ZONITID SNAILS FROM PACIFIC ISLANDS
PART 1

1. SOUTHERN GENERA OF MICROCYSTINAE

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INTRODUCTION

This is the first of a series of papers on the Helicarionidae and Zonitidae of the islands in the Pacific and deals with the genera of Microcystinae which do not reach the Hawaiian islands. The work was made possible by a Yale University and Bernice P. Bishop Museum Fellowship.

Approximately seven months (February to September, 1935) at Bishop Museum were spent in the dissection of animals and the preliminary study of their shells. Dr. C. Montague Cooke, Jr., of the Bishop Museum, generously put at my disposal his notes and anatomical figures on many of the species and his extensive bibliographic researches. He had already arranged the Museum's extensive collections into tentative species, with manuscript notes on many of them, and freely supplemented these verbally from his profound knowledge of the Oceanic fauna. He also contributed four plates of shells, which were made for him by Miss Helen Winchester. Mere words cannot express my great indebtedness to Dr. Cooke; these studies would have been quite impossible without his assistance and tutelage. My thanks are also due to all the members of his staff.

I took with me to Philadelphia a synoptic collection of shells to which was added other material, especially from the Society and Caroline Islands (Y. Kondo! 1935-6) that was forwarded by Dr. Cooke as it was cleaned or collected. Their examination was completed at the Zoological Laboratory of the University of Pennsylvania and at the Academy of Natural Sciences of Philadelphia, where Dr. H. A. Pilsbry very kindly allowed me to utilize the shell and animal collections. By means of an additional grant from Bishop Museum and a generous contribution from Dr. Cooke, Mr. E. R. Tinkham was employed to make most of the figures of shells; plates 8 to 20 in this part, except the outline figures of embryos, were drawn by him at the Academy of Natural Sciences.

This series of papers will attempt to cover the Helicarionidae and Zonitidae from all the islands in the Pacific Ocean between 24° north latitude, 120° east longitude, 175° west longitude south of the equator and 133° west longitude north of the equator. In other words, its area includes the major island-groups of Hawaii, Marquesas, Tuamotu, Society, Austral, Cook, Samoa, Tonga, Fiji, Caroline, Palau (actually part of preceding), and Marianas Islands, and, so far as their fauna is known, the smaller islands and

groups between them. Species and genera from outside this area, when used as headings, are marked by asterisks (*).

Under each species, the citation of localities from which material has been studied is arranged as follows:

1. Type island group (subdivisions of Fiji in parentheses; also synonyms, indicated by =): type island (natural subdivisions, islets and districts of Hawaiian islands in parentheses; also synonyms as indicated): museum number of type specimen or lot when examined by me (followed in parentheses by number of type lot if type specimen has been segregated or of other type lots if one contains the type), type habitat and locality (followed in parentheses by collector! and date), [localities not given by original author included in brackets]; after semicolon, other type material studied.

2. After first period, without repetition of island group or island, additional material from type island or district.

3. In separate paragraphs, material studied from other island groups, islands, or recognized subdivisions, arranged as in 1.

The following abbreviations are used in the references to literature and in the citations of museum lots of specimens collected:

ANSP.—Academy of Natural Sciences of Philadelphia.
Numbers are lots in the conchological collections.

BBM.—Bernice P. Bishop Museum.
Numbers are lots in the mollusk collections.

Conch.-Cab.—Systematisches Conchylien-Cabinet von Martini und Chemnitz, fortgesetzt von H. C. Küster, Band 1, Abtheilung 12; genus *Helix,* vols. 1-3, 1841-60.
All descriptions of species in this work, except those in the first 56 pages, appeared after the corresponding ones in Pfeiffer's Monographia.

Exped. Shells—United States Exploring Expedition during the years 1838-42 under the command of Charles Wilkes, U.S.N., vol. 12, Mollusca and shells, by A. A. Gould, 1852-56.
The first descriptions of most of Gould's species appeared in the Proceedings of the Boston Society of Natural History, vol. 2 (1846-47) and were reprinted in the Otia Conchologica [pagination in brackets]. The text of the Expedition Shells came out in 1852, but the plates were not published until about 1860. The "types" in the U. S. National Museum (examined through the kindness of Dr. Paul Bartsch) and in the New York State Museum (examined through the kindness of Dr. C. C. Adams) present convincing evidence that Gould did not select a type specimen, that the specimen figured, 13 or 14 years afterward, often does not fit the original description, and that some of the shells figured are not in the U. S. National Museum. Part of the Expedition material was evidently distributed from the Smithsonian Institution; for example, the only known specimen of *Helix tentoriolum* is in the A. D. Brown Collection (marked S.) of the Academy of Natural Sciences of Philadelphia.

Mang. Exped.!—Mangarevan Expedition of Bernice P. Bishop Museum! 1934.

Manual—Manual of Conchology (second series).

Monogr. (Pfeiffer)—Monographia Heliceorum viventium, etc., vols. 1-8, 1848-77.

The full description of each species is cited first [other vols.: page, in brackets].

NYSM.—New York State Museum.

The numbers are lots in the Gould Collection.

P. Ent. Surv.!—Pacific Entomological Survey! 1929-31.

Proc. Malac. Soc.—Proceedings of the Malacological Society of London.

Proc. Zool. Soc.—Proceedings of the Zoological Society of London.

Dates, when preceding, give actual years of publication; when following, indicate years for which published; not repeated when the same.

Reisen—Semper's Reisen im Archipel der Philippinen, part 2, vols. 3 (1870-85) and 8 (1898-1904).

USNM.—U.S. National Museum.

The numbers are lots in the mollusk collection.

Voy. Pol Sud.—Voyage au Pôl Sud, et dans l'Océanie sur les corvettes L'Astrolabe et la Zélée. Zoologie par Hombron et Jaquinot, 1842-54.

The plates of livraisons 22-24 with explanations evidently appeared before 1853, because they are quoted in Pfeiffer's Monographia, vol. 3; the text (vol. 5 or vol. 4, part 2) was written by Rousseau, who saw few of the actual specimens, and was published in 1854.

Throughout this paper, the shell dimensions given are taken from camera lucida drawings about 80 mm. in diameter. The altitude (alt.) of the shell is the greatest length parallel to the shell-axis; the major diameter (diam. or maj. diam.) is the maximum width at right angles to that axis; the minor diameter (min. diam.) is that at 90° to the major; and the altitude of the aperture is taken from its projection on a vertical plane and is measured parallel to the shell-axis; indices of the last three (maj. diam., min. diam., and alt. ap.) are expressed as percentages of the first (alt.) and precede the actual dimensions in millimeters, which are included in parentheses. The diameter of the aperture (diam. ap.) is measured at right angles to the shell-axis from the center of the columellar edge; its index is a percentage of the altitude of the aperture. Obliquity of the aperture is expressed in terms of the angle between the shell-axis and a line connecting the top of the columella with the angle of the shell. Obliquity of the peristome is the angle between the plane of the aperture and the shell-axis. The major diameter of the umbilicus is measured from the attachment of the columella (index = times in maj. diam.), but, when the last whorl considerably overlaps and constricts the umbilicus, a minor diameter (at right angles to the first) or a visible diameter (greatest diameter of the opening) may also be given.

In zonitids, whorl-size (i.e., maj. diam. at a standard number of whorls) is especially important because growth is usually persistent; that is, most

species become sexually mature when comparatively small but continue to add whorls almost indefinitely. For this reason, one may speak of embryonic and neanic whorls but the designation of any number of whorls as the adult size would give an incorrect impression. Number of whorls has been counted, under considerable magnification, from the apex of the coil (e.g., where incidence of the spiral sculpture approaches 90°); this method gives about 0.5 whorl less than when whorls are counted along the suture; neither method is very accurate. To give an idea of the apparent size of the embryonic whorls, the greatest diameter of the sutural spiral at the end of 1.5 whorls is taken as a standard; of course, this is not the actual size of a shell of 1.5 whorls, which itself appears more variable than the larger whorl-sizes, but is reduced by the even more fluctuating sutural overlap. On the other hand, the larger whorl-sizes are outside measurements of actual major diameters of the same shell. The indices of the last are obtained by use of the 1.5 whorls dimension as a divisor and are obviously not actual expressions of whorl-increase but also vary with the amount of embryonic sutural overlap and inversely to the height of spire. With the help of these indices, which precede the dimension in millimeters in the tables, diameters may be quite accurately estimated for unobserved whorl-sizes, which, when included, are followed by a question mark. In order to assist the comparison of shells of any whorl-size, the drawings of apical views are usually oriented so that the end of each whorl (1st, 2d, 3d, etc.) is towards the right side of the plate, with basal views as mirror images.

Details of sculpture and polish are described under a magnification of about 50 diameters, with very strong lateral lighting (100-watt bulb about a foot from shell, with condenser).

In the zonitids, and especially in the Helicarionidae, one is constantly reminded that positive shell-characters (e.g., definite sculpture, columellar folds or teeth) are very useful in classification, but that negative ones (i.e., the convergence exhibited by smooth, featureless, or even vestigial shells) have been repeatedly produced in widely divergent groups and may mean practically nothing. Because the very term zonitoid connotes an almost featureless shell, anatomical studies in the group are of paramount importance for an understanding of their relationships.

Subfamily MICROCYSTINAE

In the Microcystinae, the animal (pl. 1, figs. 1-6) has an elongate foot (contracted in pl. 1, fig. 1), with or without pigment [my data mainly from preserved specimens], and almost always has black ommatophores (TE). The inferior tentacles (TV) are well developed. The tail has a more or less prominent, dorsomedian groove, which extends back to the tail horn

(CH), that is soft and usually rather short and blunt (about equals tip of sole) and covers the large, folded, and often roughly diamond-shaped caudal foss (CF; often erroneously termed a mucous gland). The sole is sharply divided by longitudinal grooves into three subequal areas; in *Philonesia,* the middle one develops pedal waves in locomotion. The pedal grooves (FS) are of the usual aulacopod type. The pedal gland is imbedded the full length of the foot and opens (FG) at the anterior end of the sole, under and behind the mouth (J).

The mantle collar (pl. 1, fig. 2) usually overlaps the visceral peduncle or stalk (VS) quite widely. The right (LD) and left (L) shell-laps [turned outward in figures] vary considerably in extent and may develop, in groups with thin and polished shells, a right (LR, pl. 5, fig. 4) or even also a left (LL, pl. 7, fig. 4) shell-lobe, either of which is usually narrow, even if quite long. In living animals of *Philonesia,* the right shell-lobe lies obliquely across the penult whorl and is often in motion. The right mantle-lobe (MR) is large and heavy [shown in figures with at least the anterior end turned inward]; the left one is usually divided into a quite narrow but longer anterior lappet (MA) and an overlapping, short but extensive posterior one (MP) [both are represented in figures as if deflected inward]. The umbilical shell-lobe (LU) is usually prominent.

The outer lung wall or lung proper (pl. 1, fig. 5) is usually quite elongate but its relative length varies inversely as the rapidity of whorl-increase; it may be pigmented or colorless and quite commonly develops opaque, chalky-white areas, which become even more extensive on the apical whorls and often form a continuous band along the parietal angle of the first ones. The mantle also quite commonly shows pearl-like excrescences, which sometimes adhere to the shell. The renopericardial orifice (HK) is about opposite the junction of the auricle and ventricle. The kidney (K) is elongate triangular and often attenuate anteriad; the renal orifice (KO) is near its anterior point. The ureter (KD) is complete and opens (KX) into a small urinary chamber (LK) in the pneumostome (LP). The principal pulmonary vein (HV) is large and conspicuous, but no other distinct venation is usual. The diaphragm is muscular.

The ovotestis (G, pl. 1, fig. 4) consists of a variable number of groups of alveoli, which are imbedded in the basal whorl of the apical lobe of the liver. The hermaphroditic duct (GD) is usually swollen and convoluted in sexually mature animals, in which it acts as a seminal vesicle. The talon (GT) is commonly small, clavate and bipartite; that is, it consists of little more than a loop of the hermaphroditic duct. The carrefour (X) may be swollen into a large, thin-walled sac. The albumen gland (GG) is large in animals which are not advanced in pregnancy but becomes much reduced as the embryos develop. Ovoviviparity is of an advanced kind; in none of

the species has an egg with a calcareous shell been observed. Relatively small animals may be sexually mature, but pregnancy appears to come some time later than the complete development of the male genitalia. The eggs (UO, pl. 3, fig. 13) are small when they first reach the uterus but may become almost as large as the full-term embryo (UE) before development is noticeable. The uterus (UT), when swollen by pregnancy, is usually followed by a slender, post-uterine oviduct (UZ) which does not have such a pronounced glandular sheath as that on the vagina or free oviduct in many Euconulinae. In cross section, the walls of the post-uterine oviduct appear to consist of an outer muscular sheath and an inner, longitudinally folded, yellowish layer.

The seminal duct separates from the oviduct at or near emergence from the carrefour and is separable from the uterus throughout its length, at least in the larger species. The prostate (DG) is relatively small and consists of clavate alveoli (very numerous in large species), which surround more than half the circumference of the locally swollen seminal duct (DS). The free vas deferens (D) is usually more slender, passes around the left and outer sides of the post-uterine oviduct and is caught in the penioviducal angle by the retractor and nerves of the right ommatophore, the frontal nerve and the lateral pedal nerve. [In pl. 1, fig. 4, the post-uterine oviduct has been twisted 90° so that the uterus and albumen gland are viewed from their right sides; but, in most of the figures, it has been twisted 270° in the opposite direction, so as to free the vas deferens and the spermathecal ligament and still show the right sides of the female organs.] An epiphallus (E) is always developed but it may be very short; in the Liardetiae, *Kusaiea* and the Microcystes, it is sharply demarcated from the vas deferens and contains longitudinal folds. In the Philonesiae (pl. 4, fig. 12), it appears to consist of a longer, slender region (ED) that is little demarcated [usually less so than in my figures] from the vas deferens and a short, swollen region or sacculate outgrowth, the corona (EC), which very probably is the functional epiphallus, joins directly to or has a short stalk that connects it with the penial apex, and develops, around most of its circumference, very heavy, yellowish, internal folds, that are usually visible from the outside. The penial retractor (PR) arises from the diaphragm and usually inserts on both the epiphallus and the penial apex. A thin, but often opaque, sheath (PS) is attached around the base of the penis proper (P) and usually surrounds the epiphallus as well, so that the penial retractor and the vas deferens appear to emerge from a small opening, surrounded by a muscular ring. In some species, this sheath seems far less extensive; in certain of these species, it is evidently contracted and folded, but, in others, it seems to be actually less inclusive. [The sheath is usually cut off at its base (pl. 1, fig. 8), so that the ventral or left side of the penis is exposed in my figures, but it is described in the text.] In addi-

tion, the epiphallus is usually attached to the penis by a thin membrane (pl. 4, fig. 9). The retracted penis proper (P) exhibits longitudinal, internal folds, even when the everted structure appears perfectly smooth (pl. 1, fig. 1); it is separated from the epiphallus by a simple constriction [apical and basal demarcation exaggerated in my figures] without verge or definite papilla. In the Liardetiae (pl. 2), the penis has an almost apical caecum or appendix (PA) and usually develops a stimulator (PD) or deciduous dart (pl. 3, fig. 7). In *Diastole* (pl. 5, figs. 5-10), it typically has a basal lobe or diverticulum (PL).

The spermatheca (S), which is sessile or short-stalked (SS), opens into what appears to be a continuation of the penis, just below the attachment of the penial sheath. A review of all the species has convinced me that this apparent continuation is actually a diverticulum of the atrium (Y), which forms a sort of penial prepuce (YP) and may be either very short or longer than the penis proper. Simple membranous sacs, found occasionally in the spermatheca or in this penial prepuce are apparently sperm-capsules (pl. 4, fig. 14), but spermatophores with hard, definitely horny walls have been observed only in the penial prepuce of *Lamprocystis misella* (pl. 7, fig. 11; see also *Microcystis adusta*). On the side of the seminal duct or from the adjacent surface of the prostate arises a fine spermathecal ligament (SR) that is often broader and apparently muscular near its insertion on the apex of the spermatheca, which may be also connected to the body wall, to the post-uterine oviduct or to both by short fibers (often apparently muscular). The atrium sometimes develops a lateral lobe or diverticulum (YL, pl. 4, fig. 19). The atrial opening (YO, pl. 1, fig. 1) may be close behind the base of the right inferior tentacle or as far back as the middle of the visceral stalk or peduncle (VS). [In the figures of genitalia, the inner (or left) surface of the atrium is shown; this conceals the atrial opening and carries the penis to the right of the uterus.]

The jaw is usually fairly heavy and somewhat thickened (and often more distinctly striate) near its center, where it commonly has worn away less rapidly and thus exhibits, on its cutting edge, a median lobe or point, which, however, may be quite prominent or completely eroded away in different individuals of the same species. The buccal bulb is short and ovoid to subspherical. The salivary glands are separate, with the right one more anteriad, and together form a lanceolate mass about as long as the buccal bulb. Primitively, the radula (pl. 3, figs. 4, 6) has several squarish to oblong, tricuspid laterals and but little longer, multicuspid marginals. Commonly, the entocone of the inner laterals becomes reduced or absent on the outer ones; in *Microcystis* (pl. 1, fig. 3), it is only represented by an angle even on the innermost. The largest number observed (13 in each half row) is in *Mendaña mumfordi,* while *Kusaiea frivola* (pl. 3, fig. 11) has only two very elongate

laterals and 175 marginals. The marginal teeth always lack the entocone but may develop cusps down the outer border of the tooth; when these are noticeably smaller than the terminal cusps (as in *Kusaiea*), they are called blade ectocones. The smallest number of marginals (25) occurs in *Liardetia* and in *Lamprocystis vitrinella rapana.* The principal marginals may reduce the number of cusps and even become unicuspid, as in *Microcystis,* subgenus *Facorhina,* and in *Lamprocystis,* section *Tongacystis* (pl. 7, figs. 12, 2). The transverse rows are usually horizontal in the lateral fields, but may slope anteriad in the marginal ones; the number varies around 100, the most (126) being in *Lamprocystis venosa.* [Under the figures of individual radular teeth, the shape of the right half of a single transverse row (T) is often shown either as a line (the anterior margins of the teeth) or as a strip (to show the varying depth of the row); on either of these, the width of the central (R), the width of the lateral field and the widths of blocks of marginals, each of which includes as many teeth as the radula has laterals, are usually indicated.] The oesophagus is long and the stomach is capacious. The S-loops of the hindgut are imbedded in liver tissue and form a compact figure, which is about as long (or as wide) as the length of the kidney. The anus (A, pl. 1, fig. 2) is inside the pneumostome (LP).

The right columellar retractor (along the hindgut to the mantle collar) is narrow but quite strong. The left (principal) muscle gives off almost immediately the buccal retractor, within a short distance first the left and then the right free retractors, and continues to form the large tail fan. The buccal retractor splits near the ganglionic ring to insert either side of the buccal bulb. Each free retractor gives off almost immediately a fine tentacular muscle and continues as the large lateral pedal retractor, which is closely associated with and often attached to the tail fan; the right lateral muscle often sends a branch to the base of the atrium. Each tentacular retractor divides halfway forward into an ocular and an inferior tentacular muscle.

The central nervous system is concentrated. The nerves to the penis and its accessory organs are branches of the right lateral pedal nerve, which arises from the right pedal ganglion. Further details are given under *Microcystis ornatella* (pl. 1, fig. 6), *Cookeana vindex,* and *Mendaña rectangula altior.*

Briefly, the subfamily Microcystinae may be defined as follows:

Helicarionidae with primitive genitalia; ovoviviparous; epiphallus without lime-sac or flagellum; spermatophore simple, rarely with corneous walls; spermatheca, of short type, on male side (penial prepuce); stimulator or dart-sac never developed on female side; outer radular marginals (at least) usually multicuspid (although rarely even unicuspid); penial nerve from right pedal ganglion; shell with continuous growth and simple, sharp peristome (exclusive of columella). Mainly developed on islands in the Pacific Ocean

but with some of the species (especially the smaller ones) reaching the East Indies and the mainland of Asia.

The Microcystinae are very closely related to the Euconulinae, which include the most primitive members of the Helicarionidae.

Key to the Groups and Genera of Microcystinae

Throughout this paper, the keys are arranged primarily to show the natural relationships and so necessarily utilize the characters of the entire animal. However, they also attempt to make possible the identification of accurately localized shells. The following key defines the groups of Microcystinae and also the genera which are included in the present paper (only Philonesiae omitted):

A. Penis with terminal or subapical appendix and well developed epiphallus; shell at least superficially rimate, except that of *Cookeana,* which develops long hairs; absent from Hawaiian islands:

B. Penial appendix at least longer than its base; mantle without distinct shell-lobes; radula with at least 5 laterals, with central not much longer than broad and with less than 90 marginals; shell perspectively perforate (*Pukaloa*) or not openly so: ..... Liardetiae

C. Principal radular marginals with 3 or more cusps; all marginals fairly broad and total number (in half row) less than 50, or with the blade ectocones (subgenus *Nesoreus*); penis much longer than penial prepuce and developing stimulator or deciduous darts; shell with sharp spiral striae, but without hairs, with (at least) embryonic whorls smaller and with superficial perforation closed by internal callus (easily broken); south and western Pacific and westward: ..... genus **Liardetia** Gude.

CC. Principal marginals slender and bicuspid; total number 60-70;

D. Shell imperforate, turbinate and with spiral rows of long hairs on epidermal ribs; penis (excluding appendix) little longer than penial prepuce and without hard parts; Austral Islands: Tubuai: ..... genus **Cookeana** new.

DD. Shell openly imperforate, lenticular and with obsolete spirals; genitalia unknown; Society Islands: Raiatea: ..... genus **Pukaloa** new.

BB. Penial appendix short conical; shell-lobes prominent; radula with central and 2 laterals elongate and with 175 marginals (in half row) which develop blade ectocones; shell depressed, subglobose with sharp spirals and with small but open perforation nearly or quite hidden by abruptly reflected peristome; Caroline Islands: Kusaie and Truk: ..... genus **Kusaiea** new.

AA. Penis without terminal or subapical appendix (although sometimes prolonged beyond entrance of vas deferens); shell imperforate and without definite hairs (*Diastole bryani* has short projections);

E. Epiphallus poorly demarcated from vas deferens but developing a short, swollen, internally plicate "corona" at penial end; includes all species of Hawaii, Marquesas, Tuamotu and Society Islands exclusive of the typical group of *Diastole* in the last two groups and *Lamprocystis simillima* (Pease) from Raiatea plus the large, thin, polished species of Rapa: ..... Philonesiae.

F. Shell relatively heavy, dullish above; radular marginals with blade ectocones; right shell-lobe wanting or small; Marquesas: ..... genus **Mendaña** new.

EE. Epiphallus abruptly demarcated from vas deferens and without definite "corona" at penial end; includes all species west of 162° west longitude and those from the Cook and Austral Islands (except large, thin, polished shells from Rapa) plus all dull shells (typical group of *Diastole*) from the Society and Tuamotu Islands and the large, thin-shelled *Lamprocystis simillima* from Raiatea:.....Microcystes.

G. Mantle collar without shell-lobes; shell dullish or (Austral Islands: Rapa to Tubuai:) large (4 wh. diam. over 7 mm.), relatively opaque and often colored;

H. Principal radular marginals with prominent blade ectocones, laterals tricuspid; atrial opening close behind inferior tentacle; penis with basal lobe or (Tonga and Fiji) shorter than epiphallus; shell (at least when young) with some trace of columellar fold [visible in adults of species from the Austral and Cook Islands]; Tuamotu and Austral Islands (Raivavae and Rurutu:) to at least Fiji (Lau):.....genus **Diastole** Gude.

HH. Principal radular marginals bicuspid or unicuspid, rarely with few, minute blade ectocones, laterals practically bicuspid; atrial opening considerably behind inferior tentacle; penis without basal lobe and longer than epiphallus; shell without definite columellar fold (even in embryos); Austral (Rapa to Tubuai) and Cook Islands (Mangaia):.....genus **Microcystis** Beck.

GG. Mantle collar with large right shell-lobe; shell more polished, more transparent and colorless (except in *Avarua* and *Naiaua,* which are absent from the Austral Islands (Rapa to Tubuai:); Austral and Society Islands (Raiatea) to Fiji and westward, also Marianas and westward:.....genus **Lamprocystis** Pfeiffer.

Genus **LIARDETIA** Gude, 1913

Liardetia Gude, 1913, Proc. Malac. Soc. **10** (5): 326; monotype *Nanina clayi* Liardet = *L. striolata* (Pease).

(?) *Kieconcha* Iredale, Proc. Malac. Soc. **10** (6): 373; type by original designation *Helix kermandeci* Pfeiffer, 1857, Proc. Zool. Soc. 1856: 326, from Kermadec: Sunday Island.

Oceanesia new subgenus, type *L. discordiae* (Garrett) from Mangaia (BBM. 97539).

Dasyconus new subgenus, type *L. decussata* new species.

Belonesia new subgenus, type *L. undulata* new species.

Nesoreus new subgenus, type *L. grandis* new species.

Belopygmeus new subgenus, type *L. doliolum* (Pfeiffer) from Guam (BBM. 82705).

This inadvertently founded genus evidently contains species that have been widely disseminated, probably through the agency of man. The status of *Kieconcha,* founded on an unfigured species, must await the study of material from the isolated Kermadecs by a malacologist rather than by an erudite homonymist. The allocation of Preston's names would be pure guesswork. The center of origin of *Liardetia* is dubious; the only endemic species in the area covered by this paper are those of the Society Islands, which belong to the subgenus *Oceanesia*; this subgenus, with *Nesoreus,* forms a very distinct group. Most of the species are very small; their shells closely

approach those of the Euconulinae and their radula those of *"Kaliella"*. The closest relative to *Liardetia,* outside the Microcystinae, appears to be the American genus *Guppya.*

Key to the Subgenera of *Liardetia*

A. Penis containing thick, apparently persistent stimulator; shell at least subcarinate or quite polished; south central Pacific islands:

B. Principal radular marginals with 3 to 4 large cusps; penial stimulator in enlarged base of penis; shell smaller (4 wh. diam. under 4.2 mm.) or quite polished (4.6 mm.); Marquesas to Austral (Rurutu) and Cook Islands:.....subgenus **Oceanesia** new.

BB. Radular marginals with blade ectocones; penial stimulator in large diverticulum; shell larger (4 wh. diam. 5.3 mm.), dull and decussate above, most depressed; Society Islands: Tahiti:.....subgenus **Nesoreus** new.

AA. Penis with or without thin, apparently deciduous dart or darts; shell angulate to almost rounded, dullish and decussate above; south and west Pacific and westward: .....subgenus **Liardetia** s. s.

Comparative whorl-sizes in genus *Liardetia*

	1½	3 wh.	3.5 wh.	4 wh.	4.5 wh.	5 wh.	Maxima	Index
L. decussata	1.18	2.2(2.61)	2.6(3.14)	3.1(3.64)	3.6(4.3)?	.....	4	175
L. d. asperior	1.15	2.1(2.46)	2.6(2.94)	3.0(3.45)	3.5(4.0)?	.....	4.2	161
L. perplexa	1.17	.....	2.8(3.23)	3.3(3.85)	3.8(4.44)	4.3(5.0)?	4.6	163
L. n. aequior	1.28	.....	2.7(3.44)	3.3(4.16)	3.7(4.71)	4.2(5.4)?	4.7	157
L. n. normalis	1.22	2.0(2.45)	2.5(3.1)?	2.8(3.39)	3.1(3.8)?	3.5(4.32)	5.4	131
L. tahitensis	1.16	.....	2.1(2.43)	2.3(2.67)	2.4(2.84)	2.5(2.9)?	4.5–	136
L. subrugosa	1.32	.....	2.1(2.78)	2.4(3.15)	2.5(3.3)?	.....	4.3	137
L. discordiae	1.14	.....	2.6(2.99)	3.1(3.49)	3.4(3.9)?	.....	4¼	149
L. intermedia	1.21	.....	2.5(3.00)	2.9(3.50)	3.2(3.9)?	.....	4¼	140
L. mooreana	1.20	.....	2.7(3.22)	3.1(3.78)	3.4(4.1)?	.....	4.1	163
L. undulata	1.29	.....	2.9(3.80)	3.5(4.57)	4.0(5.2)?	.....	4.1	147
L. grandis	1.58	2.3(3.57)	2.8(4.37)	3.4(5.31)	3.9(6.1)?	.....	4.4	183
L. striolata	.98	2.0(2.0)?	2.5(2.47)	2.8(2.77)	3.1(3.07)	3.5(3.4)?	4⅝	135
BBM. 84412	.95	2.0(1.9)?	2.5(2.38)	2.9(2.75)	3.2(3.08)	3.6(3.4)?	4¾	134
L. tenuisculpta, var.	.84	.....	2.6(2.18)	3.1(2.56)	3.4(2.8)?	.....	4	147
L. sculpta	1.02	.....	2.4(2.47)	2.7(2.75)	3.4(3.0)?	.....	4¼	150
BBM. 153921	1.00	.....	.....	2.9(2.91)	3.2(3.25)	3.6(3.57)	5⅛	126
L. doliolum	1.10	2.0(2.2)?	2.5(2.77)	2.8(3.07)	3.1(3.39)	3.5(3.9)?	4⅝	134

Liardetia (Dasyconus) decussata, new species (pl. 14, figs. 2 and 3a; pl. 2, figs. 1-3).

Society Islands: Tahiti: BBM. 11293 (145988, dissected), on ferns, shrubs, and dead leaves, near shore, alt. 5-30 feet, Vaipoe, Taiarapu (Mang. Exped.! Sept. 20, 1934); BBM. 88636, dissected, on shrubs and tree trunks, alt. 750 feet, Fautaua River (Adamson! Sept. 10, 1928). BBM. 86520, dissected (shell more elevated), on ferns and shrubs, alt. 850 feet, Vaihiria

Valley (MacDaniels! June 5, 1927). Society Islands: ANSP. 49111, BBM. 3205, mixed with *L. normalis* (Garrett!)

Shell (pl. 14, figs. 2 and 3a) sublenticular (but variable in height), subcarinate (not distinctly margined); light russet horn-color (variable in intensity), dull above, glossy below. Embryonic whorls around 1¾, soon assuming very sharp, fine, spiral striae (about 35 visible at end of first); second developing neanic sculpture. Later whorls with very fine growth-threads (60 per mm. on 4th), beautifully beaded by fine, spiral striae above (pl. 14, fig. 3a); base with obsolescent growth-threads but with sharp spirals. Aperture almost transverse, sharply angulate; peristome about 25° to shell-axis, barely arcuate below; columella shortly reflected, hiding less than half of superficial perforation (13 times in diam.).

Animal with sole, top of head, mantle-lobes and region over stomach darkly pigmented; pedal grooves still darker; apex of visceral mass with dark network. Tail horn smallish but reaching to tip of sole. Left mantle lobe divided. Lung 5 times as long as base, 2.5 times length of kidney, which is almost 3 times as long as its base and 1.5 times length of pericardium. Ovotestis consisting of 5 conical groups of clavate alveoli. Talon (pl. 2, fig. 1) short clavate. Uterus containing two small eggs and two large embryos (BBM. 145998) or simply one embryo (86520). Spermatheca sausage-shaped, about as long as post-uterine oviduct. Penial sheath covering all epiphallus and penis. Epiphallus with whitish, thick walls, which are longitudinally folded internally. Penial appendix with attenuate apex (recurved in figure) and ovoid base. Penis swollen at base with asymmetrically teat-shaped, horny stimulator (pl. 2, fig. 2), attached to thickened wall so as to point toward penial base. Atrium short with very short penial prepuce; external opening at about one third the distance between tentacles and mantle-collar and twice width between pedal grooves above upper one. Jaw with prominent, broadly rounded median lobe. Radula (pl. 2, fig. 3) has squarish central, 6 squarish laterals, of which 5 are tricuspid but last adds an ectocone, and 28 short marginals, of which about 16 are tricuspid and remainder add 1 or 2 more ectocones; 101 rows counted.

Liardetia decussata was evidently included in *L. normalis* by Garrett, but its shell has stronger spiral striae and its penial stimulator is somewhat different in shape.

Key to sections, species, and subspecies of subgenus *Oceanesia*

A. Penial stimulator longer than broad, without terminal spine; shell dull to glossy above, with prominent growth-sculpture and carinate or subcarinate; Society Islands: ..... section **Dasyconus** new.

B. Shell with major growth-costulae coarse (6-7 per mm.) and high, with spiral striae fairly sharp in interstices and on base, with whorls convexly shouldered above and with suture quite deeply impressed; Tahiti and Moorea: ..... **L. subrugosa** (Garrett).

BB. Shell with lower, fine growth-wrinkles and with whorls less convex above; suture less impressed;

C. Shell with more paraboloid spire; columella with distinct to very heavy, spiral cord; Tahiti: ..... **L. tahitensis** (Garrett).

CC. Shell with more conoid spire; columella without distinct spiral cord;

D. Spiral striae weaker, not crossing growth-wrinkles above; columella usually convex (especially in young shells); Moorea: ..... **L. normalis** (Pease).

E. Shell typically more elevated, with coarser growth-wrinkles (21 per mm.); carina distinctly margined ..... typical subspecies.

EE. Shell more depressed, with finer growth-wrinkles (43 per mm.); carina less distinctly margined.....subspecies **aequior** new.

DD. Spiral striae stronger, crossing growth-wrinkles above (at least on earlier whorls); columella concave;

F. Shell more depressed, not trochiform, with very evident spirals;

G. Penial stimulator teat-shaped; shell dullish, with strong sculpture above; Tahiti:.....**L. decussata** new.

H. Growth-wrinkles coarser (30 per mm.); carina margined and beaded.....subspecies **asperior** new.

HH. Growth-threads fine (60 per mm.) and beautifully beaded; carina weakly margined below.....typical subspecies.

GG. Penial stimulator ovoid; shell more glossy, attaining larger whorl-size, higher spire and weaker growth-threads (57 per mm.); Huahine and Raiatea:.....**L. perplexa** new.

FF. Shell trochiform, with fine (60 per mm.) growth-threads continued on base, so that spiral striae are less evident; Tahiti:..... .....see genus **Euconulus.**

AA. Penial stimulator about as broad as long or with terminal spine; shell quite polished, distinctly angulate to almost rounded;

I. Penial stimulator without spine; shell with shallow growth-lines and more gradual whorl-increase; Marquesas to Austral (Rurutu) and Cook Islands: .....section **Oceanesia** s.s.

J. Shell distinctly angulate on 5th whorl, with weak and blurred spiral striae; superficial perforation usually minute (15 times in diam.) and ⅔ hidden by columella; distribution of section.....**L. discordiae** (Garrett).

JJ. Shell almost evenly rounded on 5th whorl, with sharper spirals; superficial perforation larger and much less hidden by columella; Society Islands:

K. Shell more globose, with smaller perforation (10 times in diam.); Tahiti:.....**L. intermedia** new species.

KK. Shell more depressed, with larger perforation (7.3 times in diam.); Moorea:.....**L. mooreana** (Garrett).

II. Penial stimulator with very long, terminal spine; shell with more rapid whorl-increase and large aperture, becoming almost evenly rounded, and with low, coarse (11 per mm.) growth-wrinkles; Society Islands: Raiatea:..... .....section **Belonesia** new, **L. undulata** new.

Liardetia (Dasyconus) decussata asperior, new subspecies (pl. 14, fig. 1).

Society Islands: Tahiti: BBM. 11294 (145270, dissected), open ground on ridge, Aorai trail near top, alt. 5,600-6,300 feet (Mang. Exped.! Sept. 15, 1934).

Shell (pl. 14, fig. 1) very similar to *L. decussata* but with narrowly margined carina, more convex base and darker color. Later whorls with much coarser growth-wrinkles (30 per mm. on 4th) so that spirals appear slightly less prominent above; base with even sharper spiral striae.

Animal and genitalia also very similar; uterus containing 4 eggs and 2 large embryos.

This subspecies differs from the typical form somewhat as typical *L. normalis* does from its subspecies *aequior*.

Dimensions in subgenus *Oceanesia*

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
L. decussata								
Type	2.08	175(3.64)	165(3.43)	57(1.19)	156(1.86)	1.18	3.1(3.64)	4
BBM. 88636	2.00	185(3.70)	175(3.50)	60(1.21)	157(1.90)	1.08	3.4(3.70)	4
L. d. asperior								
Type	2.26	161(3.65)	150(3.39)	58(1.31)	144(1.89)	1.15	3.0(3.45)	4.2
L. perplexa								
Type	2.78	163(4.54)	155(4.30)	56(1.55)	148(2.29)	1.17	3.3(3.85)	4.6
L. n. aequior								
Type	3.18	157(4.98)	146(4.63)	56(1.78)	144(2.57)	1.28	3.3(4.16)	4.7
L. n. normalis								
Pease	3	(4)						5-6
BBM. 142334	3.55	131(4.64)	128(4.53)	44(1.56)	147(2.29)	1.22	2.8(3.39)	5.4
L. tahitensis								
Garrett	2	(2.5)						4.5
Type	2.08	136(2.82)	133(2.77)	43(0.89)	145(1.29)	1.16	2.3(2.67)	4.5
L. subrugosa								
Garrett	2	(2.5)						4.5
Type	2.36	137(3.23)	136(3.20)	48(1.13)	143(1.61)	1.32	2.4(3.15)	4.3
L. discordiae								
Garrett	2.5	(4)						4.5-5*
BBM. 97539	2.47	149(3.69)	141(3.49)	57(1.42)	137(1.94)	1.14	3.1(3.49)	4¼
L. intermedia								
Type	2.67	140(3.73)	131(3.50)	58(1.55)	123(1.90)	1.21	2.9(3.50)	4¼
L. mooreana								
Garrett	2.5	(4)						4
Type	2.34	163(3.81)	153(3.57)	63(1.48)	117(1.73)	1.20	3.1(3.78)	4.1
L. undulata								
Type	3.21	147(4.71)	133(4.28)	66(2.13)	119(2.54)	1.29	3.5(4.57)	4.1

Liardetia (Dasyconus) perplexa, new species (pl. 14, figs. 3c and 5; pl. 8, figs. 7-8; pl. 2, fig. 4).

Society Islands (leeward group): Huahine: BBM. 11485 (151140, dissected), on dead leaves, alt. 200-300 feet, Fare Valley (Mang. Exped.! Sept. 30, 1934); BBM. 151259 (younger and more like young *L. decussata*), alt. 1,400-1,900 feet, ridge north (Mang. Exped.! Sept. 30, 1934). Raiatea: BBM. 152118, dissected, on ferns and shrubs, alt. 50-200 feet, Ereeo Valley (Mang. Exped.! Oct. 9, 1934).

Shell (pl. 14, figs. 3c, 5; pl. 8, figs. 7-8) very similar to *L. decussata* but attaining larger size, with more whorls, and higher spire, with considerably weaker growth-threads and so appearing more glossy above. Superficially similar to *L. normalis aequior* in form and size but with much stronger spiral striae.

Animal also similar but with lighter coloration throughout (still lighter in 152118). Uterus containing 1 (151140) or 2 (152118) large eggs and 1 larger embryo. Penis (pl. 2, fig. 4) similar but with penial stimulator truncate obovoid. Radula similar but with 38 marginals counted.

On the basis of the shell alone, I would consider this as a subspecies of *L. decussata;* young shells are even more alike than the larger ones. On the

other hand, the shape of the penial stimulator seems to indicate greater divergence than that between *L. decussata* and *L. normalis*.

Liardetia (Dasyconus), new species or subspecies.

Society Islands: Tahiti: BBM. 145388, valley west of Aorai, alt. 6,000 feet; BBM. 145161, small ravine on west side of ridge crest, alt. 4,600 feet, Aorai trail (Both lots Mang. Exped.! Sept. 13, 15, 1934).

