm (MA 1737).

Type Locality: "Coast of Bilaton" [Billiton; Belitung; or Belitoeng: an island, Java Sea, off SE coast of Sumatra, Netherlands Indies].

Type: BMNH, No. 1910.31.312.313 [lectotype herein].

Distribution: Amirante Island (Indian Ocean, E of Tanganyika, SW of Seychelles Islands); Adams & Reeve Station E. 12, in 59m; East Africa and Japan.

Discussion: It is most unfortunate that the type photographs of this species arrived in the author's hands too late to forestall the publication of *Phenacovolva kiiensis* Azuma & Cate, 1971.

191. ***Phenacovolva (Pellasimnia) diantha*** Cate, spec. nov.

(Figure *222*: holotype)

Description, holotype: Shell small for the genus, long, narrow, lanceolate, gently reflexed at the terminals; terminals open ended, narrowly attenuate, bluntly sharp at ends, adapical terminal longer; dorsum almost smooth, shining, except for numerous, exceedingly fine longitudinal growth lines; numerous fine transverse striae emanate from either end of shell, with central dorsum a curious network of transverse and longitudinal lines (visible only under a microscope); base long, narrowly ovate, glossy, tapering gradually, narrowly to front and back; no terminal ridge, nor funicular swelling on rear base; columella smooth, without depression; fossula indicated only by elevation of an adaxial carinal hump; aperture straight, long, very narrow to the rear, becoming more open in front due to angular constriction of outer lip, narrowing of base; outer lip smooth, more or less straight though undulatingly thick; color pinkish-ivory, with a very pale pinkish tinge on dorsum, outer lip edge almost white.

Measurements, holotype: L - 22.6; W - 5.0; H - 4.3mm.

Type Locality: Off Kii, Japan (34°00'N; 134°48'E); in 37m of water.

Type: ANSP, No. 278056 [holotype].

Distribution: Appears limited to waters of Eastern Japan.

Figure 220 a

Figure 220 b

Phenacovolva (Pellasimnia) angasi (189)

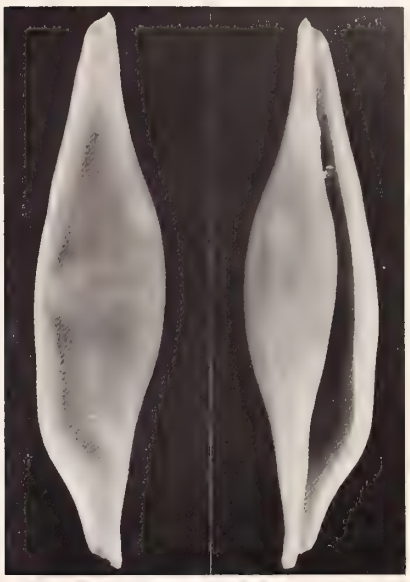


Figure 221

Phenacovolva (Pellasimnia) subreflexa (190)

Figure 221 a

Phenacovolva kiiensis (190)

Figure 222

Phenacovolva (Pellasimnia) ***diantha*** (191)

Figure 223

Phenacovolva (Pellasimnia) improcera (192)

Figure 223 a

Phenacovolva (Pellasimnia) improcera (192)

Figure 224

Phenacovolva (Pellasimnia) ***rehderi*** (193)

Figure 224 a

Phenacovolva (Pellasimnia) ***rehderi*** (193)

Discussion: This new species most closely resembles *Phenacovolva subreflexa* (A. Adams & Reeve, 1848) but differs from that species by being a somewhat longer, narrower shell; by a more acute reflexing of adapical terminal beak; by having the outer lip more acutely angular in back; by having longer, narrower, and reflexed terminal beaks; by being more angularly shouldered dorsally, and by having a colorful shell, rather than milk-white. The pinkish haze color of the shell suggests its name, which is derived from the Latin *dianthus,* meaning pink.

192. *Phenacovolva (Pellasimnia) improcera* (Azuma & Cate, 1971)

(Figure *223*: holotype)

1971 *Phenacovolva improcera* Azuma & Cate, The Veliger **13** (3): 265; fig. 12

Description, holotype: *"Phenacovolva improcera*—Shell small, long, narrow [thin], almost translucent, sub-glossy; terminals tapering, with angling edges, open ended; dorsum rounded, inflated centrally, with fine transverse incised striae over all; base smooth, long, narrowly ovate, constricted in front, with a very weak funicular thickening in back; columella broad, shallowly depressed, striate, with a very shallow fossular area in front; aperture long, very narrow, open in front; outer lip roundly smooth, with an undulating curvature; color milk-white over all, with a faint olive-brown darkening at the terminal tips." (Azuma & Cate, 1971: 265.)

Measurements, holotype: L - 11.7; W - 3.1; H - 2.6 mm.

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 55 - 91 m; leg. Azuma, 15 February 1970.

Type: MA, 1739B [holotype].

Distribution: Off Cape Deimen, Darwin, NW Australia; and Japan.

Discussion: The hypotype (Figure *223*a: C3752) from NW Australia measures: L - 18.3; W - 5.0; H - 4.1 mm.

193. *Phenacovolva (Pellasimnia) **rehderi*** Cate, spec. nov.

(Figure *224*: holotype)

Description, holotype: Shell fairly large, centrally broad, tapering acuminately to either end, thin, translucent; terminals narrowly extended; dorsum numerously transversely incised with striation extending over base onto columella, where the lines become very faint; base evenly ovate, without fossular or funicular character; aperture fairly broad, more so in front, curving; outer lip thin, though finely thickened and rounded along the edge, almost cord-like; color milk-white over all, except that terminal ends are pale orange-brown with a fine golden line the length of the shell at the right margin shoulder; interior pale lavender-mauve.

Measurements, holotype: L - 33.3; W - 9.5; H - 7.5 mm.

Type Locality: Off Kii, Japan (34°00′N; 134°48′E); in 27 m of water.

Type: USNM, No. 607171 [holotype].

Discussion: This new species appears to be unlike any other nearly related form in this genus, with shell morphology distinct enough to separate it from its nearest congener. It may, however, be compared with the following new species, *Phenacovolva* (*Pellasimnia*) ***clenchi*** Cate, spec. nov., from which it differs by being a larger shell form, with a different shell outline; by having a less angular curve of the outer lip; by being a thin, translucent shell; by possessing a different striate pattern on dorsum; by having its terminals less recurved; the aperture opening is likewise different; this species has color at the terminal tips and within the shell, and there is a golden line in the suture above the callus of the outer lip. I have named this species in honor of Dr. Harald Alfred Rehder, Senior Zoologist, Division of Mollusks, United States National Museum, Washington, D.C. The hypotype (Figure *224*a), MCZ 276102, from Tanabe Bay, Kii, Japan: L - 29.2; W - 9.2; H - 7.5 mm.

194. *Phenacovolva (Pellasimnia) **clenchi*** Cate, spec. nov.

(Figure *225*: holotype)

Description, holotype: Shell fairly small for the genus, sub-ovate, sub-cylindrical, attenuating gradually to either end; terminals tapering, narrow, bluntly pointed; dorsum very finely longitudinally striate, with widely spaced, distinct incised transverse lines throughout, striae becoming more frequent and diagonal over terminals; base elliptically ovate, long, tapering, narrow toward the front end, except that there are very weak successive spiral funicular cords at rear; columella without depression, but transversely striate; aperture curving, narrow to the rear, more open to the front; outer lip edge thickened, curving, angular, distinctly shouldered above, with exceedingly weak crenulation, almost smooth; color milk-white over all, with a very faint hint of yellow at abapical terminal edge.

Measurements, holotype: L - 19.2; W - 6.2; H - 4.7 mm.

Type Locality: United States Bureau of Fisheries Station 5335; in 84 m of water; Linapacan Strait, off Observatory Island, Palawan, Philippines (11°35′N; 119°50′E).

Type: USNM, No. 282618 [holotype].

Discussion: This new species may be most closely related to *Phenacovolva (Pellasimnia) **rehderi*** (herein) from Japan; however, it differs by having a smaller shell; by having bolder and more distinct dorsal and ventral striation; by being faintly recurved at both ends; by having a heavier, more angular, thicker outer lip construction, and by having a differently proportioned apertural area.

The species is named in honor of Dr. William James Clench, Professor Emeritus, Museum of Comparative Zoology, Harvard University.

195. *Phenacovolva (Pellasimnia) **nossibeensis***
Cate, spec. nov.

(Figure *226*: holotype)

Description, holotype: Shell inflatedly ovate centrally, with lanceolately tapering terminal processes; shell thin, transparent, delicate; terminals narrowly, evenly produced; dorsum smooth, glossy, except for numerous, very fine, longitudinal growth lines; dorsum numerously transversely incisedly striate throughout, becoming only lightly so centrally; striation over either terminal collar a checkered pattern, crossing growth lines; base narrowly ovate, striate, except for medial enlarged area; base tapers abruptly, narrowly to either beak; terminal ridge absent in front, funicular swelling absent in back; aperture fairly wide, almost straight; columella and fossula area not depressed; outer lip thin; color transparent milk-white.

Measurements, holotype: L - 15.5; W - 5.0; H - 4.1 mm.

Type Locality: Foster, Ostheimer, Buerk, Dodd Expedition Sta. H66. 7 miles W of Angorombala, SW Nossi Bé, NW Madagascar, Indian Ocean (13°15′S; 48°15′E); in 64 m, fine sand and mud; 22 September 1960.

Type: ANSP, No. 259661 [holotype].

Discussion: This new species has some of the shell characteristics of *Phenacovolva **rehderi*** Cate (herein) but differs from it by being much smaller; by having a thinner, more delicate shell; by having a comparatively larger, inflated base (body whorl), and by having none of the bright colors seen in *P. **rehderi***.

196. *Phenacovolva (Pellasimnia) **weaveri weaveri***
Cate, spec. nov.