Juvenile shells similar to *L. normalis* but with coarser growth-wrinkles (especially on second whorl and base of 145388), which beautifully bead carina and with columella more widely reflected (i. e., similar to *L. decussata asperior,* but with much less prominent spiral striae).

Liardetia (Dasyconus) normalis (Pease), (pl. 14, fig. 7; pl. 8, fig. 1; pl. 2, figs. 6-8).

Helix normalis Pease, 1864, Proc. Zool. Soc.: 669. *Helicopsis normalis* Pease, Proc. Zool. Soc., 1871:475, Moovea (sic.) *Helix normalis* Pfeiffer, Monog. **5**: 59 [**7**: 73]. *Trochonanina normalis* Garrett, Jour. ANSP. **9** (1884): 19, pl. 2, fig. 33, a-b; Tahiti, Moorea and Huahine (including subsp. *aequior, L. decussata,* and probably *L. perplexa*), beneath rotten wood. *Nanina normalis* Tryon, Manual **2**: 116, pl. 39, figs. 80-82.

Society Islands: Moorea: (Garrett!); ANSP. 49125, from Pease, but labeled Tahiti. BBM. 142334, dissected, alt. 50-100 feet, Maramu (Mang. Exped.! Sept. 26, 1934), typical. Society Islands: ANSP. 49111, "types, Jour. A.N.S. IX", BBM. 3205 (both Garrett! and mixed with subspecies *aequior* and *L. decussata*).

Shell (pl. 14, fig. 7; pl. 8, fig. 1) similar to *L. decussata asperior* but subtrochiform (although somewhat variable in height), with margined but not beaded carina; light fulvous horn-color, somewhat glossy above and more so below. Entire shell with very much weaker, blurred, fine, spiral striae, which do not cross coarse, low growth-wrinkles (21 per mm. on 6th) above; suture dropping below carina on 5th whorl. Columella less reflected, hiding little of superficial perforation (14 times in diam.); usually with slight spiral swelling, especially in young shells.

Animal similar to *L. decussata,* but tip of tail and lung darkly colored and diaphragm with some pigment. Ovotestis of 9 groups, with 3 or 4 alveoli in each basal one, imbedded in basal ¾ whorl of apical hepatic lobe. Lung almost 4 times length of kidney which is twice as long as its base and 1⅓ times length of pericardium. Talon (pl. 2, fig. 7) longer. Uterus containing 1 egg and 2 small, 1 intermediate, and 1 large embryos. Penial retractor arising from diaphragm opposite basal ⅓ of right side of uterus. Penial appendix with bilobed base. Penial stimulator (pl. 2, fig. 8) shorter and stouter. Atrium longer; opening 3 times space between pedal grooves behind inferior tentacle and twice same space above upper groove. Jaw with low, broad, rounded median lobe. Radula (pl. 2, fig. 6) similar but 6th lateral with 2 to 3 cusps; with 26 more elongate marginals; 99 rows counted.

Evidently this species has included *L. normalis aequior, L. decussata* and probably *L. perplexa.* The original description seems to fit best the elevated shell that is now chosen as the typical form, and which appears to be limited to the island of Moorea.

Liardetia (Dasyconus) normalis aequior, new subspecies (pl. 14, figs. 3b and 4; pl. 8, fig. 2).

Society Islands: Moorea: BBM. 11484 (150911, dissected), on ferns and shrubs, alt. 700-800 feet; Tepatu Valley (Mang. Exped.! Sept. 27, 1934); BBM. 150500, on dead leaves, alt. 500-1,000 feet, east branch, Faatoai Valley (Mang. Exped.! Sept. 24, 1934); ANSP. 49124 (Garrett!).

Shell (pl. 14, fig. 4; pl. 8, fig. 2) similar to *L. normalis* but usually more depressed (causing whorl-increase to appear more rapid), with less distinctly margined carina. Later whorls (pl. 14, fig. 3b) with finer, more closely spaced growth-threads (43 per mm. on early 5th) so that spiral striae of interspaces are more noticeable; suture attached at periphery of carina (causing more rapid whorl-increase). Superficial perforation slightly larger (about 13 times in maj. diam.).

Animal also similar but foot lighter in color. Uterus containing 2 eggs and 1-3 embryos of different sizes. Epiphallus longer. Penial appendix not so evidently bilobed at base. Genital opening apparently more posteriad.

Liardetia (Dasyconus) tahitensis (Garrett), (pl. 8, fig. 3; pl. 2, fig. 5).

Trochonanina tahitensis Garrett, 1884, Jour. ANSP. **9**: 23, pl. 2, fig. 39, a-c. *Nanina tahitensis* Tryon, Manual **2**: 49, pl. 23, fig. 76.

Society Islands: Tahiti: ANSP. 49303 (BBM. 2274), under side loose stones, northwest side of island, alt. 2,000 feet (Garrett!). BBM. 145527, dissected, on *Angiopteris* stems, leaves of *ieie,* etc., small, very damp valley, west of Aorai trail, alt. 5,000 feet, (Mang. Exped.! Sept. 16, 1934); also found on Mt. Orofena (Cooke).

Shell (pl. 8, fig. 3) with paraboloid spire (lower in 145527), with thread-carina narrowly margined above and below and with weakly convex base; fulvous horn-color, quite dull above and more glossy below. Embryonic whorls 2 to 2⅛, soon assuming sharp growth-wrinkles which are scarcely cut by very fine, but fairly sharp, spiral striae. Later whorls with sharp, relatively broad, low growth-wrinkles (23-24 per mm. on 5th), with fine spiral wrinkles visible in interstices (slightly sharper than in *L. normalis*); suture weakly impressed but mainly below carina (not in 145527). Aperture subtrapezoidal, obtusely angulate; peristome 20° to shell-axis. Columella gradually and narrowly reflected, hiding less than half of superficial perforation (12 times in diam.); with very heavy, rounded, spiral cord visible through base for at least a whorl back and appearing as a big tubercle (much weaker but very variable in 145527).

Anatomy similar to *L. normalis* but penial appendix longer (more like *L. undulata*); penial stimulator truncate, obovoid, small. Jaw with broad but extremely low median lobe. Radula with centrals and inner laterals (pl. 2, fig. 5) more elongate; laterals 11; inner 3 marginals bicuspid, principal ones mainly tricuspid with outermost cusp small or multifid, outer ones multicuspid.

Liardetia (Dasyconus) subrugosa (Garrett), (pl. 8, fig. 4).

Trochonanina subrugosa Garrett, 1884, Jour. ANSP. **9**: 22, pl. 2, fig. 38, a-c, Tahiti and at less elevation, north side of Moorea. *Nanina subrugosa* Tryon, Manual **2**: 49, pl. 23, fig. 75.

Society Islands: Tahiti: ANSP. 49302 (BBM. 2805), under stones on northwest side, alt. 1,000 feet, (Garrett!).

Shell (pl. 8, fig. 4) turbinate, with whorls convexly shouldered above and with high thread-carina on almost evenly rounded periphery; amber horn-color, quite dull above

and glossy below. Embryonic whorls 1⅞, soon developing coarse growth-wrinkles, which pass into neanic sculpture on second. Later whorls with heavy, high, widely spaced costulae (6-7 per mm. on 5th), which are weaker near suture and toward carina, with much weaker minor wrinkles (2-4 per interspace) and with fine, spiral wrinkles (slightly stronger than in *L. tahitensis*) above; base with blurred, but well incised, spiral striae; suture quite deeply impressed. Aperture narrow, subtrapezoidal and showing carina; peristome about 30° to shell-axis. Columella gradually reflected, much thickened, almost completely covering superficial perforation (19 times in diam.) of type (hiding more than ⅔ in younger shells); slightly convex, although without distinct spiral cord. Animal unknown.

Liardetia (Oceanesia) discordiae (Garrett), (pl. 8, figs. 11-12; pl. 2, figs. 11-13).

Helix calculosa Gould, 1861 (about), Exped. Shells: pl. 5, fig. 63, a-c, Tahiti; not 1852 (text). *Nanina calculosa* W. G. Binney (?), Ann. N. Y. Acad. Sci. 3:85. Huahine (Garrett!), radula (?); Tryon, Manual 2: pl. 23, fig. 71.

Microcystis discordice Garrett, 1881, Jour. ANSP. 8: 383, Cook, Society and Marquesas Islands. *M. discordiae* Garrett, Jour. ANSP. 9 (1884): 20, pl. 2, fig. 35, a, b. *Nanina discordice* Tryon, Manual 2: 122, pl. 41, figs. 45-47. *M. discordiae* Cooke, BBM. Occ. Papers 10 (11): 5, 1934, Tuamotu: Makatea.

Nanina subtilis "Anton" Schmeltz, 1874, Cat. Mus. Godeffroy V: 91, Huahine.

Cook Islands: [Mangaia]: beneath rotten wood and among decaying leaves (Garrett!). BBM. 97539-40, dissected, under stones, dry, open ridge and flat, alt. 115 feet, Oneroa makatea (P. H. Buck! Feb. 1, 1930). Rarotonga: ANSP. 49176 (Garrett!). Matai, Mauke, and Aitutaki: BBM.

Austral Islands: Rurutu: BBM.

Society Islands: ANSP. 49175, "types, Jour. A.N.S. IX" (Garrett!). Tahiti, USNM. 5465 (shell figured in Gould). Moorea, BBM. 150272, on dead leaves, alt. 250-300 feet, Urufara Valley (Mang. Exped.! Sept. 22, 1934); BBM. 150408 (attaining 4.5 whorls), on dead leaves, alt. 300 feet, Faatoai Valley (Mang. Exped.! Sept. 24, 1934). Mehetia, Huahine (larger umbilical dimple), Raiatea, Tahaa, and Borabora: BBM. and ANSP. (several Garrett!).

Tuamotu: Makatea: BBM.

Shell (pl. 8, figs. 11-12) suborbicular, sharply angulate when young and distinctly so on 5th whorl; light horn-color, quite polished. Embryonic whorls 1¾; first half-whorl almost smooth but remainder assuming neanic sculpture. Later whorls with fine, shallow growth-lines separating almost flat interspaces and with almost obsolescent, fine, spiral striae above; base with very faint, blurred spirals; suture lightly impressed. Aperture almost transverse, obtusely angulate; peristome about 15° to shell-axis; columella gradually reflected, hiding ⅔ of superficial perforation (typically 15 times in maj. diam.).

Animal whitish with tip of tail and band between ommatophores sometimes darker; lung with black blotch behind mantle collar and line along hindgut; apical whorls with chalky band on columellar side. Right shell lap crescentic, 2 or 3 times as broad as

deep. Lung 4.5 times as long as base or about 3 times length of kidney, which is twice as long as its base or 1.5 times length of pericardium. Ovotestis consisting of two groups of branched or clavate alveoli; talon stoutly clavate; uterus containing 2 large eggs and 2 embryos; spermatheca (pl. 2, fig. 13) short, swollen apically. Epiphallus short; penis with small, obovoid appendix; penial stimulator (pl. 2, fig. 12) short, recurved. Atrium and penial prepuce short, opening some distance above pedal grooves. Jaw with very low, broad median lobe. Radula (pl. 2, fig. 11) has 7 laterals, of which 6 are tricuspid and last may add another ectocone, and 30 marginals of which about inner 25 are tricuspid; 96 rows counted.

USNM. 5465 contains one specimen of *L. discordiae,* which is probably that figured in the Expedition Shells for *Coneuplecta calculosa.* However, the label of this lot states that it formerly contained two shells of different species and the catalog adds that one was destroyed in 1873. Gould's description is fairly good and the words "globosa-pyramidalis", "angulatus et tenuissime carinatus" and "axis paulo minor" can only apply to the *Coneuplecta,* as Garrett realized. Both species have superficial perforations, closed by a thin callus.

L. discordiae is strikingly similar to *Guppya gundlachi* (Pfeiffer) in general appearance but is considerably larger. Since the West Indian *Guppya* is also a ruderal species, its arrival on the Pacific islands is probably only a matter of time.

Liardetia (Oceanesia) intermedia, new species (pl. 14, fig. 10; pl. 8, figs. 9-10; pl. 2, figs. 9-10).

Society Islands: Tahiti: BBM. 11297 (142044, dissected), in moss on trees, top of ridge, alt. 4,700-5,500 feet, Aorai trail; BBM. 145139, on ferns and shrubs, ½ mile above Taohiri, alt. 3,700 feet, Aorai; BBM. 145805, east side of south ridge, alt. 4,500 feet, Mt. Orofena; BBM. 145841, on ferns, damp ridge, alt. 5,200-5,500 feet, Papenoo Valley, Mt. Orofena (all Mang. Exped.! Sept. 13-20, 1934).

Shell (pl. 14, fig. 10; pl. 8, figs. 9-10) similar to *L. discordiae,* but slightly more globose, subangulate when young, practically evenly rounded on 5th whorl, with narrow, deep foveola; darkish horn-color. Spiral striae much more distinct throughout, but very fine and closely spaced; major growth-lines similar (12 per mm. on late 4th whorl). Aperture evenly rounded. Columella weakly reflected and hiding about ¼ of superficial perforation (about 10 times in maj. diam.).

Animal similar to *L. discordiae* but mantle lobes, collar, and strip behind them black; apical whorls without dark pigment. Lung 4 times as long as base or length of kidney, which is twice as long as its base or 1⅓ times length of pericardium. Talon (pl. 2, fig. 9) more slender, spermatheca larger; penial appendix with recurved tip; base of penis swollen, containing large paraboloid stimulator (position shown in outline). Jaw with very low, apically emarginate median lobe. Radula (pl. 2, fig. 10) with 40 marginals, of which innermost is 3-cuspid, principal ones are usually 4-cuspid and outer 12 have more than 4 cusps; more than 90 rows.

L. intermedia, as its name indicates, is somewhat intermediate between the widely disseminated *L. discordiae* and the Moorean *L. mooreana.* In gen-

eral appearance and texture, it is much closer to the latter, but is a little more elevated and thus has a smaller umbilical depression.

Liardetia (Oceanesia) mooreana (Garrett), (pl. 8, figs. 13-15).

Zonites mooreana Garrett, 1884, Jour. ANSP. 9:23, pl. 2, fig. 28, a-b, *Nanina mooreana* Tryon, Manual 2: 119, pl. 40, figs. 59-61.

Society Islands: Moorea: ANSP. 49159 (BBM. 4990), under wood and leaves, north part (Garrett!).

Shell (pl. 8, figs. 13-15) similar to *L. intermedia* but more depressed, with less rapidly increasing but more rapidly spreading whorls, becoming evenly rounded near end of third, with broad foveola; slightly darker horn-color. Later whorls with similar major growth-wrinkles (14-15 per mm. on late 4th). Aperture smaller, more subcircular; columella hiding very little of larger umbilication (7.3 times in maj. diam.) which is similarly closed by an internal callus (broken in type). Containing embryos; animal otherwise unknown.

On account of the large size of the umbilicus, the internal callus is often partially broken away, as in the type specimen.

Liardetia (Belonesia) undulata, new species (pl. 14, fig. 8; pl. 8, figs. 5-6; pl. 2, figs. 14-16).

Society Islands: Raiatea: BBM. 151750, dissected, very rare, on dead pandanus leaves, alt. 1,200 feet, Temehani Plateau (Mang. Exped.! Oct. 5, 1934).

Shell (pl. 8, figs. 5-6) depressed turbinate, obtusely angulate at beginning and almost evenly rounded at end of 4th whorl; light horn-color, quite polished and iridescent; thin and transparent. Embryonic whorls 1⅞; first half-whorl almost smooth although with traces of fine spiral striae; remainder assuming neanic sculpture. Later whorls with broad, low, usually rounded growth-wrinkles (11 per mm. at 3.5 wh.) which die out shortly below periphery and with very shallow, spiral striae (not much stronger than in *L. discordiae*) above and below; suture moderately overriding and fairly well impressed. Aperture broadly lunate, evenly rounded; peristome about 20° to shell-axis; columella gradually reflected, hiding ⅔ of superficial perforation (15.5 times in maj. diam.).

Animal light with tentacles, tail-tip, stripe either side of hindgut and region over stomach almost black; visceral mass with blood-vessels outlined by chalky deposit and with band of similar material along apical whorls. Lung almost 4 times as long as base and 2.5 times length of kidney, which is 2.5 times as long as its base and almost twice length of pericardium. Ovotestis with 7 or 8 small, conoid clusters of alveoli; duct (pl. 2, fig. 16) swollen near middle; uterus containing 4 small eggs and 1 large embryo; spermatheca long, with swollen apical half containing a membranous sac, possibly a spermatophore. Epiphallus large with apical ⅔ whitish and more slender base yellow; penial appendix long and slender; penis short and stout with abrupt swollen base; penial stimulator (pl. 2, fig. 14) with ellipsoid base in usual position but with long, recurved, apically flattened spine that curves back almost to apex of penis. Median lobe of jaw low, broad and rounded. Radula (pl. 2, fig. 15) has oblong central, 7 tricuspid, squarish laterals and 47 marginals, of which inner 37 are usually 3-cusped, next 9 show 4 or more cusps and outermost is a mere denticle; 89 rows or more of 54 teeth.

The shining shell of *L. undulata* most resembles that of the typical section of *Oceanesia* but its whorls are more voluminous. The enormous penial stimulator is very peculiar; possibly the abrupt curvature is abnormal.

Liardetia (Nesoreus) grandis, new species (pl. 14, figs. 13-15; pl. 3, figs. 1-3).

Society Islands: Tahiti: BBM. 11298 (142049-54, dissected), in moss on trees, top of ridge, alt. 4,700-5,500 feet, Aorai trail (Mang. Exped.! Sept. 14, 1934); BBM. 87041, dissected, on ferns and shrubs, 15 miles inland, alt. 2,000-4,000 feet, sides of Orofena Peak, Papenoo Valley (MacDaniels! May 14, 1927); BBM. 88602, Vaipuarii Valley (Adamson! Aug. 28, 1928.)

Shell (pl. 14, figs. 13-15) sublenticular, with very sharp, weakly undulate, slightly margined carina; typically brownish horn-color (87041 lighter), dull above and more glossy below. Embryonic whorls around 1¾, soon assuming spiral striae (35 visible on second) which bead growth-threads (as in *L. decussata* but coarser). Later whorls with low, subangular growth-wrinkles (18 per mm. on last), wider than their interspaces, crossed but not beaded by spiral striae (stronger than in *L. normalis*); base with sharp, more widely spaced, spiral grooves; suture lightly impressed. Aperture narrowly subtrapezoidal, sharply carinate about 80° to shell-axis; peristome about 30° to shell-axis, weakly concave below; columella quite evenly rounded (even when young), gradually reflected, hiding less than ⅛ of superficial perforation (17 times in maj. diam.).

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
Type	3.21	183(5.86)	174(5.59)	54(1.73)	173(2.99)	1.58	3.4(5.31)	4.4

Animal lightish in coloration with pedal grooves, top of head, tail-tip, mantle lobes, and apex darker; tail horn not quite reaching tip of sole, of which middle division is slightly wider than lateral ones. Lung 5.5 times as long as its base or 3 times length of kidney, which is 2.5 times as long as its base or 1.5 times length of pericardium. Talon, albumen gland, and prostate similar to *L. normalis*. Uterus containing 2 small, 1 intermediate, and 1 big embryos; spermatheca (pl. 3, fig. 1) short, swollen in apical ⅔; penial appendix quite large, cylindric; penis slender apically but with large basal lobe that contains big, horny, mamilliform stimulator (pl. 3, fig. 2) with nipple-shaped tip directed obliquely upward. Atrium and penial prepuce short, opening about 3 times space between pedal grooves above upper one and about 6 times same space behind tentacles. Jaw with quite prominent, rounded median lobe. Radula (pl. 3, fig. 3) with oblong central, 7 oblong, tricuspid laterals and 78 elongate marginals, of which first is usually tricuspid and others add 3 or more large blade-ectocones.

The shell of *L. grandis* is almost an enlarged copy of that of *L. decussata*. The penis is peculiar and the radula definitely approaches that in *Diastole*.

Liardetia (Liardetia) striolata (Pease), (pl. 14, fig. 12; pl. 9, figs. 5-6; pl. 3, figs. 4-5).

Helix striolata Pease, 1860, Proc. Zool. Soc.: 439; Pfeiffer, Monogr. **5**: 55 [**7**: 68].

Nanina samoensis Mousson, 1865, Jour. de Conch. **13**: 165 [2], Samoa: Upolu: Apia (Graeffe). *Helix samoensis* Pfeiffer, Monogr. **5**: 70 [**7**: 82]. (*Zonites*) *Conulus samoensis* Mousson, J. de C. **17**: 330 [8]. Samoa, Tutuila.—**18**: 116 [8], Fiji (west and Lau): Viti Levu, Ovalau, and Vanua Mbalavu.—**21**: 104 [4], Ellice Islands: Niutao, Aituou, Nui and Nukufetau; Cook Islands; Rarotonga.—Schmeltz, Cat. Mus.

Godeffroy IV: 70, Fiji (Lau): Oneata. *Microcystis samoensis* Garrett, Jour. ANSP. **8**: 384, under dead wood and loose stones in lowland forests, Marquesas: Nukuhiva. *Trochonanina samoensis* Garrett, Bull. Soc. Malac. France **4**: 11, Marquesas: Hivaoa.

(?) *Helix tutuillae* Cox, 1870, Proc. Zool. Soc.: 83, Samoa: Tutuila.—Pfeiffer, Monogr. **7**: 64.

Zonites samoensis tenuis "Mousson" Schmeltz. 1869, Cat. Mus. Godeffroy IV: 70 (nude), Ellice Islands: Niutao, Nui, Vaitupu; Futuna. Mousson, 1871, J. de C. **19**: 10 [6] (vested), Futuna.

Helix clayi Liardet, 1876, Proc. Zool. Soc.: 101, pl. 5, fig. 7, Fiji (north): Taveuni. *Nanina clayi* Tryon, Manual **2**: 181, pl. 54, fig. 8. *Liardetia clayi* Gude, Proc. Malac. Soc. **10**: 328, Fiji (west): Ngau and Vatou (Vatuleile?).

(?) *Guppya papuana* Thiele, 1928, Zool. Jahrb. Syst. **55**: 133, pl. 5, fig. 20, Bismarck Archipelago: New Britain (= Neu Pommern): Ralum, near Kikoko (Dahl!).

Marshall Islands: Ebon: ANSP. 1948, 49177 (from Pease).

Samoa: ANSP. 49151 (Graeffe!). Tutuila: BBM. 84412, dissected, damp ridge east of Amouli; BBM. 84375, on shrubs, etc., top Olomoana, (Cooke and Dranga! March 18, 1926).

Fiji (west): Viti Levu: BBM. 77015, dissected, under logs, flat ¼ mile inland, alt. 50 feet, Suva Bay (Bryan! June 26, 1924). Ovalau: ANSP. 49146.

Cook Islands: Rarotonga: ANSP. 49340 (Garrett!). Matai and Mangaia: BBM.

Society Islands: Tahiti: BBM. 79574, Fautaua Valley (S. C. Ball! Jan. 11, 1925).

Marquesas: Nukuhiva: BBM. 92528, dissected, Hatihau, (S. Delmas! March 3, 1927). Mohotani, Fatuhiva, Hivaoa: BBM.

Shell (pl. 14, fig. 12; pl. 9, figs. 5-6) turbinate (variable in height), sharply angulate when young, distinctly so at end of 4th whorl, but becoming barely so on 5th; fulvous horn-color (variable in intensity) with silky finish above and somewhat glossy below. Embryonic whorls 1¾, soon assuming weak spirals; last with fine growth-threads, beautifully beaded by fine, impressed, spiral lines; suture overriding. Later whorls with fine, crowded, angular growth-threads (46 per mm. on 5th), which are cut but less sharply beaded by fine, spiral lines; base with growth-threads dying out just below periphery but with deeply engraved, spiral grooves; suture rather deeply impressed, with 5th whorl dropping below angle of penult. Aperture narrowly subtrapezoidal, scarcely angulate at 90° to shell-axis; peristome 20° to shell-axis and quite concave below; columella gradually reflected, hiding ¼ to ⅓ of superficial perforation (12 times in maj. diam.).

Animal with sole, zones below and between pedal grooves, top of head, tip of tail, mantle-lobes and shell-lap darkly pigmented; tail compressed laterally with prominent dorsomedian groove; tail horn blunt, not reaching tip of sole; middle area of sole little narrower than either lateral one. Lung 5.5 times as long as base or over 3.5 times length of kidney, which is almost twice as long as its base or 1.5 times length of pericardium.

Albumen gland and prostate similar to *L. sculpta*. Uterus containing 3 to 5 embryos of various sizes. Spermatheca (pl. 3, fig. 5) elongate, usually slender. Penial sheath often covering only basal ¾ of penis but attached to epiphallus. Penial appendix long, subcylindric; presence of penial darts dubious (appear to be present and similar to those of *L. sculpta* in one of several animals examined). Atrium and penial prepuce quite short, opening twice space between pedal grooves above upper one, and almost 2/5 distance to visceral peduncle behind tentacles. Jaw with broad, rounded median lobe, which may be very short or fairly prominent. Radula (pl. 3, fig. 4) with almost square central, 6 or 7 tricuspid, slightly more elongate laterals and 27 to 30, shortish marginals, of which inner 10 are tricuspid although outer ones develop 4 or 5 cusps; 80 rows counted.

This widespread species very probably has still other names in other places, but these will be recognized only after reexamination of typical material. It is more commonly known by Mousson's name, although his description is not much better than Pease's extremely poor one. Dr. Cooke has examined the type of *Helix clayi* Liardet and recognized that it is the same as the Samoan examples. I have not seen *Guppya papuana* Thiele but the description and figure fit *Liardetia striolata* very closely.

Key to sections and recognized species of subgenus *Liardetia* s.s.

A. Penis with or without triangular darts; shell columella gradually reflected near attachment; Marquesas to Philippines and China (at least):.....section **Liardetia** s.s.

B. Shell with low, closely spaced growth-threads (more than 25 per mm.), beaded by spiral striae and deleted just below periphery; base with sharp, spiral grooves;

C. Shell with weak growth-threads (40-50 per mm.), especially on embryonic whorls, distinctly angulate on 4th whorl; suture less impressed; Marquesas and Marshall Islands to Fiji and westward:.....**L. striolata** (Pease).

CC. Shell with stronger growth-threads on embryonic whorls; suture more impressed:.....**L. tenuisculpta** (Möllendorff).

D. Shell more elevated, with very minute superficial perforation almost hidden by columella; sculpture and angulation of latter whorls more like C; Philippines:.....typical.

DD. Shell more depressed, with larger superficial perforation (10 times in diam.) about ¼ hidden (as in C), with terete, scarcely angular 4th whorl and with coarser and more irregular growth-threads (30 per mm.); Marianas and Caroline Islands:.....variety?

BB. Shell with higher, distantly spaced growth-riblets (about 14 per mm.), which are seldom crossed by spirals on 4th whorl and which die out gradually about halfway between periphery and columella; base with fine, obscure, spiral striae; whorls and suture similar to DD; China, Marianas and Caroline Islands:.....**L. sculpta** (Möllendorff).

AA. Penis developing very large dart with long terminal spine; shell columella abruptly reflected so as to appear emarginate near attachment; embryonic growth-threads slightly stronger; Philippines, Marianas and Caroline Islands:.....section **Belopygmeus** new.
.....**L. doliolum** (Pfeiffer).

Dimensions in subgenus *Liardetia* s.s.

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap	1½	4.5 wh.	whs.
L. striolata								
Pease	.....	pusilla	.....	.....	.....	.....	.....	.....
(samoensis)	1.5	(3)	(2.5)	.....	.....	.....	.....	5
(tutuillae)	2.3	(3.05)	(2.5)	.....	.....	.....	.....	5
(clayi), fig.	.....	145	.....	.....	.....	.....	.....	5
(papuana)	2	(2.75)	.....	.....	.....	.....	.....	4¼
fig.	2.0	137(2.75)	.....	50(1.0)	145(1.45)	.....	.....	
ANSP. 49177	2.34	135(3.15)	128(2.99)	45(1.06)	144(1.53)	.98	3.1(3.07)	4⅝
BBM. 84412	2.47	134(3.31)	125(3.09)	47(1.16)	142(1.64)	.95	3.2(3.08)	4¾
	1.74	143(2.49)	134(2.34)	57(.99)	129(1.30)	.92	.....	3¾
L. tenuisculpta								
Möllendorff	3.25	115(3.75)	.....	.....	.....	.....	.....	6
fig.	3.3	114(3.75)	.....	47(1.55)	120(1.85)	.....	.....	
L. tenuisculpta, variety								
BBM. 82180	1.74	147(2.56)	137(2.38)	51(.89)	143(1.27)	.84	3.4(2.8)?	4
L. sculpta								
Möllendorff	2.75	127(3.5)	.....	.....	.....	.....	.....	5
fig.	2.55	137(3.5)	.....	49(1.25)	124(1.55)	.....	.....	
BBM. 75389	1.90	150(2.84)	140(2.67)	44(.84)	173(1.45)	1.02	3.4(3.0)?	4¼
BBM. 153921	2.81	126(3.55)	124(3.49)	37(1.04)	159(1.65)	1.00	3.2(3.25)	5⅛
L. doliolum								
Pfeiffer	2.5	(3.5)	(3.25)	.....	.....	.....	.....	5
Reeve fig.	2.49	141(3.5)	.....	49(1.23)	146(1.80)	.....	.....	
BBM. 82705	2.64	134(3.53)	127(3.36)	43(1.13)	155(1.75)	1.10	3.1(3.39)	4⅝

Liardetia (Liardetia) tenuisculpta (Möllendorff), variety? (pl. 9, fig. 7; pl. 2, figs. 17-18).

(?) *Kaliella tenuisculpta* Möllendorff, 1893, Ber. Senckenberg. Nat. Ges.: 69, Luzon.—Catanduanes, Marinduque and Leyte; Semper's Reisen **8**: 125, pl. 11, fig. 23.—Möllendorff, Jour. Malac. **7**: 102, Ponape (Kubary!)?

(?) Philippines: Luzon: Manila, ANSP. 63969 (from type lot!)?

Marianas Islands: Rota (= Luta): BBM. 82180, dissected, on stones and logs, coastal plain, Fanagaan (H. G. Hornbostel! July 14, 1925); BBM. 82000, under stone among bushes, alt. 25 feet., Ugis (Hornbostel! July 25, 1925). Saipan: BBM. 82587, under stones, open ground, alt. 50 feet., Laulau (Hornbostel! Sept. 9, 1925).

Caroline Islands: Truk (Tarik = Fuyo Islet): BBM. 153908, dissected, on shrubs (Y. Kondo! Jan. 7, 1936). Ponape: BBM. 154050, alt. 800 feet, Mount Tolotom (Kondo! Feb. 15, 1936). Yap (Okau District): BBM. 155025 (unique juvenile?), alt. 500 feet (Kondo! May 17, 1936).

Shell (pl. 9, fig. 7) similar to *L. striolata* but smaller, depressed turbinate, weakly angulate on third whorl, quite evenly rounded on 4th; reddish amber-color, dull above, distinctly glossy below. Embryonic whorls assuming considerably stronger and coarser growth-threads (approaching those of *L. doliolum*). Later whorls with heavier and larger growth-threads (27 per mm. on 4th), beaded by sharper spiral striae above; base

with slightly deeper spiral grooves; suture more impressed, dropping below angle with 4th whorl. Aperture evenly rounded but depressed; columella hiding about ¼ of superficial perforation (10 times in maj. diam.).

Animal very similar to *L. striolata.* Uterus containing 3-5 large eggs and 1 or 2 well formed embryos. Penial sheath covering epiphallus and penial appendix, which is relatively shorter (pl. 2, fig. 18). Penis often containing one or more, flat, attenuately triangular, thin plates (pl. 2, fig. 17), which appear to be deciduous darts. Radula with 6 laterals and 25, mainly tricuspid marginals.

The type lot of *L. tenuisculpta* has considerably weaker growth-threads than does this variety (?) and thus approaches closer to *L. striolata,* of which it may be only a local race. Probably, the material from the Marianas and the Carolines should be considered at least subspecifically distinct, but its naming would require a careful examination of the types of most of the Oriental species of *"Kaliella"* and even *"Sitala".*

Liardetia (Liardetia) sculpta (Möllendorff), (pl. 14, fig. 6; pl. 9, fig. 8; pl. 2, figs. 19-20).

Microcystis sculpta Möllendorff, 1883, Jahrb. Deutsch Malak. Ges. **10**: 364, pl. 12, fig. 4. *Kaliella sculpta* Möllendorff, Jahrb. cit. **12**: 384, pl. 10, fig. 11 (better). *Nanina sculpta* Tryon, Manual **2**: 67, pl. 28, fig. 94.

China (Kwantung): on old trees, Shaming near Macao (Hungerford!). ANSP. 98262 (young, but with embryos).

Marianas Islands: Guam: BBM. 75389, on bushes, damp ravine, alt. 400 feet, Talafofo (Hornbostel! June-July, 1923).

Caroline Islands: Ponape: BBM. 153921, dissected, alt. 85-100 feet, Govt. Agric. Exp. Sta., Colonia (Y. Kondo! March 5, 1936); BBM. 87527, from Möllendorff, (Kubary!), labeled *K. tenuisculpta.*

Shell (pl. 14, fig. 6; pl. 9, fig. 8) similar to *L. tenuisculpta,* var. [but 153921 becoming turbinate, with descending 5th and 6th whorls], rounded angulate on 4th whorl [angle disappearing on 5th]; light tan color, considerably duller below. Later whorls with extremely fine minor growth-wrinkles, interspersed with narrow but high, major riblets (14 per mm. on 4th; 15-16 per mm. on 5th), which are not beaded by finer spiral striae above; base with growth-threads dying out gradually near half distance to columella and so somewhat obscuring more closely spaced spiral striae; suture well impressed [dropping far below periphery of 5th whorl of 153921]. Aperture rounded subangulate [rounded in 153921]; columella hiding more than half of superficial perforation (13-16 times in maj. diam.).

Animal similar to *L. striolata* with dark zone below and dark line above pedal grooves; tail horn not extending to tip of sole; right shell-lap forming a weak expansion 2 or 3 times as broad as deep. Talon (pl. 2, fig. 20) short. Uterus containing 3 eggs and 1 young and 4 older embryos. Spermatheca clavate. Penial sheath covering fairly short penial appendix and Y-shaped epiphallus. Penis swollen basally, usually with more than one sagittiform plate (pl. 2, fig. 19). Atrial orifice twice space between pedal grooves above upper one and about same distance behind tentacles. Jaw with fairly prominent, rounded median lobe. Radula has 6 tricuspid laterals (entocone often vestigial on outermost) and 31 marginals, of which 6 to 8 may have more than 3 cusps; 102 rows counted.

The shells, identified with *L. sculpta,* from the Marianas agree quite closely with the ANSP. material from the type locality. Those from the

Carolines also have similar, distantly spaced riblets, but attain more whorls and a distinctly more elevated form. The dissections are based on animals from Ponape.

Liardetia (Belopygmeus) doliolum (Pfeiffer), (pl. 14, fig. 9; pl. 9, fig. 9; pl. 3, figs. 6-8).

Helix doliolum Pfeiffer, 1846, Proc. Zool. Soc.: 141, Monogr. **1**: 50 [**3**: 51-**4**:26-**5**:72-**7**:85, 527].—Reeve, Conch. Icon.: pl. 43, fig. 196a, b. *Vitrinoconus doliolum* Tryon, Manual **1**: 160, pl. 35, fig. 23. *Kaliella doliolum* Möllendorff, Jour. Malac. **7**: 102; Caroline Islands; Ponape: (Kubary!); Marianas Islands: Guam.

Philippines: Cebu: Sibonga (R. Cuming!). ANSP. 96362 (Quadras!).

Marianas Islands: Guam: BBM. 82705, dissected, on hibiscus in garden, Agana (Hornbostel! Oct. 30, 1925). Rota: BBM. 81985, under side of pandanus leaves, near shore, Ugis (Hornbostel! July 7, 1925). Tinian: BBM. 76960, on stones and logs, near shore, Taga (Hornbostel! May 16, 1925).

Caroline Islands: Truk (Tol Islet): BBM. 153876, on young pandanus trees, alt. 1,000 feet, Mount Uropot (Y. Kondo! Jan. 8, 1936). Kusaie: BBM. 153961, on shrubs, alt. 75 feet, Lammot Valley (Kondo! Jan. 25, 1936).

Shell (pl. 14, fig. 9; pl. 9, fig. 9) similar to *L. striolata* but slightly larger, subcarinate to markedly angulate when young, distinctly but somewhat bluntly angulate on 5th whorl; light fulvous color. Embryonic whorls soon assuming sharper spiral striae and coarser, considerably more prominent growth-threads. Later whorls with similar subequal growth-threads (40 per mm. on 5th), also beaded by spiral striae above; base with much more closely spaced, finer, spiral striae; 5th whorl with suture dropping below angle of penult. Aperture rounded angulate; peristome 30° to shell-axis; columella suddenly and strongly reflected so as to appear weakly emarginate, hiding more than ¾ of superficial perforation (17 times in maj. diam.).

Animal with whitish foot; tail laterally compressed; tail horn conical and reaching tip of sole. Right shell-lap forming a weakly triangular expansion, about twice as wide as deep. Lung 6 times as long as base or 3.5 length of kidney, which is over 3 times as long as its base or 1.5 times length of pericardium. Talon (pl. 3, fig. 8) stout clavate; carrefour large. Uterus much distended, containing 8 or 9 large, developing eggs. Spermatheca long clavate. Penial sheath covering epiphallus and quite long, attenuate penial appendix; penis of younger specimens sometimes containing a very large dart (pl. 3, fig. 7), which consists of an irregular base, a flat thin body, decorated with copper-colored spots and a long, slender, cylindric, hollow spine. Atrial orifice over ⅛ distance to visceral peduncle behind tentacles. Jaw with low, rounded median lobe, sometimes eroded into relative prominence. Radula (pl. 3, fig. 6) with oblong central, 5 tricuspid laterals and 30 moderately elongate marginals which vary in number of cusps but mostly have 4; 89 rows counted.

Genus **PUKALOA**, new genus

Pukaloa new genus, type *Trochonanina obconica* Garrett (BBM. 3187).

Pukaloa obconica (Pease), (pl. 9, figs. 10-12; pl. 3, fig. 9).

Helix obconica Pease, 1864, Proc. Zool. Soc.: 669, central Pacific islands.—Pfeiffer, Monogr. **5**: 85 [**7**: 99]. *Trochomorpha obconica* Pease, 1871,

Proc. Zool. Soc.: 474, Raiatea. *Trochonanina obconica* Garrett, Jour. ANSP. **9**: 22, pl. 2, fig. 37, a-b. *Nanina obconica* Tryon, Manual **2**: 49, pl. 23, figs. 72-74.

Society Islands: Raiatea: [in the higher portions of two valleys, one on the east and the other on the west side (Garrett!)]. BBM. 3187 (Garrett!); ANSP. 49337, labeled Tahiti (from Pease); ANSP. 1971, labeled Sandwich Islands (from Pease); ANSP. 49301, "Types, Jour. A.N.S.IX" (Garrett!).

Shell (pl. 9, figs. 10-12) lenticular, with sharp carina margined above and below by shallow concavities, openly perforate; light greenish horn-color, dull above and below but with base smoother. Embryonic whorls about 1¾; first half whorl weakly granulate; remainder assuming neanic sculpture; suture fairly impressed and overriding. Neanic whorls with low, quite closely-spaced growth-wrinkles, between which the interspaces are granulate but without evident spiral sculpture; suture less impressed and approaching rim of carina. Last whorl with more widely and irregularly spaced growth-wrinkles (15 per mm.) obscurer above; base smoother, but with fine, low growth-threads and very minute granulation (no evident spirals); suture little impressed, attached at rim of carina. Perforation (14 times in diam.) lined by callous deposit but perfectly open and perspective. Aperture narrow, carinate, slightly oblique (80° to shell-axis); parietal callus margined by a white line; peristome simple and sharp, very weakly concave below carina, almost 20° to shell-axis; columella very little expanded.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	umb.	1½	whs.
Pease	4.5	(7)	.....	.....	.....	.....	.....	6
BBM. 3187	3.73	205(7.64)	199(7.41)	54(2.03)	136(2.76)	14(.54)	2.13	5.5

Dried-in animal containing embryos. Jaw with very weak median lobe. Radula (pl. 3, fig. 9) with oblong, tricuspid central, 9 oblong tricuspid laterals (entocone often becoming vestigal on outermost) and 66 marginals, of which inner 42 are slender and bicuspid, 11 next become shorter and are usually tricuspid, and outer 13 have more cusps; 101 rows counted.

Pukaloa obconica has a shell much like a small *Trochomorpha,* but its ovoviviparity and the resemblance of its radula to that of *Cookeana* probably indicate a relationship with the last genus and with *Liardetia.* It is the type and only known species of the new genus *Pukaloa.*

Genus COOKEANA, new genus

Cookeana new genus, type *C. vindex* new species.

Cookeana vindex, new species (pl. 16, figs. 13-15; pl. 3, figs. 12-13).

Austral Islands: Tubuai: BBM. 11301 (136025, dissected), alt. 1,100-1,200 feet, medium damp northeast slope of Mount Pane (Mang. Exped.! Aug. 23, 1934).

Shell (pl. 16, figs. 13-15) turbinate with large whorls, weakly angulate below periphery, with flattened base and weak foveola; light brown, dull and hairy above; base polished, bright chestnut-color with light brown band just below angle. Embryo-

nic whorls 1¾, rapidly increasing, at first slightly hyperstrophic (i. e., overridden by following whorls in variable amounts); first half-whorl smoothish (largely hidden); last whorl gradually developing strong, spiral furrows and ridges (12 visible) and thin, quite high, epidermal growth-riblets, which form long, acuminate, deciduous and easily broken, brownish bristles over each spiral ridge. Later whorls with spiral ridges less prominent but with epidermal riblets (7 per mm. on last) and hairs (0.2 to 0.3 mm. long and 16 per rib on last whorl) well developed above; base polished (looks varnished) with blurred growth-lines and obscured, fine, irregular, spiral striae; suture deeply impressed. Aperture almost circular but (sharp) peristome inclined 45° to shell axis and markedly concave below periphery; parietal callus heavy and white. Columella slightly straightened and decidedly thickened, but scarcely reflected.

Animal with foot usually dark, more deeply pigmented between pedal grooves, in 3 middorsal stripes on head and over mantle-lobes and shell-lap; lung dark or with network of transparent, whitish patches around kidney and pulmonary vein; apical whorls with considerable dark pigment and with blood vessels outlined by chalky deposit. Tail with distinct dorsomedian groove and short tail horn. Shell-lobes absent; left mantle-lobe large and undivided; lung about 3 times as long as base or 2¼ times length of kidney, which is twice as long as its base or length of pericardium. Ovotestis consisting of 5 conoid groups of alveoli, imbedded in basal ⅔ of short apical lobe of liver. Talon (pl. 3, fig. 13) small, ovoid; albumen gland very small (probably exhausted); uterus attenuate apically, containing 2 small eggs and 1 very large embryo; post-uterine oviduct with longitudinal folds, visible externally. Spermatheca short, clavate. Penial sheath covering epiphallus, penis and appendix. Epiphallus gradually expanding, short and internally thrown into longitudinal folds; opening, without definite papilla or change in diameter into short apical portion of penis; body of penis subspherical with large, vermiform appendix and with small lobe or gland between arms of an internal, Y-shaped fold that lies between appendix and epiphallar stalk. Penial prepuce slightly shorter and atrium proper about as long as body of penis, opening a little in front of anterior edge of visceral peduncle. Jaw well striated mesially, where low, broadly rounded median lobe is developed. Radula (pl. 3, fig. 12) with squarish, tricuspid central, 8 slightly more oblong, tricuspid laterals which reduce entocone until vestigial on outermost, and 61 marginals, of which inner 44 become slender and bicuspid and remainder are mainly tricuspid; 106 rows counted.

Central nervous system and principal nerves as in *Microcystis ornatella*; buccal commissure and ganglia slightly more elongate; right pleural ganglion even more closely joined to parieto-abdominal; left parietal and abdominal connectives shorter; pedal ganglia slightly more distinct from each other, with otocysts more posteriad; left (and right) posterolateral pedal nerve single but with 2 roots; left caudoventral pedals with common origin but right ones separate; with only 2 left medioventral pedal nerves (most anteriad one lacking).

This very distinct genus, named for Dr. C. Montague Cooke, Jr., seems to be limited to Tubuai Island. The two species are very closely related and larger series may show intergradation. In both, the contrast between the hirsute apical surface and the polished base is very striking. A key for their separation follows:

A. Shell turbinate, weakly angulate below periphery, light brown above with epidermal riblets more closely spaced (7 per mm. on last whorl); Mt. Pane..... **C. vindex,** new species.

AA. Shell depressed turbinate, without evident angulation, chestnut-color above with epidermal riblets more widely spaced (4 per mm. on last whorl); Mount Tavaetu..... **C. anathesis,** new species.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	3 wh.	whs.
C. vindex type	7.28	125(9.08)	115(8.34)	41(2.98)	173(5.16)	3.44	2.3(8.02)	3.5
C. anathesis type	5.36	186(9.96)	168(8.99)	53(2.84)	199(5.64)	3.44	2.7(9.39)	3.2
another	5.64	160(9.04)	.....	48(2.69)	181(4.88)	.....	.....	3¼

Comparative whorl-sizes in *Pukaloa, Cookeana* and *Kusaiea*

	1½	3 wh.	3.5 wh.	4 wh.	5 wh.	6 wh.	whs.	index
P. obconica	2.13	1.6(3.45)	.....	2.4(5.10)	3.2(6.79)	4.0(8.5)?	5.5	205
C. vindex	3.44	2.3(8.02)	2.6(9.08)	3.1(10.6)?	.....	.....	3.5	125
C. anathesis	3.44	2.7(9.39)	.....	.....	.....	.....	3.2	186
K. frivola	1.56	2.4(3.76)	2.8(4.42)	3.2(5.0)?	.....	.....	3¾+	143
BBM. 153758	1.57	.....	2.9(4.51)	3.3(5.13)	.....	.....	4+	145

Cookeana anathesis, new species (pl. 16, figs. 11-12; pl. 4, figs. 1-2).

Austral Islands: Tubuai: BBM. 11302 (141829, dissected), on shrubs, ferns and dead leaves and under stones and logs, medium damp hillside, alt. 150-500 feet, Mount Tavaetu, (Mang. Exped.! Aug. 22, 1934).

Shell (pl. 16, figs. 11-12) similar to *C. vindex* but more depressed (4 adults variable in height but all lower), scarcely angulate and less flattened below; chestnut-color above with darker varices; base with light red band below periphery but mainly horn-color (same pattern in uterine embryos). Embryonic whorls less markedly hyperstrophoid; last whorl with 11 spiral grooves visible (16 altogether on embryo). Later whorls with epidermal growth-riblets more widely spaced (4 per mm. on last). Peristome about 60° to shell-axis.

Animal similar to *C. vindex* but shell-lap with row of black dots; lung with striking pattern of black, irregular (large and small) blotches, which sometimes run together; apical whorls usually pigmented. Uterus with 2 eggs, 2 small embryos and 1 large one. spermatheca (pl. 4, fig. 1) slightly longer. Epiphallus a little larger, internally with more and finer folds; penis more obovoid with some black pigment near base. Penial prepuce about as long as and atrium proper shorter than body of penis; opening similar in position and about 3 times space between pedal grooves above them. Radula (pl. 4, fig. 2) with more oblong central, 9 laterals, of which 2 outermost have vestigial entocones, and 66 marginals of which 16-20 are bicuspid and the remainder develop more cusps until outer teeth have as high as 6 denticles; 108 rows counted.

Genus KUSAIEA, new genus

Kusaiea new genus, type *K. frivola* (Pease) from Lammot Valley (BBM. 155100).

Kusaiea frivola (Pease), (pl. 14, fig. 11; pl. 9, figs. 13-15; pl. 3, figs. 10-11).

Helix frivola Pease, 1866, Amer. Jour. Conch. 2: 290, pl. 21, fig. 3, no locality. *Helicopsis frivola* Pease, Proc. Zool. Soc. 1871: 475, Oualau (= Kusaie), Caroline Islands. *Helix frivola* Pfeiffer, Monogr. 7: 71. *Nanina frivola* Tryon, Manual 2: 116, pl. 38, figs. 77-79.

Caroline Islands: Kusaie: BBM. 155100, dissected, arboreal, alt. 15-75 feet, Lammot Valley, west part (Y. Kondo! Jan. 25, 1936). Truk: Moen Islet: BBM. 153758, dissected, on shrub, alt. 900 feet, Mt. Teroken (Kondo! Dec. 27, 1936).

Shell (pl. 14, fig. 11; pl. 9, figs. 13-15) thin, with relatively strong epidermis, depressed subglobose with whorls flattened above, sharply angulate when young but becoming barely so on 4th whorl and scarcely so at beginning of 5th; base convex with narrow foveola; light greenish yellow, burnished above and glossy below, somewhat transparent. Embryonic whorls 1.8 to 2; first rapidly assuming shallow but sharply engraved, quite widely spaced, spiral lines (21 visible at end), which cross weak growth-striae; second intergrading with neanic in sculpture; suture widely overriding. Later whorls with closely spaced, spiral striae, separating flattened interspaces and crossing weak, low, major (10-11 per mm. at 3.5 wh.) and almost obsolescent minor (4-5 per major) growth-wrinkles above; base more glossy but with sharp, closely spaced spirals and weak, radiating striae; suture well overriding. Aperture about 75° to shell-axis, scarcely angulate to quite evenly rounded; peristome sharp, about 25° to shell-axis, weakly concave below; columella becoming thickened with age, markedly and often abruptly reflected so as to form crescentic expansion which is not adnate to penult whorl and which, from basal view, largely or completely hides open perforation (23-24 times in maj. diam.).

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
Pease	3.5	157(5.5)	.....	.....	.....	.....	.....	4
fig.	4.1	134(5.5)	.....	56(2.3)	126(2.9)	.....	.....	
BBM. 155100	3.39	143(4.86)	131(4.45)	65(2.21)	117(2.58)	1.56	3.2(5.0)?	3¾+
BBM. 153758	3.59	145(5.22)	134(4.81)	59(2.13)	121(2.57)	1.57	3.3(5.13)	4+

Animal white with black ommatophores; tail with marked dorsal groove and radiating, subvertical ones; tail horn twice as long as broad, extending half its length beyond tip of sole, which is scarcely stouter; caudal foss large, subvertical, but folded between horn and foot; sole with middle division a little broader than lateral ones. Mantle-lobes well developed; left deeply divided with posterior lobe big and well expanded. Shell-lobes long triangular; right one about 3 times as long as its base and ½ as long as width of mantle collar; left about ⅔ size of right and situated about ⅛ width of anterior left mantle-lobe beyond outer edge of same. Lung about 5 times as long as base or 2.3 length of kidney, which is attenuate anteriad and about 4 times as long as its base or twice length of pericardium. Talon (pl. 3, fig. 10) small, comma-shaped; uterus with 4 eggs and 3 embryos; post-uterine oviduct long and slender. Spermatheca elongate. Epiphallus mainly outside of penial sheath, large and swollen, internally with longitudinal folds. Penis elongate with very short, conical appendix, internally with heavy pilaster and 2 smaller, parallel folds. Penial retractor arising from diaphragm near base of uterus and inserting between epiphallus and penial appendix. Penial prepuce ⅔ as long as penis, containing much swollen continuation of penial pilaster; atrium proper short; distance from orifice to bases of ommatophore and inferior tentacle about equal to distance between them. Jaw very thin, with almost no median lobe. Radula (pl. 3, fig. 11) with elongate central, which has very large mesocone and small ectocones, 2 equally elongate laterals, on which entocone is reduced and carried out on mesocone, and 175 marginals, which are slender, sigmoid, and have two terminal cusps and numerous small blade ectocones; 106 rows counted.

No authentic specimens of *K. frivola* have been seen and its identification with the BBM. specimens may be a little dubious.[1] However, although Pease's figure shows a more elevated shell, his dimensions call for a more depressed one, and the base does appear imperforate unless carefully examined. The new genus *Kusaiea,* founded on the BBM. animals, is very isolated. I have placed it near the Liardetiae on account of its somewhat similar shell and the rather insignificant appendix on its penis, but its genitalia and radula are even more like those of *Lamprocystis* and *Kusaiea* may be a derivative of that group. *K. frivola* is evidently not endemic to Kusaie and should be looked for in the East Indies; it is the only species of Microcystinae that is not known to occur outside of the Caroline Islands. On the basis of its radula alone, *Kusaiea* would probably be put in the "Durgellinae".

Genus **MENDANA,** new genus

Mendaña, new genus, type *M. rectangula altior* new subspecies.

Tahuatoa, new subgenus, type *M. angulifera* (Garrett) from Kopaafaa [BBM. 94815].

Macrorbis, new subgenus, type *M. mumfordi* new species.

Uanuka, new subgenus, type *M. pisum* new species.

Fatuoa, new subgenus, type *M. longicaulis* new species.

The strictly Marquesan genus *Mendaña* approaches *Diastole* in its subgenus s. s. and *Philonesia* with its subgenus *Fatuoa.* Its radular marginals have more irregular blade ectocones than those of *Diastole.* Its epiphallus develops a corona as in the Philonesiae, although the condition in *M. dentaxis* approaches that in *Diastole.* Its shell is more like that in *Diastole,* but the embryonic whorls have finer, more nearly equal, spiral ridges. A right shell-lobe is absent from *Mendaña* s. s. as from *Diastole,* is scarcely represented in some species of *Uanuka* (see *M. adamsoni*) and is smaller, even in the subgenus *Fatuoa,* than in *Philonesia.*

Key to subgenera of *Mendaña*

A. Mantle without shell-lobes; shell heavier, with growth-sculpture more evident than the spiral, or, if subequal, either with more gradual whorl-increase or more depressed; Nukuhiva, Hivaoa, and Tahuata:.....subgenus **Mendaña** s.s.

AA. Mantle with small right shell-lobe; shell thinner; spirals more evident than growth-wrinkles;

B. Penial atrium swollen or with distinct diverticulum; penis stout and short; shell with heavy epidermis, usually bright-colored or banded; spiral ridges coarse and closely spaced; Nukuhiva, Uapou, and Uahuka:.....subgenus **Uanuka** new.

BB. Penial atrium small; penis elongate with swollen apex; shell with thinner, horn-colored epidermis; spiral ridges finer, with evident interspaces; Hivaoa, Tahuata, and Fatuhiva:.....subgenus **Fatuoa** new.

[1] Since this was written, ANSP 49296, Pease's type lot, has been found and is this species.

Comparative dimensions in the genus Mendaña

	1½	4 wh.	4.5 wh.	5 wh.	6 wh.	Maxima	Index
M. r. altior.....	3.26	2.5(8.13)	2.8(9.00)	3.0(9.84)	3.5(11.30)	6	106
M. rectangula	3.00	.....	2.9(8.63)	3.1(9.30)	3.7(11.2)?	5¾—	118
M. dentaxis	2.75	2.8(7.78)	3.2(8.82)	3.6(10.02)	.....	5¼	132
M. subconula	1.45	2.7(3.90)	3.0(4.37)	3.4(4.93)	4.1(6.0)?	6—	136
M. angulifera	1.92	3.1(5.87)	3.5(6.63)	4.0(7.76)	5.2(10.0)?	5¾	180
M. garrettiana	1.92	3.4(6.54)	4.0(7.69)	4.7(9.03)	.....	5¼	179
M. tais.....	2.63	3.1(8.17)	3.6(9.41)	4.1(10.82)	5.3(13.7)?	5⅞—	168
M. mumfordi	3.05	3.9(12.03)	4.6(14.14)	5.4(16.4)?	.....	4.8	160
M. gummea	1.12	3.5(3.92)	4.1(4.58)	4.8(5.36)	.....	5⅛	159
M. adamsoni	2.49	3.2(8.00)	3.6(9.06)	4.1(10.2)?	.....	4½	152
M. intermedia	2.59	3.2(8.22)	3.6(9.3)?	4.1(10.6)?	.....	4.3	147
M. pisum	2.31	3.0(6.93)	3.4(7.94)	3.9(9.0)?	.....	4.5+	143
M. marquesana ..	3.09	2.9(9.03)	3.3(10.2)?	3.7(11.4)?	.....	4.3	130
M. subvenosa	2.36	3.3(7.72)	3.7(8.7)?	.....	.....	4.1	163
M. subpatula	2.44	3.5(8.65)	4.0(9.8)?	.....	.....	4¼	170
M. longicaulis	2.88	3.3(9.61)	3.7(10.7)?	.....	.....	4⅜	156

Mendaña (Mendaña) rectangula altior, new subspecies (pl. 15, figs. 7-8; pl. 4, figs. 3-5).

Marquesas: Nukuhiva: BBM. 11303 (96001, dissected), damp ridge, alt. 3,500-4,000 feet, Ooumu (Nov. 11). BBM. 96089, on ground, same place; BBM. 96120, same place, alt. 3,900 feet; BBM. 95923-6, dissected, on ferns and shrubs, cloud zone, alt. 3,485 feet, Tonua Ridge (Oct. 22). (All lots P. Ent. Surv.! 1929.)

Shell (pl. 15, figs. 7-8) turbinate-trochiform (spire with convex outlines), with weakly margined thread-carina on 6th whorl; flattened base with small, shallow foveola; typically straw-colored with reddish suture, reddish-brown band broadly above and narrowly below carina and weak, foveolar spot on base [varying from pale straw unicolor (BBM. 95925) to orange-buff with dark band (sometimes divided by white, carinal line) and sharply defined basal spot]; dull above but slightly glossy below. Embryonic whorls around 2¼, with very fine, sharply impressed, spiral striae (41 visible on last whorl), separating low but sharp threads, which are rarely cut by weak growth-striae. Later whorls very gradually increasing in diameter but more rapidly becoming higher; growth-lines augmenting in strength above carina but weak even on 6th whorl, where they render spirals wavy and even crenulate carina; base smoother with very weak growth-striae and much blurred spirals; suture weakly impressed. Aperture slightly inclined downward (about 100° to shell-axis), markedly angulate; peristome about 30° to shell-axis. Columella in embryonic shells with a heavy, angular spiral lamella, which is still quite evident at 5.5 whorls, but becomes obsolescent in larger shells.

Animal with sides of foot darkly pigmented, with black line between pedal grooves, with 3 middorsal black stripes on head and with whitish V dorsally on base of tail; caudal horn short crescentic; tail longer than head. Mantle collar (pl. 4, fig. 5) without shell-lobes and with left mantle-lobe deeply bifid. Lung over 5 times as long as base and over 3 times length of kidney, which is 3 times as long as its base or 1.5 times length of pericardium. Ovotestis consisting of clavate alveoli; duct (pl. 4, fig. 4) very long; talon crescentic bipartite. Uterus with 1 egg and 2 embryos; post-uterine oviduct long and slender. Spermatheca long fusiform. Penial sheath including about ⅔ of epiphallus, of which slender portion is relatively small; penial retractor arising near posterior border of diaphragm and inserting by branches on epiphallus but mainly near

apex of penis; penis enormous but relatively short and stout. Penial prepuce and atrium very short; orifice slightly behind right inferior tentacle. Jaw with well defined, but rounded and quite low median lobe; growth-lines conspicuous. Radula (pl. 4, fig. 3) has moderately elongate central, 11 laterals with minute entocone reducing until absent on last 2, and 52-54 marginals, of which first 3 or 4 are bicuspid, the next 17-22 tricuspid (with few blade ectocones) and the last 30 increase the number of cusps; 107 rows counted.

Central nervous system and principal nerves very similar to those of *Microcystis ornatella* but with considerable superficial black pigment, especially in more dorsal organs; left parietal connective shorter; right parietoäbdominal ganglion relatively somewhat smaller; 2 posterolateral pedal nerves on either side; last (third) medioventral pedal bifurcates immediately; 2 posteroventral pedal nerves on each side have a common trunk; and a nerve (anterior oesophageal) to anterior end of oesophagus comes off directly from each buccal ganglion (instead of from anterior buccal nerve).

M. rectangula altior is probably little more than an ecologic form, which inhabits the heavier forests of the mountains. Its whorls are slightly larger than those of the typical form and shells of the same number of whorls are more elevated, although specimens of the typical form with more than 6 whorls may become practically as high as the largest observed shells (6 whorls) of the form *altior*.

Key to sections, species, and subspecies of subgenus *Mendaña* s.s.

A. Principal radular marginals shorter, usually with 3 large cusps (not more than 8 bicuspid); shell with gradual whorl-increase and with columellar fold, at least when young;

B. Shell with closely spaced spirals (about 40 above), elevated, usually brightly colored or banded, and larger; Nukuhiva:.....subgenus **Mendaña** s.s.

C. Shell dull above, often with color bands; last whorl distinctly angulate; columellar cord heavy in young but obsolescent in large shells; epiphallus not sharply enlarged.....**M. rectangula** (Pfeiffer).

D. Shells of the same whorl-size less elevated; probably from low altitudes.....typical subspecies.

DD. Shell at 6 whorls almost as high as broad; elevations above 3,000 feet.....subspecies **altior** new.

CC. Shell glossy above, light yellowish green; last whorl quite evenly rounded but with low peripheral thread; columella produced below into narrow, tongue-shaped lamella; epiphallus quite sharply enlarged; principal marginals of radula usually with blade ectocones.....**M. dentaxis** new species.

BB. Shell with more widely spaced spirals (about 30 above), much depressed (large) or elevated (small), horn-colored; Hivaoa and Tahuata:.....section **Tahuatoa** new.

E. Shell elevated and small, with glossy base and strong columellar fold; Hivaoa:.....**M. subconula** Garrett.

EE. Shell much depressed and half again as large, with duller base and with columellar fold becoming obsolescent in large examples;

F. Shell with more gradual whorl-increase and with weakly margined carina; Hivaoa and Tahuata:.....**M. angulifera** (Garrett).

FF. Shell with more rapid whorl-increase and with carina broadly and distinctly margined; Tahuata:.....**M. garrettiana** (Garrett).

AA. Principal marginals (22) elongate with two large cusps; shell without columellar cord and typically with more rapid whorl-increase; embryonic whorls like B; Nukuhiva:.....section **Macrorbis** new.

G. Shell smaller, rougher and with more gradual whorl-increase.....
.....**M. tais** (Pfeiffer).

GG. Shell larger, smoother and with more rapid whorl-increase.....
.....**M. mumfordi** new species.

Dimensions in subgenus *Mendaña* s.s.

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	5 wh.	whs.
M. rectangula								
Pfeiffer	10	(13)	(12)	.....	.....	.....	.....	6-6.5
fig.	11.85	110(13)	.....	37(4.40)	124(5.45)	.....	.....	
(hapa)	11	(15)	.....	.....	.....	.....	.....	7
fig.	12.9	116(15)	109(14.0)	42(5.4)	133(7.2)	.....	.....	
(alta)	9	(10)	.....	.....	.....	.....	.....	6
fig.	9.0	111(10)	.....	49(4.4)	123(5.4)	.....	.....	
ANSP. 49016	8.90	118(10.5)	113(10.05)	43(3.87)	136(5.24)	3.02	3.1(9.30)	5¾—
M. r. altior								
Type	10.67	106(11.30)	102(10.92)	37(3.90)	139(5.42)	3.26	3.0(9.84)	6
M. dentaxis								
Type	7.96	132(10.47)	126(10.02)	52(4.12)	123(5.04)	2.75	3.6(10.02)	5¼
M. subconula								
Garrett	5	(6)	.....	.....	.....	.....	.....	6
BBM. 3435	4.38	136(5.95)	130(5.69)	47(2.08)	139(2.90)	1.45	3.4(4.93)	6—
M. angulifera								
Garrett	5	(8.5)	(7.75)	.....	.....	.....	.....	5
	5	(9.5)	(9)	.....	.....	.....	.....	6
BBM. 94815	5.11	180(9.21)	175(8.93)	57(2.94)	152(4.48)	1.92	4.0(7.76)	5¾
M. garrettiana								
Garrett	5	(9)	(8)	.....	.....	.....	.....	5.5
BBM. 3845	5.33	179(9.54)	169(9.03)	56(2.98)	161(4.79)	1.92	4.7(9.03)	5¼
M. mumfordi								
Type	9.52	160(15.20)	148(14.11)	62(5.95)	128(7.61)	3.05	5.4(16.4)?	4.8
M. tais								
Pfeiffer	7	(13)	(12)	.....	.....	.....	.....	6
type fig.	9.18	142(13)	.....	56(5.13)	126(6.44)	.....	.....	
H. & J. fig.	8.7	152(13.2)	136(11.8)	48(4.2)	150(6.3)	.....	.....	
ANSP. 49299	7.96	168(13.4)	157(12.53)	51(4.09)	178(6.86)	2.63	4.1(10.82)	5⅞—

Mendaña (Mendaña) rectangula (Pfeiffer), (pl. 10, fig. 1).

Helix rectangula Pfeiffer, 1846, Proc. Zool. Soc. 1845: 130, Marquesas; Monogr. **1**:35 [**3**:36—**4**:16—**5**:56, 465—**7**:68]; Conch.—Cab. **I**:242, pl. 28, figs. 8, 9.—Tryon, Manual **3**:73, pl. 14, figs. 92-94.

Helix hapa Hombron et Jaquinot 1852 (?), Voy. Pol. Sud, livr. **22**: pl. 7, figs. 38-41.—Rousseau, Voy. Pol. Sud. **5**: 27, Nouka-Hiva.

Helix alta Pease, 1868, Amer. Jour. Conch. **4:** 153, pl. 12, fig. 1, Ponape (sic).—Pfeiffer, Monogr. **7**: 69.—Tryon, Manual **3**: 73, pl. 14, fig. 91.

Marquesas: [Nukuhiva: probably at low elevations]; BBM. 3769, 5736 (Garrett!); ANSP. 49016 (*H. alta* from Pease, possibly the type, without locality).

Mendaña (Mendaña) dentaxis, new species (pl. 15, figs. 13-15; pl. 4, figs. 6-7).

Marquesas: Nukuhiva: BBM. 11304 (106318-9, dissected), on the ferns and shrubs, damp hillside, alt. 3,000 feet, Toovii Plateau (P. Ent. Surv.! June 19, 1931).

Shell (pl. 15, figs. 13-15) globose-turbinate, weakly thread-carinate at periphery but not flattened above or below; base with slightly deeper foveola than in *M. rectangula*; pallid yellowish green with still lighter apex; scarcely glossy above but somewhat so below. Embryonic whorls 2¼ to 2½, rather smoothish, with more obscure spirals than in *M. rectangula* on last whorl and sometimes with angulate growth-wrinkles near end. Later whorls more rapidly increasing; with obscure growth-wrinkles and much blurred and wavy, fine spirals; base with wavy spirals; suture weakly overriding and scarcely impressed. Aperture broadly lunate, scarcely oblique (about 80° to shell-axis) and almost evenly rounded; peristome about 30° to shell-axis. Columella much thickened; produced below into a tongue-shaped lobe, which diverges about 30° from peristome, becomes thicker and transversely angular in large shells and apparently represents a spiral fold that is dissolved from behind to near plane of aperture.

Animal white with black tentacles and a trace of middorsal stripes on head; tail with prominent dorsal groove and weakly developed horn. Lung opaque white, 5 times as long as base or 3.5 times length of kidney, which is about twice as long as its base or 1.5 times pericardial length. Female genitalia very like *M. rectangula altior,* but post-uterine oviduct relatively shorter. Penial sheath includes most of epiphallus (pl. 4, fig. 6), which is relatively stout and well demarcated at vas end and has ovoid corona; penial retractor attached mainly along side of last half of epiphallus but reaching penial apex; penis longer than all female genitalia, enlarged at both ends. Jaw with lower, more rounded median lobe. Radula (pl. 4, fig. 7) has 10 laterals with larger entocone becoming vestigial on last, and 58 marginals, of which first 2 are bicuspid but principal ones are tricuspid with several small, irregular blade-ectocones; 99 rows counted, with shape of each much as in preceding.

M. dentaxis is the glossiest species of *Mendaña* and develops the most prominent columellar fold. Its epiphallus is better demarcated at the vas deferens end than is usual in Philonesiae.

Mendaña (Tahuotoa?) subconula (Garrett), (pl. 15, figs. 5-6).

Trochonanina subconula Garrett, 1887, Bull. Malac. Soc. France 4: 13, Dominique.

Marquesas: Hivaoa: BBM. 3435 (from type lot), under decaying vegetation. Marquesas: ANSP. 83208 (C. D. Voy!).

Shell (pl. 15, figs. 5-6) conoid-turbinate, with narrowly margined carina; base rounded with very shallow foveola; light russet-colored, dull above but decidedly burnished near middle of base. Embryonic whorls 2.5; last with about 25, distantly spaced, fine spiral ridgelets visible. Later whorls with very weak major growth-wrinkles (5-6 per mm. on last wh.) and extremely fine, anastomosing, minor ones (about 15 to interspace), not crossing spirals (25 on last wh.) above carina, continuing less distinctly about 0.2 diameter of base; central 0.8 base with indistinct and blurred spirals; suture lightly impressed, attached at end of carina (slightly below on last wh.). Aperture quite narrow, slightly oblique (75° to shell-axis), angulate; peristome weakly arcuate below and 15° to shell-axis. Columella heavy and white, with prominent, rounded, entering, spiral cord (at 6 whorls). Anatomy unknown.

Although smaller and more elevated than the other species of the section

Tahuatoa, M. subconula has similar sculpture. The characters that separate this group of Hivaoan and Tahuatan species from *Mendaña* s.s. are rather trivial; peculiarly enough, the two sections from Nukuhiva are much more distinct from each other.

Mendaña (Tahuatoa) angulifera ("Mousson" Garrett), (pl. 15, figs. 1-2; pl. 4, figs. 8-9).

Trochonanina angulifera Garrett, 1887, Bull. Soc. Malac. France 4: 11, Dominique.

Marquesas: Hivaoa: BBM. 3426 (from type lot), under rotten wood (Garrett!). BBM. 94815-6, dissected, on ferns and shrubs, medium damp valley, alt. 2,770 feet, Kopaafaa (Aug. 2, 1929); BBM. 95911, juvenile with strong columellar fold, on leaves, alt. 2,600 feet, northeast slope of Mount Temetiu (Sept. 11, 1929). Tahuata: BBM. 99749-50, approaching *M. garrettiana,* on ferns and shrubs, damp valley 3 miles from shore, alt. 2,000 feet, Ivaivaiti (June 28, 1930). (All lots P. Ent. Surv.!).

Shell (pl. 15, figs. 1-2) almost lenticular, subcarinate (with very narrowly and weakly margined carina; 99750 more distinctly margined); base rounded with shallow foveola; russet horn-colored (99750 pallid), dull above and weakly burnished below. Embryonic whorls 2¼; last with about 31 (about 21 more distinct), quite distantly spaced, fine, spiral ridgelets visible. Later whorls with low but quite sharp, angular, closely spaced growth-wrinkles (13 per mm. on 6th) that crenulate carina, crossed by spirals (as on embryonic whorls) above; base a little smoother but with similar spirals (becoming more closely spaced towards columella); suture scarcely impressed, at end of carina (or below on last wh.). Aperture narrow, almost transverse, markedly angulate at 80° to shell-axis; peristome about 20° to shell-axis, weakly arcuate below. Columella heavily calloused; young shells (95911) with strong angular spiral fold, which is much less distinct at 5.5 whorls and is often obsolete in largest shells.

Animal similar to *M. rectangula altior,* light in color except some pigment on sides of head and in three middorsal stripes, of which central is broken into dots. Mantle collar and lung similar but surface of latter light with small white spots and one or two large patches over kidney. Talon stouter and uterus contains two large eggs and one embryo; epiphallar corona (pl. 4, fig. 9) with 10 folds. Radula (pl. 4, fig. 8) has 10 laterals, with stronger entocone becoming obsolete on last, and 38 marginals, of which eight are often bicuspid. Anatomy of Tahuata specimens the same.

Although the specimens of *M. angulifera* from Tahuata have slightly more distinct carinal sulci and additional material may bring proof of intergradation, the type lot of *M. garrettiana* seems to represent a fairly distinct species. Although the columellar fold may be absent from large shells of either species, it is quite strong in young specimens of *M. angulifera.*

Mendaña (Tahuatoa) garrettiana ("Ancey", Garrett), (pl. 15, figs. 3-4).

Trochonanina garrettiana, Nanina multistriata Garrett, 1887, Bull. Soc. Malac. France 4: 12, Taiwata.

Marquesas: Tahuata: BBM. 3845 (from type lot; Garrett!).

Shell (pl. 15, figs. 3-4) similar to *M. angulifera,* but with carina distinctly margined by a broad groove above and somewhat less so below. Later whorls more rapidly increas-

ing; growth-wrinkles (9 per mm. on 6th) slightly heavier above. Columella without fold in large shell. Animal unknown.

Ancey is, of course, to blame for the description by Garrett of a species that bears his own name.

Mendaña (Macrorbis?) tais ("Jaquinot", Pfeiffer), (pl. 10, figs. 4-5).

Helix thais Pfeiffer, 1849, Zeitschr. Malak. **6**: 68, Marquesas.

Helix tais Hombron et Jaquinot, 1852 (?), Voy. Pol. Sud, livr. **22**: pl. 7, figs. 42-45.—Pfeiffer, Monogr. **3**: 37 [**4**: 19—**5**: 59—**7**: 74]; Conch. Cab. II: 298, pl. 125, figs. 32, 33.—Rousseau, Voy. Pol. Sud. **5**: 27.

Nanina tais Tryon, Manual **2**: 48, pl. 23, fig. 61.

Marquesas: [Nukuhiva: probably at low elevations]; BBM. 3742, ANSP. 49299 (Garrett!).

Shell (pl. 10, figs. 4-5) depressed (49299 much more so than Pfeiffer's figures) trochiform, sharply angulate, subcarinate (scarcely margined but sharply angulate), with fairly convex base and narrow, moderately deep foveola; tan-colored, dull above, glossy below. Embryonic whorls almost two; first assuming weakly beaded, low, spiral ridgelets (40 visible at end); second developing fine, angular growth-wrinkles, which are crossed by spirals. Later whorls assuming sharper growth-wrinkles (6 per mm. on 5th), which are less strikingly crossed by low spiral ridgelets (55 major ones on 6th) above; base with wavy spirals becoming more blurred toward columella; suture lightly impressed, attached at angle. Aperture narrowly subtrapezoidal (49299 much lower than in Pfeiffer's figures), angulate at 80° to shell-axis; peristome 25° to shell-axis, almost straight below. Columella, at 1⅝ whorls (embryo), almost straight, cylindrical and steeply inclined; at 5.5, very heavily thickened and subtruncate; at 5⅞, scarcely truncate and continued by a low but heavy thickening some distance inside peristome. Animal unknown.

Mendaña (Macrorbis) mumfordi, new species (pl. 15, figs. 9-10; pl. 4, figs. 10-12).

Marquesas: Nukuhiva: 11308 (105161-2, dissected), on ground under dead leaves, damp ridge, alt. about 3,000 feet, Ooumu (P. Ent. Surv.! May 29, 1931); BBM. 96061-2, same place, 3,400 feet, (P. Ent. Surv.! Nov. 13, 1929).

Shell (pl. 15, figs. 9-10) heliciform, distinctly angulate, slightly flattened above but rounded below; typically chestnut-color above and on angle, brownish (to light) olive below, with a vague (to distinct) chestnut spot around white columella; dull above and quite polished below. Embryonic whorls about 2.25, with spirals like *M. rectangula,* but becoming much reduced on last. Later whorls with weak, fine growth-wrinkles at first, becoming excessively weak on last whorl (5-6 per mm.), crossed by weaker spirals than in *M. rectangula,* above; base polished with spirals almost obsolete; suture weakly impressed, overriding and margined. Aperture fairly broad, almost transverse (80° to shell-axis); peristome about 20° to shell-axis. Columella thickened and abruptly tapered (especially when young) but without distinct fold at any stage.

Animal similar to *M. rectangula altior* but sole dark gray. Lung black with rows of white dots which sometimes coalesce into short stripes; 4.5 times as long as its base or 2.5 times length of kidney, which is 3.3 times as long as its base or about twice length of pericardium. Uterus contains two ovoid eggs and three embryos; postuterine oviduct shorter; spermatheca (pl. 4, fig. 12) much shorter and stouter; epiphallar corona more elongate and penis very long (like *M. dentaxis*). Jaw of some animals like that of *M. rectangula altior,* of others more like that of *M. dentaxis.* Radula of adult (pl. 4, fig. 10) has 13 laterals, of which the minute entocone is absent from only the last, and

52 marginals, of which about the first 22 are bicuspid (+ minute, sporadic blade ectocones) and much more elongate and remainder develop spatulate mesocone. Radula of old embryo (shell with 2 whorls) has eight similar laterals (last bicuspid) and 15 marginals, of which only two are bicuspid and rest have more ectocones that tend to extend down blade. Radula of young embryo (shell with one whorl) has 66 transverse rows, of which the most anterior (first formed) four contain only three plates (central and one on each side) without cusps [although apparently none of the teeth are worn]; rows 5-7 with 5 plates; 8-10 with 7; 11-15 with 9 and with mesocone first appearing on central; 16-21, beyond which cusps become evident, with 11; row 33 (pl. 4, fig. 11) with central and first two laterals squarish and tricuspid, next three teeth with two ectocones and last four decidedly broader than long [like marginals in Endodontidae] without entocone but with two or three ectocones [19 teeth in all]; 42d row with 21 teeth; 64th with 27 [marginals still broader than long!].

T. mumfordi is one of the largest and handsomest shells in the Microcystinae. Its more rapid whorl-increase and few whorls give it some resemblance to the subgenera *Uanuka* and *Fatuoa*. Its adult radula is quite specialized, although its embryonic marginals closely resemble those of some Endodontidae.

Mendaña (Uanuka) adamsoni, new species (pl. 16, figs. 1-2; pl. 4, figs. 13-15).

Marquesas: Uapou: BBM. 11309 (98285, also 98339, dissected), on shrubs and tree trunks, alt. 2,000-3,000 feet, Hakahetau Valley (P. Ent. Surv.! Dec. 6, 1929).

Shell (pl. 16, figs. 1-2) depressed trochiform, sharply but narrowly carinate; base with very shallow foveola; typically light russet horn-colored, sometimes (98339) with brownish band almost covering whorl above and another, almost as broad, shortly below carina; dull above and little brighter below. Embryonic whorls 2 to 2⅜, with heavy, subequal, spiral wrinkles (about 32 visible on last), slightly crenulated but scarcely beaded by weak growth-wrinkles. Later whorls similar above but spirals rendered more wavy by stronger, but still low growth-wrinkles; base with weaker growth-wrinkles and slightly blurred, but still distinct spirals; suture lightly impressed. Aperture fairly narrow, almost transverse and sharply angulate; peristome about 20° to shell-axis and scarcely arcuate below. Columella without spiral cord (no very young shells seen), slightly thickened, considerably behind peristome, so as to form an angular ridge extending to middle of base.