(Figure *227*: holotype)

Description, holotype: Shell of medium size, narrowly, pointedly ovate, spindle-shaped; terminals taper evenly to fairly sharp, broad points; dorsum roundly, somewhat bulbously inflatedly ovate; transverse incised striae emanate very restrictedly at terminal collars, otherwise dorsum is smooth, except for fine longitudinal growth lines; base glossy, broadly, roundly inflated, almost constricted abapically, constricted adapically due to effect of a long, roughened, spiralling cord-like funiculum; aperture narrow, nearly straight, becoming broadly open in front due to acute angling of abapical outer lip; columella rounded, smooth, glossy, narrowing to the front, where a vestigial adaxial carinal ridge indicates presence of fossula; outer lip edge roundly thickened, acutely shouldered above; color orange-beige over very pale grey, with a wide transverse band of the lighter color over dorsum; superimposed on right side is a narrow lateral band of darker orange-brown, broken centrally, with right angles of same color outlining dorsal band of light grey; a bright orange line encircles shell at the side margins; terminal ends and terminal canals, bright orange.

Measurements, holotype: L - 22.0; W - 7.2; H - 6.0 mm.

Type Locality: Au Au Channel, Maui, Hawaii (20°55′N; 156°45′W); in 67 m of water, on brown coral; leg. M. King, Lahaina, Maui; January 1971.

Type: BPBM, No. 9735 [holotype].

Discussion: This new species may bring to mind the well known species *Phenacovolva* (*Pellasimnia*) *gracilis* (A. Adams & Reeve, 1848), due to the brown lateral markings. However, in *P. **weaveri*** the shell is much smaller and of a different outline; it is more roundly, bulbously inflated dorsally and on the base (not narrow and centrally angled); terminals are shorter, broader, tapering quickly, and they are not recurved, canals are shorter; aperture is broader, more constricted adapically, constriction due to a better developed, longer, spiralling, cord-like funiculum; and the base is much broader, without transverse angle centrally.

The name honors Clifton Stokes Weaver, Hawaii, who has contributed much to our knowledge of Hawaiian mollusca and worldwide Volutidae.

Figure 225
Phenacovolva (Pellasimnia)
clenchi (194)

Figure 226
Phenacovolva (Pellasimnia)
nossibeensis (195)

Figure 227
Phenacovolva (Pellasimnia)
weaveri weaveri (196)

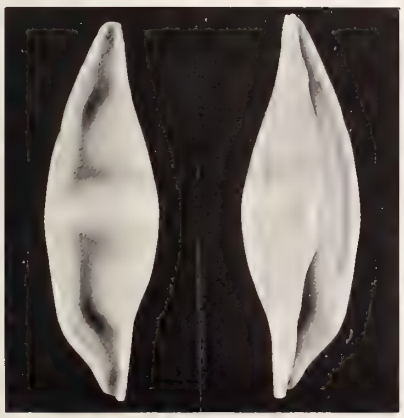


Figure 228
Phenacovolva (Pellasimnia)
weaveri pseudogracilis (197)

Figure 229
Phenacovolva (Pellasimnia)
gracilis (198)

Figure 229 a
Phenacovolva (Pellasimnia)
gracilis (198)

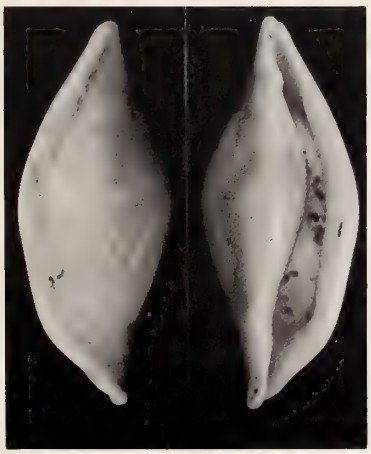


Figure 230
Phenacovolva ***(Turbovula)***
brevirostris (199)

Figure 230 a
Phenacovolva ***(Turbovula)***
brevirostris (199)

Figure 230 b
Phenacovolva ***(Turbovula)***
brevirostris (199)

197. ***Phenacovolva (Pellasimnia) weaveri pseudogracilis*** Cate & Azuma, subspec. nov.

(Figures *228*, *228*C: holotype)

Description, holotype: Shell of medium size, fairly narrow, elongate; terminals distinct, long, concavely tapering, almost pointed adapically, obtusely square in front; dorsum glossy, elongately ovate, roundly formed, angularly elevated centrally, with widely spaced, wavy transverse striae emanating from both terminal beaks, central dorsum smooth; base narrowly ovate, smooth, glossy, thinly coated with transparent callus, left side of base is defined with a dark orange line; base adaperturally straight in front, with a faint constriction of the inner canal lip in back; funiculum a longitudinal series of low knobs, two of which are fairly prominent; columella broad, mainly defined as a change of base color; fossula is only barely visible; aperture of medium breadth, though wider in front because of outer lip constriction; outer lip thickened, somewhat narrow, with a faint crenulation at the rear; color basically off-white, superimposed dorsally by a cover of light brown, interrupted centrally by a broad transverse band of bright greyish-white; superimposed on the right side is a longitudinal line of darker brown, which right-angles upward following either side of a transverse greyish-white band to dorsal summit; terminal tips dark orange-brown; a yellow-orange line fills the suture at the shoulder of the outer lip; base cloudy off-white.

Measurements, holotype: L - 19.5; W - 6.0; H - 6.0 mm.

Measurements, hypotype: L - 19.1; W - 5.8; H - 4.7 mm (C3888).

Type Locality: Off Tomida, Kii, Japan (34°00′N; 134° 48′E); in 40 - 50 m of water; leg. Azuma, 31 January 1971.

Type: MA, No. 15419 [holotype].

Discussion: This new subspecies, like *Phenacovolva weaveri weaveri* Cate, bears a superficial resemblance to *P. gracilis* (A. Adams & Reeve, 1848), but differs from both, while having more of the shell characters that would align it with the Hawaiian *P. weaveri weaveri,* with which I associate it subspecifically. It differs by being a narrower, more slender, more delicate shell, with slight recurving of the terminal extensions; by being a smaller form; by lacking a full development of the funiculum; by being more obviously angular dorsally and basally; by having a darker, red-brown shell color over all, rather than orange-beige, and by being geographically isolated.

198. ***Phenacovolva (Pellasimnia) gracilis*** (A. Adams & Reeve, 1848)

(Figures *229*: holotype; *229*C: C3904)

1848 *Ovulum gracile* A. Adams & Reeve, Voy. Samarang, Moll. *Ovulum,* London: 22; plt. 6, fig. 11
1859 *Birostra gracilis;* Chenu, Man. Conch.: 273
1881 *Ovula gracilis;* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 198; plt. 50, figs. 2, 9
1941 *Volva (Phenacovolva) gracilis;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva gracilis;* Allan, Cowries World Seas: 133

Description, holotype: "*Ovulum gracile*—Ovul. testá elongatá, fusiformi, minutissimè striatá, ad extremitates attenuatá, recurvá; labio externo laevi, sub-angulatim arcuato; labio interno laevi, in medio sub-ventricoso, ad extremitates attenuato, acuminato; colore pallidè fulvo, dorso prope margineum longitudinaliter rubro-fasciato. Fusiform, striated, more gradually ventricose in the center, and less attenuated at the canals than either *O. longirostratum* or *O. recurvum*. At the back, near the margin, is an irregular longitudinal band of dull red, interrupted in the center." (A. Adams & Reeve, 1848: 22.)

Description, hypotype: Shell fairly large, elongate, narrowly ovate, lightweight, nearly translucent; terminals long, attenuating evenly, then very narrowly to the ends; terminals slightly reflexed at either end; dorsum faintly glossy, transversely incisedly striate over all, restrictedly inflated centrally; base transversely striate, though somewhat covered and obscured with thin callus; base long, narrowly ovate, curving at front end; funiculum on rear base is a narrow, spiralling series of knobs or crenulations; aperture narrow, curving, opening up somewhat in front; posterior canal long; columella rounded adaxially, curving sharply longitudinally; fossula without special feature; outer lip edge smooth, narrow, convexly rolled, shouldered and sutured above; color white over all, with a fine orange line encircling periphery of shell, particularly prominent along suture of right lip shoulder, with two irregularly impressed, lateral, unevenly broad, abutted bands of purplish-grey parallel to and above right margin.

Measurements, holotype: L - 12.5; 3.0 mm (approx.).

Measurements, hypotype: L - 25.1; W - 6.2; H - 4.8 mm (Figure *229*a: C3904).

Type Locality: "East Coast of Borneo"; here restricted to 2 - 3 km, off Minabe, Kii Peninsula, Japan (34°00′N 134°48′E); in 40 - 50 m of water.

Type: BMNH, No. 1879.2.26.148 [holotype].

Distribution: Leyte Island, Carigara Bay (L - 34.0; W - 11.0; H - 9.0mm: V. Dan, Manila); off Zamboanga City, S Mindanao, Philippines; NE Borneo.

Discussion: The Adams & Reeve holotype measurements are not recorded by the authors. Schilder (personal communication) has a specimen in his collection (No. 4004) that is 28.9mm in length; a specimen in the Winckworth collection from Hendjam Island, Persian Gulf is 17.7mm; another specimen in Tomlin collection from Hendjam Island, with lateral side markings reduced to small spots near the extremities, measures 28.9mm.

(Turbovula) Cate, subgen. nov.

Type species: *Radius brevirostris* Schumacher, 1817

Shells are broad centrally, semi-cylindrical, tapering quickly to either end, pointed; and most of the species possess spindle-shaped shells. The name is derived from the Latin word *turbo,* meaning spindle, spindle-shaped.