Animal light in color with some dark pigment on sides of tail and top of head (2 stripes present middorsally). Mantle collar (pl. 4, fig. 13) white; right shell-lobe represented by a crescentic expansion, two or three times as broad as long, with pigmented edge; left mantle-lobes deeply divided. Lung with dark anterior border and numerous chalky-white spots; five times as long as its base or 3.5 times kidney length, which is twice its base or 1.5 pericardial length; apical whorls also with chalky spots which become confluent along columellar side at very apex. Genitalia similar to *M. pisum* but uterus with one ovoid egg and one embryo; spermatheca containing a membranous sac (pl. 4, fig. 14). Penial sheath including all epiphallus, which has elongate corona with six folds; penis short, tapering apically; penial retractor attached by branches to one or two loops of epiphallus and inserting on corona and near apex of penis. Penial prepuce and atrium everted in all adults seen [probably about as long as penis when not so], but apparently with a short lobe or swelling on right side, where wall is considerably thickened. Jaw with very low median lobe in one animal and irregularly eroded in another. Radula has oblong central (less elongate than in *M. pisum* but more so than

in *M. rectangula altior*), nine laterals, with minute entocone absent from 9th, and 53 marginals, of which one or two are bicuspid and principal ones (pl. 4, fig. 15) add one to several blade ectocones; 98 rows counted.

M. adamsoni and *M. intermedia* are very closely related to each other, but the differences, outlined in key, seem to warrant their specific separation. They have sculpture rather similar to the much smaller *M. gummea.*

Key to the species of the subgenus *Uanuka*

A. Shell markedly angulate, with slightly coarser spiral ridges;.....group of **M. adamsoni.**

B. Shell diameter (4.5 wh.) about 8 to 9 mm.; penial atrium apparently without distinct diverticulum;

C. Shell carinate; whorls markedly flattened above; growth-wrinkles irregular and indistinct; foot lightly pigmented; right shell-lobe broader than long; Uapou: .....**M. adamsoni,** new species.

CC. Shell angulate; whorls more convex above; growth-wrinkles regular and sharper; foot dark; right shell-lobe longer than broad; Uahuka:.....**M. intermedia,** new species.

BB. Shell about half as large, carinate; Nukuhiva:.....**M. gummea** (Garrett).

AA. Shell weakly angulate; spiral ridges slightly finer; penial atrium with sac-like diverticulum .....typical group.

D. Shell more depressed, weakly angulate, unbanded or with light peripheral stripe; smaller than B; penial atrium with short diverticulum; foot dark; Nukuhiva: .....**M. pisum,** new species.

DD. Shell subglobose, barely angulate, with dark band just above periphery; larger than B; penial atrium with elongate diverticulum; foot with black band on either side; Uahuka: .....**M. marquesana** (Pease).

Dimensions in subgenus *Uanuka*

	Shell			Aperture		Standard Sizes		whs.
	alt.	maj.diam.	min.diam.	alt.	diam.	1½	4 wh.	
M. adamsoni								
type	5.95	152(9.06)	142(8.46)	53(3.13)	154(4.82)	2.49	3.2(8.00)	4½
M. intermedia								
type	6.15	147(9.05)	138(8.46)	56(3.47)	139(4.82)	2.59	3.2(8.22)	4.3
M. gummea								
Garrett	3	(6)	.....	.....	.....	.....	.....	5
BBM.3770	3.47	159(5.52)	151(5.25)	55(1.90)	126(2.39)	1.12	3.5(3.92)	5⅛
M. pisum								
type	5.66	143(8.08)	136(7.72)	57(3.24)	128(4.16)	2.31	3.0(6.93)	4½+
M. marquesana								
Pease	7	(9)	.....	.....	.....	.....	.....	5
BBM. 104969	7.24	130(9.42)	127(9.19)	51(3.70)	134(4.96)	3.09	2.9(9.03)	4.3

Mendaña (Uanuka) intermedia, new species (pl. 16, fig. 3; pl. 9, fig. 1).

Marquesas: Uahuka: BBM. 11310 (104809, dissected; also 104950), on ferns and shrubs, damp ridge, two miles inland, alt. 1,900 feet, Penauhane

Valley (P. Ent. Surv.! Feb. 27, 1931). Marquesas: ANSP. 49331 (Garrett! labeled *N. conula*).

Shell (pl. 16, fig. 3; pl. 9, fig. 1) similar to *M. adamsoni* but angulate, with whorls more rounded above and with suture more impressed; color more golden, sometimes (104950) with upper band present. Embryonic whorls 2.25 to 2.5, with weaker spirals (about 40 visible on last) that are more often cut by growth-wrinkles. Later whorls with spirals considerably weaker and crenulated by regular, closely spaced, angular but low growth-wrinkles (about 11 per mm. on 5th) above periphery. Aperture weakly angulate.

Animal similar to *M. adamsoni* but quite darkly pigmented with three middorsal black stripes and a light band between pedal grooves. Right shell-lobe about twice as long as broad, very small. Lung light with numerous circular to oval, white dots; four times as long as base or almost four times kidney length, which is slightly longer than wide and 1.5 times pericardial length. Uterus with two eggs and two embryos; spermatheca slender. Jaw with low, evenly rounded median lobe. Radula similar to *M. pisum* but with 69 marginals, of which 3 to 5 are bicuspid; 92 rows counted.

Mendaña (Uanuka?) gummea (Garrett), (pl. 10, figs. 7-8).

Trochonanina gummea Garrett, 1887, Bull. Malac. Soc. France **4**: 14.

Marquesas: Nukuhiva: BBM. 3770 (type), on leaves in mountains (Garrett!).

Shell (pl. 10, figs. 7-8) depressed conoid, similar to *M. adamsoni* in form but much smaller, with narrowly margined carina; amber-colored; dull above but slightly brighter below. Whorls with feeble growth-wrinkles crossed by about 31, spaced, spiral ridgelets above carina; base smoother. Aperture fairly narrow, almost transverse (about 80° to shell-axis) and sharply angulate. Columella thickened but without trace of fold (only type shell seen). Animal unknown.

Mendaña (Uanuka) pisum, new species (pl. 16, figs. 4-5; pl. 4, figs. 16-17).

Marquesas: Nukuhiva: BBM. 11311 (96039, dissected; also 95993-5), on shrubs, near summit of damp ridge, alt. 4,050 feet, Ooumu (P. Ent. Surv.! Nov. 12, 1929).

Shell (pl. 16, figs. 4-5) globose-trochiform, angulate when young but almost evenly rounded with weak thread-carina on 5th whorl; basal foveola very weak; medium to dark russet-color; dull above and slightly brighter below. Embryonic whorls 2.25 to 2.7, with fine spiral ridges (47 visible on last; similar to but not so high as in *M. rectangula*), undulated and weakly beaded by growth-wrinkles. Later whorls with very weak growth-wrinkles above (12 per mm. on 5th wh.), crossed by fine spirals; base like *M. adamsoni;* suture impressed. Aperture slightly oblique, scarcely angulate at about 75° to shell-axis; peristome about 20° to shell-axis. Columella considerably heavier than that in *M. adamsoni,* quite convex, although without distinct cord even in young shells.

Animal black with markings like *M. rectangula altior*; tail horn quite prominent; right shell-lobe as long as wide, pigmented. Lung opaque white. Hermaphroditic duct almost as long as uterus; talon (pl. 4, fig. 16) short, recurved and bipartite; uterus with two small eggs and two embryos; spermatheca slender. Penial sheath including over half of epiphallus, which is short with sphaeroid corona; penis short; penial retractor inserted on corona and for some distance above and below. Penial prepuce and atrium considerably larger than penis, with thin-walled, sacculate lobe almost full length of right side (more apparent when viewed from inner side, which is turned away in fig. 16), with a strong internal pilaster on inner side and with a large, crescentic fold, with flocculent surface, obliquely across inside of outer wall; opening shortly behind inferior tentacle. Jaw with low median point or irregularly eroded. Radula (pl. 4, fig. 17)

has nine laterals, with minute entocone absent from last, and 79 to 80 marginals, of which 2 are usually bicuspid and remainder have three principal cusps and often a varying number of blade ectocones.

M. pisum, the type of the subgenus *Uanuka,* has a shell rather similar to that of the group of *M. adamsoni,* although its atrial diverticulum approaches that in *M. marquesana.*

Marquesas: [Uahuka:] BBM. 104969, dissected, on ferns and shrubs, *Helix marquesana* Pease, 1868, Amer. Jour. Conch. 4: 153, pl. 12, fig. 2.—Pfeiffer, Monogr. 7: 65. *Nanina marquesana* Tryon, Manual 2: 113, pl. 37, fig. 26.

Marquesas: [Uahuka:] BBM. 104969, dissected, on ferns and shrubs, damp ridge 2.5 miles inland, alt. 2,380 feet, Hane (Mar. 3, 1931); BBM. 95496, crest of northern range, alt. 2,350 feet, south-southwest of Katohau Bay (Sept. 24, 1929; both lots P. Ent. Surv.!).

Shell (pl. 10, figs. 2-3) globose-turbinate, weakly angulate when young but becoming barely so; yellowish horn-colored with russet-brown band a little above periphery. Embryonic whorls 2.1 to 2.3, with spirals similar to *M. pisum* (58 visible on last). Later whorls with growth-wrinkles above as in *M. intermedia,* but not so distinct (about 9 per mm. on 5th); base slightly glossy. Aperture slightly oblique (about 75° to shell-axis) and almost evenly rounded; peristome about 30° to shell-axis. Columella heaviest in subgenus, giving just a suggestion of a columellar fold in young shells.

Animal with black stripe on each side above pedal grooves; top of tail black with whitish V at its base; head dark above with three dorsomedian black stripes, which are broader than their interspaces. Mantle collar light in color; right shell-lobe small, about twice as long as its base. Lung almost all chalky white as also apical whorls. Talon similar to *M. pisum*; animals examined not pregnant (uterus as slender as post-uterine oviduct). Penial sheath covering all epiphallus (pl. 4, fig. 19), which has elongate corona with 9 folds; penial retractor attaching near middle of epiphallus and inserting near and on corona, below apex of penis. Penial prepuce and atrium shorter than penis, with large, trigonal, rather thin-walled sac on right side. Jaw as in *M. intermedia.* Radula of adult (pl. 4, fig. 18) has nine elongate laterals, with minute entocone disappearing on last, and 56 marginals, of which three to five are bicuspid and principal ones similar to *M. pisum,* but outermost shorter and multicuspid; 104 rows counted. Radula of embryo (shell with almost two whorls) very similar to that of adult *Liardetia striolata*; has four squarish, tricuspid laterals and a 5th which loses entocone but gains another ectocone, and 21 shortish marginals, of which eight are tricuspid; 69 rows counted.

M. marquesana is the largest and most globose species of the subgenus *Uanuka* and has much the most prominent atrial diverticulum.

Mendaña (Fatuoa) subvenosa ("Ancey", Garrett), (pl. 9, fig. 4).

Microcystis subvenosa, Nanina affinis Garrett, 1887, Bull. Soc. Malac. France, 4: 4, Faiwata.

Marquesas: Tahuata: on foliage, alt. 2,000 feet (Garrett!); BBM. 3411 (type lot). BBM. 99673, dissected, on ferns and shrubs, two miles from shore, alt. 1,500 feet, Haniamiai Valley (P. Ent. Surv.! May 27, 1930).

Shell (pl. 9, fig. 4) depressed turbinate, narrowly carinate when young and distinctly angulate on early 5th whorl; basal foveola small and shallow; light horn-colored, darker at apex; quite dull above, glossy below. Embryonic whorls about two,

with low and rounded, spiral wrinkles (about 55 visible on second) considerably narrower than their interspaces, beaded on first and crenulated by growth-wrinkles on second. Later whorls fairly convex above, with equally prominent spirals above, but much crenulated by weak growth-wrinkles on fifth; base convex, with sharply cut, although slightly weaker, more closely spaced, spiral wrinkles; suture well impressed. Aperture fairly broad, almost transverse and weakly angulate; peristome about 20° to shell-axis, very weakly arcuate below. Columella with weak, spiral cord in young shell, just represented by slight, oblique truncation at four whorls.

Animal light colored, with some dark pigment, including faint indication of three middorsal stripes, on top of head; tail with distinct dorsomedian groove and short, triangular lobe over caudal foss. Right shell-lobe small, almost four times as long as its base. Lung with crescentic, chalky-white spots; almost four times as long as base or 2.5 to 3 times kidney length, which is almost 2.5 times as long as its base or 1.5 times pericardial length; apical whorls with confluent white blotches. Ovotestis consisting of four or five groups of clavate alveoli, imbedded in basal half of apical lobe of liver. Female genitalia very similar to *M. longicaulis,* but post-uterine oviduct relatively half as long; uterus with two large eggs and one embryo. Male genitalia also similar but epiphallar corona 1.5 times as long as wide and penis about as long as female genitalia; penial sheath covering all epiphallus except upper one-fourth or one-fifth. Penial prepuce short. Radula similar to subspecies *hivaoae,* but ninth lateral with obscure entocone; marginals 43, of which inner four are bicuspid.

All the species of the subgenus have a distinct, although often weak, columellar fold when young but may absorb it completely, or in part, when larger. This fold is strongest and most persistent in *M. subvenosa hivaoae.* The right shell-lobe is best developed in this group of *Mendaña,* and distinctly approaches that in *Philonesia,* but is relatively much smaller when equally expanded.

Dimensions in subgenus *Fatuoa*

	Shell			Aperture		Standard Sizes		
	alt.	maj. diam.	min. diam.	alt.	diam.	1½	4 wh.	whs.
M. subvenosa								
Garrett	5.25	(8.7)	(7.75)	(3.7)	.....	.....	.....	5
BBM. 99673	4.84	163(7.89)	153(7.42)	59(2.84)	144(4.10)	2.36	3.3(7.72)	4.1
M. s. hivaoae								
Type	5.20	157(8.14)	150(7.78)	57(2.99)	141(4.23)	2.33	3.3(7.78)	4¼
M. subpatula								
Type	5.39	170(9.19)	161(8.65)	60(3.25)	148(4.82)	2.44	3.5(8.65)	4¼
M. longicaulis								
Type	6.82	156(10.62)	145(9.90)	58(3.94)	142(5.59)	2.88	3.3(9.61)	4⅜

Key to the species and subspecies of the subgenus *Fatuoa*

A. Shell smaller, with diameter (4 to 4.5 wh.) 7.7 to 8.7 mm., distinctly angulate, with stronger embryonic spirals; penis not excessively elongate.....**M. subvenosa** (Garrett).

B. Shell with weaker spiral striae and usually lighter in color; columellar cord weak in young and just represented at 4 whorls; Tahuata:..typical subspecies.

BB. Shell with stronger spirals and usually darker in color; columellar cord fairly strong in young and columella decidedly truncated at 4 whorls; Hivaoa:.....**hivaoae** new subspecies.

AA. Shell larger and quite weakly angulate on 5th whorl; embryonic spirals considerably weaker; penis several times length of animal;

C. Shell more depressed than *M. subvenosa*; columellar cord and spiral ridges on last whorl almost as strong as in subspecies *hivaoae;* Hivaoa:..... .....**M. subpatula** new species.

CC. Shell shaped more like typical *M. subvenosa* and with similar columellar cord, but larger than *M. subpatula* and with weakest spirals; Fatuhiva:..... .....**M. longicaulis** new species.

Mendaña (Fatuoa) subvenosa hivaoae, new subspecies (pl. 16, fig. 6; pl. 9, fig. 2; pl. 5, figs. 3-4).

Marquesas: Hivaoa: BBM. 11314 (94508, dissected), on shrubs, Oimea (Plateau) (P. Ent. Surv.! Feb. 1, 1929). BBM. 95855-62, very abundant on ferns and shrubs, medium damp flat, alt. 1,515 feet, Aimoa (P. Ent. Surv.! Sept. 12, 1929).

Shell (pl. 16, fig. 6; pl. 9, fig. 2) similar to typical subspecies in form but slightly higher, heavier, and usually more distinctly angulate; dark horn-colored with vague, still darker varices. Embryonic whorls 2 to 2⅛, with stronger spirals (about 55 visible on last). Later whorls also with stronger spirals (76 counted on last), above, markedly crenulating growth-lines. Peristome about 25° to shell-axis. Columella with fairly strong, spiral cord in young shell and decidedly truncated in largest.

Animals similar to typical form; foot usually white and sometimes pigmented; tip of tail and horn black. Right shell-lobe (pl. 5, fig. 4) almost 3 times as long as broad. Lung with black near anterior border. Uterus with three eggs and three embryos, graded in size. Jaw with decussating striae, especially near thickened center, which forms fairly prominent, rounded median lobe. Radula (pl. 5, fig. 3) has nine laterals, with moderate entocone reducing until absent on 9th, and 42 marginals, of which five are usually bicuspid and remainder with two to four large cusps and one to several blade ectocones; 88 rows counted.

Mendaña (Fatuoa) subpatula, new species (pl. 16, fig. 10; pl. 9, fig. 3).

Marquesas: Hivaoa: BBM. 11315 (94556, dissected; also 94555), on ferns, shrubs and tree trunks, alt. 3,600 feet, north slope of Mt. Temetiu (P. Ent. Surv.! March 24, 1929).

Shell (pl. 16, fig. 10; pl. 9, fig. 3) larger and more depressed than *M. subvenosa,* narrowly carinate when young, weakly angulate on 5th whorl; light brownish-horn-colored; dull above, more glossy below. Embryonic whorls about two, with much weaker but similarly spaced spirals. Later whorls with increasingly stronger spirals above, crossing weak growth-wrinkles (about 9 per mm. on fifth); suture widely and distinctly impressed. Aperture weakly angulate; peristome about 25° to shell-axis. Columellar fold almost as strong as that in *M. subvenosa hivaoae.*

Animal similar to *M. subvenosa*; three middorsal stripes on head not so dark. Lung with large, irregularly and widely spaced, chalky dots. Genitalia similar to *M. longicaulis* but spermatheca more attenuate; uterus with four embryos. Jaw with median lobe almost completely eroded away. Radula has central with shorter mesocone than in *M. subvenosa,* nine similar laterals and 53 marginals, of which three or four are usually bicuspid and principal ones often develop blade ectocones (intermediate between *M. subvenosa* and *M. longicaulis*).

Mendaña (Fatuoa) longicaulis, new species (pl. 16, figs. 7-9; pl. 5, figs. 1-2).

Marquesas: Fatuhiva: BBM. 11316 (99946, dissected; also 99945-61),

on ferns, shrubs, and tree trunks, damp valley three miles inland, alt. 1,800 feet, Ahuava (P. Ent. Surv.! Aug. 19, 1930).

Shell (pl. 16, figs. 7-9) larger but similar in form to *M. subvenosa,* weakly angulate on fifth whorl; light yellowish horn-colored (affected by alcohol?) with darker apex. Embryonic whorls 2 to 2⅛, with weakest spirals in genus. Last whorl with slightly stronger spirals (78 counted) above; suture narrower and shallower than in *M. subpatula.* Aperture and peristome much as in *M. subpatula.* Columellar fold weak, much as in typical *M. subvenosa.*

Animal similar to *M. subvenosa* but blue-black on head, on each side of three mid-dorsal stripes. Right shell-lobe very small, about three times as long as broad, edged with black, as are also mantle-lobes. Ovotestis with several groups of clavate alveoli; hermaphroditic duct and talon (pl. 5, fig. 1) much as in *M. pisum*; uterus containing one large egg and two embryos; spermatheca fusiform, moderate in length. Penial sheath (outlined in figure) including all epiphallus except two loops attached to penial retractor, which inserts on base of corona and apex of penis; epiphallus long with corona about twice as long as wide; penis over three times as long as female genitalia, much enlarged apically and slightly so toward base. Penial prepuce short. Radula (pl. 5, fig. 2) has elongate central, 10 laterals (entocone absent from last) and 59 marginals, of which principal ones are mainly tricuspid and infrequently have blade ectocones; 105 rows counted.

Of all the species of the genus *Mendaña, M. longicaulis,* the type of the subgenus *Fatuoa,* with infrequent blade ectocones on its radular marginals and a weak columellar fold on its shell, approaches most closely to the genus *Philonesia.* Its excessively long penis is also equalled in some species of *Philonesia* from Oahu.

Genus DIASTOLE Gude, 1913

Trochonanina "Mousson", Garrett, 1884, Jour. ANSP. **9**:21, with type *Nanina schmeltziana* Mousson. Not *Trochonanina* Mousson, 1869, Jour. de Conch. **17**: 330 [8], proposed in discussion of (*Nanina*) *Trochonanina schmeltziana,* but including *Helix mozambicensis* Pfeiffer; type by subsequent designation of Nevill, 1878, Hand List **1**:45, *Helix mozambicensis* Pfeiffer.

Diastole Gude, 1913, Proc. Malac. Soc. **10**(6) : 391 ; type by original designation, *Helix conula* Pease.

Fanulum Iredale, 1913, Proc. Malac. Soc. **10**(6) : 372; type by original designation *Trocho-Nanina exposita* Mousson, 1873, Jour. de Conch. **21** : 111 [11], pl. 7, fig. 2, from Kermadec : Sunday Island.

Euanana new subgenus, type *D. fornicata* (Ancey) from Eua (BBM. 87721).

Laua new subgenus, type *D. bryani* new species.

Trochonanita new subgenus, type *D. schmeltziana* (Mousson) from Tutuila (BBM. 84756).

Because *Trochonanina* has almost universally been used for this genus, Nevill's choice of type is peculiarly unfortunate, but I can see no way to evade it, even though Mousson probably intended otherwise. Nevill was simply following von Martens, who (Zool. Rec. for 1870, p. 154), designated

Helix mossambicensis as the type of Semper's preoccupied *Martensia* and then made the last a synonym of *Trochonanina*. *Diastole* and *Fanulum* appeared simultaneously; as the first reviser, I definitely prefer the former, although, scientifically, the systematic position of the latter is still dubious.

The typical subgenus of *Diastole* is a group of closely related species, with a penial diverticulum remarkably like that in the genus *Euconulus,* but the other two subgenera, *Euanana* and *Laua,* are almost as closely allied to *Lamprocystis*. However, the known Microcystes, unlike the Philonesiae, exhibit no connecting series between the absence of a right shell-lobe (*Diastole* and *Microcystis*) and the presence of a well developed one (*Lamprocystis*).

Comparative whorl-sizes in genus *Diastole*

	1½	4 wh.	4½ wh.	5 wh.	6 wh.	Maxima	Index
D. conula	1.81	2.8(5.16)	3.3(6.04)	3.9(7.1)?	5.1(9.2)?	5	150
D. necrodes	1.89	3.2(5.96)	3.8(7.12)	4.4(8.3)?	.....	4⅝	165
D. glaucina	2.01	3.0(6.07)	3.4(6.92)	4.0(8.0)?	.....	4½—	154
D. rurutui	1.94	.....	3.7(7.24)	4.3(8.36)	.....	5	133
D. matafaoi	2.01	.....	3.5(7.05)	4.0(7.96)	.....	5¼+	133
D. futunae	1.72	3.5(6.07)	4.2(7.20)	4.7(8.1)?	.....	4¾	153
D. tongana	1.75	2.9(5.14)	3.5(6.14)	4.1(7.11)	5.3(9.20)	6+	136
D. schmeltziana	2.00	3.5(6.93)	4.1(8.20)	4.6(9.26)	5.8(11.6)?	5	167
D. s. usurpata	2.26	.....	3.1(7.05)	3.5(7.99)	4.4(10.0)?	5½	126
D. savaii	2.29	.....	4.1(9.34)	4.8(10.97)	.....	5	181
D. lamellaxis	2.03	2.2(4.49)	2.5(5.10)	2.7(5.58)	3.2(6.59)	6¼	90
D. fornicata	1.75	3.3(5.86)	3.8(6.58)	4.2(7.30)	5.4(9.5)?	5.5(?)	151
D. bryani	1.85	3.8(6.94)	4.4(8.17)	5.0(9.19)	.....	5¼	151
D. lauae	1.31	3.0(3.93)	3.4(4.42)	3.7(4.8)?	.....	4.8	172

Key to the subgenera of *Diastole*

A. Penis with diverticulum or decided swelling at base; principal marginals of radula with two terminal cusps and regular, large blade-ectocones; shell with less than 15 coarse spiral ridges visible on embryonic whorls and with more trochiform spire; Tuamotu, Society, Austral (Raivavae and Rurutu), Cook, Samoa, Futuna and Tonga:.....subgenus **Diastole** s.s.

AA. Penis without diverticulum or basal swelling; principal marginals with small blade ectocones or with mesocone accentuated; shell with 25 or more extremely fine spirals visible on embryonic whorls and with fornicate spire;

B. Penis about as long as penial atrium (cf. *Lamprocystis*); principal marginals with 2 or 3 large cusps; shell without very prominent sculpture; Tonga: Eua: .....subgenus **Euanana** new.

BB. Penis considerably longer than penial atrium; principal marginals with mesocone much the largest cusp (cf. *Lamprocystis* s. s.); shell with more prominent growth-sculpture; Fiji (Lau):.....subgenus **Laua** new.

Diastole (Diastole) conula (Pease), (pl. 17, fig. 3; pl. 5, figs. 9-10).

Helix conula Pease, 1861, Proc. Zool. Soc.: 243, Tahiti.—Pfeiffer, Monogr. 5: 62 [7:75]. *Microcystis conula* Garrett, Jour. ANSP. 8: 383, Raro-

tonga. *Trochonanina conula* Garrett, Jour. ANSP. **9**: 21, pl. 2, fig. 36, a, b, foliage of low bushes, all Society Islands. *Nanina conula* W. G. Binney, Ann. N. Y. Acad. Sci. 3: 85, Huahine (Garrett!), radula.—Tryon, Manual 2: 49, pl. 23, figs. 77, 78.

Nanina tongana "Mousson", Schmeltz, 1874, Cat. Mus. Godeffroy V: 91, Rarotonga.

Society Islands: Tahiti: (Garrett!); ANSP. 1958, 49339 (from Pease). Society Islands: BBM. 3192 (Garrett!); ANSP. 49304, "types, Jour. A. N. S. IX (Garrett!)". Tahiti: BBM. 86975-7, dissected, on ferns and shrubs, in damp valley and sides Orohenu Peak, 15-20 miles inland, alt. 500-2,000 feet, Papenoo Valley (MacDaniels! May 12, 1927). Mehetia, Moorea, Raiatea and Borabora: BBM. Huahine: ANSP. (Garrett!).

Austral Islands: Rurutu: BBM. 148014, on ferns, shrubs and tree trunks, hillside one third mile inland, alt. 200 feet, west of Moerai (Mang. Exped.! Aug. 24, 1934).

Cook Islands: Mangaia, Mauke (weaker columellar fold), Matai and Rarotonga: BBM.

Shell (pl. 17, fig. 3) somewhat depressed, trochiform with rounded apex, sharply angulate with very thin, mainly epidermal carina, lightly flattened below with pronounced, conoid foveola; russet to light horn-colored; dull above and brighter below. Embryonic whorls 2 to 2¼, with irregularly and distantly spaced, spiral ridges (16 visible on last), of which 3 to 5 are much heavier, crossed by extremely fine, anastomosing growth-threads. Later whorls similar, but with minor spirals much weaker and sometimes with major ones becoming obsolescent above angle, and with weaker growth-wrinkles and fine, distantly spaced, spiral ridgelets below; suture lightly impressed, attached at carina or slightly below (last whorl). Aperture quite narrow, almost transverse, sharply angulate; peristome about 35° to shell-axis. Columella about as long as depth of foveola, slightly thickened, truncated below by broad, compressed, spiral lamella (strong from embryo to 5 wh.), which is almost horizontal but enters obliquely upward.

Animal similar to *D. schmeltziana,* light in color with black tentacles and with some black behind mantle collar and on right shell-lap; tail with prominent dorsal groove and short pyramidal horn, not reaching tip of sole; no definite shell-lobes. Lung with chalky-white dots; 4.5 times as long as base or 3 times length of kidney, which is almost twice as long as its base or 1⅓ times pericardial length. Apical whorls with white dots becoming confluent near parietal angle. Penial retractor arising opposite middle of uterus; penis (pl. 5, fig. 10) with small, long-ellipsoid diverticulum on right side of base. Radula (pl. 5, fig. 9) with elongate central, 8 laterals, which reduce small entocone until lost on last (that may gain 1 or 2 ectocones), and 82 marginals, of which principal ones have about 7 ectocones, that gradually diminish in size down blade; 106 rows counted.

The widely disseminated *D. conula* always has a fairly well developed columellar fold. The next three species, *D. necrodes, D. glaucina* and *D. rurutui* occur within its range but have this fold much less developed; although other differences are present, they may be local mutations rather than distinct species.

Key to the Sections and Species of the Subgenus *Diastole* s.s.

A. Penis with distinct basal diverticulum; shell with 1st embryonic whorl exposing 3 to 7 prominent (lowest in *D. rurutui*), scarcely beaded, major, spiral ridges and interstitial minor ones; typically with prominent columellar lamella but often without; distribution of subgenus:.....section **Diastole** s.s.

B. Penial diverticulum not distinctly swollen basally; shell dull above, less so below:.....typical group.

C. Shell columella with fairly strong, broad lamella, even at 5 or 6 whorls;

D. Penial diverticulum much smaller than penis proper; shell light to russet horn-color, attaining 5 whorls; last embryonic whorl with distinct minor spirals; Society, Austral (Rurutu), and Cook Islands:.....**D. conula** (Pease).

DD. Penial diverticulum almost as long as penis; shell whitish, attaining 6 whorls; last embryonic whorl with less distinct minor spirals; Tonga: Tongatabu (and Vavau?):.....**D. tongana** (Quoy and Gaimard).

CC. Shell columella with low spiral cord, or often without trace at 4 or 5 whorls;

E. Shell depressed trochiform, usually without columellar cord at 4 to 5 whorls; diam. less than 7.5 mm.;

F. Shell whitish, with smaller protoconch than *D. rurutui;* Society Islands: Tahiti: Fautaua Valley.....**D. necrodes** new species.

FF. Shell purplish brown, with more gradual whorl-increase than *D. rurutui;* Tuamotu: Henderson:.....**D. glaucina** new species.

EE. Shell higher and becoming larger, with low columellar cord or abrupt truncation at 5 whorls, dark russet horn-color; Austral Islands: Rurutu (and Raivavae):.....**D. rurutui** new species.

BB. Penial diverticulum swollen basally; shell with last whorl (at least) almost polished above and more so below:.....group of **D. matafaoi.**

G. Shell weakly angulate, with obsolescent carina at 5 whorls; typically higher; Samoa: Tutuila: Matafao Peak.....**D. matafaoi** new species.

GG. Shell decidedly angulate and less polished; typically more depressed; Futuna:.....**D. futunae** new species.

AA. Penis with swollen base or vestigial diverticulum; first embryonic whorl with 11 to 13, lower, subequal, spiral ridges, that are beaded by growth-lines; shell columella with low spiral cord; Samoa:.....section **Trochonanita** new.

H. Penis swollen basally; shell intermediate in height, angulate, with 4.5 wh., diam. 6.5 to 8.5 mm.; columella with weak spiral cord; Samoa: all islands:.....**D. schmeltziana** (Mousson).

I. Shell more depressed..... typical form.

II. Shell more elevated.....var. **usurpata** (Mousson).

HH. Penis with very short diverticulum; shell very high or very low, usually paler in color; columellar fold usually stronger;

J. Shell most depressed and largest, carinate; columella typically with rather prominent spiral lamella; Samoa: Savaii:.....**D. savaii** new species.

JJ. Shell smallest and becoming higher than broad; last whorl quite evenly rounded but with vestigial thread-carina; columella with heavy spiral cord; Samoa: Savaii:.....**D. lamellaxis** new species.

Dimensions in subgenus *Diastole* s.s.

	Shell			Aperture		Standard Sizes		whs.
	alt.	maj. diam.	min. diam.	alt.	diam.	1½	4½	
D. conula								
Pease	5	(7)	.....	.....	.....	.....	.....	5
BBM. 86975	4.34	150 (6.52)	139 (6.04)	47(2.04)	165(3.38)	1.81	3.3(6.04)	4¾
D. necrodes								
type	4.41	165 (7.26)	154 (6.81)	53(2.32)	166(3.85)	1.89	3.8(7.12)	4⅝
D. glaucina								
type	4.46	154 (6.85)	144 (6.42)	50(2.21)	162(3.58)	2.01	3.4(6.92)	4½—
D. rurutui								
type	6.27	133 (8.36)	123 (7.74)	48(3.01)	149(4.48)	1.94	3.7(7.24)	5
D. matafaoi								
type	6.38	133 (8.48)	126 (8.06)	50(3.16)	117(3.69)	2.01	3.5(7.05)	5¼+
D. futunae								
type	4.99	153 (7.66)	144 (7.20)	56(2.79)	125(3.48)	1.72	4.2(7.20)	4¾
D. tongana								
Q. & G.	6.7	(8.9)	.....	.....	.....	.....	.....	6
fig.	6.5	137 (8.9)	122 (7.9)	51(3.3)	140(4.6)	.....	.....	
BBM. 88252	6.84	136 (9.32)	130 (8.88)	47(3.23)	149(4.83)	1.75	3.5(6.14)	6+
D. concentrica								
Guillou	6	(7)	.....	.....	.....	.....	.....	5
D. schmeltziana								
Mousson	4	(7)	(6)	.....	.....	.....	.....	5½
fig.	4.35	161 (7)	.....	53(2.30)	163(3.75)	.....	.....	
BBM. 94295	5.56	167 (9.26)	157 (8.74)	55(3.05)	161(4.90)	2.00	4.1(8.20)	5
D. s. usurpata								
BBM. 94305	7.03	126 (8.89)	121 (8.52)	46(3.24)	147(4.76)	2.26	3.1(7.05)	5½
D. savaii								
type	6.07	181(10.97)	166(10.08)	58(3.52)	169(5.95)	2.29	4.1(9.34)	5
D. lamellaxis								
type	7.66	90 (6.91)	86 (6.57)	36(2.77)	127(3.51)	2.03	2.5(5.10)	6¼

Diastole (Diastole) necrodes, new species (pl. 17, fig. 6; pl. 10, fig. 6).

Society Islands: Tahiti: BBM. 11399 (88635, dissected), on shrubs and tree trunks, alt. 750 feet, four miles inland in Fautaua River valley, one mile below falls; BBM. 88620, alt. 750 feet, 0.5 mile inland near falls (both A. M. Adamson! Sept. 9, 1928).

Shell (pl. 17, fig. 6; pl. 10, fig. 6) similar to *D. conula,* but larger and typically more depressed with shallower foveola, sharply angulate to weakly carinate; whitish with slightly more corneous apex. Embryonic whorls 2.1 to 2.5, with similar spirals becoming weaker on last whorl (typically with seven major ones visible). Later whorls with spirals markedly obsolescent and with growth-wrinkles (10-11 major per mm. on 5th) weaker above; base slightly polished, with weak and blurred spirals. Columella slightly thickened; spiral cord sometimes represented by a weak trace of swelling (absent from type).

Animal also similar; lung (and apical whorls) with squarish, white blotches, seven times as long as base or 3.75 times kidney length, which is more than three times as long as its base or 1.2 times pericardial length. Uterus with two large eggs, two small embryos and two large ones. Penis very similar to *D. rurutui* but with more cylindrical diverticulum. Jaw with median lobe almost obsolete. Radula with eight to nine laterals (entocone often obsolete on last) and 60 to 115 marginals; 117 rows counted.

Although *D. conula* has a dark and a light form, the latter is never as pallid as *D. necrodes.*

Diastole (Diastole) glaucina, new species (pl. 17, fig. 7; pl. 10, fig. 9).

Tuamotu: Henderson: BBM. 11400 (142011-8, dissected), on shrubs, 0.5 mile from shore, alt. 100 feet, plateau on northwest side (Mang. Exped.! June 21, 1934).

Shell (pl. 17, fig. 7; pl. 10, fig. 9) similar to *D. conula* but heavier and slightly larger throughout; dark purplish brown. Embryonic whorls 2.75, with more subequal spirals (22 visible on last whorl with none very big), beaded by sharper growth-wrinkles. Later whorls with spirals more irregularly and widely spaced above. Columella usually with very weak, obtuse-angled, spiral thickening in young shells, but without trace at 4.5 whorls.

Animal similar to *D. conula.* Genitalia like *D. necrodes,* but spermatheca and penial diverticulum more elongate. Radula with 7 laterals and 71 marginals.

D. glaucina is one of the few species that appears to be limited to a raised coral reef without volcanic rock.

Diastole (Diastole) rurutui, new species (pl. 17, figs. 1-2; pl. 5, fig. 8).

Austral Islands: Rurutu: BBM. 11401 (141998-142003, dissected), on ferns and *Piper,* in native forest of medium damp valley, alt. 950-1,150 feet, on west side of north ridge of Mount Manureva (Aug. 28). Raivavae: BBM. 146894, on single orange tree, south slope of Mount Muanui, alt. 500-700 feet (Aug. 8; both lots Mang. Exped.! 1934).

Shell (pl. 17, figs. 1-2) similar to *D. conula* but larger and typically higher, with even deeper basal foveola [with spiral groove (injury) in type]; darker russet-color. Embryonic whorls 2.1 to 2.3, with similar minor spirals (27 visible on last) but with major ones weak or not developed. Neanic whorls usually with 3 or 4 major spirals. Last whorl with weaker, but still distinct minor spirals above. Peristome about 10° to shell-axis. Columella with low but sharp spiral ridge when young; often reduced to a rounded cord or abrupt truncation at 5 whorls.

Animal similar to *D. conula* but foot quite dark, especially between pedal grooves; shell-laps and mantle-lobes dark. Lung 6 times as long as base or 3.5 times kidney length, which is about 3 times its base or 1.25 times pericardial length. Uterus with 1 large egg, 3 very small embryos, 1 intermediate and 2 large ones; spermatheca (pl. 5, fig. 8) more attenuate; penis longer with broader and slightly longer diverticulum.

D. rurutui attains a larger size than do the preceding species and appears to be quite distinct, although a form of *D. conula* with a weakened (although much stronger) columellar fold occurs in the near-by Cook Islands.

Diastole (Diastole) tongana (Quoy and Gaimard), (pl. 10, fig. 15; pl. 5, fig. 5).

Helix tongana Quoy and Gaimard, 1832, Voy. Astrolabe **2**: 130, pl. 11, figs. 19-23.—Pfeiffer, Monogr. **1**: 38 [**4**:17-**7**:71], synonymy but not description (= *Coneuplecta confusa*).—Gould, Exped. Shells: pl. 5, figs. 64, 64a.

(?) *Helix concentrica* Le Guillou, 1842, Rev. Zool.: 139, Vavao.—Pfeiffer, Monogr. **1**: 51 [**3**:58-**4**:36-**5**:90-**7**:103].

Tonga: Tongatabu: on leaves of trees, road Bea à Hifo. BBM. 88252-4, dissected, on shrubs, alt. 8 feet, 1 mile inland from Nukuatofa (Ostergaard! Aug., 1926).

Shell (pl. 10, fig. 15) similar to *D. conula,* but attaining one more whorl, strongly carinate when young, less so on 6th whorl; very light horn-color, almost white. Embryonic whorls around 2.5; first with five or six major spirals and with or without distinct minor ones. Last whorl with all sculpture much reduced, but visible above; base very glossy with spirals often blurred. Columellar lamella like *D. conula,* of similar whorl-size, but becoming a little weaker with 6th whorl.

Animal similar to *D. conula;* lung with sparse white blotches; spermatheca (pl. 5, fig. 5) much more elongate; penial diverticulum subbasal, about 2/3 as long as penis proper, thin walled and irregularly swollen. Jaw with weak median point. Radula with 11 laterals (entocone obsolete on last) and 94 marginals; 124 rows counted.

The shell of *D. tongana* is very similar to that of *D. conula* but attains a larger size. Its penial diverticulum is the largest in *Diastole* and approaches that of the next group in form. Except for its obsolete umbilicus, the description of *Helix concentrica* is fairly good for this species, which, however, has not been reported from Vavau.