199. ***Phenacovolva (Turbovula) brevirostris*** (Schumacher, 1817)

(Figure *230*: holotype)

1817 *Radius brevirostris* Schumacher, Essai Nouv. Syst. Vers. Test. Copenhagen: 259
1848 *Ovulum spelta* Sowerby 2nd, Thes. Conch., *Ovulum*: 480 [42]; plt. 100, figs. 63, 64
1865 *Ovulum spelta*; Reeve [err.], Conch. Icon., *Ovulum*: 7; plt. 10, figs. 42a, 42b
1881 *Ovula sowerbyana* Weinkauff, Mart. & Chem., Syst. Conch. Cab.: 202; plt. 51, figs. 10, 11
1885 *Ovula birostris* Tryon, Man. Conch. **7**: 253; plt. 5
1885 *Ovula spelta* Tryon, Man. Conch. **7**: 253; plt. 5, figs. 26, 27
1887 *Birostra birostra*; Paetel, Cat. Conch. Samml. **1**: 325
1887 *Simnia sowerbyana* Paetel, Cat. Conch. Samml. **1**: 327
1899 *Radius (Ovula) sowerbyana*; Horst & Schepman, Cat. Syst. Moll. (2): 189
1941 *Volva (Phenacovolva) sowerbyana*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1941 *Volva (Phenacovolva) brevirostris*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva brevirostris*; Allan, Cowries World Seas: 132

Description, holotype: *"Radius brevirostris*—Testa ovalis-oblonga, utrinque rostrata; rostris rectis acutis, canaliculatis. Apertura linearis, extremitate altera, subdilatata; labium externum repandum, crassiusculum, marginatum; labium internum, involutum, laeve." (SCHUMACHER, 1817: 259).

Description, hypotype: Shell broadly ovate, narrowed rather abruptly to a narrow beak at either end, solid, strong; dorsum glossy, smooth except for transverse incised concentric lines over either terminal collar; a few widely spaced, angled, upraised dorsal lines form broad transverse, flat surfaces across shell; terminals attenuated, narrow; aperture broadly open, curving; base glossy, bulbously ovate, with a very fine crenate area for a funiculum; outer lip thickly formed, edge rounded, rolled, straight centrally, angled adaxially at either end to short, sturdy terminal beaks; lip may be faintly crenate, shouldered above; color shades from rosy-beige to a light café-au-lait; a specimen from Fukien Prov., China is stark white (Figure *230*b: C2536); a wide central transverse band of white almost always crosses dorsum, extremities are orange (Figure *230*a: C3805).

Measurements, holotype: L - 17.2; W - 7.1; H - 5.4mm [holotype].

Measurements, hypotype: L - 31.5; W - 12.0; H - 9.0mm (C2793).

Type Locality: unknown; here designated, Bataan, Manila Bay, Philippines (14°40'N; 120°25'E).

Type: UZMC, Sch. 259 [holotype].

Distribution: Japan; Coast of Mainland China; Taiwan; Ryukyu Islands; Luzon to Mindanao, Philippines; Cook Islands, and Hawaii (off Maui) [see CATE 1969: 364; plt. 56, fig. 5].

Discussion: Schumacher added the following comment to his description of this species: *"Radius brevirostris.* Martin 1 Tab. 23, fig. 217. a. b. Knorr Vergen. 6 Tab. 20, fig. 5. Mr. Martin a decrit cette coquille comme une variété de la Navette a longs becs (*Bulla volva* Lin.); mais elle en est très differente, comme on n'en trouvé jamais d'une grandeur considérable, et les becs en sont toujours plus courts."

200. ***Phenacovolva (Turbovula) insculpta*** (Odhner, 1919)

(Figure *231*: holotype)

1919 *Ovula insculpta* Odhner, Ark. Zool. **12/6**: 37; plt. 3, fig. 34
1941 *Volva (Phenacovolva) insculpta*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva sowerbyana* Allan, Cowries World Seas: 132

Description, holotype: "Coquille ovale, aux extrémités également prolongées, assez gonflée au milieu. Surface polie, sculptée de fine lignes transversales, impressées et ponctuées à des intervalles réguliers (chaque intervalle a une largeur d'environ trois stries). Couleur claire rouge grisâtre, les extrémités et le labre extérieur blancs; une zone grisâtre transversant le milieu de la coquille. Bord extérieur épais, un peu réfléchi, presque lisse à l'intérieur, (de faibles traces de dents présentes) avec un sinus mince a l'extrémité inférieure. Columelle avec un pli supérieur et une impression flanquée d'un cal dans le bas. Ouverture étroite, élargie à l'inférieur, contractée près des canaux des deux extrémités." (Odhner, 1919: 37.)

Description, hypotype: Shell small, broadly ovate, boat-shaped, tapering to the terminals, which are somewhat short, blunt, less so adapically; dorsum glossy, with widely, evenly spaced, distinct, transverse incised striae over all, somewhat less distinct centrally; base ovate, narrowing to the front and back, with base faintly transversely lined, though half of base is thinly overlaid with thin callus; front terminal ridge almost absent; a smooth funicular cord spirals to the rear adapically; aperture wide, gently curving, flaring openly abapically due to constriction of outer lip; outer lip smoothly, roundly thickened; dorsal color deep rosy-mauve throughout, except that a broad grey-white color-band bisects the central dorsum, with lesser color bands across the terminal beaks; terminals, outer lip, and base are contrastingly whitish-beige, canals may be pale orange.

Measurements, holotype: "long. 16, larg. 7 mm."

Measurements, hypotype: L - 15.5; W - 6.8; H - 5.1 mm (Figure *231a*: C3796).

Type Locality: "Majunga" = [seaport town on Bombetoka Bay, NW coast of Madagascar, E Africa].

Type: UZMC, no number [holotype].

Distribution: Madagascar, E Africa to Goa, W coast of India (hypotype); and Cape Cormoin, S India.

Discussion: Although resembling the *Phenacovolva* (*Turbovula*) *sowerbyana* (Weinkauff, 1881) (= *P.* (*T.*) *brevirostris* (Schumacher, 1817)) in morphological outline, Odhner provided an adequate illustration for his species. Though it does resemble Weinkauff's species, it differs by being a considerably smaller form, and by having a constant different dorsal coloring and distributional pattern, as well. Odhner adds the comment: "Cette espèce ressemble par sa forme à l'*O. sowerbyana* Weinkauff (Tryon, Man. of Conch. 7, pl. 5, fig. 26, 27), mais elle est sculptée à la façon de l'*O. borbonica* Deshayes (1863, p. 136; pl. XIII, fig. 18–20), une espèce qui est, cependant, différente par sa taille plus petite et ses extrémités moins allongées."

201. ***Phenacovolva (Turbovula) fusula*** Cate & Azuma, spec. nov.

(Figure *232*: holotype)

Description, holotype: Shell small, narrowly ovate, thin, sub-translucent; terminals produced, somewhat narrowly attenuated; dorsum glossy, roundly inflated, with fine transverse incised striae emanating from above terminal beaks, striae becoming obscure and obsolete centrally; base narrowly ovate, spindle-shaped, with faintly incised striae over all; base narrows thickly and evenly straight to the front, with a single, well developed, spiral funicular cord on rear base; aperture narrow in back, wide and open in front; columella curving, convex, faintly striate, almost smooth, with a slight interior longitudinal ridge which elevates slightly to provide a weak fossula in front; outer lip edge thickened, cord-like, smooth, shouldered above; lip curves evenly from back to front, abruptly, sharply angling obliquely to abapical terminal; color basically greyish-white on dorsum and base, with two bands of rosy-mauve either side of a broad, central band of lighter basic color; two minor bands of greyish-white separate rosy-mauve color-bands from terminal beaks; terminal beaks are pinkish-beige; terminal tips are bright yellow; terminal canals are pale pink; outer lip edge is bright whitish-beige; and a golden line encircles shell at side margins.

Measurements, holotype: L - 13.1; W - 4.6; H - 3.5 mm.

Type Locality: 2 - 3 km off Minabe, Kii, Jajan (34°00'N; 134°48'E); in 40 - 50 m of water.

Type: MA, No. 14977 [holotype].

Discussion: This new species appears to be somewhat like the south Asian species, *Phenacovolva insculpta* (Odhner, 1919). It differs from it by having a more slender shell, being more fragile, with more narrowly attenuated terminal beaks; by being much less obviously striate on the central dorsum; and by having bright yellow terminal tips. The name is derived from the Latin word *fusulus*, meaning little spindle.

202. ***Phenacovolva (Turbovula) dancei*** Cate, spec. nov.

(Figure *233*: holotype)

---- *Volva brevirostris tomlini* Schilder [unpublished, label only] Nat. Mus. Wales, Cardiff, U. K.

Description, holotype: Shell of medium size, fairly thin, almost transparent, body whorl somewhat inflated; terminal beak extensions are slightly recurved, tapering to sharp points, especially in back; dorsum irregularly transversely incisedly striate over either terminal collar, central dorsum smooth, glossy; base is relatively small, sharply ovate, with no front terminal ridge; a roundly upraised cord callus spirals weakly to the rear; base evenly, undulatingly striate throughout; aperture wide, flaring openly in front; columella has only slight flattening of the adaxial base; fossular depression absent; outer lip thickened, sharply flattened, acutely angled in front, shouldered above; dorsal color with three bands of light brownish-mauve; terminal collars and beaks brilliant orange; intermediate section of outer lip off-white.

Measurements, holotype: L - 17.9; W - 5.0 mm.

Measurements, hypotype: L - 21.6; W - 6.5; H - 4.7 mm (Figure *233*a: ANSP 243105).

Type: NMW, No. 70.25. Z3 [holotype].

Type Locality: Singapore, Malaysia (1°14′N; 103°55′E).

Distribution: Southeast India; Malaysia; to northwest Australia (hypotype was collected 150 miles NW of Darwin, Northern Territory, Australia; living on *Pinctada maxima* (Jameson)); Manaba Beach, S Natal (NM) South Africa.

Discussion: The form of this new species recalls the more northern and eastern ranging *Phenacovolva* (*Calcaria*) *longirostrata* (Sowerby 1st, 1828), but it appears to differ by being a more fragile, smaller species; by having a shorter, broader, more compact, though centrally inflated body whorl; by having a three-banded dorsal color design; and by having shorter terminal beaks, both of approximately equal length and faintly recurved.