Diastole (Diastole) matafaoi, new species (pl. 17, figs. 4-5; pl. 5, fig. 7).

Samoa: Tutuila (central): BBM. 11402 (83404, dissected), on pandanus, *ieie,* and leaves of shrubs, alt. 1,500-1,600 feet, below sub-peak on connecting ridge to Matafao; BBM. 83421, alt. 2,000-2,141 feet, on summit of Matafao (T. T. Dranga! Feb. 9, 1926).

Shell (pl. 17, figs. 4-5) variable in height; similar to *D. conula* but larger and typically higher, with much more convex whorls; strongly angulate when young but becoming weakly so (or with obsolescent carina) on 6th whorl; light horn-color, quite glossy above and more so below. Embryonic whorls 2.1 to 2.3; first with strong spirals (8-9 visible); remainder with weaker major spirals so that minor ones are more easily seen, and with fine, weak growth-striae. Last whorl almost polished, with extremely weak, fine growth-striae (8 major per mm.) and little stronger spirals; base quite polished with minor growth-striae and spirals just visible in high light; suture impressed. Aperture barely angulate; peristome about 10° to shell-axis. Columella with low spiral cord when young; simply thickened and barely truncate at five whorls or even less.

Animal similar to *D. conula*; lung with large patches of chalky white that form almost continuous bands near hindgut; lung five times as long as its base or 3.5 kidney length, which is 2.5 times its base or 1.5 pericardial length; uterus with two large eggs and three embryos; penis (pl. 5, fig. 7) longer, with basally swollen diverticulum. Jaw with weak rounded median point. Radula with 7 laterals (last lacking entocone) and 77 marginals; 110 rows counted.

Despite its locality, *D. matafaoi* seems to be more closely related to typical *Diastole* than to *D. schmeltziana.*

Diastole (Diastole) futunae, new species (pl. 17, fig. 8; pl. 10, fig. 12; pl. 5, fig. 6).

(?) *Nanina schmeltziana usurpata* "Mousson", Schmeltz, 1869, Cat. Mus Godeffroy IV: 71, Futuna (Graeffe!).

(?) *Nanina schmeltziana* Mousson, 1871, Jour. de Conch. **19**: 9[5] Futuna.

Futuna: BBM. 11403 (115444-5, dissected), alt. 2,000 feet, three miles inland (E. G. Burrows! May 8, 1932).

Shell (pl. 17, fig. 8; pl. 10, fig. 12) similar to *D. conula* but with more rapidly increasing whorls, typically carinate (115445 higher and less so); bright horn-color, less glossy than *D. matafaoi.* Embryonic whorls 2.1, with spirals much as in *D. matafaoi* (7 major ones visible on first whorl). Last whorl with minor growth-striae (eight major per mm. on late 5th) and spirals almost as obsolete as in *D. matafaoi,* but appearing less polished; suture lightly impressed. Aperture angulate. Columella typically without spiral cord (also absent in two younger shells, but just indicated in 115445).

Animal similar to *D. matafaoi* but white spots on lung larger; kidney about twice as long as pericardium; uterus with three big eggs and one embryo; spermatheca (pl. 5, fig. 6) considerably longer; penis not much bigger than epiphallus, with much larger diverticulum, that is expanded laterally into a lens-shaped wing.

D. futunae must be closely related to *D. matafaoi* but its shell appears less glossy and its penial diverticulum is more expanded basally. I have seen none of Graeffe's specimens.

Diastole (Trochonanita) schmeltziana (Mousson) and variety **usurpata** (Mousson), (pl. 10, figs. 10-11, 13-14; pl. 5, figs. 11-12).

Nanina schmeltziana Mousson, 1865, Jour. de Conch. **13**: 167 [4]. *N. schmeltziana* Schmeltz, 1865, Cat. Mus. Geoffroy II: 25. *Helix schmeltziana* Pfeiffer, Monogr. **5**: 58 [**7**: 70]. (*Nanina*) *Trochonanina schmeltziana* Mousson, J. de C., **17**: 329 [7], pl. 14, fig. 4; **19**: 9[5], Futuna (?).—Tryon, Manual **2**: 47, pl. 22. fig. 59. (?) *Trochonanina schmeltziana* Pfeiffer, Arch. Naturg. **44** (1): 420, pl. 13, fig. 2, incorrect anatomy from Fidji (sic)?

N. schmeltziana usurpata Mousson, 1869, J. de C. **17**: 329[7].—Schmeltz, Cat. Mus. Geoffroy IV: 71, Futuna (?).

Samoa: Upolu (typical; ANSP. 49335 from Schmeltz) and Savaii (*usurpata*; both Graeffe!). Upolu: BBM. 94295 (typical, dissected) and 94305 (*usurpata*), medium damp hillside forest, six miles inland, alt. 1,600 feet, below Malololelei (Christophersen! Aug. 16, 1929). Savaii: BBM. 75808 (appr. *usurpata*), dissected, on ferns and shrubs, damp hillside, alt. 900 feet, two miles behind Salealua (Bryan! May 16, 1924); BBM. 95734 (*usurpata*), forest above Malavanu Crater, alt. 2,200-3,500 feet (Christophersen! Sept. 23, 1929). Tutuila (west): BBM. 84756-8 (intermediate), dissected, on ferns, shrubs and trees, alt. 700-900 feet, Leone-Aoloau trail (Cooke! Mar. 23, 1926). Ofu: BBM. 83191 (*usurpata*), dissected, alt. 1,200-1,500 feet, damp highlands (Cooke! March 1, 1926). Tau: BBM. 82978 (*usurpata*), dissected, mostly arborescent, alt. 800-1,000 feet, hillside on south trail (Cooke! Feb. 20, 1926).

Shell (pl. 10, figs. 10-11) very variable in height, typically depressed trochiform but intergrading with much higher shells (var. *usurpata*; pl. 10, figs. 13-14) which thus

appear to have more gradual whorl-increase; sharply angulate (typical) to angulate (*usurpata*) with a thin, epidermal carina; base slightly flattened with narrow, rather shallow foveola; light to brownish horn-colored, dull above, more burnished below. Embryonic whorls 1.9 to 2.2; first with prominent spiral ridges (13 visible at end), beautifully beaded by growth-lines; remainder with weaker spirals, of which two to five may be more prominent. Later whorls with weak major growth-wrinkles (5-7 per mm. on last) and exceedingly minute, anastomosing, minor ridgelets above and with spirals often becoming almost obsolete on last; base quite polished (like burnished copper) with spirals blurred to just visible under high light; suture fairly well impressed, typically attached on carina but often below (especially in *usurpata,* in which it thus appears more deeply impressed and doubly margined). Aperture quite narrow, almost transverse, sharply to distinctly angulate; peristome about 20° to shell-axis, weakly concave below. Columella with a very low, spiral thread when young, usually thickened into a swelling with largest whorl-sizes.

Animal light or with brownish pigment on sides of foot and darker on top of head; without shell-lobes; mantle-lobes rather dark, left divided. Lung with white spots (BBM. 84756) or with five rows of big spots (83191); five times as long as base or four times kidney length, which is three times as long as its base or 1.5 pericardial length. Middle whorls with more or less continuous band of white along parietal angle. Ovotestis (pl. 5, fig. 11) consisting of five groups of three to six clavate alveoli, with moderately long duct; talon clavate, small; uterus with one or two smallish eggs, one small embryo and two to three large ones; post-uterine oviduct short; spermatheca short, slightly swollen in apical half. Prostate small but elongate; penial sheath including all epiphallus; penial retractor arising from diaphragm near middle of uterus and inserting along basal half of epiphallus and for a distance beyond on apex of penis. Epiphallus rather short; interior of upper end with a large pilaster and several longitudinal folds; separated from penis by simple constriction. Penis elongate, with a basal lobe or swelling on right side. Penial prepuce and atrium, each about as long as broad, opening shortly behind base of right inferior tentacle. Jaw well striate longitudinally, with vestigial median point. Radula (pl. 5, fig. 12) has elongate central, eight very elongate laterals, with vestigial entocone absent from last, and 87 (BBM. 84756) to 125 (94295) marginals, of which principal ones have long, slender blades with about seven ectocones that form a graded series with terminal one about as large as mesocone; outermost teeth much shorter but similar; 119 rows counted.

D. schmeltziana seems to be distributed throughout Samoa. Possibly a more detailed examination of the highly variable material in Bishop Museum will establish subspecies, but the anatomy of animals from different islands is almost identical and the shell variation appears fortuitous.

Diastole (Trochonanita) savaii, new species (pl. 17, figs. 9-10; pl. 5, fig. 13).

Samoa: Savaii: BBM. 75807, dissected, on ferns and shrubs, damp hillside, alt. 900 feet, two miles behind Salealua (May 16); BBM. 75767, alt. 1,000-2,000 feet, same locality (May 21); BBM. 75871, on ferns, shrubs and tree trunks, damp high ridge, alt. 1,500-3,000 feet, 5-8 miles south of Safune (May 3). (All E. H. Bryan, Jr.! 1924.)

Shell (pl. 17, figs. 9-10) similar to typical *D. schmeltziana,* but larger and more depressed, with well margined carina; light horn-colored, dull above and burnished below. Embryonic whorls 2⅛, with similar sculpture (12 spirals visible at end of first whorl). Last whorl with more closely spaced major growth-wrinkles (10 per mm.); base with fairly regular major growth-wrinkles and very fine, wavy, blurred spirals; suture lightly impressed. Aperture narrower. Columella often similar, but typically with much stronger (although still low), entering, spiral lamella.

Animal similar to *D. schmeltziana*; uterus with three eggs and three embryos; penis

(pl. 5, fig. 13) with broad base so that larger lobe is well separated. Radula has seven laterals with slightly larger entocones, and about 115 marginals; 115 rows counted.

The shell of *D. savaii* seems to differ less from typical *D. schmeltziana* than the latter does from extremes of the variety *usurpata,* but the basal lobe of its penis is much more definite.

Diastole (Trochonanita) lamellaxis, new species (pl. 15, figs. 11-12; pl. 5, fig. 14).

Samoa: Savaii: BBM. 75769, dissected (75770), on ferns and shrubs, damp hillside, alt. 1,000-2,000 feet, one to three miles behind Salealua (E. H. Bryan, Jr.! May 21, 1924); BBM. 75875, on ferns and shrubs, on damp high ridge, alt. 1,500-3,000 feet, 5-8 miles south of Safune (Bryan! May 3, 1924).

Shell (pl. 15, figs. 11-12) turbinate, higher than broad; quite evenly rounded but with very low thread-carina, deeply crenulated by growth-lines; base rounded with deep foveola; light, greenish horn-colored, somewhat glossy above and burnished below. Embryonic whorls 2⅛, with sculpture like *D. schmeltziana* (11 spirals visible on last). Later whorls with weaker sculpture than *D. schmeltziana*; suture deeply impressed. Aperture almost evenly rounded; peristome about 20° to shell-axis. Columella with quite heavy, spiral cord, so that it appears twisted (as in *Lamellaxis*).

Animal similar to *D. schmeltziana*; lung and middle whorls with large, squarish, chalky white blotches; uterus with two eggs and four embryos; spermatheca (pl. 5, fig. 14) with attenuate apex; penial sheath not reaching penial apex; penial lobe considerably larger with short recurved tip free. Radula has eight laterals with slightly larger entocones and 79 marginals; 99 rows counted.

D. lamellaxis is much higher, smoother, and less angulate than *D. schmeltziana usurpata*; it appears to be rather rare.

Diastole (Euanana) fornicata (Ancey), (pl. 11, figs. 14-15; pl. 5, figs. 15-16).

Trochonanina fornicata Ancey, 1889, Le naturaliste **11**: [ser. 2, vol. 3] 19, Eua.

Medyla globulus Boettger, 1916, Abhandl. Senkenberg. N. Ges. **36**: 289, pl. 21, fig. 5 a-c, Eua.

Tonga: Eua. BBM. 87721, dissected, on tree trunks and dead leaves, damp hillside, two miles inland, alt. 385 feet, Johanssen plantation (Ladd! May 14, 1928).

Shell (pl. 11, figs. 14-15) fornicate above, subcarinate or sharply angulate when young, distinctly to moderately angulate at end of fifth whorl, very little more flattened below, with broad but well impressed foveola; light horn-colored with weak, darker varices; slightly glossy above and more so below. Embryonic whorls 2.4; first half whorl with weak spiral threads which decrease in strength (25 visible on last), but cross weaker growth-striae. Later whorls with fine, weak growth-wrinkles (14 per mm. on 5th) and similar, blurred spirals above; spirals slightly more distinct below; suture weakly impressed and overriding (margined). Aperture fairly broad, angulate (when young) to barely angulate; peristome about 10° to shell-axis. Columella short, thickened and truncated below by a heavy, spiral, entering cord.

Animal similar to *D. schmeltziana,* with whitish foot, black tentacles and some dark pigment behind mantle-collar and along hindgut. Lung without white spots, almost five times as long as base or three times kidney length, which is 2.5 times its base or 1.5 pericardial length. Hermaphroditic duct shorter and more abruptly swollen near middle;

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4.5 wh.	whs.
Ancey	4.75	141(6.7)	133(6.3)	.....	.....	.....	.....	5
Boettger	6	158(9.5)	142(8.5)	.....	.....	.....	.....	5.5
BBM. 87221	4.76	151(7.18)	142(6.74)	55(2.60)	133(3.47)	1.75	3.8(6.58)	4.9

uterus not pregnant. Penial sheath including about 2/3 of epiphallus (pl. 5, fig. 16), which is relatively very long and contains a heavy pilaster; penial retractor inserting on epiphallus at about one-fourth length of last above simple entrance into very short, simple penis. Penial prepuce and atrium combined almost as long as penis. Radula (pl. 5, fig. 15) has less elongate central and eight oblong laterals, which decrease markedly in size and reduce minute entocone (absent from last), and 35 marginals which are relatively broader and shorter and have smaller and less regular blade ectocones (somewhat approaching *Mendaña*); 80 rows counted.

Both in shell and in radula, *D. fornicata* has certain resemblance to *Mendaña,* although its penis approaches that of *Lamprocystis.* Boettger's *M. globulus* seems to be considerably larger than any specimens in Bishop Museum, but his figure closely resembles the present species.

Diastole (Laua) bryani, new species (pl. 17, figs. 13-15; pl. 5, figs. 17-18).

Fiji (Lau): Avea: BBM. 11406 (79035, dissected), on shrubs and tree trunks, alt. 0-600 feet, from beach to wind-swept peak, one-fourth mile inland (Sept. 22). Vanua Mbalavu: BBM. 78992 (banded form), same habitat, alt. 60-150 feet, 300 feet inland, forest on limestone, north end (Sept. 20). (Both lots E. H. Bryan, Jr.! 1924.)

Shell (pl. 17, figs. 13-15) fornicate-trochiform, with carina very narrowly margined above and broadly so below; base somewhat flattened with broad, shallow foveola; very pale horn-color, slightly darker at tip, with very weak, vague, pinkish varices (78992 pinkish horn-color shading into lighter around columella, with a narrow, salmon-colored band above and slightly below carina); dull above, dully burnished below. Embryonic whorls 2.25; first with very fine, weak, beaded, spiral threads (about 35 visible at end); remainder with spirals disturbed by growth-wrinkles. Later whorls developing thin, high, epidermal, wavy growth-wrinkles (12 per mm. on 5th) above, that often develop small triangular points where crossed by about nine low spiral ridges (vague finer spirals also present); base smoother with numerous, blurred, minute, spiral striae and relatively few, irregular, macroscopic wrinkles; suture weakly impressed, attached on carina. Aperture rounded oblong, almost transverse, carinate; peristome about 30° to shell-axis, weakly concave below carina. Columella with a compressed, obliquely entering, spiral lamella, similar in form to but considerably smaller than that in *D. tongana.*

Animal similar to *D. schmeltziana*; tail horn blunt, not reaching tip of sole; caudal foss large. Lung with white blotches (becoming confluent on apical whorls); over five times as long as base or over three times kidney length, which is about three times its base or twice pericardial length. Ovotestis similar; uterus with three large eggs and four embryos; spermatheca (pl. 5, fig. 18) much longer. Penial sheath (evidently contracted) folded around base of simple penis, which is about as long as large epiphallus. Penial prepuce about twice as long as wide. Jaw with almost no median point. Radula (pl. 5, fig. 17) has central with weaker ectocones, 10 or 11 laterals with small entocone becoming obsolescent on last, and 41 to 43 marginals, of which each principal one has extremely long mesocone and one or two relatively small ectocones; outer teeth increase number of blade ectocones; 101 rows counted.

This remarkable species, the type of the subgenus *Laua,* is named for Mr. E. H. Bryan, Jr., who collected it. Its wavy growth-wrinkles with triangular projections are quite unlike those of any other Pacific zonitid but slightly approach those in *Cookeana.*

Key to species of the subgenus *Laua*

A. Shell about 9 mm. in diam. (5 wh.), more elevated, with thin epidermal growth-riblets above, developing triangular points where crossed by nine spiral ridges; columellar lamella compressed; Fiji (Lau: Exploring Isles): Avea and Vanua Mbalavu: .....**D. bryani** new species.

AA. Shell about half as large, more depressed, with fine growth-threads above; columellar cord thickened so as to appear as nodular swelling; Fiji (Lau: more southern): Aiwa, Karoni, Katafanga, and Tavunasithi:.....**D. lauae** new species.

Dimensions in subgenus *Laua*

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4.5 wh.	whs.
D. bryani type	6.30	151(9.54)	146(9.19)	48(3.05)	161(4.90)	1.85	4.4(8.17)	5¼
D. lauae type	2.69	172(4.64)	168(4.51)	45(1.22)	180(2.20)	1.31	3.4(4.42)	4.8

Diastole (Laua) lauae, new species (pl. 17, figs. 11-12; pl. 6, figs. 1-2).

Fiji (Lau): Aiwa: BBM. 11407 (132830, dissected), elevation about 40 feet (H. S. Ladd! Aug. 7, 1934). Karoni: BBM. 78598, on dry leaves, about 90 feet up on slope of peak (E. H. Bryan! Aug. 15, 1924). Katafanga: BBM. 78831 (Bryan! Sept. 8, 1924). Tavunasithi: BBM. 78804 (Bryan! Aug. 28, 1924).

Shell (pl. 17, figs. 11-12) similar to *D. bryani* but smaller and more depressed, with distinctly impressed foveola; light to medium russet horn-color (type bleached), little more burnished below than above. Embryonic whorls two; first with very minute and barely visible spiral threads; second with extremely fine growth-threads obscuring spirals. Later whorls with regular, low, angular, major growth-wrinkles (19 per mm. and about as wide as interspaces on 5th) and extremely fine minor growth-threads above; base with major and minor growth-wrinkles obscure and decussated by fine spiral striae and ridges; suture little impressed but with shallow furrow beneath it, weakly overriding on neanic whorls and attached at rim and finally below carina on fifth. Aperture markedly carinate at 95° to shell-axis; peristome concave below carina, 25° to shell-axis. Columella with spiral cord about as prominent as in *D. bryani* but relatively heavier so as to appear like a nodular swelling.

Animal similar to *D. bryani*; right shell-lobe represented by a weak, semicircular expansion marked by a black dot. Lung with narrow black border behind mantle-collar and lines each side of hindgut; mantle glands invading anterior end as semicircular mass; 5.5 times as long as base or over three times kidney length, which is 2.5 times its base or 1.5 pericardial length. Apical whorls with some black pigment and with narrow chalky parietal band. Ovotestis consisting of nine groups of alveoli, imbedded in little more than basal whorl of apical lobe of liver; duct (pl. 6, fig. 2) quite long, convoluted and swollen; carrefour large; uterus relatively small, with one embryo. Penis relatively shorter, about twice length of penial prepuce. Jaw with rib-like striae in central area; median lobe represented by rather well demarcated straight line. Radula (pl. 6, fig. 1) has squarish central, seven or eight short oblong laterals with smallish entocone becoming obsolescent on last, and 37 to 40 marginals with long mesocones,

and with weak blade ectocones on inner three or four teeth, usually only one ectocone on next 14 and more again on remainder; 95 rows counted.

The shell of *D. lauae* is much smaller and less peculiarly sculptured than that of *D. bryani.* Possibly, its differences deserve at least sectional separation, but it is also somewhat like the type of *Fanulum.* Young shells of *D. lauae* considerably resemble those of *Lamprocystis unisulcata* but are duller and have sharper growth-threads.

Genus MICROCYSTIS Beck, 1837

Microcystis Beck, 1837, Index: 2 (nude except for queried reference to *Helix pellicula* Fér.); 1837, Nov. sp. : 2, 3 (includes *Nanina trifasciella, N. pictella, N. ornatella, N. filiceti* and *N. amoenula*). Invalid subsequent designations of type: Herrmannsen, 1847, Ind. Mal. II: 42, *Helicomalix pellicula* Fér. (queried in original); Gray, with query, 1847, Proc. Zool. Soc.: 169, *M. pellicula* (not defined in original). Type by valid subsequent designation of Albers-Martens, 1860, Die Heliceen II: 49, *Nanina ornatella* Beck. See Iredale's excellent discussion, Proc. Malac. Soc. **10**: 373.

Leurocystis new subgenus, type *M. saintjohni* new species.

Facorhina new subgenus, type *M. andersoni* new species.

Cnesticystis new subgenus, type *M. kondoi* new species.

The genus *Microcystis* is now limited to a group of species, all new except the type, from the Austral and Cook Islands. The two subgenera, *Microcystis* s. s. and *Facorhina,* are distinct enough to rank as separate genera, but are evidently more closely related to each other than to anything else.

Key to the subgenera of the genus *Microcystis*

A. Principal radular marginals bicuspid; shell glossy to almost polished, more so below, often with color bands; embryonic whorls with weak to fairly prominent spirals and later whorls with weak to very weak ones; Austral Islands: Rapa, Raivavae, and Tubuai: .....subgenus **Microcystis** s. s.

AA. Principal marginals unicuspid; shell dull, at least above, brownish and rarely with prominent bands; embryonic whorls with strong and later whorls with fairly strong spirals; growth-threads or wrinkles also more prominent; Austral and Cook Islands: Raivavae, Tubuai, and Mangaia: .....subgenus **Facorhina** new.

Microcystis (Microcystis) benesculpta, new species (pl. 18, figs. 1-2).

Austral Islands: Rapa (southeast): BBM. 11405 (143813, dissected), on ferns and shrubs, north side of Mt. Tanga (beyond Teutu), alt. 600-800 feet (Mang. Exped.! July 31, 1934).

Shell (pl. 18, figs. 1-2) thinnish, depressed turbinate with whorls somewhat flattened above, sharply angulate when young and quite distinctly so at 4.5 whorls; base quite convex, with deep and fairly broad foveola; light greenish (type) to yellowish horn-color, weakly polished and subtranslucent below. Embryonic whorls about 2.5; first with fine and low, but sharp, decussating spiral ridgelets and growth-wrinkles;

Comparative whorl-sizes in genus *Microcystis*

	1½	4 wh.	4½ wh.	5 wh.	Maximum	Index
M. benesculpta	2.12	3.5(7.37)	3.9(8.37)	.....	4.5+	148
M. o. parva	2.59	3.6(9.21)	3.9(10.1)?	.....	4.4	149
M. ornatella	2.83	3.9(10.97)	4.5(12.8)?	.....	4.4	146
M. perahui	3.07	4.1(12.72)	4.8(14.7)?	.....	4.1	165
M. fosbergi	2.73	4.1(11.32)	4.8(13.1)?	.....	4.3	173
M. f. taraiae	2.54	3.8(9.58)	4.3(10.9)?	.....	4.3	154
M. saintjohni	3.51	3.2(11.27)	3.6(12.7)?	.....	4.3	140
M. lenticula	2.09	3.0(6.32)	3.5(7.31)	3.8(7.9)?	4½	208
M. adusta	1.81	3.3(5.90)	3.7(6.66)	4.1(7.4)?	4¾—	179
BBM. 147659	1.75	3.5(6.05)	4.0(6.97)	4.4(7.68)	5+	174
M. andersoni	2.09	3.6(7.51)	4.2(8.76)	4.6(9.71)	5½	194
M. buckorum	1.44	2.9(4.17)	3.2(4.68)	3.4(4.9)?	4½+	213
M. aspera	2.81	3.8(10.59)	4.2(11.87)	4.8(13.42)	5⅛	147
M. kondoi	2.86	3.9(11.06)	4.4(12.6)?	.....	4.4+	168

second with still stronger spiral (45 visible) and growth ridgelets, which mark off little pits. Later whorls with slightly stronger growth-wrinkles (15-16 per mm. on 5th) and gradually weakening spirals above (5th whorl with about as strong spirals as 3rd whorl of *parva*); base more polished but with fine spirals still visible; suture fairly impressed, narrowly overriding (but attached very near angle) and marginate. Aperture almost transverse, quite broad, weakly angulate; peristome about 25° to shell-axis, quite concave below angle; columella short, not very heavy and almost straight.

Animal similar to *M. ornatella* but lung with dark pigment mainly along hindgut and behind mantle collar. Uterus with 3 eggs and 3 embryos; spermatheca with slightly shorter, less sharply constricted stalk. Penial sheath (evidently contracted) only covering ⅓ of partially everted penis; penial retractor attached along basal 0.2 of longer epiphallus, which is markedly swollen at upper end. Radula has central with slightly more elongate reflection and with even smaller mesocone, 8 laterals and 51 marginals, of which about inner 12 are bicuspid; more than 97 rows.

M. benesculpta is the smallest and most sharply sculptured species of the typical group of *Microcystis*.

Key to the sections, species, and subspecies of the subgenus *Microcystis* s.s.

A. Penis elongate; principal radular marginals rarely with blade ectocones; embryonic whorls with less than 50 major spirals (also minor interstitials) visible; later whorls with fairly distinct growth-wrinkles but fading spirals; Austral Islands: Rapa and Raivavae:.....section **Microcystis** s.s.

B. Shell heavier, usually more opaque, with slightly stronger sculpture (strongest in thinnest species) and with thickened columella; Rapa:....typical group.

C. First embryonic whorl with fairly prominent, decussating spiral and growth-wrinkles, which become stronger on 2d and remain fairly distinct on 4th whorl; shell thinnest and smallest; Mt. Tanga:.....
.....**M. benesculpta** new species.

CC. First embryonic whorl with weaker sculpture, which becomes still weaker on 2d and very weak on later whorls; shell larger and heavier;

D. Shell smaller, usually higher and less sharply angulate; variously colored and banded; most of Rapa:.....**M. ornatella** (Beck).

E. Embryonic whorls with stronger spirals; shell smaller; Mt. Tepiahu (south of bay).....subspecies **parva** new.

EE. Embryonic spirals weaker; shell larger; typically north of bay.... typical subspecies.

DD. Shell largest, more depressed, quite sharply angulate, pallid and rarely with narrow color band; Mt. Perahu.....**M. perahui** new species.

BB. Shell thinner, less opaque and more shining, with narrow, dark band above and another below angle; columella slender; Raivavae:..... **M. fosbergi** new species.

F. Shell very much depressed, with 5th whorl sharply angulate; Mt. Mua-nui: .....typical subspecies.

FF. Shell much more elevated, with 5th whorl barely angulate; Mt. Ta-raia:.....subspecies **taraiae** new.

AA. Penis stout and short; principal radular marginals often with vestigial blade ectocones; embryonic whorls with about 100, very fine subequal spirals; later whorls with almost no growth-wrinkles but with undiminished spirals; shell with higher spire, colored yellowish with dark subsutural lines and white peripheral band (rarely bordered above by dark line); Austral Islands: Tubuai:..... section **Leurocystis** new. **M. saintjohni** new species.

Dimensions in subgenus *Microcystis* s.s.

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
M. benesculpta type	5.71	148(8.47)	141(8.02)	53(3.04)	145(4.38)	2.12	3.5(7.37)	4.5+
M. o. parva type	6.64	149(9.93)	144(9.55)	50(3.35)	147(4.94)	2.59	3.6(9.21)	4.4
M. ornatella								
Beck	7	(10)		(4)	(5)			4½
Pfr.	7	(11.3)	(10.5)					4½
(amoenula)	5.5	(10)		(4)	(5.5)			4½
BBM. 135220	8.53	146(12.47)	136(11.16)	54(4.61)	143(6.60)	2.83	3.9(10.97)	4.4
M. perahui type	8.02	165(13.25)	150(12.0)	61(4.93)	142(6.98)	3.07	4.1(12.72)	4.1
M. fosbergi type	7.29	173(12.62)	158(11.54)	65(4.84)	144(6.99)	2.73	4.1(11.32)	4.3
M. f. taraiae type	6.91	154(10.66)	142(9.80)	59(4.06)	145(5.87)	2.54	3.8(9.58)	4.3
M. saintjohni type	8.66	140(12.12)	133(11.49)	51(4.38)	150(6.55)	3.51	3.2(11.27)	4.3

Microcystis (Microcystis) ornatella parva, new subspecies (pl. 18, figs. 3-4).

Austral Islands: Rapa (south of Ahurei Bay): BBM. 11408 (135197-8), north side of Mt. Tepiahu (Mang. Exped.! July 10, 1934).

Shell (pl. 18, figs. 3-4) similar to *M. benesculpta* but larger and heavier, obtusely but distinctly angulate at 4.4 whorls; variously colored and banded, less weakly polished above and quite well so below, considerably more opaque (especially above). Embryonic whorls about 2.5; first with slightly weaker spirals (about 30 fairly distinct and more minor ones visible near end) and growth-wrinkles; second with much weaker sculpture (although sometimes fairly prominent in patches). Later whorls with weak, rounded growth-wrinkles (about 8 per mm. on last) and with spirals becoming increasingly weaker until almost obsolescent above on last whorl and very weak on more polished

base (yet visible under high light). Aperture barely to weakly angulate; peristome about 30° to shell-axis; columella more heavily thickened, often very weakly convex.

M. ornatella parva intergrades with typical *M. ornatella* but seems sufficiently distinct for recognition as a subspecies.

Microcystis (Microcystis) ornatella (Beck), (pl. 12, fig. 15; pl. 1, figs. 1-6).

Nanina ornatella Beck, 1837, Index: 2 (nude), Opara; 1837, Nov. sp.: 3 (described). *Helix ornatella* Pfeiffer, Monogr. 3:38 [1:32-4:16-5:57-7:70], Pitcairn (sic); Conch.-Cab. III:318, pl. 129, figs. 7-10. *Nanina ornatella* Tryon, Manual 2: 115, pl. 38, figs. 59-61.

N. amoenula Beck, 1837, Index: 2 (nude); 1837, Nov. sp.: 3 (described), Opara.

Helix realis "Mühlf." Anton, 1839, Verz.: 35 (nude), vested in synonymy of *H. ornatella* Pfr., 1842, Symbolae II: 36.

Austral Islands: Rapa: [Area, north side of Ahurei Bay], BBM. 135220-2, dissected, from ferns and shrubs, medium damp hillside, alt. 250-450 feet, back of Area (Mang. Exped.! July 15, 1934); BBM. lots from many localities (outside of Mt. Perahu and Mt. Tanga), intergrading with subspecies *parva.*

"N. testa conoidea nitida, testacea, lituris radiantibus obscurioribus; ultimo anfractu ancipiti apertura rotundato-subtrapezoidali; columella basi rectiuscula. *M. a* 10. *b* 7. *c* 5. *d* 4. *Hab.* in foliis *Dracænae terminalis Insulæ Opara. H. Cuming,* etc. Testa semipellucida, anfractibus 4½ fere planulatis, ultimo ancipiti, acute angulato. Apertura depressiuscula, antice obsolete angulata, fere trapezoidalis; columellæ subrectæ basi callo tenui, candido, subincrassata. Color flavidus vel pallide testaceus, plagis incrementi irregularibus, radiantibus, badiis vel fuscis; pagina inferior, mox flava, mox badia vel infuscata, centro tamen semper lutescente; interdum fascia fusca vel picea supra carinam adest. Varietates . . ." (Beck; Nov. sp.).

Nanina (Microcystis) amoenula: "N. testa subdepressa nitida lutescente concolore; ultimo anfractu obtuse angulato, apertura subtrapzoidali; columella rectilinea. M. *a.* 10, *b.* 5½, *c.* 5½, *d.* 4. Hab. *Insularum Opara. H. Cuming.* Praecedenti [*N. filiceti*] proxime accedens, at magis depressa. Anfractus 4½, fere planulati, sutura simplic distincti; ultimus anceps, supra parum, infra sat convexus, angulo tamen obtuso. Apertura magis depressa magisque transversa, quam praecedentis, cum angulo antico obsoleto. Columella ad basin fere recta, callo tenui aucta. Color exalbidus, in luteum vergens, ultimi anfractus infra virescens; apertura alba." (Beck; Nov. sp.).

Shell (pl. 12, fig. 15) similar to subsp. *parva* but larger (dimensions in table for one of the largest), similarly variable in height [7.23 × 141(10.22 mm.), 4⅛ wh., to 6.24 × 162(10.00 mm.), 4 wh.]; very variable in color, usually with darker varices and often with prominent, reddish, spiral bands. Embryonic whorls 2.1 to 2.5; first whorl with sculpture similar but very weak (as if erased, but weak even in young shells). Later whorls also smoother and base quite polished (although with spirals visible under high light).

Animal (pl. 1, fig. 1) with some black pigment on top of head, which is longer than tail; caudal horn (CH) rounded, not quite reaching tip of sole; median area of sole slightly wider than either lateral one. Shell-lobes absent (pl. 1, fig. 2). Lung (pl. 1, fig. 5) with chalky-white and black blotches [latter become more prominent in older animals]; over 4 times as long as base or 3 times length of kidney (K), which is 2.4 times its base or twice length of pericardium (H). Apical whorls with white deposit along parietal angle. Ovotestis (pl. 1, fig. 4) with 2 large, lobulate and 1 small group

of short clavate alveoli, imbedded in basal 0.4 of apical lobe of liver; duct (GD) quite short, swollen and convoluted; talon (GT) short clavate, bipartite; carrefour (X) large and sacculate; uterus (UT) containing 3 eggs and 6 embryos (UE), gradually tapering into post-uterine oviduct (UZ); spermatheca (S) short-stalked, attached to floor of haemocoele and to oviduct by short fibers. Penial retractor (PR) arising opposite middle of uterus and inserting on penial apex and along basal ⅓ or ¼ of epiphallus (E), which is very small and all included in penial sheath (PS, outline shown); penis proper (P) long, slightly larger apically. Penial prepuce (YP) thin-walled, about as long as wide; atrium proper (Y) very short, opening (YO, pl. 1, fig. 1) slightly above level of inferior tentacle (TV) and ⅓ distance between it and anterior edge of visceral peduncle (VS). Jaw with strong growth-lines and evident longitudinal striations, not much thickened centrally, so with low, rounded, thin median lobe. Radula (pl. 1, fig. 3) has short, oblong central with ectocones carried out on mesocone so that last appears very short [a special feature of *Microcystis*], 9 laterals with entocone of first represented by a very slight, obtuse angle, which is lost on last 2 or 3, and 54 rather broad and short marginals, of which inner 9 are bicuspid, next 12 have only a small second ectocone (very rarely with very minute blade ectocones as well) and outermost seldom attain more than 5 cusps; 101 rows (T) counted.

Central nervous system (pl. 1, fig. 6) concentrated; cerebral and pedal commissures simply constrictions; right parietal and abdominal ganglia fused; right parietal connective simply a constriction; right pleural, left parietal and left abdominal connectives very short; left pleural about twice as long; left pedal connective about as long as pedal ganglion; right pedal connective slightly the longest. Left (or right) cerebral ganglion gives off (N) nuchal nerve from ventral side near posterior border to front of head with branches to near upper lip, (TE) large (attached) ommatophoral and optic, (NF) frontal (with 3 lateral roots) to region around base of ommatophore, (TV) inferior tentacular, (JN) labial from ventral side near buccal connective to lateral corner of mouth and lower lip, (NS) subcerebral from ventral side along artery and just in front of pedal connective, (AC) acoustic to otocysts, and (BC) relatively long buccal connective from posterior edge of ventral side. Left pleural connective gives off from base minute nerve (BR; apparently unpaired) to buccal retractor muscle. Left (and right) pleural ganglion gives off (TR) tiny nerve to tentacular retractors. Left parietal ganglion gives off (M) left pallial nerve. Right parietal plus abdominal ganglion gives off (NM) right pallial laterad, (I) intestinal nerve near caudal border to follow aorta, (A) large anal more ventrad (passes under uterus), and (C) caudal or columellar near right abdominal connective to pass between columellar muscles to dorsum of tail. Left pedal ganglion gives off around edge (FA) anterolateral pedal nerve to sides of head, (FL) large bifurcate lateral pedal to sides of foot and (FP) 4 very fine posterior lateral pedals to sides of foot and tail, and, from ventral surface, (VA) 2 anteroventral pedals, (VL) 3 medioventral pedals and (VP) 2 caudoventral pedals to region of sole. Right pedal ganglion has similar branches but right posterolaterals are given off as 1 large and 1 small nerve, right caudoventral pedals have a short common trunk, and right lateral is almost 3 times as large as left one and divides almost immediately into a fan of nerves, including one branch anteriad along post-uterine oviduct, 2 nerves along vas deferens (which loops around right ommatophoral, frontal and lateral pedal nerves) to enter apical orifice of penial sheath, a large nerve to base of penis, a smaller one to base of penial sheath and apicad along it, a quite large nerve (with branches to uterus) and a small one to spermatheca and 2 branches (like those of left lateral) to body wall. Buccal ganglia and their commissure subequal in length; each ganglion gives off (B) large lateral buccal with a deep buccal branch (not shown) near its origin, (BA) anterior buccal with a branch to anterior end of oesophagus, (O) smallish oesophageal that arises behind middle of dorsal side and sends a very minute twig anteriad along salivary duct before curving caudad, and (RN) odontophoral nerve (partly from buccal commissure) to radular region.

Microcystis ornatella, which is limited to the island of Rapa, was confused by Pfeiffer, probably because of some mix-up in the Cuming material, with

Philonesia filiceti (pl. 18, fig. 12) from Pitcairn Island. Beck' s original description, copied above from a photograph made for the Bishop Museum by the British Museum, applies to the Rapa shell. Pfeiffer's figures and dimensions (Beck usually overcounts the number of whorls) prove that the Cuming material consists of shells of the large form and very probably came from the lowlands near Area, the principal landing-place. *N. amoenula,* as Pfeiffer recognized, seems to have been founded on a very low-spired specimen of *M. ornatella;* it is too small and weakly angulate for *M. perahui,* although similar in color. Pfeiffer's unfigured *H. lardyi* "Charpentier", if actually perforate, undoubtedly did not come from Rapa and probably is not related to the Microcystinae.

Another peculiar feature of the genus *Microcystis* is the relation between the lengths of preserved animals before and behind the visceral peduncle. In such partially contracted specimens of *Microcystis,* the anterior end is longer than the tail, while the opposite is true in the other genera of Microcystinae. The penis is smooth when partially everted (P, pl. 1, fig. 1) although internally plicate when introverted (sections P and PB, pl. 1, fig. 4).

Microcystis (Microcystis) perahui, new species (pl. 18, figs. 5-6).

Austral Islands: Rapa (northwest): BBM. 11409 (135261), also 135271 (dissected) and 135280, on under side of leaves of shrubs, *Freycinetia* and birds' nest ferns, alt. 1,200-1,500 feet, eastern edge of Mt. Perahu (Mang. Exped.! July 21, 1934).

Shell (pl. 18, figs. 5-6) similar to *M. ornatella* but larger, more depressed (than usual), and more sharply angulate (especially when young shells of similar whorl-sizes are compared); usually paler greenish to yellowish; unicolor or with very narrow, reddish, supraperipheral band. Embryonic whorls 2.2 to 2.5, with similar, weak sculpture. Later whorls with slightly more rapid whorl increase.