This new species is named in honor of Stanley Peter Dance, Assistant Keeper of Zoology, National Museum of Wales, Cardiff, U.K. Mr. Dance was the first to bring to my attention this unusual ovulid species, and furnished the photographs used here. He is also well known for his many valuable contributions to molluscan literature.

203. *Phenacovolva (Turbovula) hirasei* (Pilsbry, 1913)

(Figure *234*: GIY3791)

1913 *Ovula (Neosimnia) hirasei* Pilsbry, Nautilus **26:** 114; plt. 7, fig. 4
1941 *Pellasimnia hirasei;* Schilder, Arch. Molluskenk. **73**(2/3): 110
1956 *Neosimnia hirasei;* Allan, Cowries World Seas: 128

Description, holotype: *"Ovula (Neosimnia) hirasei*— The shell is fusiform, its greatest diameter contained 2.8 times in the length; thin, bluish white, the ends pale ochre colored for a distance of 4 or 5 mm.; glossy, under the lens showing distinct very fine longitudinal striation, and about 6 oblique, low, and well separated spiral cords at the lower end, one or two more than this at the summit. The rest of the surface has a microscopic spiral striation, so minute as to be hardly noticeable except under the compound microscope. The two ends are about equally produced, pointed. Outer lip thickened outside and within, retracted at both ends, very indistinctly angular near the lower end, columella straight and simple. Near the summit there is a low, indistinct spiral swelling very obliquely encircling the axis." (Pilsbry, 1913: 114.)

Measurements, holotype: "Length, 28.0; diam. 10 mm."

Measurements, hypotype: L - 23.9; W - 9.0; H - 6.9 mm (Figure *234*a: C3606).

Type Locality: "Province of Tosa, Japan, Y. Hirase."

Type: Location not known; Pilsbry may have returned the shell to the Hirase collection, Japan.

Distribution: Japan, south to Zamboanga City, S Mindanao (311 m, off Dapitan), Philippines.

Discussion: The species has a peculiar distinction about it that makes identification fairly easy. Dr. Pilsbry carefully pointed out, "……It is decidely more inflated than *O. carpenteri* Dkr. The axial fold [funiculum] above is quite weak in *O. hirasei,* and the [pellucid] coloration is characteristic."

204. *Phenacovolva (Turbovula) kashiwajimensis* Cate & Azuma, spec. nov.

(Figure *235*: holotype)

Description, holotype: Shell large, broad, spindle-shaped, transversely sub-angled and humped centrally; terminals taper evenly, sharply produced, obliquely truncate, square edged at ends; dorsum sub-glossy, with widely spaced transverse incised striae over all; base smooth, glossy, even though faint transverse striation is visible; a faint crenular, funicular cord is on inner lip of adapical canal; columellar fossular area smooth, rounded without indentation; aperture fairly broad, gently curving; outer lip smooth, glossy, roundly edged, constricted abapically; color milk-white over all, with red-brown terminal tips and beige terminal collars; a lemon-yellow line fills the outer lip shoulder suture.

Figure *231*
Phenacovolva (***Turbovula***)
insculpta (200)

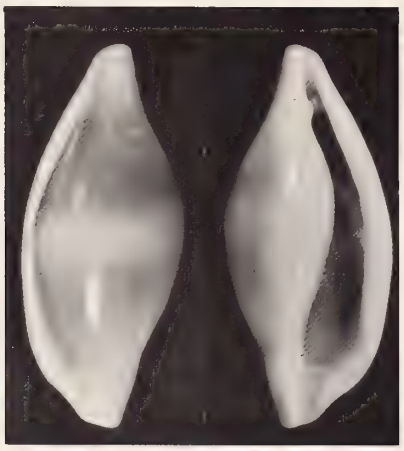


Figure *231* a
Phenacovolva (***Turbovula***)
insculpta (200)

Figure *232*
Phenacovolva (***Turbovula***)
fusula (201)

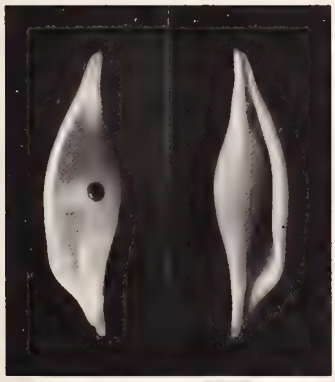


Figure *233*
Phenacovolva (***Turbovula***)
dancei (202)

Figure *233* a
Phenacovolva (***Turbovula***)
dancei (202)

Figure *234*
Phenacovolva (***Turbovula***)
hirasei (203)

Figure *234* a
Phenacovolva (***Turbovula***)
hirasei (203)

Figure *235*
Phenacovolva (***Turbovula***)
kashiwajimensis (204)

Figure *236*
Phenacovolva (***Turbovula***)
bartschi (205)

Measurements, holotype: L - 31.7; W - 9.7; H - 7.8 mm.

Measurements, paratype: L - 25.8; W - 8.2; H - 6.4 mm.

Type Locality: 2 km off Tomida, Kii Peninsula, Japan (34°00′N; 134°48′E); in 73 - 91 m.

Type: MA, No. 15420 [holotype].

Distribution: Off Kashiwajima, Tosa, Japan.

Discussion: This new species somewhat resembles *Phenacovolva hirasei* (Pilsbry, 1913) in outline, but differs greatly in other respects: by lacking the funicular development seen in *P. hirasei;* by being a much larger form; by being dorsally striate over all; by having a more thickly constructed shell, and by having more and darker colors.

The name is derived from the geographical area near where the holotype was collected.

205. ***Phenacovolva (Turbovula) bartschi*** **Cate, spec nov.**

(Figure *236*: holotype)

Description, holotype: Shell small, thin, translucent, angular, subovate, gently longitudinally reflexed; terminals pointed, canals open; dorsum very finely lined with longitudinal growth lines, with limited number of transverse incised striae over either terminal collar area; base inflated, smooth, glossy, ovate, tapering evenly front and back, with a spiralling funicular cord at rear; columella smooth, glossy, without depression; fossula a long, narrow, shallow groove; aperture fairly wide, curving, becoming open in front due to constriction of outer lip; outer lip roundly thickened, with vague crenular undulations on inner edge of outer lip; color ivory-white over all.

Measurements, holotype: L - 9.1; W - 4.3; H - 3.4 mm.

Type Locality: Johnson-Smithsonian Deep-Sea Expedition Sta. Records: West Indies Sta. 104 (collection "Tintag" No. 717); in 91 m, between N Lat. 18°30′40″, to 18° 30′10″, and W Long. 66°13′20″, to 66°13′50″, off the north coast of Puerto Rico.

Type: USNM, No. 492178 [holotype].

Discussion: This new species is named in honor of Dr. Paul Bartsch, who collected the shell while working on the E. R. Johnson yacht *CAROLINE,* 8 March 1963. This new species vaguely resembles *Phenacovolva hirasei* (Pilsbry, 1913), but differs from it by being much smaller; by having a relatively broader body whorl for the length of the shell; by having a thicker rolled outer lip edge, with an adjoining narrower aperture adapically, and by lacking the bright lemon-yellow coloring seen on the terminal beaks of *P. hirasei.*

206. ***Phenacovolva (Turbovula) honkakujiana*** **(Kuroda, 1928)**

(Figure *237*: holotype)

1928 *Radius honkakujiana* Kuroda, Venus **1** (1): 79; plt. 1 figs. 1, 2
1941 *Volva (Phenacovolva) honkakujiana;* Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Volva honkakujiana* (in index: *honkakeyiana* [err]); Allan, Cowries World Seas: 133

Description, holotype: *"Radius honkakujianus*—Shell large for a member of the group; lanceolate, thin and pellucid, dull cream or pale grey, shining, almost smooth, except for very fine, close incremental lines of growth. Limited in both rostrations there is a sculpture, consisting of oblique, delicate, linear striations, and about 11 on the anterior and 18 on the posterior part, the intervals between them are unequal and wider than the striations. Both extremities pointed into a simple and sharp rostration, which is not so long and slender as in *R. longirostratus;* gently reducing in thickness towards the terminal. Aperture as long as the shell length, narrow, with almost uniform width, dilated only a little at the lower part. Outer lip slightly expanded, peristome narrowly thickened on both sides, with a white callus, which disposition diminishes gradually towards the extremities. Both rostrations slightly recurved to the left, narrowly opened as a canal, facing to the right side. No callus on the parietal wall. Para-type a little slenderer shell with somewhat longer rostrations." (KURODA, 1928: 79).

Measurements, holotype: L - 54.0; W - 16.5 mm.

Measurements, paratype: L - 55.0; W - 15.5 mm.

Measurements, hypotype: L - 46.9; W - 13.8; H - 10.4 mm. (R. Kawamura, Tokyo).

Type Locality: "uncertain"; here designated Tanabe Bay, Kii, Japan.

Type: Holotype is located at the Honkaku-ji Temple, near Seto-Kanayama-Mura, Tanabe, Kii, Japan.

Discussion: According to Shikama, GIY, this species is "extremely rare" (personal communication). In commenting on it Kuroda said, "The above name is given to the two specimens, both type and paratype, which are in

possession of the Buddhist temple 'Honkaku-ji at Setokanayama-Mura, near Tanabe, Kii. The locality is uncertain, but I am sure that these specimens were secured from the sea not for [sic] from Tanabe Bay, Kii. This fine species is the biggest, as far as my knowledge goes, in the group, except the unique large *R. volva* (Linnaeus). It is easily distinguishable by its broader figure and shorter rostrations from *R. longirostratus* (Sowerby), which is probably the nearest ally. It is not to be compared with *R. roseus* (A. Adams), a narrower shell with a rich purplish scarlet color."

207. *Phenacovolva (Turbovula) acuminata* (A. Adams & Reeve, 1848)

(Figure *238*: holotype)

1848 *Ovulum acuminatum* A. Adams & Reeve, Voy. Samarang, Moll., *Ovulum*: 21; plt. 6, fig. 1
1859 *Ovula acuminata*; Sowerby 2nd, Index Brit. Shells: 21; plt. 20, fig. 3
1887 *Simnia acuminata*; Paetel, Cat. Conch. Samml. **1**: 327
1941 *Pellasimnia acuminata*; Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia acuminata*; Allan, Cowries World Seas: 127

Description, holotype: "*Ovulum acuminatum*—Ovul. testá subovali, in medio sub-ventricosá, ad extremitates sub-rostatá, laevi, albá, longitudinaliter fasciatá; dorso margine distincto; canalibus ad elevatis; labio externo crasso, laevi, ad extremitates recedent, anticè sub-angulato, ad canalem emarginato; labio interno tumido, intus unicarinato, posticè spiraliter uniplicato, ad canales retiusculo." (A. Adams & Reeve, 1848: 21.)

Description, holotype: "Shell is sub-ovate, somewhat inflated centrally, with limited striae over terminal beaks, otherwise dorsum is smooth, white, longitudinally banded with growth lines; dorsum distinctly margined at the side; terminal beaks elevated; outer lip thick, smooth, extremities drawn back [recurved], front sub-angled, canals without a border; columella swollen, carinate within, with a spiral funicular cord in back, canals are straight." (C. Cate translation.)

Measurements, holotype: L - 9.0; W - 3.0 mm (approx).

Type Locality: "The east coast of Bilaton." [Billiton (Belitung or Belitoeng) Island: in the Java Sea, off SE coast of Sumatra, Netherlands East Indies.]

Type: BMNH, No. 1879.2.26.178 [holotype].

Discussion: I have not seen a specimen of this species; however, Adams & Reeve remarked: "Differing from *O. secale* [= *Neosimnia spelta*] (Linnaeus, 1758) in being proportionately ventricose in the middle, and having the extremities turned upwards at the back."

(Calcaria) Cate, subgen. nov.

Type species: *Ovulum longirostratum* Sowerby 2nd, 1828

Shells are long, narrow; terminals are often lengthened, narrowly lanceolate, drawn out processes. The name for this new subgenus is derived from the Latin word, *calcar,* meaning a long spur, as suggested by the terminal projections in these shells.

208. *Phenacovolva (Calcaria) longirostrata* (Sowerby 1st, 1828)

(Figure *239*: lectotype)

1828 *Ovulum longirostratum* Sowerby 2nd, Zool. Journ. London **4**: 160
1843 *Ovula longirostrata*; Kiener, Icon. Coq. Viv., *Ovula* **2**: 25; plt. 5, fig. 5
1860 *Ovulum longirostrata*; Reeve, Elem. Conch. **1**: 36
1887 *Birostra longirostrata*; Paetel, Cat. Conch. Samml. **1**: 327
1899 *Radius (Ovula) longirostrata*; Horst & Schepman, Cat. Syst. Moll. (2): 189
1971 *Volva (Phenacovolva) longirostrata*; Cernohorsky, Rec. Auckland Inst. Mus. **8**: 126
1971 *Bulla birostris* Cernohorsky (*nom. dub.*), *Rec. Auckland* Inst. Mus. **8**: 126

Description, holotype: "*Ovulum longirostratum* — O. testá oblongá, tenui, albicante, utrinquè longirostratá; dorso sub-gibboso; aperturá angustá, prope basin paululùm expansá; labii externi margine exteriore subincrassato." "Shell oblong, slender, whitish, with a slight flesh-colored tint; the back is rather tumid, and both the terminal canals are very much elongated and sharply acuminated, like the long beak of some small birds; aperture narrow, slightly wider near the base; outer lip with its outer margin rather thickened; inner margin smooth. A most interesting, delicate, and slender species, of which I have only seen one specimen, brought from the Adriatic [err.] by the Rev. Dr. Goodall." (Sowerby 1st, 1828: 160.) It should be further added that the dorsum is very finely transversely incisedly striate over all, except that central dorsum may be without lines; base and body whorl are smooth, glossy, without terminal ridge or funicular thickening; columella and fossular impressions are absent, and color varies from a glossy, glistening white (Figure *239*a: GIY 3792) to yellowish; frequently brownish coloring on dorsal surface of beak ends.

Figure 237
*Phenacovolva (**Turbovula**) honkakujiana* (206)

Figure 238
*Phenacovolva (**Turbovula**) acuminata* (207)

Figure 239 b
*Phenacovolva (**Calcaria**) longirostrata* (208)

Figure 240
*Phenacovolva (**Calcaria**) wakayamaensis* (209)

Figure 239 a
*Phenacovolva (**Calcaria**) longirostrata* (208)

Figure 239
*Phenacovolva (**Calcaria**) longirostrata* (208)

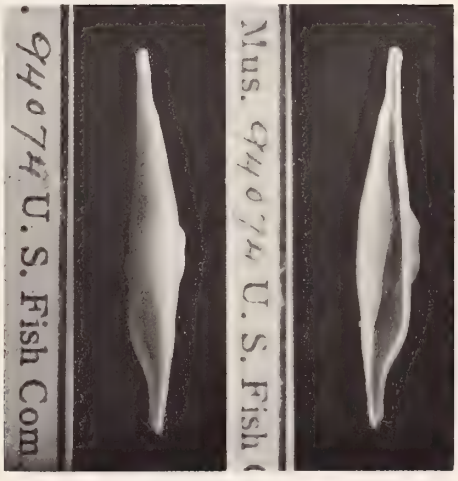


Figure 241
*Phenacovolva (**Calcaria**) piragua* (210)

Figure 242
*Phenacovolva (**Calcaria**) tokioi* (211)

Measurements, holotype: "long. 2 5/10, lat. 4/10, poll." (L - 64.2; W - 11.2 mm).

Measurements, hypotype: L - 69.6; W - 13.5; H - 10.0 mm (Figure *239*a: GIY 3792).

Measurements, hypotype: L - 49.2; W - 7.3; H - 5.7 mm (Figure *239*b: C3793).

Type Locality: "Isl. of Bourbon" [= Reunion; possible loc. err]. Type locality here designated: off Kashiwajima Island, Kii, Japan (34°00'N; 134°48'E;); in 91 - 128 m (C3792: Shikama, GIY).

Type: NMW, without number [lectotype].

Distribution: Off Kii Peninsula, Japan: Minabe, 37 - 73 m; off Mio, Kii, in 37 - 55 m (MA 15069); Tosa Bay, at 146 m (MA 1258).

Discussion: The type specimen figured herein is thought to be the specimen figured by Reeve (1865; plt. 9, figs. 40a–b–c); the shell is *ex.* Thomas Lombe Taylor (1802–1874); *ex.* James Cosmo Melvill coll. (1845–1929); *ex.* John le Brocton Tomlin col. (1864–1954). It would seem that Reeve erroneously cited the locality for the species as "Adriatic Sea"; this species is not presently known to live in the Mediterranean Sea. The Sowerby type locality, Isl. of Bourbon, now known as Reunion Island, 400 miles east of Madagascar, Indian Ocean, also appears to be an unknown locality for these animals at the present time. Shell measurements are calculated from tips of shell, rather than from following curvature of shell. The easiest way to separate this species from all the other species in the genus is by the even length of both terminal processes, and by the finer, more abundant dorsal striation. Presently confirmed knowledge of this species appears to limit it to Japanese waters. The following new species seems to have been lumped together with this Sowerby species, thus making it appear to have a much wider distributional range than is the case.

209. *Phenacovolva (Calcaria) wakayamaensis* Cate & Azuma, spec. nov.

(Figure *240*: holotype)

Description, holotype: Shell long, cylindrical though delicately proportioned, narrow, thin, with noticeably translucent body whorl; terminals very long, very narrow, needle-like, rostrate, not recurved; dorsum glossy though longitudinally uneven due to numerous exceedingly fine growth lines; there are no concentric nor transverse dorsal striae; base very long, smooth, glossy, very narrowly elongately ovate; no funicular cording on adapical base, nor terminal ridge in front; columella evenly rounded, without depression or internal carina; aperture evenly narrow, almost straight, broader in front due to constriction of outer lip; both canals of nearly even length, almost tubular, glossy within, very long and narrow, open at ends; outer lip very gently curving, constricted abapically, lip edge very finely corded, edentulate, with comparatively broad side margins just barely shouldered above; body-whorl color glassy-grey, with long terminal beaks rosy-beige to a dark brown, the latter color more intense in front; base and outer lip off-white, with less translucent columella color same as that of outer lip edge; interior of long canals deep orange.

Measurements, holotype: L - 61.1; W - 7.7; H - 6.0 mm.

Measurements, paratype: L - 36.8; W - 5.7; H - 4.7 mm (no. 1).

Type Locality: Off Minabe (2 - 3 km), Kii Peninsula, Japan (34°00'N; 134°48'E); in 37 - 55 m.

Type: MA, No. 14846 [holotype].

Discussion: This new species can be compared with *Phenacovolva* (***Calcaria***) *longirostrata* (Sowerby 1st, 1828). It seems to differ, however, from it by having a generally different appearance; by having longitudinally aligned terminal beaks, not recurving; by lacking the concentric dorsal striation at either end, which is especially prominent on the Sowerby species; by having a thinner, noticeably translucent body whorl; by having a longer, narrower body whorl, and by having a more delicate, thread-like thickening of the outer lip edge.

The name is derived from the area off which these animals were dredged.

210. *Phenacovolva (Calcaria) piragua* (Dall, 1889)

(Figure *241*: holotype)

1889 *Simnia piragua* Dall, Bull. Mus. Comp. Zool., Harvard, Blake Reprt. 18 (21), prt. 2: 235
1932 *Neosimnia piragua;* Schilder, Proc. Malacol. Soc. London 20 (1): 55

Description, holotype: *"Simnia piragua*—Shell remarkably slender, narrow and long, tapering regularly toward the posterior end from a point about one third of the length behind the anterior end. Viewed from above the left profile is gently arched like a bow, on the right there is a shallow emargination behind the end of the canal, and the rest of the right hand profile is almost in a straight line. The back is pale coffee-brown, the lips and slightly thickened margin white. Below, the aperture is seen to

be very narrow except for a short space anteriorly, behind the above mentioned emargination. There is a slight callus on the body whorl; the columella, if any may be so called, is tinged with rose-pink. Both ends of the shell are slightly recurved; the surface is marked only with lines of growth, and a very faint few spiral striae towards the ends. The extreme anterior end of the canal is sharp-edged, the rest is thickened but not reflected." (DALL, 1889: 235)

Measurements, holotype: L - 23.5; W - 3.4; H - 2.6 mm.