Animal similar to *M. ornatella* but with only eyes pigmented; lung with dorsal surface largely covered by chalky deposit. Uterus with 3 eggs and 4 embryos; spermatheca with very short stalk (as in *M. saintjohni*). Epiphallus with middle loop outside penial sheath. Radula with 10 laterals and 67 slightly more elongate marginals, of which about inner 19 are usually bicuspid; 117 rows counted.

M. perahui differs less from typical *M. ornatella* than the latter does from subspecies *parva,* but the large series collected by the Mangarevan Expedition show no intergradation between the first two.

Microcystis (Microcystis) fosbergi, new species (pl. 18, figs. 7-8; pl. 1, figs. 7-8).

Austral Islands: Raivavae (central): BBM. 11410 (135946-51, dissected), on ferns and shrubs, medium damp hillside, alt. 500-700 feet, south slope of Mount Muanui (Mang. Exped! Aug. 8, 1934).

Shell (pl. 18, figs. 7-8) thin, depressed (spire with less convex outlines than that in *M. ornatella*), very sharply angulate when young and distinctly so at 4.3 whorls; base quite convex with deep and fairly narrow foveola; clouded with whitish above but horn-color and translucent below, with narrow chestnut band above and another below

periphery; quite well polished. Embryonic whorls around 2.1, quite polished, with obsolescent spiral wrinkles separated by series of short scratches (very faintly visible). Later whorls with weak growth-wrinkles (9-10 per mm. on 5th) and with spirals becoming slightly more prominent (about as on last whorl of *M. ornatella*); base well polished, with spirals almost obsolete (intermittently discernible in high light); suture slightly more impressed than in *M. ornatella* but more narrowly margined. Aperture broadly lunate, almost transverse; peristome about 10° to shell-axis and weakly concave below; columella short, slender (scarcely calloused) and rounded.

Animal similar to *M. ornatella* but foot lighter in color, with three middorsal black stripes on head; tail horn more conical. Lung (and apical whorls) solidly chalky white over dorsal side and 0.2 distance below periphery; with some pearly excrescences; diaphragm with less white deposit. Ovotestis consisting of five or six conical groups of alveoli in basal 2/3 whorl of apical lobe of liver. Uterus containing one egg and three embryos; post-uterine oviduct (pl. 1, fig. 8) tapering more rapidly; spermatheca stout, without definite stalk. Penial sheath not including basal half of epiphallus; penis somewhat shorter. Atrial opening about half distance between inferior tentacle and anterior edge of visceral stalk. Radula (pl. 1, fig. 7) has 11 laterals and 53 marginals, of which six to eight are bicuspid and rest add one or two small ectocones; 120 rows counted.

This species is named for Mr. Raymond Fosberg, assistant botanist on the Mangarevan Expedition. Its thin shell separates it from all the other species of *Microcystis,* but its sculpture is similar to that in the typical group.

Microcystis (Microcystis) fosbergi taraiae, new subspecies (pl. 18, fig. 9).

Austral Islands: Raivavae (southwest): BBM. 11411 (135966, dissected, 135973), on ferns and shrubs, medium damp hillside, alt. 400-600 feet, south slope of Mount Taraia (Mang. Exped.! Aug. 9, 1934).

Shell (pl. 18, fig. 9) similar to typical subspecies but more elevated (type much more so), with fifth whorl barely angulate; brown bands broader. Embryonic whorls with slightly more distinct spiral wrinkles and scratches. Suture more distinctly impressed. Aperture evenly rounded; peristome about 20° to shell-axis.

This subspecies is not known to actually intergrade with the typical form.

Microcystis (Leurocystis) saintjohni, new species (pl. 19, figs. 1-3; pl. 1, figs. 9-10).

Austral Islands: Tubuai (central): BBM. 11412 (135997, dissected, also 136005-6), northeast slope of Mount Pane, alt. 1,100-1,200 feet (Mang. Exped.! Aug. 23, 1934).

Shell (pl. 19, figs. 1-3) with spire similar to but higher than that in *M. ornatella* so that base seems more flattened, sharply angulate and lenticular when young, distinctly angulate near end of fourth and obtusely so on fifth whorl; base with narrow and deep foveola; with chestnut subsutural line which becomes so deep chocolate on fourth whorl as to seem almost black, followed by an opaque yellow zone (lighter toward apex), a broad opaque whitish peripheral band that occupies about ⅓ upper surface of last whorl and extends a lesser distance below angle, and with greenish and more translucent foveolar region [one shell (136006) with narrow chocolate band between yellow and white zones, sharply marked off from latter but diffusing into former]; polished above and below. Embryonic whorls around 2.25; with extremely fine, subequal, spiral wrinkles (about 100 visible at end of first), practically as obscure as in *M. fosbergi.* Later whorls with about as weak growth-wrinkles as possible, but with spirals on fifth slightly more distinct than in *M. ornatella*; base with fairly distinct spirals; suture scarcely impressed.

Aperture similar to but broader than in *M. ornatella*; peristome about 40° to shell-axis and markedly convex below; columella short and thickened.

Animal similar to *M. ornatella* but foot lighter in color, with black eyes but light ommatophores; tail with evident dorsal groove and fairly large, shield-shaped horn; mantle-lobes and shell-lap light. Lung (and apical whorls) solidly chalky white; four times as long as base or 2.3 times kidney length, which is three times its base or 1.6 pedicardial length. Uterus containing three or four eggs and one embryo; post-uterine oviduct (pl. 1, fig. 10) sharply demarcated; spermatheca with less evident stalk. Epiphallus slightly larger, with basal half outside penial sheath; penis short and stout, larger at base than apex. Penial prepuce shorter; atrial opening more than half distance behind inferior tentacle to visceral stalk. Jaw with low and rounded median lobe. Radula (pl. 1, fig. 9) has 11 laterals and 79 more elongate marginals, which more commonly develop small ectocones and of which inner 15 are otherwise bicuspid; 115 rows counted.

This very handsome and distinct species, the type of the section *Leurocystis,* is named for Dr. Harold St. John, botanist of the Mangarevan Expedition.

Microcystis (Facorhina) lenticula, new species (pl. 19, figs. 4-5; pl. 7, figs. 14-15).

Austral Islands: Raivavae (off east end): BBM. 11413 (142274, dissected), islet of Hotuatua (Aug. 5). (West): BBM. 142146-8, under stones and on dead leaves, medium damp valley, one-fourth mile inland, alt. 50 feet, west of Raiurua (Aug. 5); BBM. 142168, on dead leaves, 10-30 feet from sea, 0.5 mile west of flat, Ahuoivi Point (Aug. 9). (All lots Mang. Exped.! 1934).

Shell (pl. 19, figs. 4-5) lenticular, rather thin, with narrowly margined carina; base as convex as spire, with fairly broad and quite deep foveola; light tan-color, dull above, less so below. Embryonic whorls 2 to 2.4, with moderately impressed suture; first with seven quite prominent spiral cords, weakly and irregularly beaded although growth-wrinkles are not prominent between them; second with one or two minor spirals to each interspace. Later whorls with major spirals becoming weak and irregular above (although minor ones remain fairly evident) and with weakish growth-threads (20 per mm. on 5th); base with distinct major and quite evident minor spirals; suture weakly impressed but fourth and fifth whorls often attached below carina. Aperture narrow, almost transverse, sharply angulate; peristome 40° to shell-axis and moderately arcuate near very short, well thickened columella.

Animal similar to *M. andersoni*; tail horn small and conical; mantle-lobes and shell-lap dark. Lung with pearl-like excrescences; six times as long as base or four times length of kidney. Apical whorls with close network of chalky-white. Ovotestis with seven closely packed, wedge-shaped groups of few lobules. Uterus with five embryos. Penial prepuce (pl. 7, fig. 15) much shorter; atrial opening 4 times pedal groove interspace above upper groove. Radula (pl. 7, fig. 14) has central with still longer mesocone, six laterals, of which innermost has slightly stronger entoconal angle, and 34 marginals, of which first and outermost seven have traces of an ectocone; 116 rows counted.

M. lenticula is rather closely related to *M. adusta.*

Key to the sections and species of the subgenus *Facorhina*

A. Embryonic whorls with less than 10 major spirals above; shell lenticular, with 4.5 wh. diam. less than 9 mm.; penis and epiphallus short; Austral and Cook Islands: Raivavae, Tubuai, and Mangaia: .....section **Facorhina** s. s.

B. First embryonic whorl lower, with moderately to well impressed suture and with beaded spirals; shell thinner, narrowly carinate, with lower spiral ridges and weaker growth-wrinkles; 4.5 wh. diam. 6.7 to 7.3 mm.; group of *M. lenticula;*

C. Shell larger with weaker sculpture (especially on last whorl), lighter tan-color, lower spire and with peristome moderately arcuate near columella; Raivavae: ..... **M. lenticula** new species.

CC. Shell smaller with stronger sculpture, darker color, higher spire and less arcuate peristome; Tubuai: ..... **M. adusta** new species.

BB. First embryonic whorl high, with deep suture and more continuous spirals, shell heavier, broadly carinate, with higher spirals and stronger growth-threads; typical group;

D. Shell larger than B; carina straight and more widely margined below than above; Tubuai: ..... **M. andersoni** new species.

DD. Shell much smaller than B; carina upcurved and widely margined above and below; Mangaia: ..... **M. buckorum** new species.

AA. Embryonic whorls with 28 to 45 major spirals above; shell more elevated, with 4.5 wh. diam. more than 11 mm.; penis and epiphallus usually longer; Austral Islands: Raivavae and Tubuai: ..... section **Cnesticystis** new.

E. First embryonic whorl beaded by spirals (about 40 visible) and growth-threads that are subequal in strength and spacing; shell more depressed, with finer sculpture and more glossy base; Tubuai: ..... **M. kondoi** new species.

EE. Embryonic whorls decussated by strong growth-ridges and more closely-spaced, weaker spirals (about 30 visible); shell more elevated, rougher, with coarser sculpture; Raivavae: ..... **M. aspera** new species.

Dimensions in subgenus *Facorhina*

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4.5 wh.	whs.
M. lenticula type	3.52	208 (7.31)	194 (6.84)	52(1.84)	199(3.66)	2.09	3.5 (7.31)	4.5
M. adusta type	3.88	179 (6.96)	171 (6.65)	47(1.84)	182(3.35)	1.81	3.7 (6.66)	4 ¾—
BBM. 147659	4.45	174 (7.73)	167 (7.44)	48(2.12)	172(6.65)	1.75	4.0 (6.97)	5 +
M. andersoni type	5.46	194(10.59)	185(10.13)	51(2.81)	182(5.12)	2.09	4.2 (8.76)	5.5
M. buckorum type	2.20	213 (4.68)	211 (4.65)	54(1.19)	190(2.26)	1.44	3.2 (4.68)	4.5+
M. aspera type	9.32	147(13.75)	140(13.03)	47(4.38)	156(6.84)	2.81	4.2(11.87)	5 ⅛
M. kondoi type	7.16	168(12.0)	.....	60(4.26)	143(6.09)	.....	.....	4.5+
another	7.27	168(12.23)	162(11.80)	57(4.15)	143(5.91)	2.86	4.4(12.6)?	4.4+

Microcystis (Facorhina) adusta, new species (pl. 19, fig. 6; pl. 13, fig. 1).

Austral Islands: Tubuai (west end): BBM. 11414 (147911, dissected), in jungle of hala, *Barringtonia,* and hau, dry flat 50 feet from sea, 0.5 mile south of Araua (Aug. 22, 1934). (North side): BBM. 147659 (bleached),

sweepings about 200 yards west of Mataura (Aug. 16, 1934). (Both lots Mang. Exped.!).

Shell (pl. 19, fig. 6; pl. 13, fig. 1) similar to *M. lenticula* but with higher spire and deeper basal foveola; dark tan-color. Embryonic whorls about 2.25, with better impressed suture (whorls not so high as in *M. andersoni*); first with eight major spirals and with fine, closely spaced growth-threads between them; second with nine major spirals visible. Later whorls with stronger growth-threads (15 per mm. on last) and with major spirals weakening but remaining more prominent than in *M. lenticula*; base with obscure, wavy minor spirals and broken major ones; suture dropping below carina with fifth whorl. Peristome less arcuate near columella.

Animal similar to *M. andersoni* but dark on top of head; lung sometimes with large, black blotches on lower half but with less chalky deposit. Uterus with three embryos. Spermatheca, epiphallus, and penis much as in *M. lenticula.* Penial prepuce more as in *M. andersoni,* but with basal half much more slender; containing simple spermatophore (squeezed out of shape) with heavy, yellowish (somewhat corneous?) walls. Radula as in *M. lenticula,* with 35 marginals; more than 97 rows.

The dead shells in lot 147659 have more rapid whorl-increase and attain a larger size than do those of the type lot, and evidently form a rather distinct local race.

Microcystis (Facorhina) andersoni, new species (pl. 19, figs. 7-9; pl. 7, figs. 12-13).

Austral Islands: Tubuai (central): BBM. 11415 (141821, dissected), under stones and logs, medium damp hillside, alt. 150-500 feet, Mount Tavaetu (Mang. Exped.! Aug. 22, 1934).

Shell (pl. 19, figs. 7-9) lenticular, with sharp carina, broadly margined below but less so above; basal foveola deep and fairly broad; brownish, dull and rough above, less so below and glossy in foveola. Embryonic whorls around 2.5; first high, narrow, with deeply impressed suture and with seven or eight high, angular, spiral ridges visible, which are not crossed by far weaker, fine, closely spaced growth-threads; second with major spirals similar but beaded by growth-lines; minor spirals obscure. Later whorls with prominent, closely spaced growth-threads (more distant and 7 per mm. on sixth) which cross weakening spiral ridges (6 on 6th) above; base with major spirals much less prominent (fairly strong in embryos) but discernible to near columella and with minor spirals obscure or absent; suture scarcely impressed, or attached below carina. Aperture narrow, carinate at about 80° to shell-axis; peristome about as in *M. adusta*; columellar callus still heavier.

Animal similar to *M. ornatella* but with row of black dots between pedal grooves, similar squarish ones above this and vaguer, smaller ones below; mantle-lobes and shell-laps edged with dark spots. Lung with much dark pigment behind mantle collar, with dark lines along hind-gut and with sparse, vague and irregular, white blotches; five times as long as its base or 3.3 times kidney length, which is over three times its base or twice pericardial length. Uterus (pl. 7, fig. 13) containing no eggs and four embryos, of which one has small, one intermediate, and two have large shells; post-uterine oviduct more sharply demarcated and longer. Penial retractor arising near base of uterus and inserting on base of still smaller epiphallus and on penial apex. Penial sheath including all epiphallus; penis small, tapering slightly toward apex. Penial prepuce relatively larger; atrial opening 0.5 distance from inferior tentacle to anterior margin of visceral stalk and three times pedal groove interspace above upper groove. Radula (pl. 7, fig.

12) has central with slightly longer mesocone, seven almost bicuspid laterals, of which last begins to lose ectocone, and 44 marginals, of which all are unicuspid except outermost one, which occasionally (as in fig.) shows bifid mesocone; 111 rows counted.

This strikingly ornamented species, the type of the subgenus *Facorhina,* is named for Mr. Donald Anderson, assistant malacologist on the Mangarevan Expedition.

Microcystis (Facorhina?) buckorum, new species (pl. 19, fig. 12; pl. 13, fig. 2).

Cook Islands: Mangaia: BBM. 97624 (dead), under stones, medium damp makatea, 50 feet, alt. 1,200 feet inland, Oneroa (P. H. Buck! Feb. 14, 1930).

Shell (pl. 19, fig. 12; pl. 13, fig. 2) similar to *M. andersoni* but much smaller and more depressed, with carina broadly margined above and curved upward, and with base rather tumid between broad carinal sulcus and quite narrow, moderately deep foveola. Embryonic whorls almost two; first with eight major spirals and second with six visible; minor spirals quite distinct. Later whorls with prominent growth-threads (16 per mm. on 5th) crossing less reduced spirals above; base dull, with fairly distinct, major and minor spirals; suture of fifth whorl considerably below carina. Peristome 30° to shell-axis; columella very thick and heavy.

Although *M. buckorum* is described from a single dead shell, it is a very distinct species and I feel confident that it belongs in or near this section. Despite its small size, the shell and its sculpture are relatively the heaviest in the group. It is named for Dr. and Mrs. P. H. Buck.

Microcystis (Cnesticystis) kondoi, new species (pl. 19, figs. 13-15; pl. 7, figs. 16-17).

Austral Islands: Tubuai (central): BBM. 11417 (136011, dissected, also 136023), medium damp northeast slope of Mount Pane, alt. 1,100-1,200 feet. BBM. 141818, under stones and logs, on shrubs, ferns and dead leaves, medium damp hillside, alt. 150-500 feet, Mount Tavaetu; BBM. 147882 (dead), west slope of Mount Tavaetu (Mang. Exped.! Aug. 22-23, 1934).

Shell (pl. 19, figs. 13-15) suborbicular, sharply angulate or weakly and very narrowly carinate, with basal foveola quite narrow and the deepest in *Facorhina*; dark tan-color with whitish angle and subsutural line [one shell (147882) with three subequal zones (two of chestnut separated by one of dark tan) above, with practically a duplicate pattern just below angle, and with central 0.6 of base as usual]; dull above and shining, almost polished below. Embryonic whorls 2.2 to 2.5, with moderately impressed suture; first whorl with spiral ridges (37 visible at end), as strong or stronger than growth-wrinkles and about equally spaced, developing series of beads; second whorl (45 spirals visible near end) appearing more decussate. Later whorls with growth-lines becoming more closely spaced (7 per mm. on 5th) above, decussating but not obscuring spirals; base with similar sculpture on outer one-fourth but much reduced on remainder; suture weakly impressed but dropping below carina on fifth whorl. Aperture fairly broad, almost transverse, sharply angulate; peristome 30° to shell-axis and weakly concave below; columella sometimes very weakly twisted in embryos but short and fairly heavy at 4.4 whorls.

Animal similar to *M. andersoni.* Lung often with small black dots, especially near mantle collar, and with vague, smallish, white spots; 4¼ times as long as its base and more than twice length of kidney. Uterus containing five embryos; spermatheca (pl. 7,

fig. 17) practically sessile. Epiphallus much larger; penis stouter, slightly enlarged apically; penial prepuce slightly shorter. Jaw with a good, strong medium point. Radula (pl. 7, fig. 16) has more elongate central and laterals, and 58 marginals, of which outer seven usually have an ectocone represented by a distinct angle; 96 rows counted.

This species, the type of the section *Cnesticystis,* is named for Mr. Yoshio Kondo, who collected many shells on the Mangarevan Expedition. This section is closer than *Facorhina* s. s. to the typical subgenus of *Microcystis.*

Microcystis (Cnesticystis) aspera, new species (pl. 19, figs. 10-11; pl. 7, figs. 18-19).

Austral Islands: Raivavae (southwest): BBM. 11416 (BBM. 135918-24, dissected), south slope of Mount Taraia (Mang. Exped.! Aug. 6, 1934).

Shell (pl. 19, figs. 10-11) similar to *M. kondoi* but more elevated and more coarsely sculptured, attaining 5⅛ whorls and becoming more obtusely angled; basal foveola quite broad and fairly deep; dull brownish (epidermis deciduous and often exposing white shell), much rougher, although somewhat burnished in foveola. Embryonic whorls 2.5 to 2.7, with prominent, angular growth-ridges decussated by slightly lower and more closely spaced, spiral ones (30 visible at end of first; 28 at end of second); minor spirals (4-5 per interspace) visible in embryos. Later whorls with embryonic sculpture continued above, although spirals may be obscured by more closely packed growth-ridges on sixth whorl; base with spirals still distinct in central area. Aperture broader and quite weakly angulate; peristome 20° to shell-axis; columella concave, but with much heavier callus.

Animal similar to *M. andersoni* but usually darker. Lung sometimes with dark pigment and often with pearly excrescences; 3¼ base and twice kidney. Uterus containing one egg and three embryos; post-uterine oviduct (pl. 7, fig. 18) more as in *M. ornatella*; spermatheca with very short stalk. Epiphallus more like *M. kondoi* and epiphallus still larger. Atrial opening below anterior margin of visceral stalk. Jaw with prominent, rounded median point. Radula (pl. 7, fig. 19) has central and 12 laterals with much more elongate backs, and 47 marginals, of which outer 13 often have a weak ectocone; 106 rows counted.

M. aspera attains more whorls and the greatest size in the genus *Microcystis.* In form of shell, it approaches the closest of all the species of *Facorhina* to the typical subgenus.

Genus LAMPROCYSTIS Pfeffer, 1883

Lamprocystis Pfeffer, 1883, Abhandl. Ver. Hamburg **7** (2) [1882]: 20 (anatomy incorrect); type by subsequent designation of Pilsbry, 1928, Nautilus **42**: 67, *L. excrescens* (Mousson).

(?) *Fanulum* Iredale, 1913, Proc. Malac. Soc. **10**: 372; type by original designation *Trocho-Nanina exposita* Mousson, 1873, Jour. de Conch. **21**:111 [11], pl. 7, fig. 2, from Kermadec: Sunday Island.

Avarua new subgenus, type *L. globosa* new species.

Raiatea new subgenus, type *L. simillima* (Pease) from Raiatea (BBM. 87212).

Manureva new subgenus, type *L. rurutuana* new species.

Naiaua new subgenus, type *L. laddi* new species.

Kerakystis new subgenus, type *L. perpolita* (Mousson) from Savaii (BBM. 75826).

Tongacystis new subgenus, type *L. solida* (Mousson) from Tongatabu (BBM. 54346).

Moala new subgenus, type *L. moalana* new species.

Guamia new subgenus, type *L. misella* (Férussac) from Talafofo (BBM. 75148).

This genus might, with equal reason, be divided into three: *Avarua, Lamprocystis* and *Guamia. Avarua,* with *Raiatea* as a subgenus and *Manureva* as a section, would approach *Microcystis,* both in its small epiphallus and, especially *Avarua* s. s., in its shell. *Lamprocystis,* with *Tongacystis* and *Moala* as subgenera, would almost intergrade with the subgenera *Euanana* and *Laua* of *Diastole. Guamia* is isolated in structure as well as in locality; since *Lamprocystis* appears to be absent from the Caroline Islands, connecting links might be expected in the East Indies.

Key to subgenera and sections of *Lamprocystis*

A. Genital opening much in front of visceral peduncle; spermatophore membranous (so far as observed); south Pacific, from Society (Raiatea:) and Austral Islands westward (*L. denticulata* in Marianas Islands:):

B. Radular marginals broader, with two subequal terminal cusps; mantle without left shell-lobe; epiphallus smaller than penis; shell less translucent (approaching *Microcystis*) with simple and thin columella (DD) or sharply angulate on fifth whorl (D) or with much larger whorls (C); Society (Raiatea:), Austral (Rurutu:) and Cook Islands (Rarotonga:):.....subgenus **Avarua** new.

C. Radula with 13 laterals that decrease in size and intergrade with short, broad, multicuspid marginals; epiphallus about as long as simple penis; penial prepuce swollen with an internal boss; shell thin, with much larger whorls, and with spiral swelling on columella when young; Society Islands: Raiatea: .....section **Raiatea** new.

CC. Radula with marginals longer than first of eight or nine laterals; shell smaller;

D. Epiphallus, penis and penial prepuce more as in C; radula with about nine bicuspid marginals; shell angulate on fifth whorl, with a steeply inclined columellar fold (reduced with age); Austral Islands: Rurutu: .....section **Manureva** new.

DD. Epiphallus extremely small; penis apparently sometimes developing a lateral diverticulum; radula with 1-4 bicuspid marginals; shell weakly angulate (at most) on 5th whorl, with simple, thin columella; Cook Islands: Rarotonga: .....section **Avarua** s. s.

BB. Radular marginals more elongate with accentuated mesocones or mantle with left shell-lobe (EE); epiphallus longer and usually larger than penis; shell smaller than C, less angulate than D, and either thinner and more transparent than C (excl. G) or with columellar fold or lamella (excl. H);

E. Mantle with narrow right and without left shell-lobes; shell usually heavier and horn-colored; same range as A: .....subgenus **Lamprocystis** s. s.

F. Principal marginals of radula at least bicuspid; shell typically smaller (excl. F and G); columella with nearly horizontal cord, tongue-shaped lamella or simple curvature;

G. Shell less translucent or colored (approaching *Avarua*), with weakly angulate periphery on fifth whorl; 4 wh. diam. more than 6 mm.; Fiji (Lau): Naiau: .....section **Naiaua** new.

GG. Shell more translucent, usually smaller (excl. *L. perpolita*), with rounded periphery (*L. unisulcata* with sulci);

H. Columellar cord absent in large shells; whorl-increase quite rapid; epiphallus entering side of penis; Samoa and Austral Islands: .....section **Kerakystis** new.

HH. Columella with spiral cord or lamella; shell with more or less dome-shaped spire and more gradual whorl-increase; 4 wh. diam. less than 5 mm.; epiphallus entering more apically; Pacific islands from Samoa and Rarotonga westward: .....section **Lamprocystis** s. s.

FF. Most marginals unicuspid; columella with steeply inclined cord (at least when young); shell with rounded fifth whorl; 4 wh. diam. about 6.5 mm.; Tonga: .....section **Tongacystis** new.

EE. Mantle with broad right and left shell-lobes; shell pallid, subglobose and thin; columella with fine but sharp, almost horizontal cord; Fiji (central): Moala: .....subgenus **Moala** new.

AA. Genital opening near middle of visceral stalk; spermatophore typically horny; principal radular marginals elongate, with numerous blade-ectocones; shell fairly heavy; columella with rounded, steeply inclined cord in embryo but becoming simply thickened; Marianas Islands (and Philippines ?):.....subgenus **Guamia** new.

Comparative whorl-sizes in the genus *Lamprocystis*

	1½	4 wh.	4.5 wh.	5 wh.	Maxima	Index
L. simillima	2.47	4.2(10.33)	5.1(12.6)?	.....	4	183
L. rurutuana	2.54	3.5(8.98)	4.0(10.0)?	.....	4.1	191
L. venosa	2.13	3.5(7.53)	4.2(8.9)?	.....	4⅜	145
L. v. subcicercula	2.22	3.9(8.57)	4.6(10.0)?	.....	4¼	172
L. globosa	2.70	3.1(8.28)	3.7(10.0)?	.....	4+	125
L. laddi	2.09	3.5(7.23)	4.0(8.43)	.....	4.6	163
L. perpolita	1.63	4.1(6.69)	5.0(8.2)?	.....	4.3	169
L. v. rapana	1.28	3.8(4.9)?	4.5(5.8)?	.....	3⅞	186
L. punctifera	1.05	3.8(3.96)	4.5(4.7)?	.....	4¼	171
L. upolensis	1.25	3.7(4.65)	4.5(5.6)	5.2(6.5)?	4.3	168
L. oneataensis	1.45	3.0(4.41)	3.4(5.0)?	3.7(5.4)?	4½—	173
L. ongeae	1.32	2.8(3.76)	3.2(4.2)?	3.5(4.6)?	4.4	136
L. unisulcata	1.32	3.3(4.30)	3.7(4.87)	4.1(5.4)?	4.7	167
L. nodulata	1.18	3.0(3.49)	3.3(3.94)	3.6(4.2)?	4¾—	154
L. excrescens	1.10	3.5(3.85)	4.0(4.39)	4.5(5.0)?	5—	162
L. kioaensis	1.34	3.1(4.15)	3.6(4.77)	4.0(5.4)?	4.5+	134
L. ensifera	1.08	.....	3.2(3.47)	3.5(3.80)	5.05	143
L. denticulata	1.03	.....	3.3(3.38)	3.6(3.66)	5.3	148
L. solida	1.81	3.5(6.35)	4.0(7.2)?	.....	4.1	141
L. vavauensis	1.75	3.8(6.72)	4.4(7.7)?	.....	3.9	157
L. moalana	1.81	3.5(6.39)	4.1(7.4)?	.....	4+	151
L. misella	1.53	3.2(4.9)?	3.8(5.83)	4.3(6.64)	5.2	152
L. hornbosteli	1.27	3.2(4.1)?	3.8(4.80)	4.4(5.60)	5.1	147
L. fastigata	1.77	3.5(6.20)	4.1(7.3)?	4.7(8.3)?	4+	157

Lamprocystis (Raiatea) simillima (Pease), (pl. 11, figs. 5-6; pl. 1, figs. 11-12).

Helix simillima Pease, 1864, Proc. Zool. Soc.: 669, central Pacific islands. —Pfeiffer, Mongr. **5:** 56 [7:69]. *Microcystis simillima* Garrett, Jour. ANSP. **9**: 19, pl. 2, fig. 32, a, b, peculiar to Raiatea.

Society Islands: Raiatea: beneath moist decaying leaves and rotten wood, high up in mountain ravines (Garrett!); ANSP. 49288 (Garrett's fig.); BBM. 3759 (Garrett!). BBM. 87212, dissected (also 87213-7), on Faropepe and leaves of shrubs, highest mountain, 2¼ miles inland, alt. 3,000 feet (J. W. Moore! June 3, 1927).

Shell (pl. 11, figs. 5-6) depressed suborbicular, quite sharply angulate on third whorl, distinctly but more bluntly so on early fourth and barely so near its end, with convex base and rather narrow, fairly deep foveola; darkish or light horn-color, sometimes with faint darker band just above periphery, well polished and almost transparent, with thick epidermis but thin shell substance. Embryonic whorls around 2.1, with extremely fine and faint spiral striae and ridgelets visible under high light (about 100 above on last); suture broadly overriding. Later whorls with similar spirals and with weak, fairly regular growth-lines above; base with spiral striae more blurred (prominent in young shells); suture becoming moderately impressed and less overriding. Aperture broad, depressed, with rounded periphery; peristome about 15° to shell-axis, almost straight below. Columella steeply inclined; at 2.5 whorls, with a slight spiral swelling; at 4, concave, slightly thickened and continued by a weak thickening well inside peristome.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	3.5 wh.	whs.
Pease	4	(9)	.....	.....	.....	.....	.....	4
BBM. 87212	5.65	183(10.33)	166(9.41)	69(3.86)	144(5.55)	2.47	3.4(8.43)	4

Animal similar to *L. globosa* but with dark pigment on sides of tail and head, although dorsum and tentacles are lighter; tail horn tetrahedral, as long as sole. Right shell-lobe (expanded) eight times as long as its base or considerably longer than major diameter of mantle collar; anterior left mantle-lobe large. Lung with sparse black blotches and with white patch at parietal angle of mantle collar and some deposited around kidney; 5.5 times as long as base or 2.7 kidney length, which is four times its base or 2.5 pericardial length. Apical whorls with row of large, squarish, white spots. Uterus (looks depleted) containing four eggs and one embryo; spermatheca (pl. 1, fig. 11) much more elongate. Penial retractor arising opposite middle of right side of uterus and inserting around base of moderately long, slender epiphallus, which is included in penial sheath; penis apparently large (twisted in animal figured), with two heavy internal pilasters. Penial prepuce large and swollen, internally with a big, lenticular boss; atrial orifice a large vertical slit, four times pedal groove interspace behind inferior tentacle and close to upper groove. Jaw with distinct, rounded median point. Radula (pl. 1, fig. 12) has central with smaller reflection, 13 laterals which form 0.4 of entire row and decrease in size and of which 13th has vestigial entocone but gains one or two ectocones, and 49 marginals, of which principal ones do not markedly increase in length and usually have at least four cusps and of which outer teeth diminish rapidly in length and become multicuspid; 99 rows counted.

This isolated species has a decidedly primitive radula but its genitalia are rather similar to those in the other sections of *Avarua*. Its shell has the

largest whorls of any *Lamprocystis* and its whorl-increase is more rapid than in any other species except *L. perpolita.*

Lamprocystis (Manureva) rurutuana, new species (pl. 20, fig. 6; pl. 11, fig. 7; pl. 6, figs. 10-11).

Austral Islands: Rurutu: BBM. 11420 (141987-95, dissected), on ferns and *Piper,* alt. 950-1,150 feet, on west side of north ridge of Mount Manureva (Mang. Exped.! Aug. 28, 1934).

Shell (pl. 20, fig. 6; pl. 11, fig. 7) sublenticular, thinner than *L. laddi,* sharply angulate even on fifth whorl; base quite convex with narrow, rather weak foveola; typically light horn-color with reddish amber apex [sometimes with broad, subsutural, light chestnut band (often darker at its lower border) and with periphery lighter than base]; glossy and subtranslucent above, more polished and translucent below. Embryonic whorls with impressed spiral lines and interstitial wrinkles sharp, especially on first whorl (54 visible at end). Later whorls with spiral lines becoming weaker and separating wider and flatter interspaces and with weak but quite regular growth-wrinkles (about 12 per mm. on late 4th) above; base with much weaker spirals; suture very lightly impressed and broadly margined. Aperture slightly oblique and markedly angulate; peristome almost 30° to shell-axis and quite concave below angle. Columella with steeply inclined spiral cord, strong in young but much weaker and indistinctly truncating at 4 whorls.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
Type	4.86	191(9.29)	177(8.63)	66(3.21)	151(4.85)	2.54	3.5(8.98)	4.1

Animal similar to *L. globosa* but top of head and mantle-lobes darker; right shell-lobe (expanded) dark outside, six times its base or 2/3 greatest diameter of mantle collar. Lung with pearl-excrescences, with chalky band behind mantle collar and with one or two rows of dots along main vein; 4.25 times as long as base or 2.5 kidney length, which is twice its base or 1.5 pericardial length. Uterus containing one egg and one young embryo. Penial sheath including epiphallus (pl. 6, fig. 10) which is small but almost as long as penis; penial retractor arising from diaphragm near base of uterus and inserting near middle of epiphallus but with fibers to penial apex. Penis internally with two or three pilasters which continue into large, swollen, penial atrium, that also contains a large crescentic fold on its right side; atrial opening shortly behind inferior tentacle. Radula (pl. 6, fig. 11) has seven broader laterals and 38 relatively short marginals, of which inner nine have two large, subequal cusps, about next 13 are tricuspid and rest add more ectocones.

L. rurutuana has the most depressed and angulate shell in *Lamprocystis.*

Lamprocystis (Avarua) venosa (Pease), (pl. 11, figs. 1-2; pl. 6, figs. 3, 5).

Helix venosus Pease, 1866, Amer. Jour. Conch. 2: 290, pl. 21, fig. 2, no locality. *Helicopsis venosa* Pease, Proc. Zool. Soc. 1871: 475, Rarotonga. *Helix venosa* Pfeiffer, Mongr. 7: 71. *Microcystis venosa* Garrett, Jour. ANSP. 8: 382, on foliage of bushes, widely diffused throughout island ravines. *Nanina venosa* Tryon, Manual 2: 116, pl. 38, figs. 62-64.

Nanina radians "Pfr." Schmeltz, 1874, Cat. Mus. Godeffroy V: 91, Rarotonga; not Pfeiffer. (?) *Trochonanina radians* Pfeffer, Arch. Naturg. 44 (1): 420, pl. 13, fig. 1, impossible anatomy for Fidji (sic)? (?). *N. radians* W. G. Binney, Ann. N. Y. Acad. Sci. 3: 85, pl. 17, fig. P. Rarotonga (Garrett!), radula?

Trochonanina sykesi Gude, 1905, Jour. Malac. 12: 12, pl. 4, figs. 7a, 7b, Marquesas (sic).

Cook Islands: Rarotonga. BBM. 3189; ANSP. 49163, 49295, 74332 (Garrett!); BBM. 95578, dissected, on ferns and shrubs, dry valley 1.5 to 2.5 miles inland, alt. 500-1,000 feet, Tukuvaine (Buck! Nov. 5, 1929); BBM. 97682, under stones and logs, on ferns, shrubs and dead leaves, 2 miles inland, alt. 500 feet, Papeta, Avarua (Buck! Feb. 28, 1930).

Marquesas (sic): BBM. 106223, 115362 (*T. sykesi,* from Gude).

Shell (pl. 11, figs. 1-2) turbinate, distinctly angulate when young and weakly so to fifth whorl; base convex with broad deep foveola; light to darkish horn-color and glossy above and usually with whitish growth-streaks in shell-substance that render it subopaque; more polished and translucent below. Embryonic whorls around 2.25, with very fine, microscopic, but fairly distinct spiral striae. Later whorls with spirals becoming less distinct above and with obscure, low rounded, closely spaced growth-wrinkles; base more polished and with very fine obsolescent spirals only visible under high light; suture lightly impressed and overriding. Aperture quite broad, slightly oblique and barely angulate; peristome sharp, inclined 20° to shell-axis. Columella thin, short and simple.

Animal similar to *L. globosa*; tail horn short; right shell-lobe (contracted) four or five times as long as its base. Lung with many pearl-like excrescences and with some dark pigment behind mantle collar, along hindgut and around kidney; over five times as long as base or three times kidney length, which is three times base or twice pericardial length. Ovotestis with five or six groups of alveoli; uterus containing three eggs and three embryos; spermatheca (pl. 6, fig. 5) elongate, sometimes containing membranous spermatophore. Penis short with weak insignificant lobe near its middle (pl. 6, fig. 5). Radula (pl. 6, fig. 3) has oblong central, eight laterals with diminishing, but fairly prominent entocones, and 46 marginals, of which three or four are bicuspid, one or two tricuspid and rest develop more ectocones; 126 rows counted.

L. venosa intergrades with subspecies *subcicercula* and is more or less intermediate between the latter and *L. globosa* in elevation of shell. It commonly has whitish varices, somewhat similar to those of *Helix radians* Pfeiffer, from Tahiti, which probably accounts for Schmeltz's identification of either this form or the next. Pfeffer's puzzle may be an incorrect citation and dissection of material from Schmeltz. Binney apparently confused his *N. radians* and his *N. subcircula.* Most of the localities in the paper that includes Gude's synonym are obviously incorrect.

Key to species and subspecies of the section *Avarua*

A. Shell turbinate with whorls more flattened above, heavier and usually with whitish streaks in shell-substance, distinctly angulate when young and weakly so on fifth whorl; ..... **L. venosa** (Pease).

B. Shell more depressed..... subspecies **subcicercula** (Garrett).

BB. Shell more elevated..... typical subspecies.

AA. Shell globose-turbinate with whorls larger and more convex above, dark horn-color, thinner and more translucent, weakly angulate when young and almost evenly rounded near fifth whorl.....**L. globosa** new species.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
L. venosa								
Pease	5	160(8)						5
fig.	5.8	138(8)		62(3.6)	114(4.1)			
(sykesi)	6	142(8.5)	(8)					5
fig.	5.65	150(8.5)	136(7.7)	65(3.65)	134(4.9)			
BBM. 95578 ..	5.93	145(8.62)	135(8.02)	58(3.45)	131(4.53)	2.13	3.5(7.53)	4⅜
L. v. subcicercula								
Garrett	5	180(9)						5
BBM. 3190	5.40	172(9.31)	159(8.57)	62(3.37)	139(4.70)	2.22	3.9(8.57)	4¼
L. globosa								
type	6.01	125(7.53)		61(3.66)	113(4.13)			3.9
BBM. 95581 ..	6.68	125(8.35)	118(7.89)	55(3.65)	123(4.48)	2.70	3.1(8.28)	4+

Lamprocystis (Avarua) venosa subcicercula ("Mousson" Garrett), (pl. 11, figs. 3-4; pl. 6, fig. 4).

Nanina subcicercula Schmeltz, 1874, Cat. Mus. Godeffroy V: 91 (nude), Rarotonga. *Microcystis subcicercula* Garrett, 1881, Jour. ANSP. **8:** 382 (vested). Not *N. subcircula* W. G. Binney (1875) from Raiatea.