Type Locality: U. S. Fisheries Station 2138, at 42 m; between Jamaica and Haiti, West Indies.

Type: USNM, No. 94074 [holotype].

Discussion: The animal had been living on gorgonian coral, and Dall further remarked that the dried animal, seen still remaining in the shell, gave the impression of being nearly black in life. As may be observed, this geographically isolated species is similar in some respects to *Phenacovolva* (*Calcaria*) *tokioi* (herein), and may eventually be considered subspecific to it.

211. *Phenacovolva (Calcaria) tokioi* Cate, spec. nov.

(Figures *242*: holotype; *242*C: hypotype)

Description, holotype: Shell elongate, narrow, strong; dorsum spirally striate over terminals, with central area mostly smooth, unlined and glossy; terminals vary in length, usually long, lanceolate to the rear, with front terminal processes broader at the base, shorter in length, body whorl and terminal beaks usually in a straight line, recurving only slightly in some shells from the central Philippines; base short, very narrow, glossy, without either front terminal ridge or rear funicular swelling; central aperture of medium breadth, becoming acutely broader in front because of angular constriction of outer lip; terminal beak canals open, very narrow; outer lip roundly thickened from tip to tip, cord-like and barely angled above at shoulder; columella-fossula area evenly smooth; shell color varies from beige-white to dull rosy-red, usually with a dull grey band traversing dorsum centrally; shell interior reflects the exterior color, with terminal canals usually orange within; outer lip edge off-white.

Measurements, holotype: L - 39.2; W - 7.3; H - 5.3 mm.

Type Locality: Cooktown, Queensland, Australia (15° 38′S; 145°25′E); below tide line living on gorgonians.

Type: (*ex* C2556): LACM No. 1190 [holotype].

Distribution: Queensland coast, Australia; East Indies Generally; Bataan, Manila Bay, Philippines; Ryukyu Islands.

Discussion: This species somewhat resembles the preceding species, *Phenacovolva* (*Calcaria*) *piragua* (Dall, 1889), but differs from it by being much larger; by having a narrower, longer body whorl and a narrower base; by having an overall different shell outline, and by lacking the transverse band of color over central dorsum.

I take pleasure in naming this species in honor of Dr. Tokio Shikama, Geological Institute, Yokohama, Japan, who kindly assisted me in many ways with the present work.

212. *Phenacovolva (Calcaria) yoshioi* (Azuma & Cate, 1971)

(Figure *243*: holotype)

1971 *Phenacovolva yoshioi* Azuma & Cate, The Veliger **13** (3) : 266; fig. 13

Description, holotype: *"Phenacovolva yoshioi*—Shell fairly large, long, narrow, lanceolate, solid; terminals long, attenuate, narrow, especially in back where they become blunt-ended; dorsum glossy, roundly, evenly humped, broadening noticeably centrally, and numerously transversely incisedly striate over all; base long, narrow, tapering to either end with a curious sharply angled outer edge centrally, which becomes the summit of a longitudinal base ridge; base slopes flatly, angling sharply downward and inward to a long low, adaxial carinal ridge; there is no funicular process [on rear base]; columella long, narrow, without special character except that it deepens weakly to form a fossula; aperture long, very narrow, widening in front due to constriction of base and lip; outer lip long, narrow, roundly thickened, smooth; color milk-white, with a broad, distinct lemon-yellow line on the dorsal periphery of the sides and terminals, below which it darkens to a pale butter-yellow; ventral terminal beaks milk-white; base and outer lip of different intensities of yellow; columella lemon yellow to brownish the length of the adaxial carinal ridge; carinal ridge stark white." (AZUMA & CATE, 1971: 266).

Measurements, holotype: L - 29.7; W - 4.8; H - 3.8 mm.

Type Locality: 2 - 3 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); in 37 - 55 m; leg. Yoshio Azuma, 15 February, 1970.

Type: MA, No. 1750 [holotype].

213. *Phenacovolva (Calcaria) gracillima* (E. A. Smith, 1901)

(Figure *244*: holotype)

1901 *Radius gracillimus* E. A. Smith, Journ. Conch., London **10**: 107; plt. 1, figs. 20, 21
1941 *Pellasimnia gracillima*; Schilder, Arch. Molluskenk. **73** (2/3): 110
1956 *Neosimnia gracillima*; Allan, Cowries World Seas: 127

Description, holotype: *"Radius gracillimus*—Testa gracilis, utrinque attenuata, supra pallide carnea, infra flava, transversim tenuissime striata, lineisque incrementi decussata; extremitates callo conspicuo supra terminatae; apertura undulata, linearis, antice paulo latior; labrum intus reflexum, flavum, extus callo lato minute corrugato dilute carneo linea flava marginato instructum; labium callo flavo in medio crasso indutum." (E. A. Smith, 1901: 107.) A free translation: "Shell slender, both ends attenuate, very pale flesh-color [pink] dorsally, yellowish ventrally, thin [fine] transverse striation, incremental lines crossing same; extremities conspicuously thickened above; aperture undulating, open in front; lip reflexed within, yellow, side fold narrow and thick, with a faint yellow-pink line at margin; calloused lip enveloped in yellow centrally."

Measurements, holotype: L - 31.0; W - 4.5 mm.

Type Locality: "Hab., from stomach of a fish caught in 73 meters, ten miles from Durban (Quekett)" [South Africa].

Type: BMNH, No. 1902.5.18.5 [holotype]; (Figure *244*a: orig. illustr.).

Discussion: Smith remarks, "Remarkable for its very slender form, being even narrower than *R.* (*Radius*) *philippinarum* Sowb. or *R. lanceolatus* Sowb. It differs from the latter in being more produced at both ends, and in being smoother. The striae in *lanceolatus* are stronger and punctate, a feature not noticed by the monographers."

Volva Röding 1798

Type species: *Bulla volva* Linnaeus, 1758 [TT]

Syn.: *Radius* Montfort, 1810
Conchyl. Syst., Paris **2**: 627
Type species: *Bulla volva* Linnaeus, 1758 [OD]
: *Birostra* Swainson, 1840
Treat. Malac. *in*: Lardner's Encyclop., London: 325
Type species: *Bulla volva* Linnaeus, 1758 [M]

The shells of this genus have large, sub-globular body whorls, with accompanying long, exceedingly lanceolate, sub-cylindrical, fairly open terminal beak projections, approximately of the same length, emanating from front and back of the shell.

214. *Volva volva volva* (Linnaeus, 1758)

(Figure *245*: holotype)

1758 *Bulla volva* Linnaeus, 1758, Syst. Nat. ed. 10: 725
1798 *Ovula textoria* Röding, Mus. Bolt., Hamburg: 222
1810 *Ovula volva*; Lamarck, Ann. Mus. Hist. Nat., Paris **16**: 113
1811 *Ovula aspera* Perry, Conchology: plt. 53, fig. 3
1840 *Birostra volva*; Swainson, Treat. Malacol.: 326
1842 *Ovulum volva*; Sowerby 2nd, Conch. Man., ed. 4: 226
1899 *Radius (Ovula) volva*; Horst & Schepman, Cat. Syst. Moll. (2): 189
1931 *Volva volva cumulata* Iredale, Rec. Austral. Mus. Sydney, **18**: 222 (Figure *246*: holotype)
1931 *Radius volva*; Thiele, Handb. Syst. Weichtierk.: 271
1941 *Volva lemurica* Schilder, Arch. Molluskenk. **73** (2/3): 110

Description, holotype: *"Bulla volva*—B. testa birostri, rostris elongatis striatis, acutis." (Linnaeus, 1758: 725)

Description, hypotype: Shell large, elongate, centrally ovate, bulbously enlarged, inflated; dorsum smooth, glossy, with 2 or 3 widely spaced, upraised, transverse angular ridges, at least one extending onto base; dorsum smooth, without striation; terminals long (approx. 30 mm), often gently recurved, narrow, elongately, lanceolately beaked, with numerous diagonally incised, transverse lineal lines and ridges, not extending onto dorsum; base inflated, without columellar depression or fossula groove; aperture broad, terminal canals very narrow; outer lip edge thick, rounded, sub-crenate, not shouldered above; color pale flesh to ivory, with lip somewhat darker at times.

Measurements, type: L - 57.0 mm.

Measurements, hypotype: L - 97.2; W - 25.1; H - 18.8 mm (Figure *245*a: C3566).

Type Locality: Jamaica (err.) here designated as deep water off Cape Moreton, Moreton Bay, Queensland, Australia (27°12′S; 153°12′E).

Type: LSL, No. 328 [holotype].

Distribution: Northern New South Wales; Queensland coast north to Thursday Island; throughout the East Indies; Sulu Sea; Philippines; Central Pacific Island to Fiji.

Discussion: Iredale's type of *Volva volva cumulata* (Figure *246*) was collected in Sydney Harbor (Austral. Mus. No. C 60667) with a type locality Southport, where it was trawled. The absence of dorsal striation, among other

facts, seems to identify the Iredale species with that of Linnaeus.

215. *Volva volva habei* Oyama, 1961

(Figure *247*: C3567)

1830 *Ovulum volva* Sowerby 1st, Spec. Conchyl., *Ovulum* **1** (1): 9; figs. 56, 57
1843 *Ovula volva*; Kiener, Icon. Coq. Viv., *Ovula*: 26; plt. 4, fig. 1
1961 *Volva volva habei* Oyama, Venus **21**: 288; figs. 3, 4

Description, holotype: *"Volva volva habei*—Shell long, pinkish, terminals extended same as in *Volva volva* (Linnaeus); dorsum smooth in the latter, striate in *Volva volva habei."* (Oyama, 1961: 288)

Measurements, holotype: L - 94.8; W - 26.6 mm.