(?) *N. radians* W. G. Binney, 1884, Ann. N. Y. Acad. Sci. 3: 85, pl. 17, fig. P, Rarotonga (Garrett!), radula? See *L. venosa.*

Cook Islands: Rarotonga: BBM. 3190; ANSP. 74330 (dissected), 46162, 49174 (labeled *N. radians*) (Garrett!); BBM. 58973 (from ANSP. 74330), dissected by both Dr. Cooke and myself (Garrett!). BBM. 94361, dissected (also 94376, dissected), June 9, on ferns, shrubs, tree trunks and dead leaves, 0.5 mile inland, alt. 0-300 feet, Muri (Nia's valley) (Buck! Sept. 9, 1929); BBM. 95579, Tukuvaine (Buck! Nov. 5, 1929).

Shell (pl. 11, figs. 3-4) very similar to *L. venosa* but more depressed (although little more angulate); basal foveola somewhat shallower; usually lighter horn-color with less whitish streaks (BBM. 3190 with dull surface of long-dead shells).

Animal similar to *L. globosa,* but with some dark pigment on top of head; tail horn longer; right shell-lobe (more expanded) six times as long as its base and about equalling major diameter of mantle collar. Lung with very numerous black flecks; four times as long as base or 2.5 times kidney length, which is three times its base or 1.5 times pericardial length. Penis similar to *L. venosa,* or (BBM. 58973) with a large diverticulum (pl. 6, fig. 4; abnormal?), which has spongy walls and contains flocculent material. Jaw with or without median point. Radula has nine laterals, with weakish entocones becoming obsolescent on last, and 48 marginals, of which one or two are bicuspid, one or two tricuspid and rest multicuspid; with more than 108 rows.

In all the more recently collected animals, the penis has an insignificant swelling like that of *L. venosa* (pl. 6, fig. 5). I do not know whether the large diverticulum in the animals from Garrett is an abnormality, a seasonal

condition (very improbably) or due to some mix-up in the material. Certainly, the Garrett shells look very much like this depressed form of *L. venosa.*

Lamprocystis (Avarua) globosa, new species (pl. 20, figs. 4-5; pl. 11, fig. 8; pl. 6, figs. 6-7).

Cook Islands: Rarotonga: BBM. 11418 (95592, dissected), on ferns and shrubs, dry hill, 3 miles inland, alt. 1,850 feet, Te Kou Mt. (P. H. Buck! Nov. 5, 1929); BBM. 95581-2, on ferns and shrubs, hillside of dry valley, 1.5 to 2.5 miles inland, alt. 500-1,000 feet, Tukuvaine (Buck! Nov. 5, 1929).

Shell (pl. 20, figs. 4-5; pl. 11, fig. 8) globose-turbinate, weakly angulate when young but almost evenly rounded at end of fourth whorl; base convex with narrow foveola; dark horn-color, very thin and translucent, more polished than *L. venosa.* Embryonic whorls 2 to 2.1, with sculpture much as in *L. venosa,* but considerably larger. Later whorls more convex and with texture more like subspecies *subcicercula* above; base brightly polished with spirals just visible under very high light; suture scarcely impressed and vertically overriding. Aperture almost transverse and evenly rounded; peristome 20° to shell-axis.

Animal light in color with black tentacles; tail-horn not reaching tip of sole. Right shell-lobe (contracted) three or four times as long as its base or about 0.5 greatest diameter of mantle collar; left shell-lap fairly wide but without definite lobe; left mantle-lobe deeply bipartite. Lung colorless (diaphragm with dark streaks); over three times as long as base or 2.3 kidney length, which is 2.5 as long as its base or twice pericardial length. Ovotestis consisting of six conical groups of alveoli; duct (pl. 6, fig. 7) moderately long; talon short, crescentic, and bipartite; uterus containing two eggs and two embryos; spermatheca moderately long. Prostate quite small; penial sheath including half of very short epiphallus; penial retractor inserted around basal 2/3 of epiphallus and on penial apex. Penis short and swollen, with weak apical caecum; internally with a longitudinal fold in apical half and a heavy fold with a knoblike free upper end; basal half with two pilasters. Penial prepuce fairly long; atrial opening about halfway between base of right inferior tentacle and anterior edge of visceral stalk, and three or four times distance between pedal grooves above upper one. Jaw well striate, with fairly sharp, low median point. Radula similar to *L. venosa;* has eight laterals with weaker entocone obsolescent on last, and 51 marginals, of which inner three are bicuspid, and about next 36 have three principal cusps and vestigial blade ectocones (pl. 6, fig. 6).

L. globosa seems to be a quite distinct species, although it differs from the variable *L. venosa* mainly in the more globose form of its shell. It is the type of the subgenus *Avarua. L. exposita* (Mousson), the type of Iredale's *Fanulum,* has color varices when fresh and lacks a columellar fold; USNM. 214749 (W. R. Olivier!) has heavier growth-wrinkles than *Lamprocystis* and much weaker spirals than *Laua,* but it does contain embryos, and *Fanulum* may be related to *Avarua.*

Lamprocystis (Naiaua) laddi, new species (pl. 20, figs. 7-8; pl. 6, figs. 8-9).

Fiji (middle Lau): Naiau: BBM. 11419 (132833, dissected), Navutu (H. S. Ladd! Aug. 13, 1934); BBM. 78905, 78910, dissected, on shrub leaves, medium damp limestone slopes of basin, more than 0.5 mile inland, alt. 300 feet (Bryan! Sept. 12, 1924).

Shell (pl. 20, figs. 7-8) depressed turbinate, sharply angulate when young but weakly so on 5th whorl; base slightly flattened with broad, fairly shallow foveola; typically rather intense horn-color with vague, darker varices [sometimes very light (78905) or with light chestnut peripheral band (78910]), glossy and almost opaque above but more polished and weakly translucent below. Embryonic whorls 2.25 to 2.5, with numerous, fairly sharp, but very fine, closely spaced, impressed, spiral lines which separate very low wrinkles. Later whorls with similar spirals but stronger, although very weak and irregular growth-wrinkles above; base with minor spirals wavy but distinct; suture lightly impressed, overriding and well margined. Aperture almost transverse and barely angulate; peristome about 20° to shell-axis and almost straight below periphery. Columella with sublamellate, spiral cord when young but more broadly thickened, although still distinctly truncated by heavy cord, at 4.5 whorls.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
Type	5.30	163(8.64)	151(8.02)	58(3.06)	141(4.30)	2.09	3.5(7.23)	4.6

Animal whitish with tip of tail and tentacles black; tail horn wedge-shaped, extending beyond tip of sole; right shell-lobe heavy, 5 times as long as its base or 0.6 greatest diameter of mantle collar. Lung with some black pigment behind mantle collar; 4¼ times as long as base or 3¼ kidney length, which is 2.5 times as long as its base or 1.4 pericardial length. Talon similar to *L. globosa* but longer; uterus containing 2 large embryos; spermatheca (pl. 6, fig. 8) swollen. Penial sheath including very long epiphallus, which receives penial rectractor near its middle. Penis not much longer than thick. Atrial orifice 5 times pedal groove interspace behind inferior tentacle twice above upper groove. Jaw with low and broad but sharply defined median lobe. Radula (pl. 6, fig. 9) has 10 laterals with fairly large entocone of first lost on last, and 50 marginals with prominent mesocones, of which inner 13 are usually bicuspid, next 7 tricuspid and remainder add more ectocones; 117 rows counted.

L. laddi somewhat resembles *L. rurutuana* but is much less angulate, has a less steeply inclined columellar cord and reverses the color pattern on its banded form. The section *Naiaua* is monotypic.

Lamprocystis (Kerakystis) perpolita (Mousson), (pl. 12, figs. 1-2; pl. 6, figs. 12-13).

(*Nanina*) *Microcystis perpolita* Mousson, 1869, Jour. de Conch. **17**: 326 [4], pl. 14, fig. 1; (?) J. de C. **18**: 113 [5], Viti Levu (?). *Helix perpolita* Pfeiffer, Monogr. **7**: 65. *N. perpolita* Tryon, Manual **2**: 113, pl. 37, fig. 27.

Samoa: Upolu: (Graeffe!). BBM. 3184 (Garrett!). Savaii: BBM. 75826, dissected, on ferns and shrubs, damp valley, alt. 1,000-2,500 feet, 4-6 miles inland on south side (Bryan! May 2, 1924).

Shell (pl. 12, figs. 1-2) depressed, with rapidly increasing whorls, slightly angulate at 3.5 whorls but evenly rounded at 4.3; base rounded with fairly deep, quite narrow foveola; rather dark horn-color, thinner and more polished than *L. laddi*. Embryonic whorls 2. Later whorls with very weak spiral lines visible in high light above and still more obscure below; suture lightly impressed (but more strongly than in *L. solida*). Aperture quite broad, evenly rounded; peristome 45° to shell-axis. Columella concave, lightly thickened and reflected, without trace of spiral cord at 4.3 whorls (no young shells seen).

Animal (1 example) bleached and contracted, similar to *L. ensifera;* tail with very deep and prominent dorsomedian groove; horn dome-shaped but extending to tip of sole and covering large foss. Right shell-lobe (contracted and heavy) 4 times as long as its base and 0.5 greatest diameter of mantle collar [possibly small left shell-lobe as well]; anterior left mantle-lobe large. Lung with anterior third black and with sparse streaks of chalky white; 4 times as long as base or 2.5 kidney length, which is 3 times as long as its base or twice pericardial length. Uterus with 2 eggs, 1 small embryo and 2 larger ones; spermatheca (pl. 6, fig. 13) less swollen. Penis longer than epiphallus and with short apical caecum; penial retractor inserting near base of epiphallus and on adjacent side of penis; penial sheath including all except apical ¼ of epiphallus. Penial prepuce relatively short; position of atrial orifice dubious (animal too contracted). Radula (pl. 6, fig. 12) has 2 ectocones (probably abnormal) on right side of central, 7 laterals with large entocone becoming reduced toward last, and 41 marginals, of which 14 are bicuspid, about 6 tricuspid (mesocone often spatulate) and rest multicuspid; 98 rows counted.

The shell of *L. perpolita* is easily distinguished by its rapid whorl-increase, rounded 5th whorl, and concave columella. It is separated from the smaller species, which are also included in the section *Kerakystis,* by the following key:

Key to species of section *Kerakystis*

A. Shell with diam. (4 wh.) more than 6.5 mm.; Samoa: Upolu and Savaii:..... **L. perpolita** (Mousson).

AA. Shell with diam. (4 wh.) less than 5 mm.: Austral Islands:

B. Shell polished below, diam. (4 wh.) almost 5 mm..... **L. vitrinella** (Beck).

C. Shell less depressed and attaining more whorls; Rurutu(?):..... typical subspecies.

CC. Shell much depressed and attaining 3⅞ whorls; Rapa:..... subspecies **rapana** new.

BB. Shell more or less granulate below; diameter (4 wh.) almost 4 mm.; Rurutu: ..... **L. punctifera** (Garrett).

Dimensions in section *Kerakystis*

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
L. perpolita								
Mousson	4.8	146(7)	.....	.....	.....	.....	.....	4½
fig.	4.5	156(7)	.....	.....	.....	.....	.....	
BBM. 75826..	4.52	169(7.66)	152(6.87)	74(3.35)	121(4.04)	1.63	4.1(6.69)	4.3
L. vitrinella								
Beck	4(?)	(5)	.....	(2)	(2.5)	.....	.....	5(?)
(subtilis)								
Anton	2.8	(5.6)	.....	.....	.....	.....	.....	4.5-5
Pfeiffer	3.3	(6)	(5.3)	.....	.....	.....	.....	4.5-5
fig. Conch. C.	3.5	172(6)	.....	65(2.25)	134(3.0)	.....	.....	
L. v. rapana								
type	2.54	186(4.74)	168(4.27)	72(1.83)	131(2.39)	1.28	3.8(4.9)?	3⅞
L. punctifera								
Garrett	3	(4.5)	.....	.....	.....	.....	.....	4½
BBM. 1093....	2.53	171(4.34)	156(3.96)	67(1.70)	127(2.16)	1.05	3.8(3.96)	4¼

Lamprocystis (Kerakystis?) vitrinella (Beck).

Helicopsis vitrinella Beck, 1837, Ind.: 2 (nude); 1837, Nov. sp.: 2, Oheatara.

Helix subtilis Anton, 1839, Verz.: 35, no locality.—Pfeiffer, Monogr. **1**:33 [**3**:34—**4**:14—**5**:54-**7**:66] Oheatora.—Conch.-Cab. **1**:236, pl. 29, figs. 33-35. *Nanina subtilis* Tryon, Manual **2**: 113, pl. 38, fig. 49. Not *H. subtilis* Lowe (1831).

Austral Islands: Rurutu: (Cuming!).

"H. testa pallide virenti-fuscescente; spira convexiuscula subacuta; anfractibus 5, parum convexis, lævibus nitentibus. M. *a*, 5, *b*, 4, *c*, 2½, *d*, 2. In herbis *Ins. Oheatara* oceani pacifici legit *H. Cuming*. Statura et magnitudo præcedentis ([*H. glandula*], a qua differt præsertim forma spiræ, anfractibus pluribus minusque convexis, ultimo ad centrum sensim coarctato, striis incrementi magis conspicuis, nitore minus splendente, coloreque pallido, corneo vel virente, rarius in rufo-fuscum vergente." (Beck).

Helicopsis with shell pallid to greenish fuscous; spire slightly convex, subacute; whorls 5, little convex, smooth, shining. Form and size of *H. glandula*, from which it differs chiefly in form of spire [more acute], more, less convex whorls, of which last is gradually crowded toward center, more conspicuous growth-striae, less brilliant polish and pallid color, corneous or greenish, more rarely sinking into reddish fuscous. [The second measurement (altitude) is evidently erroneous.]

I have seen no authentic specimens of this species, but, from Pfeiffer's figures, it would seem to be related to what I am naming as a subspecies from Rapa. All Cumingian localities are dubious. From material in collections, Anton's name has often been applied to *Liardetia discordiae* (Garrett), but Pfeiffer, at least, would not have called that species imperforate.

Lamprocystis (Kerakystis) vitrinella rapana, new subspecies (pl. 20, fig. 3; pl. 12, fig. 3; pl. 6, figs. 14-15).

Austral Islands: Rapa: BBM. 11421 (135514, dissected), under stones in native forest with coffee trees, alt. about 675 feet, Maitua; BBM. 135281, alt. 1,200-1,500 feet, east ridge of Mt. Perahu; BBM. 143284, on ferns and shrubs, damp hillside, alt. 750 feet, northwest of Tautautu. (All Mang. Exped.! July 20, 21 and 25, 1934.)

Shell (pl. 20, fig. 3; pl. 12, fig. 3) suborbicular, scarcely angulate when young and evenly rounded on 4th whorl; base convex with foveola relatively broader than in *L. perpolita* and quite deep; light horn-color, polished and quite transparent. Embryonic whorls 1.6 to 1.8, with very weak, extremely fine, spiral striae, visible under high light. Later whorls with still weaker spirals; suture lightly impressed and quite widely margined. Aperture narrow, slightly oblique; peristome about 10° to shell-axis; umbilical callus distinct. Columella thickened and very weakly convex at 3¼ whorls but concavely rounded at 3⅞.

Animal similar to *L. ensifera*. Ovotestis consisting of 7 conical groups of alveoli; duct rather long; talon short; uterus containing 2 embryos; spermatheca (pl. 6, fig. 14) long with apical ⅔ basally swollen. Penial retractor dividing to insert below middle of epiphallus and near apex of penis; penial sheath including less than half of epiphallus; penis moderate in length with very short caecum on narrowed apex. Penial prepuce (large) and atrium together as long as penis, opening shortly behind inferior tentacle. Jaw with median point apparently obsolete. Radula (pl. 6, fig. 15) has squarish central with short ectocones and long mesocone, 5 laterals which reduce prominent entocone,

and 25 moderately long marginals, of which inner 6 to 14 are bicuspid; more than 63 rows.

Lamprocystis (Kerakystis?) punctifera (Garrett), (pl. 12, figs. 4-5).

Microcystis punctifera Garrett, 1879, Proc. ANSP. **31**: 17.

Austral Islands: Rurutu: BBM. 1093 (from type lot).

Shell (pl. 12, figs. 4-5) similar to *L. vitrinella rapana* but smaller and more elevated, slightly more angulate at beginning of 4th whorl but becoming evenly rounded; base with narrower foveola (more like *L. perpolita*); horn-color and not so polished, translucent. Embryonic whorls 1.75, with slightly stronger spirals (probably considerably more so in fresh shells). Basal spirals on last whorl much stronger and more widely spaced, sporadically with very slightly raised, minute bosses or points in rows between them and growth-lines. Aperture broader; peristome almost vertical (less than 10° to shell-axis). Columella heavy, with a low but quite noticeable, spiral swelling. Anatomy unknown.

The minute granulation on the base of some shells of *L. punctifera* seems variable and of trivial significance, but the species is considerably smaller than *L. vitrinella.*

Lamprocystis (Lamprocystis) upolensis (Mousson), (pl. 12, figs. 6-7).

Nanina upolensis Mousson, 1865, Jour. de Conch. **13**: 166 [3]. *Helix upolensis* Pfeiffer, Monogr. **5**: 108 [7:114]. *Nanina upolensis* Schmeltz, Cat. Mus. Godeffroy IV: 71, Savai, Tutuila.—Tryon, Manual **2**: 119, pl. 39, figs. 89, 90.

Helix samoensis Baird, 1873, Cruise Curaçao: 447, pl. 40, figs. 12, 13, Samoa.

Samoa: Upolu: (Graeffe!); ANSP. 49160 (from type lot). BBM. 166 (Garrett!); BBM. 54370, radula (E. S. Handy! Feb. 13, 1923).

Shell (pl. 12, figs. 6-7) quite depressed, with most rapid whorl-increase and least fornicate spire in *Lamprocystis* s.s., barely angulate at middle of third whorl and becoming evenly rounded; base convex with narrow, steeply impressed foveola; pale, pearly horn-color, quite polished and translucent. Embryonic whorls 2.25. Later whorls with spirals obsolescent above (shell not fresh); base with quite strong, microscopic, spiral striae and some tendency toward granulation as in *L. punctifera;* suture rather lightly impressed (more so than in *L. oneataensis*). Aperture quite broad for *Lamprocystis* s.s., evenly rounded; peristome about 15° to shell-axis. Columella quite steeply inclined, distinctly but obliquely truncated by very low, spiral cord.

Jaw and radula much as in *L. excrescens,* but entocone more prominent on first lateral and lost on 6th; with 40 marginals, of which inner 13 are bicuspid, next 2 or 3 tricuspid and rest add ectocones and often have more spatulate mesocone.

Key to the species of section *Lamprocystis* s.s.

A. Columella with nearly horizontal cord (often obscured by thickening in large shells);

B. Shell most depressed, with most rapid whorl-increase and with smallest columellar cord; 4.5 wh. diam. almost 6 mm.; Samoa: Upolu, Savaii and Tutuila:.....**L. upolensis** (Mousson).

BB. Shell smaller, with more gradual whorl-increase and stronger columellar cord (group of *L. oneataensis*);

C. Shell without subsutural sulcus; spire evenly rounded;

D. Shell suborbicular; 4.5 wh. diam. about 5 mm.; Fiji (Lau): Oneata, Vanua Mbalavu, and Namuka-i-Lau:.....**L. oneataensis** (Mousson).

DD. Shell usually less depressed, with heavier columellar cord; 4.5 wh. diam. about 4 mm.; Fiji (north Lau): Vanua Mbalavu (also Kimbombo and Ovalau?):.....**L. nodulata** (Mousson).

CC. Shell with subsutural sulcus or sulci;

E. Shell elevated, polished, with strong subsutural sulcus and rounded periphery; Fiji (Lau): Ongea:.....**L. ongeae** new species.

EE. Shell depressed, with stronger growth-striae above, with weaker subsutural sulcus but with strong supraperipheral one; Fiji (Lau): Vanua Mbalavu, Lauthala, Tavunasithi; also Samoa (?):.....**L. unisulcata** (Mousson).

AA. Columella with tongue-shaped lamella inclined downwards (often thickened and adnate in large shells); spire dome-shaped (typical group);

F. Shell with higher spire and without basal or palatal lamella at 3¼ whorls;

G. Shell similar in size to *L. ensifera* but with more paraboloid spire and stronger spiral striae; Marianas Islands:.....**L. denticulata** Quadras und Möllendorff.

GG. Shell quite like *L. excrescens* but with more ogival spire; columellar lamella separated from base by sulcus; Fiji (north): Kioa, Taveuni, and Ngamea:.....**L. kioaensis** (Garrett).

FF. Shell more depressed, with basal and palatal lamella in young shells;

H. Shell with more rapidly increasing and more widely overlapping whorls; 5 wh. diam. about 5 mm.; basal and palatal teeth obsolete in large shells; Rarotonga to New Hebrides:.....**L. excrescens** (Mousson).

HH. Shell with more gradually increasing and more vertically overlapping whorls; 5 wh. diam. about 4 mm.; basal and sometimes palatal teeth retained in large shells; Samoa to Fiji:.....**L. ensifera** (Mousson).

Lamprocystis (Lamprocystis) oneataensis (Mousson), (pl. 12, figs. 10-11; pl. 6, figs. 22-23).

Nanina upolensis oneataensis Mousson, 1870, Jour. de Conch. **18**: 113 [5], Oneata and Vanua Balavo. *Helix upolensis oneataensis* Pfeiffer, Monogr. **7**: 114.

Fiji (s. Lau): Oneata (Graeffe!). BBM. 78645-6, dissected, on and under fallen leaves, moist central forest, one fourth mile inland, alt. 10-30 feet. (Bryan! Aug. 18, 1924). Namuka-i-lau: BBM. 132860, dissected (Ladd! July 2, 1934).

Shell (pl. 12, figs. 10-11) suborbicular with low-domed spire; weakly angulate on third whorl but evenly rounded on fifth; base convex with deep and quite broad foveola; rather dark horn-color (78645-6 lighter), often with darker varices, quite polished above and more so below. Embryonic whorls 1.75 to 2. Later whorls polished, but with spiral striae (as in *L. denticulata*) quite sharply cut above and distinct below. Aperture narrowly lunate, evenly rounded; peristome 15° to shell-axis. Columella more oblique than in *L. upolensis*, truncated slantingly by nodular, spiral cord at 4.5 whorls (slightly more prominent at 4).

Dimensions in section *Lamprocystis* s.s.

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4.5 wh.	whs.
L. upolensis								
Mousson	4.5	(6.5)	(5.5)	.....	.....	.....	.....	5
(samoensis)	3.2	(6.3)	.....	.....	.....	.....	.....	4.5
fig.	3.95	160(6.3)	147(5.8)	65(2.55)	128(3.25)	.....	.....	
BBM. 54370	3.18	168(5.34)	151(4.81)	73(2.31)	121(2.80)	1.25	4.5(5.6)?	4.3
L. oneataensis								
BBM. 132860	2.82	173(4.87)	161(4.53)	65(1.82)	131(2.38)	1.45	3.4(5.0)?	4.5—
L. ongeae								
type	2.96	136(4.03)	130(3.84)	59(1.74)	120(2.09)	1.32	3.2(4.2)?	4.4
L. unisulcata								
Mousson	2.75	(4.5)	(3.75)	.....	.....	.....	.....	4.5
(laqueata)	3.2	(5.3)	.....	.....	.....	.....	.....	4.5
fig.	3.2	166(5.3)	158(5.05)	70(2.25)	118(2.65)	.....	.....	
BBM. 78803	2.99	167(5.00)	161(4.82)	61(1.83)	140(2.57)	1.32	3.7(4.87)	4.7
L. nodulata								
Mousson	2.3	(5.1)	.....	.....	.....	.....	.....	6
fig.	2.93	176(5.1)	.....	.....	.....	.....	.....	
(sororia)	2.3	(3.8)	(3.3)	.....	.....	.....	.....	5
BBM. 79096	2.60	154(4.00)	150(3.89)	65(1.68)	117(1.97)	1.18	3.3(3.94)	4¾—
L. excrescens								
Mousson	3.5	143(5)	.....	.....	.....	.....	.....	4½
fig.	2.9	172(5)	.....	.....	.....	.....	.....	
(layardi)	3	(5)	(4.5)	.....	.....	.....	.....	5
fig.	3.55	155(5)	.....	59(2.1)	109(2.3)	.....	.....	
BBM. 115334	2.54	161(4.10)	153(3.88)	65(1.66)	122(2.02)	1.05	4.0(4.1)?	4⅜
BBM. 87921	3.02	162(4.88)	155(4.67)	67(2.02)	118(2.38)	1.10	4.0(4.39)	5—
L. kioaensis								
Garrett	5	(4)	.....	.....	.....	.....	.....	5
type	3.59	134(4.81)	124(4.46)	67(2.39)	108(2.55)	1.34	3.6(4.77)	4.5+
(taviuniensis)	.....	123(fig.)	.....	.....	.....	.....	.....	5
L. ensifera								
Mousson	1.5	(2)	.....	.....	.....	.....	.....	4.5?
(margarita)	....	.....	.....	.....	.....	.....	.....	5
fig.	2.7	141(3.8)	131(3.55)	59(1.6)	144(1.8)	.....	.....	
(futunaënsis)	3.2	125(4)	.....	.....	.....	.....	.....	5½
fig.	2.5	160(4)	.....	.....	.....	.....	.....	
(stearnseana)	2	(3)	.....	.....	.....	.....	.....	5
BBM. 87852	2.67	143(3.81)	135(3.60)	58(1.54)	125(1.92)	1.08	3.2(3.47)	5.05
L. denticulata								
Q. and M.	3.25	(4)	.....	.....	.....	.....	.....	5
BBM. 75296	2.62	148(3.89)	142(3.72)	51(1.34)	154(2.06)	1.03	3.3(3.38)	5.3

Animal similar to *L. ensifera* but with some dark pigment on top of head and black behind mantle collar; right shell-lobe heavy, dark on outer surface, about 4.5 times as long as base (when contracted) and 0.7 greatest diameter of mantle collar; mantle-lobes dark. Lung 4.5 times as long as base or 4 times kidney length, which is 2.3 times its base or 1.5 pericardial length. Talon (pl. 6, fig. 23) shorter; uterus containing two small and one large eggs and one embryo; spermatheca longer. Penial sheath covering most of epiphallus, which contains several big pilasters. Atrial opening about one fourth distance from inferior tentacle to front edge of visceral stalk and about twice space between pedal grooves above upper one. Jaw with more prominent median lobe. Radula

(pl. 6, fig. 22) with seven laterals (entocone obsolescent on last) and 38 marginals, of which inner one or two are bicuspid, next two or three tricuspid and rest multicuspid; 96 rows counted.

L. oneataensis has larger embryonic whorls but much less rapid whorl-increase than *L. upolensis*.

Lamprocystis (Lamprocystis) ongeae, new species (pl. 20, figs. 11-12).

Fiji (south Lau): Ongea Levu: BBM. 78332, dissected (78380), on shrubs and tree leaves, medium damp central forest, one fourth to one mile inland, alt. 20-80 feet (E. H. Bryan, Jr.! July 31, 1924).

Shell (pl. 20, figs. 11-12) subglobose-turbinate, much thinner than *L. oneataensis*, with periphery weakly angulate on third whorl but rounded on fifth; base much as in *L. upolensis*; light, pearly horn-color, more polished than *L. oneataensis*. Embryonic whorls 1.75. Later whorls with weaker spiral striae than in *L. oneataensis* (more like in *L. ensifera*); suture vertically overriding but with a broad furrow and horizontal shelf below it. Aperture fairly narrow, evenly rounded at periphery but distinctly sulcate below suture; peristome about 20° to shell-axis. Columella very steeply inclined, quite sharply truncated by horizontal, spiral cord in embryo and at three whorls, but with cord quite like *L. oneataensis* at 4.4.

Animal very similar to *L. oneataensis*; tail with some dark pigment and prominent middorsal groove; mantle-lobes and shell-laps black; right shell-lobe very stout (contracted), twice as long as its base and 0.6 major diameter of mantle collar; lung long (broken); diaphragm with dark streaks. Penis and terminal organs (rest broken) very similar but more slender. Radula has seven laterals (entocone lost on last) and 32 shorter, but similar marginals, of which inner three are bicuspid, next four tricuspid and rest multicuspid; more than 72 rows.

L. ongeae is more elevated than *L. unisulcata* and has only the subsutural sulcus.

Lamprocystis (Lamprocystis) unisulcata (Mousson), (pl. 12, figs. 13-14).

Nanina unisulcata Mousson, 1865, Jour. de Conch. **13**: 191 [28]. *Helix unisulcata* Pfeiffer, Mongr. **5**: 80 [7:94]. *Microcystis unisulcata* Garrett, Proc. Zool. Soc. 1887: 169, widely diffused in Fiji.

Helix laqueata Baird, 1873, Cruise Curaçao: 446, pl. 40, figs. 8, 9, Samoa.—Pfeiffer, Monogr. **7**:94.

Fiji (north Lau): Vanua Mbalavu: Lomma-Lomma (Graeffe!); ANSP. 49182 (from type lot). Lauthala: BBM. 105 (Garrett!). Tavunasithi (south Lau): BBM. 78803 (Bryan! Aug. 28, 1924).

Shell (pl. 12, figs. 13-14) depressed, with peripheral angle rounded, but boldly marked off above by a horizontal shelf and a broad, obliquely impressed furrow (like subsutural one of *L. ongeae*); basal foveola intermediate between those of *L. oneataensis* and *L. upolensis*; horn-color, highly glossy. Embryonic whorls two. Later whorls with spirals about as in *L. oneataensis* but with growth-striae decidedly stronger above (23 per mm. on fifth whorl); base glossy with distinct spirals; suture vertically overriding with a shallow sulcus beneath it (less distinct than in *L. ongeae*). Aperture quite narrow, with prominent sulcus above angle but scarcely showing subsutural one; peristome 15° to shell-axis. Columella less steeply inclined and with columellar cord slightly weaker than in *L. ongeae*. Animal unknown.

Baird's figure certainly looks like *L. unisulcata,* which seems to get around, and may have reached Samoa.

Lamprocystis (Lamprocystis) nodulata (Mousson), (pl. 13, figs. 3-4; pl. 6, figs. 19-20).

Nanina nodulata Mousson, 1870, Jour. de Conch. **18**: 114 [6], pl. 7, fig. 4. *Helix nodulata* Pfeiffer, Monogr. **7**: 67. *N. nodulata* Tryon, Manual **2**: 124, pl. 41, fig. 87.

(?) *Helix sororia* Cox, 1870, Proc. Zool. Soc.: 83, Ovalau, west Fiji.—Pfeiffer, Monogr. **7**: 60. Not *H. sorora* Fér. (1821).

Fiji (north Lau): Vanua Mbalavu (= Balavo): (Graeffe!). Kimbombo: BBM. 79096-7, dissected, on herbs and shrub leaves, medium damp limestone slopes, over 300 feet inland, alt. 50-100 feet, eastern "large" islet (Bryan! Sept. 29, 1924).

BBM. 79096 (pl. 13, figs. 3-4) similar in form to *L. ensifera* but about as large as *L. excrescens*; weakly angulate at 2.5 whorls but becoming evenly rounded; basal foveola broad and moderately impressed. Sculpture and polish much as in *L. excrescens* (weaker than in *L. oneataensis*). Aperture without parietal or basal lamella at 2.5 whorls. Columella somewhat steeply inclined; lamella sharply cut but short and horizontal at 2.5 whorls, becoming little more than a spiral thickening at 4¾ (but stronger and appearing as a heavier nodule than in *L. oneataensis*).

Animal similar to *L. ensifera*; right shell-lobe (contracted) 4 times as long as its base or 0.5 greatest diameter of mantle collar. Uterus containing 2 embryos. Penis (pl. 6, fig. 19) far longer and penial atrium quite short. Atrial opening 1.5 times pedal groove interspace behind inferior tentacle and two thirds as far above grooves. Radula has seven laterals with more prominent entocones, and 31 marginals with shorter blades and longer bases (pl. 6, fig. 20), of which only first is bicuspid, second has three or four cusps and rest vary in number of ectocones; 93 rows counted.

No authentic specimens of *L. nodulata* have been seen and the more elevated BBM. shells may be incorrectly identified with it. The unfigured *Helix sororia* Cox is not exactly determinable and may be synonymous with some other species.

Lamprocystis (Lamprocystis) denticulata Quadras und Möllendorff, (pl. 13, figs. 9-10; pl. 6, fig. 16).

L. denticulata Quadras und Möllendorff, 1894, Nachr. Deutsch. Malak. Ges. **26**: 13, Marianas Islands.

Marianas Islands: Guam: BBM. 86190 and 87454 (J. F. Quadras!), ANSP. 96413 (from type lots). BBM. 75296, ferns, shrubs and tree, one mile inland, alt. 200 feet, Pasò (Hornbostel! July 12, 1923); BBM. 82686-7, on sides of stones and on fern leaves near ground, along trail in shade, 200 feet inland, alt. 40 feet, Alupang Islands (Hornbostel! Oct. 28, 1925). Rota: BBM. 81997, Ugis (Hornbostel! July 25, 1925). Saipan: BBM. 82576, dissected, on ferns and shrubs, 0.5 mile inland, alt. 25 feet, Charlan Conore (Hornbostel! Sept. 9, 1925).

Shell (pl. 13, figs. 9-10) with subconoid, obtuse spire, with evenly rounded periphery and broad, quite deep foveola; horn-colored, highly glossy above and polished below. Embryonic whorls 1.9 or more, with fairly strong, very fine, spiral striae. Later whorls with weaker spirals above and still more polished base; suture lightly impressed and vertically overriding. Aperture narrow, evenly rounded, without palatal or basal lamella (see *L. ensifera*) at 3.25 whorls (former may be represented by slight thickening beyond columellar lamella). Columella very oblique, with heavy lamella (shortest in typical group) inclined downwards and adnate below (almost to tip, even at 3.5 whorls, and becoming stouter with age).

Animal similar to *L. ensifera*; tail horn conical, reaching to about tip of sole; right shell-lobe (contracted) three times as long as its base and 0.5 major diameter of mantle collar; left shell-lap about as wide as posterior left mantle-lobe but without shell-lobe. Hermaphroditic duct more swollen; talon stouter and shorter; uterus with no eggs and only one embryo; spermatheca (pl. 6, fig. 16) considerably more elongate. Penial sheath covering basal 0.6 of relatively smaller epiphallus; penis larger. Atrial opening three times pedal groove interspace in front of anterior margin of visceral stalk, five behind inferior tentacle and three or four above grooves. Radula very similar to that of *L. excrescens,* but inner laterals with slightly larger entocone; has 41 marginals, of which 26 are usually bicuspid and next three tricuspid; 76 rows counted.

L. denticulata and all the species of my typical group may be simply local races of *L. ensifera.* The differences between them are largely a matter of size and of the stage when the various lamellae in the aperture appear and disappear. *L. denticulata* is closest to *L. ensifera* in size but has the weakest columellar lamella and the other teeth, if ever present, have disappeared before the shell reaches 3¼ whorls.

Lamprocystis (Lamprocystis) kioaensis (Garrett), (pl. 13, figs. 7-8).

Nanina kivaensis Garrett, 1873, Proc. ANSP. 25: 237, pl. 3, fig. 71.—Tryon, Manual 2: 124, pl. 41, fig. 61. *Microcystis kioaensis* Garrett, Proc. Zool. Soc. 1887: 169.

Nanina? taviuniensis Liardet, 1876, Proc. Zool. Soc.: 99, pl. 5, fig. 1, a, b, Taveuni (= Taviuni) and Ngamea (= Gamia), north Fiji.

Fiji (north): Kioa (=Kiva): ANSP. 49170 (BBM. 2470) (Garrett!).

Shell (pl. 13, figs. 7-8) similar to *L. excrescens* but much more elevated with slightly ogival spire, barely angulate on third whorl, evenly rounded on fourth; base more convex with narrower foveola. Aperture without basal or palatal lamellae at 3.1 whorls (youngest seen); peristome 20° to shell-axis, almost straight below. Columella more steeply inclined, appearing spirally twisted (especially in young shells) because of fairly broad but thinner, spiral lamella, which is separated from basal peristome by a deep horizontal sulcus. Animal unknown.

Liardet's figure shows the peculiar columella of *L. kioaensis* rather clearly. This species is known only from the islands east of Vanua Levu. Since Garrett himself corrected it, his original spelling may be taken as a lapsus.

Lamprocystis (Lamprocystis) excrescens (Mousson), (pl. 13, figs. 5-6; pl. 6, fig. 21).

Nanina excrescens Mousson, 1870, Jour. de Conch. 18: 114 [6], pl. 7, fig. 5, Viti Levu; 1871, J. de C. 19: 8 [4], Tonga: Vavao, Haafeva, Haapai

Group (= Hufeva, Hapai) and Tongatabou.—Schmeltz, Cat. Mus. Godeffroy V: 91, Cook Islands: Rarotonga. *Helix excrescens* Pfeiffer, Monogr. **7**: 67. *N. excrescens* Tryon, Manuel **2**: 124, pl. 41, fig. 86.

N. subexcrescens Garrett, 1881, Jour. ANSP. **8**: 381, in synonymy of *Microcystis excrescens,* Cook Islands: Rarotonga.

Hyalina layardi Thomson, 1885, Proc. Zool. Soc.: 27, figs., New Hebrides: Vate.

Fiji (west): Viti Levu: (Graeffe!). BBM. 87921 (Sigatoka, H. S. Ladd! July 12, 1928); 115334, radula.

Tonga: Eua: BBM. 87747, on shrubs, tree trunks and dead leaves, damp hillside, about two miles inland, alt. 385 feet, Johanssen plantation (Ladd! May 14, 1928).

Cook Islands: Rarotonga: BBM. 3196 (*subexcrescens*) and 3201 (*excrescens*; both Garrett!).

Shell (pl. 13, figs. 5-6) with low, dome-shaped spire, scarcely angulate on third whorl and evenly rounded on fourth; basal foveola broad and moderately deep; horn-colored and well polished. Embryonic whorls about two, with very fine, weak spiral striae. Later whorls still more polished, but spirals visible above and below in very high light; suture scarcely impressed and widely overriding, so that the last whorl appears relatively broad. Aperture narrow, palatal lamella rarely present at four whorls and basal lacking near end of fifth; peristome about 20° to shell-axis. Columella very oblique, with long, sharp lamella, which is free for some distance at tip, in young shells, but becomes much stouter and largely adnate below at five whorls.

Epiphallus and penis (from dried-in animal) very similar to those of *L. ensifera.* Radula (pl. 6, fig. 21) accentuates mesocones throughout; has six laterals with smallish but persistent entocone, and 30 elongate marginals, of which about seven are bicuspid, about nine tricuspid and remainder develop additional ectocones; 85 rows counted.

L. excrescens is very close to *L. ensifera* and may be only a form of the latter that is produced under more favorable conditions. The principal differences are the more rapid whorl-increase and more widely overriding suture of *L. excrescens* and the more persistent lamellae of *L. ensifera.* Both species are rather widely disseminated and their known ranges considerably overlap.

ANSP. 63136 is a lot of *L. excrescens,* received in exchange from J. Ponsonby in 1892, with the following note: "This is, ex typo, *H. guttula* Pfr. The original specimens are from the New Hebrides, not from New Zealand, tho always quoted from the latter locality. My specimens are from Tonga Is. & apparently = *excrescens* Mss. I don't know the N. Z. shell." Whatever this "type" may be, the original description of *Helix guttula* Pfeiffer (1853, Zeitschr. Malak. **10**: 53) gives "Nova Seelandia" as the locality and is not definitely recognizable, while Reeve's figure (Conch. Icon.: pl. 158, fig. 1040), which was accepted by Pfeiffer (Monogr. **4**: 15) does not resemble *L. excrescens* in the least.