Measurements, hypotype: L - 86.4; W - 25.3; H - 19.5 mm (Figure *247:* C3567).

Type Locality: Sagami Bay, Japan.

Type: NSMT, [holotype unavailable; in private Japanese collection].

Distribution: Chiba-choshi; Kochi; Wakayama; Kii; to Taiwan.

Discussion: The original description, in Japanese, is brief; a free translation is recorded here. Normally, the shell description of this subspecies follows that of the species in the strict sense, except that it differs noticeably by having transverse incised dorsal striations on the inflated body whorl, where it is missing from the nominate species. Furthermore, the Japanese shells also display a tendency to be more colorful, reddish-pink at times, especially along the marginal callus. The Japanese subspecies appears to lose its morphological identity south of Taiwan.

Habe (1968: 55) says this about the Japanese shell, "Shell with long and narrow projection anteriorly and posteriorly; involute. Animal covering shell is pinkish with many black spots. *Volva volva* (L.) has longer projection, with pinkish staining on its terminal ends, and is distributed in the tropical Pacific south of Shikoku [Japan]. This subspecies is not colored on its terminal ends, it has an aperture which becomes wider anteriorly, and lives commonly on fine sand at 10 - 50 meters depth; it is well like *V. volva cumulata* Iredale, of N. Australia."

It is interesting to note that the illustrations of Sowerby 1st (1830: fig. 56, 57) of Kiener (1843: plt. 4, fig. 1), Sowerby 2nd (1848; plt. 99, figs. 6–8), and Reeve (1865: plt. 9, figs. 41a–41b all appear to be representations of *Volva volva habei,* their artists apparently having worked from Japanese shells. Authors seem not to have examined enough specimens having good locality data to note the differences in these shells, although both Sowerby 2nd and Reeve noticed that there were two 'varieties.' Linnaeus very pointedly excluded dorsal striation on the body whorl, mentioning only "rostris elongatis striatus" [beaks elongate striate].

216. *Volva volva striata* (Lamarck, 1810)

(Figure *248*: C3870)

1810 *Ovula striata* Lamarck, Ann. Mus. Hist. Nat. Paris **16**: 113 (12.B)

Description, holotype: *"Ovula striata*—O. utrinque rostrata; dorso tumido; rostris praelongis cylindraceis. Eadem albido rosea, transversim striata." (Lamarck, 1810: 113, 12.B)

Description, hypotype: Shell comparatively small for the species s.s., lightweight in form, opaquely translucent; terminal beaks relatively short, though lanceolately extended; canals long, narrow, deeply channeled; dorsum and terminal beaks widely, transversely, incisedly striate, with faint longitudinal growth lines contributing a dullness to normal gloss; base inflated, roundly ovate, subglossy, with dorsal striae prominent across base to columella; columella barely thickened, roundly curved, otherwise without depression; aperture curving, broadly open, more so at squaring of outer lip abapically; lip edge thickened, finely rounded, corded at edge, with a narrow, smooth, nacreous band above lip on right side margin; color pale ivory-beige over all, except that interior is pale orange to orange-brown.

Measurements, holotype: "Length, 8 cm."

Measurements, topotype: L - 51.8; W - 17.8; H - 13.3 mm (Figure *248:* C3870).

Type Locality: "Habite l'Océan des Antilles"; here restricted to Dry Tortugas (south) Key; in 101 m of water, (24°40′N; 82°55′W).

Type: Unknown. USNM, No. 712926; [*ex* C3870; hypotype].

Discussion: James Moore, Bradenton, Florida, dredged two specimens of this subspecies, which Mrs. Gladys Rodrigue, Delray Beach, Florida, found in a sack of dredge tailings purchased from Mr. Moore in 1963. The shells were found in a tangle of sea plants along with the small Atlantic Oyster, *Pteria colymus* (Röding, 1798) and a specimen of *Cyphoma mcgintyi* Pilsbry, 1939. Mrs. Rodrigue adds to the information, saying, "The shells con-

Figure *243*
Phenacovolva (***Calcaria***)
yoshioi (212)

Figure *244*
Phenacovolva (***Calcaria***)
gracillima (213)

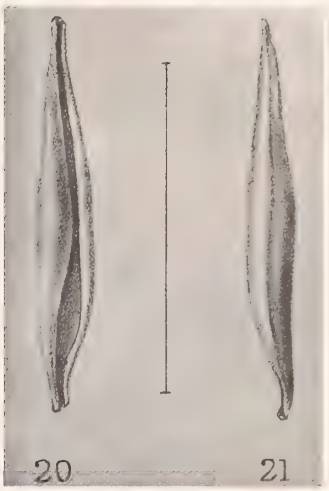


Figure *244* a
Phenacovolva (***Calcaria***) *gracillima* (213)

Figure *245*
Volva volva volva (214)

Figure *245* a
Volva volva volva (214)

Figure *246*
Volva volva cumulata (214)

Figure *247*
Volva volva habei (215)

Figure *248*
Volva volva striata (216)

Figure *248* a
Volva volva striata (216)

tained a mass of decaying animal residue, a gummy dark and light brown mass, such as found in newly dead *Pectens, Sinum,* etc.; they were very difficult to clean, and, in spite of many soakings, the shells still have an odor and a slight amount of animal residue in the body whorl. There can be no doubt about the animals' being alive when dredged." The second shell (Figure *248*a) is now in the collection of Mrs. Mary Moser, also of Delray Beach (L - 49.2; W - 17.6; H - 12.8 mm). This subspecies appears to have been overlooked by most authors and the thought of a "Japanese" form of *Volva volva* (Linnaeus, 1758), living in the Caribbean-Gulf of Mexico must have seemed impossible.

217. *Volva surabajensis* Schilder, 1937

(Figure *249*: holotype)

1937 *Volva surabajensis* Schilder, Ingen. Ned. Ind. (4) 4: 195

This ancient species is represented by a single specimen, which is preserved at the RGM, No. RGM-St. 41860 [holotype]. I am indebted to Dr. Gerda E. deGroot and Dr. Henry Coomans (RGM) for the photographs of this and the following species. Although the shells are somewhat broken, they appear clearly to belong in the genus *Volva*. Specific details for these species may be obtained from the literature. This and the following species are from the Pliocene and Pleistocene formations of Java, Netherlands East Indies. Since the photographs were available it seems appropriate to illustrate the species here as points of reference in future studies.

218. *Volva javana* (Martin, 1899)

(Figure *250*: holotype)

1899 *Ovula (Amphiperas) javana* Martin, Samml. Geol. Reichsmus. (2) 1/1 165; fig. 381

K. Martin described this species as *Ovula (Amphiperas) javana,* giving the type locality as Java, Netherlands East Indies. This apparently now extinct ovulid form is from the Pliocene formation there. Although collected in a broken and eroded condition, the shell still reveals much of its orginal morphological character. The holotype is at the RGM, No. RGM-St. 10060 [holotype].

219. *Primovula (Adamantia) kurodai* Cate & Azuma, spec. nov.

(Figure *95*A, *95*A C: holotype)

Description, holotype: Shell small, sub-rhomboidally ovate, thickly formed, solid; terminals restrictedly produced, truncate, closed, roundly so adapically, squarely so in front, both thickly formed; dorsum rough, sub-glossy, numerously coarsely incisedly striate over all; base ovate, conic, striate though thinly covered with off-white nacre; rear base tapers thickly to straight terminal ridge; a large, thick, triangular, multi-knobbed funiculum at rear base; columella broad, depressed, striate, elevated longitudinally as an adaxial ridge within, the latter thickening, elevated to form a large, deep fossula; aperture rather irregularly wide, curving; outer lip very broad, somewhat flattened, sloping inward, with numerous fairly large well developed teeth, many of which lengthen beyond periphery of outer lip edge front and back; color light beige at either end of dorsum, with most of dorsal surface a deep, rich rose, with numerous thick, longitudinal wavy lines of bright orange; terminal tips, terminal canals, color blotches on base, and columella are rosy-orange; parts of base, funiculum, and outer lip are off-white to light beige.

Measurements, holotype: L - 5.8; W - 3.4; H - 3.0 mm.

Type Locality: 2 - 4 km off Kirimesaki, Kii Peninsula, Japan (34°00′N; 134°48′E); leg. Yoshio Azuma, 2 April 1971.

Type: MA, No. 15645 [holotype].

Discussion: This new species seems most closely to resemble *Primovula* (*Adamantia*) *roseomaculata florida* (Kuroda, 1958) [= *P.* (*A.*) *fulguris* Azuma & Cate, 1971] see species **89**), but differs by having a more roundly ovate peripheral outline; by having differently formed terminal processes; by having a larger, more ponderous funiculum; by having a meandering, irregularly shaped inner edge of outer lip; by having longer, more distinct outer lip teeth, some of which, front and back, extend beyond edge of outer lip, and the dorsum is more colorful, deep rose rather than grey; the orange dorsal markings are much heavier in design, occupying more dorsal surface.

The new species is named in honor of Dr. Tokubei Kuroda, MSMT, who has contributed so much to the understanding of Japanese mollusca.

220. *Calpurnus (Procalpurnus) lacteus semistriatus* (Pease, 1862)

(Figure *138*: holotype)

1862 *Amphiperas semistriata* Pease, Proc. Zool. Soc. London: 241
1865 *Ovulum semistriatum*; Reeve, Conch. Icon., *Ovulum*: plt. 3, figs. 13a, 13b
1881 *Ovula semistriata*; Weinkauff, Mart. & Chem., Syst. Conch. 176; plt. 46, figs. 5, 8
1885 *Ovula lactea*; Tryon, Man. Conch. **7**: 247
1941 *Calpurnus (Procalpurnus) semistriata*; Schilder, Arch. Molluskenk. **73** (2/3): 108
1968 *Amphiperas semistriata* Pease = *Calpurnus (Procalpurnus) lacteus*; Cernohorsky, The Veliger **10** (4): 359; plt. 50, fig. 4

Description, holotype: *"Amphiperas semistriata*—Shell ovate, somewhat gibbous, white, shining, transversely striated; striae undulated and obsolete on the back, somewhat roughened longitudinally by fine irregular striae [probable growth lines]; ridges on outer lip small [denticulation]; inner lip [columella] roundly convex on base; right margin [side] slightly thickened; aperture flexuous, canal very short." (Pease, 1862: 241)

Measurements, holotype: "Length 12½, breadth, 7½ mill."

Measurements, holotype: L - 7.0; W - 4.2; H - 3.5 mm (Figure *138*a: C3908).

Type Locality: "Pacific Islands"; here restricted to: 73 m, Kii Channel, Japan (24°00′N; 134°48′E).

Type: ANSP, No. 17042 [holotype].

Distribution: off Kirimesaki, Kii Peninsula, Japan (MA 15638).

Discussion: Since Pease did not designate a type locality for his species it seems impossible to guess where these animals geographically approach the nominate species. However, in comparing the two shell forms as figured herein (Figures *137* & *138*), one may observe rather significant morphological differences between them. *Calpurnus (Procalpurnus) lacteus semistriatus* (Pease, 1862) differs chiefly in shell outline, being narrower and more evenly ovate; it has a gently curving outer lip, rather than being abruptly angled front and back; the abapical columella and base also lack the acute constriction observed in the Lamarckian species in the strict sense; and the shells of this subspecies seem generally very much smaller. Weinkauff (1881) was evidently unaware of *Amphiperas semistriata*. Most subsequent authors have placed it in the synonymy of *Ovula lacteus* Lamarck, 1810. However, after a comprehensive study of these shells, it is my opinion that the Japanese form (*striatus*) is sufficiently separable both in morphology and in geographical distribution to merit the new combination proposed herein, namely as a subspecies of *Calpurnus (Procalpurnus) lacteus*.

221. ***Dissona reflexa*** Cate, spec. nov.

(Figure *190*: holotype)

Description, holotype: Shell of medium size, oblong-ovate, somewhat inflated centrally; terminals, shell margins and base thickened, sublanceolate, bluntly attenuate; dorsum numerously, very finely transversely striate over all; base smooth, glossy, inflatedly ovate, tapering evenly to the front, with a rounded smooth funicular projection at rear; columella striate, broadly depressed, with a long, low, longitudinal adaxial ridge within forming a narrow shallow fossula in front; aperture narrow in back, widening slightly to the front; outer lip broad, glossy, gently angling inward, with a few tooth-like crenulations at the extreme rear; color yellowish, with a lemon-yellow haze over all, and rosy-pink within the adapical canal.

Measurements, holotype: L - 12.1; W - 4.4; H - 3.6 mm.

Type Locality: Off Jolo Island, Philippines (06°00′N; 121°10′E); at 40 m, on sand and shell bottom; USNM Smithsonian Expedition, Sta. 5136.

Type: USNM, No. 263827 [holotype].

Discussion: This new species seems quite distinct, although at first inspection one is reminded of an immature *Cyphoma aureocincta* (Dall, 1889), as both forms are faintly reflexed dorsally; both have the same general peripheral outline, and heavily thickened terminals and margins. However, the lack of the central angled, transverse dorsal ridge in ***Dissona reflexa*** is an easy means of distinguishing them.

The name is from the Latin *reflexus,* meaning turned back.

222. ***Crenavolva (Crenavolva) borbonica*** (Deshayes, 1863)

(Figure *44*A: original illustration)

1863 *Ovula borbonica* Deshayes, Not. Île Réunion, annex E, Moll., Paris: 136; plt. 13, figs. 18 - 20
1887 *Birostra borbonica*; Paetel, Cat. Conch. Samml. **1**: 326
1941 *Pellasimnia formicaria* Schilder, Arch. Molluskenk. **73** (2/3): 109
1956 *Neosimnia formicaria*; Allan, Cowries World Seas: 127

Description, holotype: *"Ovula borbonica*—O. testa minima, elongato-angusta, extremitatibus aequaliter attenu-

Figure *249*
Volva surabajensis (217)

Figure *250*
Volva javana (218)

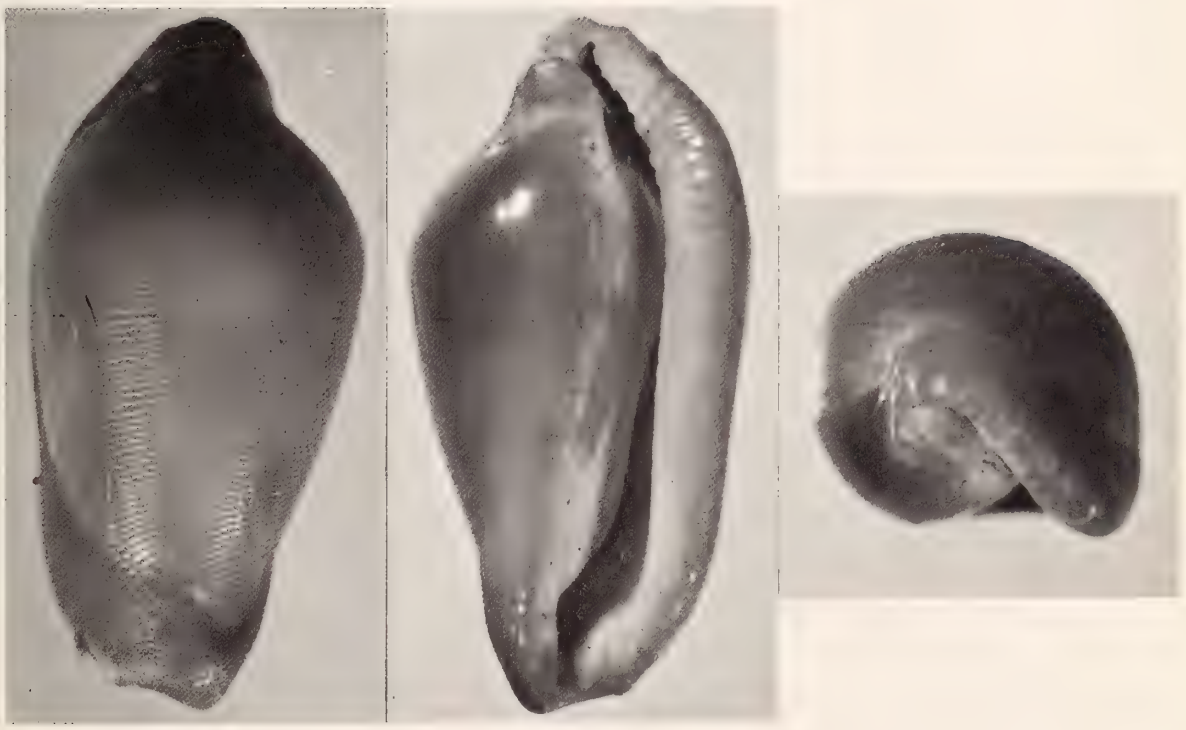


Figure *251*
Crenavolva (Cuspivolva) tigris (111)

ata, in medio mediocriter inflata et obscure subangulata, transversim minuitissime et regulariter striata, tenui, pellucida, albescente, roseo-obscure zonata et maculata; apertura elongata, angustissima, albo-rosea, extremitatibus paulo arcuata, antice, magis aperta, labro incrassato, utroque latere marginato." (DESHAYES, 1863: 136)

Measurements, holotype: "7 mill. de long; elle en a 2 de diamètre."

Type Locality: "Île de Réunion."

Type: whereabouts unknown.

Discussion: I have not seen this species; the type appears to be at neither MNHN or UPSO, the present repositories of most of the Deshayes collection. However, Deshayes had this to say about his species:

"Very small, but very elegant species of *Ovula,* belonging to the *spelta* section; it approaches the *gracilis* of Sowerby, but is distinguished very easily by having shorter extremities; it is elongate, straight, very attenuated at the extremities, lengthened into a small canal which is slightly recurved above; it is weakly reflexed toward the middle, the most swollen part of the shell is noticeable approximately at $\frac{3}{5}$ of the total length; the spire is apparently not completely enveloped, lengthening into a narrow, weakly raised keel and is transversely truncate at the extremity; the front extremity is equally attenuate; it is more elongate at the rear [what Deshayes referred to as the "front end" of the shell is, under present usage, referred to as the rear (abapical)], that is the only noticeable difference; the inflated part of the shell is very weakly angled, and the surface is ornamented with very numerous, transverse, very fine striae, of a remarkable regularity. The aperture is very long and very straight; the borders remain parallel in the major part of their length; they are little more removed at the anterior extremity, the right border is thickened and provided with a rotund swelling likewise projecting within and without. The entire aperture is a beautiful rose-purple, which color spreads to the rest of the shell also, in the form of three large zones, which do not stop at the contours, and are separated by bands of a transparent, subcorneous white" (J. Cate, transl.).

POSTSCRIPT

Article 13 (a) (i) of the International Code of Zoological Nomenclature appears subject to various interpretations. In AZUMA & CATE (1971) we accepted one of these possible interpretations, but because of confusing comments received from various sources, the taxa described were "validated" in CATE (1971), following another of the possible interpretations. This seemed to result in eliminating AZUMA as a co-author of the taxa in question. However, a prominent member of the ICZN expressed his view (*in litt.*) to the effect that the joint authorship was acceptable, if I so wished. Consequently, I have listed the taxa in the present work as originally cited with joint authorship. I would point out, however, that I have done so without prejudice, and that any worker who does not agree with this decision may petition the ICZN for a ruling.

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Names printed in ***bold face italics*** type are of taxa described as new herein.

Ordinary figures (*i. e.*, 1, 2, etc.) refer to pages on which the particular taxon is mentioned or listed, whereas **bold face figures** refer to pages on which the taxon is described or discussed extensively; figures in ordinary *italics* refer to the illustration of the taxon on the halftone plate; if the *italics* number is followed by a C, it indicates an illustration on one of the four color plates.


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