Lamprocystis (Lamprocystis) ensifera (Mousson), (pl. 20, figs. 13-15; pl. 13, figs. 11-15; pl. 6, figs. 17-18).

(?) *Helix margarita* Hombron et Jaquinot, 1852 (?), Voy. Pol. Sud, **22**: pl. 11, figs. 5-8, Vavao.—Rousseau, Voy. Pol. Sud, **5**: 43.—Pfeiffer, Monogr. **4**: 14[**3**: 273-**5**: 55-**7**: 66]. *Nanina margarita* Tryon, Manual **2**: 114, pl. 38, figs. 37-39. Not *H. margarita* Pfeiffer (1845) nor Montagu (1808).

(*Nanina*) *Gastrodonta ensifera* Mousson, 1869, Jour. de Conch. **17**: 327 [5], pl. 14, fig. 2 (young). *Helix ensifera* Pfeiffer, Mongr. **7**: 259. (*Zonites*) *Hyalinia ensifera* Tryon, Manual 2: 199, pl. 60, fig. 34.

Nanina futunaana Mousson, 1870, Jour. de Conch. **18**: 115[7], nude.

N. futunaensis Mousson, 1871, J. de C. **19**: 7[3], pl. 3, fig. 1, Futuna: (Graeffe!). *Helix futunaënsis* Pfeiffer, Monogr. **7**: 67. *N. futunaensis* Tryon, Manual 2: 125, pl. 41, fig. 85.

Microcystis stearnseana Garrett, 1887, Proc. Zool. Soc.: 171; Fiji (Lau): Vanua Mbalavu; and Uea or Wallis Island (latter now chosen as type locality).

Samoa: (Graeffe!).

Uvea (Wallis Island): BBM. 3935 (*M. stearnseana* Garrett!).

Tonga: Vavau: BBM. 87852-55, dissected, near Holonga (Hoffmeister! July 4, 1928). Tongatabu: BBM. 54348 (Mrs. Handy! Feb. 20, 1923). Eua: BBM. 87608, under logs and on dead leaves, valley ¼ mile inland, alt. 160 feet, Ohinua Ravine (May 3); BBM. 87651, on ferns, tree trunks and dead leaves, valley 2 miles inland, alt. 500 feet (May 7; both Ladd and Hoffmeister! 1928).

Shell (pl. 20, figs. 13-15) with dome-shaped spire, obtusely angulated above periphery when young but becoming evenly rounded by fourth whorl, with basal foveola broad and quite deep; horn-colored (often inclining toward fulvous), polished above and more so below. Embryonic whorls up to 2.75, with sharper spiral striae than in *L. excrescens*. Later whorls more polished; suture lightly impressed and vertically overriding. Aperture narrow; peristome about 10° to shell-axis. Columellar lamella present in embryos of about one whorl (pl. 13, fig. 11), becoming broader (i.e., longer parallel to peristome) but shallower (more tongue-shaped), with tip extensively free even at five whorls. Palatal lamella usually not present until about 1.75 whorls (pl. 13, fig. 12), situated a little above middle of distance between lamella and peripheral angle of young shells, not quite reaching peristome and about ¼ whorl long, although high for only its outer 1/3 to 2/5 in young shells; reaching its maximum prominence by 2.5 whorls (pl. 13, fig. 13), still strong at 4⅛ whorls (pl. 13, figs. 14-15) but becoming reduced and often lacking on sixth whorl. Basal lamella is represented by a vague callus at 1.75 whorls, is definitely formed at about two whorls, is situated just beyond tip of columellar one, which connects basally with it by a callus, and does not quite reach peristome; still strong at 4⅛ whorls but often reduced to a conical boss in large shells.

Animal whitish; tail long and narrow with quite distinct dorsomedian groove; caudal lobe broad but widely overhanging folded, diamond-shaped fossule; left mantle lobe especially large; right shell-lobe narrow and fully as long as greatest diameter of mantle collar; umbilical lobe well developed. Lung more than five times as long as base or 3.3 times kidney length, which is 2.5 times its base or twice pericardial length; anterior end invaded by mantle glands. Ovotestis (pl. 6, fig. 17) consisting of six conical groups of alveoli; duct moderately long; talon fairly large, clavate and bipartite; carrefour large, sacculate; uterus containing five large eggs and embryos; spermatheca moderate, swollen apically. Epiphallus large with heavy internal pilasters; penial retractor arising from diaphragm near base of uterus and inserting between middle and basal thirds of

epiphallus; penial sheath black, only covering about half of very small penis proper but connected to epiphallus. Penial prepuce about as long as penis; atrium proper shorter, opening nearly below anterior border of mantle collar. Jaw with very low, broadly rounded, almost straight median lobe. Radula very similar to *L. excrescens,* but even innermost (seventh tooth) of 27 marginals has two or three ectocones (pl. 6, fig. 18); 77 rows counted.

The identification of Hombron et Jaquinot's preoccupied name would be only of academic interest. *N. ensifera* is evidently a young shell; *M. stearnseana* is the usual large specimen, and *N. futunaensis* is a still older example, from which the palatal fold has disappeared.

Lamprocystis (Tongacystis) solida (Mousson), (pl. 20, figs. 1-2; pl. 12, fig. 12; pl. 7, figs. 1-2).

Nanina perpolita solida Mousson, 1871, Jour. de Conch. **19**: 8[4]. *Helix perpolita solida* Pfeiffer, Monogr. **7**: 65.

Tonga: Tongatabu: (Graeffe!). BBM. 54346, dissected (Mrs. E. S. Handy! Feb. 20, 1923). Eua: BBM. 87606, under logs on dead leaves, ¼ mile inland, alt. 160 feet, Ohinua Ravine (May 3); BBM. 87746, on shrubs, tree trunks, and dead leaves, damp hillside, about 2 miles inland, alt. 385 feet, Johanssen plantation (May 14; both Ladd and Hoffmeister! 1928).

Shell (pl. 20, figs. 1-2) subglobose, angulate as embryo (pl. 12, fig. 12), just so near end of third and evenly rounded near middle of fourth whorl; basal foveola moderate in breadth and depth; pale horn-color, quite polished above and more so below. Embryonic whorls about 2.1, with fairly sharp, fine, spiral striae (about as in *L. ensifera*). Later whorls more polished; with sharper spirals and with suture more lightly impressed than in *L. perpolita.* Aperture subcircularly lunate, evenly rounded; peristome about 15° to shell-axis. Columella quite steeply inclined, with heavy, very oblique, spiral cord of embryo (pl. 12, fig. 12) somewhat obscured because of extensive thickening at 4.1 whorls.

Animal similar to *L. ensifera,* but with dark pigment on top of head, sides of tail, mantle-lobes and base of right shell-lobe; last 4.5 times as long as its base and 0.6 greatest diameter of mantle collar. Lung with white dots between kidney and pulmonary vein. Talon shorter; carrefour more elongate; uterus containing three eggs and one small and two big embryos; spermatheca (pl. 7, fig. 1) shorter. Penial sheath including most of epiphallus, which enters below apex of penis. Penial prepuce shorter than atrium proper, which opens three times pedal groove interspace behind inferior tentacle and twice same above upper groove. Radula (pl. 7, fig. 2) has 10 laterals, with entocone large on first and absent from last, and 36 slender marginals, of which about inner three are bicuspid, next 16 unicuspid and outer 17 have no more than one ectocone and usually only a trace of that; 108 rows counted.

L. solida, the type of the section *Tongacystis,* is especially distinguished by its aculeate radular marginals. Besides the columellar fold, its shell has larger embryonic whorls and less rapid whorl-increase than *L. perpolita.*

Key to the species of section *Tongacystis*

A. Shell subglobose, more polished, with columellar cord stronger when young and still prominent at 4.1 whorls; Tonga: Tongatabu and Eua:....**L. solida** (Mousson).

AA. Shell more depressed, less polished, with columellar cord reduced to a weakly convex swelling at 3.9 whorls; Tonga: Vavau:.....**L. vavauensis** (Baird).

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
L. solida								
Mousson	5	(8)	.....	.....	.....	.....	.....	....
BBM. 54346....	4.63	141(6.52)	133(6.17)	62(2.89)	119(3.43)	1.81	3.5(6.35)	4.1
L. vavauensis								
Baird	4.2	(6.3)	.....	.....	.....	.....	.....	4.5
fig.	4.05	156(6.3)	148(6.0)	64(2.6)	119(3.1)	.....	.....	
BBM. 87844....	4.14	157(6.49)	142(5.88)	71(2.93)	117(3.43)	1.75	3.8(6.7)?	3.9

Lamprocystis (Tongacystis) vavauensis (Baird), (pl. 12, figs. 8-9).

(?) *Helix succinulata gavaoensis* Le Guillou, 1842, Rev. Zool. 1842: 138, [Vavao?]; also from Noukahiva [Marquesas?], Hapaï [= Haapai, Tonga?] and Hogolu [= Truk, Carolines] !!

?*Nanina perpolita* Mousson, 1871, Jour. de Conch. **19**: 8 [4], Vavao? Not 1869.

Helix vavauensis Baird, 1873, Cruise Curaçao: 446, pl. 40, figs. 10-11, Vavau. *Nanina vavauensis* Tryon, Manual **2**: 114, pl. 38, figs. 35-36.

Tonga: Vavau: BBM. 87844-7, dissected, on cliffs, medium damp valley, 2 miles inland, alt. 200 feet, near Holonga (Hoffmeister! July 4, 1928).

Shell (pl. 12, figs. 8-9) much as in *L. solida* but more depressed, with weaker basal foveola; less polished. Embryonic whorls especially, but also later ones, with sharper spiral striae. Columellar cord distinctly angulate at three whorls, although lower than in *L. solida;* rounded and extremely weak in largest shell.

Animal similar to *L. solida* but foot lighter; lung with black streaks and some chalky white blotches, which become continuous behind mantle collar and on apical whorls. Genitalia almost identical; uterus with two big eggs and three embryos of graded size. Jaw with slightly more prominent median lobe. Radula with 33 marginals, of which inner two or three bicuspid, next 13 unicuspid, and rest much more commonly have one ectocone; 97 rows counted.

As recognized by Mousson, the shell of *L. vavauensis* is more or less intermediate between those of *L. solida* and *L. perpolita.* On the other hand, the radula of the first two have similar aculeate marginals. Le Guillou's original description is quite unrecognizable and probably was founded on several species; however, I have little doubt but what his *"gavaoensis"* is a misspelling of Vavau.

Lamprocystis (Moala) moalana, new species (pl. 20, figs. 9-10; pl. 7, figs. 3-5).

Fiji (central): Moala: BBM. 77095, dissected (also 77108), on shrubs and tree trunks, ¼ to ¾ mile inland, alt. 800-1,500 feet, ridges behind Maloku (E. H. Bryan, Jr.! July 10, 11, 1924).

Shell (pl. 20, figs. 9-10) depressed turbinate, weakly angulate at beginning of fourth whorl but evenly rounded by its end; base tumid with narrow, deep foveola; pallid horn-color, well polished, very thin, fragile and almost transparent. Embryonic whorls nearly two, with very fine and weak spiral striae. Later whorls with spirals obsolescent (just visible in favorable places under high light) and with growth-striae very weak

and irregular above; base still more polished, with extremely weak spirals; suture fairly well impressed (for *Lamprocystis*), but quite broadly overriding and margined. Aperture subcircular-lunate; peristome very thin, about 20° to shell-axis; columella thin and almost vertical, with horizontally spiral cord very fine and narrow, but sharp at four whorls.

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4 wh.	whs.
Type	4.31	151(6.49)	134(5.76)	65(2.82)	122(3.45)	1.81	3.5(6.39)	4+

Animal similar to *L. ensifera* but top of head darkly pigmented; tail rounded above, with deep dorsomedian grooves; tail horn crescentic (short) but extending to tip of sole. Two shell-lobes present, both pebbled on outer surface; right one (pl. 7, fig. 4) very broad, 1.5 times as long as its base and 0.7 greatest diameter of mantle collar; left one semicircular, as broad as right but length only 0.75 width; right mantle-lobe dark at base; left anterior one small and dark. Lung with narrow black band behind mantle collar and sparse chalky-white blotches (outlined by dotted lines in pl. 7, fig. 4); almost 5.5 times as long as base or almost three times kidney length, which is three times its base or about twice pericardial length. Apical whorls with chalky deposit. Uterus containing five big eggs (BBM. 77108) or two eggs and two small and one large embryos (77095); spermatheca (pl. 7, fig. 3) shorter. Penial sheath including basal 0.2 of epiphallus but attached near tip of last; retractor inserting near base of epiphallus but continuing on to side of pear-shaped penis. Penial prepuce shorter than atrium proper, which opens close behind inferior tentacle and little above pedal grooves. Jaw with very low and broad median lobe. Radula (pl. 7, fig. 5) has short oblong central, eight little more elongate, tricuspid laterals and 42 rather stout and short marginals, of which inner eight are bicuspid, next two are tricuspid and rest add more ectocones; 112 rows counted.

On the basis of its shell, *L. moalana,* the only species of the new subgenus *Moala,* would be considered close to *L. perpolita* and *Tongacystis,* although its columellar fold is more horizontal than in the last section. Its genitalia are similar to those of *Lamprocystis* s.s., but its shell-lobes are almost like those of *Helicarion,* and its radula distinctly approaches that of *Avarua.*

Lamprocystis (Guamia) misella (Férussac), (pl. 11, fig. 9; pl. 7, figs. 9-11).

Helix misella Férussac, 1821, Tabl. Syst. Limaçons: 46 [50], L'île Gouham, l'une des Moluques (otherwise nude); 1825, Voy. Uranie: 473 (scarcely vested).—Quoy et Gaimard, 1832, Voy. Astrolabe 2: 122, pl. 10, figs. 5-9.—Pfeiffer, Monogr. 1: 38 [3:39-4:17-5:58-7:70]. *Nanina misella* Tryon, Manual 2: 115, pl. 38, figs. 47-48.

Helix succinulata Le Guillou, 1842, Rev. Zool. 1842:138, Gouham [for var. a, see *L. vavauensis*].—Pfeiffer, Monogr. 1: 37 [3:40-4:17-5:57-7:70].

(?) *Helix electrina* Hombron et Jaquinot, 1852 (?), Voy. Pol. Sud, 22: pl. 6, figs. 37-40.—Rousseau, Voy. Pol. Sud, 5: 22, Guam.—Pfeiffer, Monogr. 4: 13 [3:273-5:54-7:65]. Not *H. electrina* Gould (1841).

Marianas Islands: Guam. BBM. 75148-9, dissected by Dr. Cooke and myself, Tarague (Crampton! Aug. 15, 1920); BBM. 75380, dissected, on bushes, damp ravine, 3,000 feet inland, alt. 400 feet, Talafofo (Hornbostel!

June-July, 1923); BBM. 76971, on stones and logs, 1,800 feet inland, alt. 10 feet, Taga (Hornbostel! May 16, 1924).

Shell (to be figured in next part)[2] depressed turbinate, angulate when young and weakly so at 5.2 whorls; base convex with broad and fairly shallow foveola; horn-color, fairly well polished (less so than in *Lamprocystis* s. s.) and translucent when fresh. Embryonic whorls 2.2 to 2.5, with impressed, spiral lines extremely fine and closely spaced but fairly sharp in fresh, young shells (more distinct than in *Lamprocystis* s. s.). Later whorls with somewhat weaker spirals and quite weak, very low growth-wrinkles above and more polished below, although with spiral striae still visible under high light; suture moderately impressed, overriding. Aperture lunate, depressed but scarcely angulate; peristome almost 20° to shell-axis. Columella rather oblique (more upright in young shells), with steeply inclined, rounded, spiral thread in embryo (pl. 11, fig. 9), but soon becoming straight or even concave, although thickened behind peristome.

Animal similar to *L. ensifera* but top of head dark; tail with prominent middorsal groove and spatulate tail horn that reaches tip of sole. Right shell-lobe (contracted) triangular, about three times as long as its base and 0.5 greatest diameter of mantle collar. Lung (and apical whorls) without pigment; over six times as long as base or thrice kidney length, which is 3.5 times its base or twice pericardial length. Ovotestis consisting of 10 groups of alveoli imbedded in basal whorl of apical lobe of liver; talon (pl. 7, fig. 10) short, bipartite; uterus containing three to five large eggs and six or seven developing embryos; spermatheca more slender. Penial sheath including all epiphallus; retractor inserted between base of epiphallus and apex of penis. Penial prepuce stouter and sometimes containing short, horny spermatophore (pl. 7, fig. 11) with a stout hook at its lower end and a short winged tail opposite opening of spermathecal stalk. Atrium proper short, opening slightly in front of middle of visceral stalk and four times space between pedal grooves above them. Jaw with prominent growth-lines and very low, obsolescent median lobe. Radula (pl. 7, fig. 9) has shorter mesocone on central; seven laterals with entocone large on first but much reduced on last, and 75 to 82 elongate marginals, all with two large terminal cusps and also with one or two blade ectocones on first tooth, three or four on second and third and several on all others [one radula with a longitudinal row of freakish, giant teeth]; 118 rows counted.

L. misella, which should date from Quoy et Gaimard, evidently came from Guam, even if Férussac did stretch the Moluccas a thousand miles or so to include that island. The three species of *Guamia* from the Marianas differ mainly in size and *L. misella,* the type of the subgenus, is here used for the intermediate one, that is the commonest of the species from Guam. However, the measurements given by Quoy et Gaimard indicate a larger specimen than any I have seen and Le Guillou's and especially Rousseau's dimensions fit *L. fastigata* better. *L.? myops* (Semper, Reisen 3:43, pl. 1, fig. 14; pl. 4, fig. 9), from the Philippine Islands, may belong in or near this subgenus, but the shell is perforate (like *Kusaiea*) and the radula is unknown.

Key to the species of *Guamia* from the Marianas Islands

A. Shell with smaller whorls and slightly more gradual increase, distinctly angulate at beginning of fifth whorl; 4.5 wh. diam. 6 mm. or less;

B. Shell larger throughout; 4.5 wh. diam. almost 6 mm.; Marianas: Guam:.... **L. misella** (Férussac).

BB. Shell smaller; 4.5 wh. diam. almost 5 mm.; Marianas: Tinian:..... **L. hornbosteli** new species.

[2] Plate 36, fig. 1.

AA. Shell with larger whorls and slightly more rapid increase, barely angulate at beginning of fifth whorl; 4.5 wh. diam. about 7 mm.; Marianas: Guam, Tinian, and Rota: ..... **L. fastigata** (Gude).

Dimensions

	alt.	maj. diam.	min. diam.	alt. ap.	diam. ap.	1½	4.5 wh.	whs.
L. misella								
Q. and G.....	4.5	(7.8)	.....	.....	.....	.....	.....	.....
fig.	4.8	162(7.8)	142(6.8)	58(2.8)	139(3.9)	.....	.....	5.5+
(succinulata)	5.5	(8)	.....	.....	.....	.....	.....	5
(electrina)	6	(10)	.....	.....	.....	.....	.....	.....
BBM. 75148	4.63	152(7.03)	140(6.48)	58(2.70)	132(3.56)	1.53	3.8(5.83)	5.2
BBM. 76971	3.59	154(5.53)	140(5.03)	63(2.27)	129(2.92)	1.47	3.8(5.53)	4.5
embryo								
(75380)	1.46	140(2.05)	.....	85(1.24)	93(1.15)	.....	.....	2⅛
L. hornbosteli								
type	3.99	147(5.87)	134(5.34)	59(2.37)	129(3.06)	1.27	3.8(4.80)	5.1
L. fastigata								
Gude	4.5	(6.5)	(6)	.....	.....	.....	.....	4.5
fig.	4.25	153(6.5)	142(6.05)	67(2.85)	114(3.25)	.....	.....	
BBM. 75290	4.05	157(6.37)	153(6.20)	65(2.64)	126(3.32)	1.77	4.1(7.3)?	4+

Lamprocystis (Guamia) hornbosteli, new species (pl. 11, figs. 12-13; pl. 7, figs. 7-8).

Marianas Islands: Tinian: BBM. 11423 (77005, dissected) (H. G. Hornbostel! May, 1924).

Shell (pl. 11, figs. 12-13) very similar to *L. misella* but smaller and slightly more angulate at all whorl-sizes; base more tumid with narrower foveola. Embryonic whorls about 2¼. Sculpture throughout much as in *L. misella* but growth-striae on late fifth whorl (13 per mm.) slightly sharper above. Aperture barely angulate. Columella concave, but thickened behind peristome, at 5.1 whorls.

Animal also similar; lung with kidney more attenuate anteriad; uterus containing no eggs but with two large embryos. Epiphallus (pl. 7, fig. 8) relatively smaller; penis longer; penial prepuce much longer; no spermatophores seen. Radula with six or seven laterals and with 49 marginals, of which inner four have minute blade ectocones only (pl. 7, fig. 7); 117 rows counted.

This species, which is named for Mr. H. G. Hornbostel, is a miniature replica of *L. misella*.

Lamprocystis (Guamia) fastigata (Gude), (pl. 11, figs. 10-11; pl. 7, fig. 6).

Pseudhelicarion fastigata Gude, 1917, Proc. Malac. Soc. **12**: 316, text-fig.

Marianas Islands: Guam: (Quadras!). BBM. 75290, dissected, ferns, shrubs and trees, 1 mile inland, alt. 200 feet, Paso (July 12, 1923). Rota: BBM. 82074-6, dissected, mostly on fern leaves, also on rocks, logs and trees, plateau in native forest, 3 miles inland, alt. 200 feet, Mau (July 10, 1925). Tinian: BBM. 77001 (May, 1924). (All lots Hornbostel!)

Shell (pl. 11, figs. 10-11) similar to *L. misella* but with larger and slightly more rapidly increasing whorls; angulate when young but barely so at beginning of fifth whorl; base convex with rather narrow and fairly deep foveola; slightly darker horn-color and

more polished. Embryonic whorls 1.8 to 2, with sharper, spiral striae, especially on first whorl, intermediate in strength between those of *L. rurutuana* and *L. laddi,* and probably about 100 visible (estimated). Later whorls more polished and with weaker growth-wrinkles but still with stronger spirals than in *L. misella* above and below. Aperture more broadly lunate, almost evenly rounded. Columella concave and moderately thickened behind peristome at 4 whorls.

Animal much as in *L. misella* but more bleached; lung more than 5 times as long as base and 2.7 kidney length, which is 3 times its base or 1.7 pericardial length. Uterus containing no eggs, 1 small and 3 larger embryos. Epiphallus shorter (pl. 7, fig. 6) and penis more as in *L. hornbosteli.* Penial prepuce about as long as penis; no spermatophores seen in 8 animals examined. Radula with 7 laterals and 50 marginals, of which inner 4-9 usually have minute blade ectocones; 98 rows counted.

As mentioned under *L. misella, L. fastigata* may be a synonym of *Helix succinulata* Le Guillou, but a name with a figure should have the benefit of the doubt.

EXPLANATION OF PLATES

Unless otherwise stated, the scales for the wash figures of shells (pls. 14-20) represent lengths of 2 mm.; those for outlines of shells and for figures of animals, mantle collars, pallial complexes, genitalia and nervous systems represent 1 mm.; those for outlines of radula transverse rows (T) and parts of genitalia (darts, spermatophores, etc.) 0.1 mm.; and those of individual radular teeth 10 microns (0.01 mm.). Plates 8-20, except figures of embryonic shells, are drawn by E. R. Tinkham. The following symbols are used throughout the paper:

A: anus or anal nerve. AC: acoustic nerve.

B: lateral buccal nerve. BA: anterior buccal nerve. BC: buccal connective. BR: buccal retractor or nerve.

C: caudal or columellar nerve. CF: caudal foss. CH: caudal horn. CS: middorsal sulcus or groove.

D: vas deferens. DG: prostatic gland. DS: seminal duct (prostatic part).

E: epiphallus. EC: epiphallar corona. ED: slender part (?) of epiphallus. EF: flagellum or apical calc-sac. ER: retractor caecum of epiphallus.

F: foot. FA: anterolateral pedal nerve. FG: pedal gland (opening). FL: mediolateral or lateral pedal nerve. FP: posterolateral pedal nerve. FS: pedal grooves.

G: gonad (ovotestis). GD: hermaphroditic duct. GG: albumen gland. GT: talon.

H: heart or pericardium. HG: hindgut. HK: renopericardial pore. HV: principal pulmonary vein.

I: intestinal nerve.

J: jaw (mouth). JN: labial nerve.

K: kidney. KD: ureter. KO: renal orifice. KX: external ureteric opening.

L: left shell-lap. LD: right shell-lap. LK: urinary chamber. LL: left shell-lobe. LP: pneumostome. LR: right shell-lobe. LU: umbilical shell-lobe.

M: left pallial nerve. MA: anterior left mantle-lappet. MC: mantle collar. MG: mantle glands. ML: left mantle-lobe. MP: posterior left mantle-lappet. MR: right mantle-lappet. MW: attachment of mantle collar to visceral stalk and diaphragm.

N: nuchal nerve. NF: frontal nerve. NM: right pallial nerve. NS: subcerebral nerve.

O: oesophageal nerve. OA: anterior oesophageal nerve.

P: penis or penial nerve. PA: penial appendix (apical). PC: penial caecum or lobe (apical). PD: penial dart, stimulator or their sacs. PE: epiphallar branch of penis. PG: dart glands. PL: penial lobe or diverticulum (lateral or basal). PP: penial stimulator papilla or pilaster. PR: penial retractor. PS: penial sheath. PV: verge or penial papilla proper, through which epiphallus opens.

R: radular central tooth. RN: odontophoral nerve.

S: spermatheca. SR: spermathecal ligament. SS: spermathecal stalk.

T: right half of radular transverse row (outline or line); also tentacle. TE: ommatophore or its nerves. TR: tentacular retractors or their nerves. TV: inferior tentacle or its nerve.

U: oviduct as a whole. UE: embryos. UG: glandular sheath on free oviduct. UT: uterus. UO: eggs. UV: free oviduct. UZ: post-uterine oviduct.

V: vagina. VA: anteroventral pedal nerve. VG: vaginal gland. VL: medioventral pedal nerve. VP: posteroventral pedal nerve. VS: visceral stalk or peduncle.

X: carrefour. XL: lobe or sac of carrefour.

Y: atrium. YD: atrial stimulator. YG: atrial gland. YL: atrial lobe or diverticulum. YO: atrial opening. YP: penial prepuce (atrial outgrowth).

Z: liver.

Plate 1. Microcystis and Lamprocystis

Figs. 1-6. *Microcystis* (*Microcystis*) *ornatella* (Beck), BBM. 135220-2: 1. Animal, partially extended, with penis partly everted. 2. Mantle collar with shell-laps turned outward and mantle-lobes inward. 3. Radula; central and first lateral, 8th to 10th, 18th, 31st and 58th teeth; also (T) outline of right half of transverse row with widths of central (R) and blocks of 9 (number or laterals) teeth indicated. 4. Dissected genitalia (penial sheath shown in outline), with (E) section near middle of apical loop of epiphallus, (P) section near penial apex, and another near base of penis, and (UZ) section through post-uterine oviduct. 5. Internal view of pallial complex with right mantle-lobe turned inward and left ones outward. 6. Central nervous system (pleuro-abdominal ring pulled towards right side) and roots of principal nerves.

Figs. 7-8. *Microcystis* (*Microcystis*) *fosbergi*, new species, BBM. 135946: 7. Radula; central. 8. Penis to prostrate with ends of female genitalia; penial sheath mainly omitted.

Figs. 9-10. *Microcystis* (*Leurocystis*) *saintjohni* new species, BBM. 135997: 9. Radula; central with 1st lateral, 15th and 16th, and 44th and 45th teeth. 10. Dissected genitalia (ovotestis and penial sheath omitted).

Figs. 11-12. *Lamprocystis* (*Raiatea*) *simillima* (Pease), BBM. 87212: 11. Penis (sheath omitted) and ends of female genitalia. 12. Radula; central with first lateral, 12th to 14th, 19th, 40th and 48th teeth (same scale as fig. 7); also (T) outline of half row with widths of central and blocks of 13 teeth indicated.

Plate 2. Liardetia

Figs. 1-3. *Liardetia* (*Dasyconus*) *decussata* new species, BBM. 86520: 1. Dissected genitalia (ovotestis and duct omitted) with stimulator outlined on penis (sheath cut away). 2. Penial stimulator, by transmitted light. 3. Radula; central with first lateral, 11th and 12th teeth.

Fig. 4. *Liardetia* (*Dasyconus*) *perplexa* new species, BBM. 151140: Penis (sheath removed) with outlined stimulator and ends of female organs.

Fig. 5. *Liardetia* (*Dasyconus*) *tahitensis* (Garrett), BBM. 145527: Radula; central with first lateral.

Figs. 6-8. *Liardetia* (*Dasyconus*) *normalis* (Pease), BBM. 142334: 6. Radula; 14th and 29th teeth. 7. Dissected genitalia (ovotestis and penial sheath omitted). 8. Penial stimulator.

Figs. 9-10. *Liardetia* (*Oceanesia*) *intermedia* new species, BBM. 142004: 9. Penis (sheath cut away) with stimulator outlined, and ends of female organs. 10. Radula; central with first lateral and 35th tooth.

Figs. 11-13. *Liardetia* (*Oceanesia*) *discordiae* (Garrett), BBM. 97540: 11. Radula; 7th, 8th and 17th teeth. 12. Penial stimulator. 13. Penis (sheath removed) and terminal female organs.

Figs. 14-16. *Liardetia* (*Belonesia*) *undulata* new species, BBM. 151750: 14. Penial stimulator, viewed by transmitted light. 15. Radula; 23rd tooth. 16. Dissected genitalia (ovotestis and penial sheath omitted).

Figs. 17-18. *Liardetia* (*Liardetia*) *tenuisculpta* (Möllendorff), variety (?), BBM. 82180: 17. Dart (twisted). 18. Penis (sheath cut away) and terminal female organs.

Figs. 19-20. *Liardetia* (*Liardetia*) *sculpta* (Möllendorff), BBM. 153921: 19. Dart. 20. Dissected genitalia (ovotestis and duct omitted); one dart outlined on penis (sheath removed).

Plate 3. Liardetia, Pukaloa, Cookeana and Kusaiea

Figs. 1-3. *Liardetia* (*Nesoreus*) *grandis* new species, BBM. 87041: 1. Penis (sheath cut away) and ends of female organs. 2. Penial stimulator on optical section of adjacent wall. 3. Radula; central with first lateral, 20th, 21st and 51st teeth; also (T) outline of half row with widths of central, lateral group and blocks of 7 marginals indicated.

Figs. 4-5. *Liardetia* (*Liardetia*) *striolata* (Pease): 4. Radula, BBM. 92528; central with first lateral, 6th to 8th and 19th teeth; also (T) line of half row with widths of central and blocks of 6 teeth indicated. 5. Penis (with sheath) and ends of female organs, BBM. 84412.

Figs. 6-8. *Liardetia* (*Belopygmeus*) *doliolum* (Pfeiffer), BBM. 82705: 6. Radula; 5th to 7th, 20th and 33rd teeth; also (T) line of half row with widths of central and blocks of 5 teeth indicated. 7. Dart, by transmitted light. 8. Genitalia (ovotestis and penial sheath omitted).

Fig. 9. *Pukaloa obconica* (Pease), BBM. 3187: Radula; central with first lateral, 17th, 52nd and 60th teeth; also (T) line of half row with widths of central and blocks of 9 teeth indicated.

Figs. 10-11. *Kusaiea frivola* (Pease), BBM. 155100: 10. Dissected genitalia (ovotestis, duct and penial sheath omitted). 11. Radula: central with first to third, 20th and 120th teeth; also (T) line of half row with widths of central and lateral fields indicated.

Figs. 12-13. *Cookeana vindex* new species, BBM. 136025: 12. Radula; central with first lateral, 8th to 10th, 18th and 65th teeth; also (T) line of half row with widths of central and blocks of 8 teeth indicated. 13. Dissected genitalia (penial sheath and ovotestis omitted).

Plate 4. Cookeana and Mendaña

Figs. 1-2. *Cookeana anathesis* new species, BBM. 141829: 1. Penis (sheath cut away) and ends of female organs. 2. Radula; central with first lateral, 27th, 28th and 71st teeth.

Figs. 3-5. *M.* (*Mendaña*) *rectangula altior* new subspecies: 3. Radula (BBM. 95925); central with first lateral, 11th with 12th, 22nd, 34th with 35th and 60th teeth (same scale as fig. 7); also (T) outline of half row with widths of central and blocks of 11 teeth indicated. 4. Dissected genitalia (BBM. 96001; ovotestis and penial sheath omitted). 5. Mantle collar (BBM. 96001), with shell-laps turned outward and left mantle-lobes [MA, MP] and tip of right one [MR] turned inward.

Figs. 6-7. *Mendaña* (*Mendaña*) *dentaxis* new species, BBM. 106318: 6. Penis (sheath omitted) and ends of female organs. 7. Radula; central with first lateral, 18th and 19th teeth.

Figs. 8-9. *Mendaña* (*Tahuatoa*) *angulifera* (Garrett), BBM. 94815: 8. Radula; 15th and 20th teeth (same scale as fig. 7); also (T) line of half row with widths of

central and blocks of 10 teeth indicated. 9. Penis (sheath removed) and ends of female organs (same scale as fig. 5).

Figs. 10-12. *Mendaña* (*Macrorbis*) *mumfordi* new species, BBM. 105161: 10. Radula of adult; central with first lateral, 19th with 20th, 37th and 57th teeth (same scale as fig. 7); also (T) line of half row with widths of central and blocks of 13 teeth indicated. 11. Radula of young embryo (shell with 1 whorl); central with first lateral and 6th teeth; also (T) line of half row with widths of all teeth indicated. 12. Penis (sheath omitted) and ends of female genitalia.

Figs. 13-15. *Mendaña* (*Uanuka*) *adamsoni* new species, BBM. 98285: 13. Mantle collar, as in fig. 5. 14. Spermatophore (?) from spermatheca (same scale as fig. 13). 15. Radula; 17th tooth.

Figs. 16-17. *Mendaña* (*Uanuka*) *pisum* new species, BBM. 96039: 16, Dissected genitalia (ovotestis, duct and penial sheath omitted; same scale as in fig. 13). 17. Radula; central with first lateral, 19th to 21st, 63rd and 64th teeth; also (T) line of half row with widths of central and blocks of 9 teeth indicated.

Figs. 18-19. *Mendaña* (*Uanuka*) *marquesana* (Pease), BBM. 104969: 18, Radula, central with first lateral, 25th, 26th and 58th teeth (same scale as fig. 7). 19. Penis (sheath cut away) and ends of female genitalia.

Plate 5. Mendaña and Diastole

Figs. 1-2. *Mendaña* (*Fatuoa*) *longicaulis* new species, BBM. 99946: 1. Dissected genitalia (ovotestis omitted) with penial sheath outlined so that opening is in actual position. 2. Radula; central and first lateral, 21st and 22nd, 58th and 59th teeth; also (T) line of half row with widths of central and blocks of 10 teeth indicated.

Figs. 3-4. *Mendaña* (*Fatuoa*) *subvenosa hivaoae* new subspecies, BBM. 94508: 3. Radula; central and first lateral, 14th and 15th, 25th and 26th, and 45th teeth (same scale as fig. 2). 4. Mantle collar as in pl. 4, fig. 5.

Fig. 5. *Diastole* (*Diastole*) *tongana* (Quoy et Gaimard), BBM. 88253: Penis (sheath and most of retractor omitted) with spermatheca and post-uterine oviduct.

Fig. 6. *Diastole* (*Diastole*) *futunae* new species, BBM. 115444: Penis, etc., as in fig. 5, but half oviduct omitted.

Fig. 7. *Diastole* (*Diastole*) *matafaoi* new species, BBM. 83404: Penis, etc., as in fig. 5.

Fig. 8. *Diastole* (*Diastole*) *rurutui* new species, BBM. 141998: Penis, etc., as in fig. 5 (same scale as fig. 4).

Figs. 9-10. *Diastole* (*Diastole*) *conula* (Pease), BBM. 86975: 9. Radula; central and first lateral. 10. Penis (sheath omitted) and ends of female genitalia.

Figs. 11-12. *Diastole* (*Trochonanita*) *schmeltziana* (Mousson), BBM. 84756: 11. Dissected genitalia (penial sheath omitted; same scale as fig. 4). 12. Radula; central and first lateral, 8th to 10th, 72nd and 90th teeth; also (T) outline of half row with widths of central and blocks of 8 teeth indicated.

Fig. 13. *Diastole* (*Trochonanita*) *savaii* new species, BBM. 75807: Penis (sheath omitted), spermatheca and post-uterine oviduct (same scale as fig. 4).

Fig. 14. *Diastole* (*Trochonanita*) *lamellaxis* new species, BBM. 75769: Penis (sheath outlined), spermatheca and base of oviduct.

Figs. 15-16. *Diastole* (*Ɛuanana*) *fornicata* (Ancey), BBM. 87721: 15. Radula; central and first lateral, 8th and 9th, 13th, and 33rd teeth; also (T) outline of half row with widths of central and blocks of 8 teeth indicated (same scales as fig. 17). 16. Penis (sheath omitted) and ends of female genitalia.

Figs. 17-18. *Diastole* (*Ɛaua*) *bryani* new species, BBM. 79035: 17. Radula; central with first lateral, 11th to 13th, 20th, 33rd and 46th teeth; also (T) line of half row with widths of central and blocks of 11 teeth indicated. 18. Penis (with sheath) and ends of female organs (same scale as fig. 14).

Plate 6. Diastole and Lamprocystis

Figs. 1-2. *Diastole* (*Laua*) *lauae* new species, BBM. 132830: 1. Radula; central with first lateral and 12th teeth; also (T) outline of half row with widths of central and blocks of 7 teeth indicated. 2. Dissected genitalia (ovotestis and penial sheath omitted).

Figs. 3, 5. *Lamprocystis* (*Avarua*) *venosa* (Pease), BBM. 95578: 3. Radula; central with first lateral, 13th and 14th, and 43rd teeth (same scale as fig. 1); also (T) outline of half row with widths of central and blocks of 8 teeth indicated. 5. Penis (sheath omitted) and ends of female genitalia (same scale as figs. 4, 7).

Fig. 4. *Lamprocystis* (*Avarua*) *venosa subcicercula* (Garrett), BBM. 58973 (from ANSP. 74330): Penis (sheath omitted) with large diverticulum (same scale as fig. 7); also (dissected and drawn by Dr. Cooke from another specimen of same lot) transverse sections (A) near tip of diverticulum and (B) through penis above diverticulum.

Figs. 6-7. *Lamprocystis* (*Avarua*) *globosa* new species, BBM. 95592: 6. Radula; 17th tooth (same scale as fig. 1). 7. Dissected genitalia (ovotestis and penial sheath omitted).

Figs. 8-9. *Lamprocystis* (*Naiaua*) *laddi* new species, BBM. 132833: 8. Penis (sheath omitted) and ends of female genitalia (same scale as fig. 7). 9. Radula; central with first lateral, 15th and 16th, and 35th teeth.

Figs. 10-11. *Lamprocystis* (*Manureva*) *rurutuana* new species, BBM. 141987: 10. Penis (sheath omitted) and ends of female genitalia. 11. Radula; central with first lateral and 15th teeth (same scale as fig. 9).

Figs. 12-13. *Lamprocystis* (*Kerakystis*) *perpolita* (Mousson), BBM. 75826: 12. Radula; central with first lateral and 23rd teeth (same scale as fig. 1); also (T) line of half row with widths of central and blocks of 7 teeth indicated. 13. Penis (sheath omitted) with ends of female organs.

Figs. 14-15. *Lamprocystis* (*Kerakystis*) *vitrinella rapana* new subspecies, BBM. 135514: 14. Penis (sheath omitted) and ends of female genitalia. 15. Radula; central with first lateral, 5th and 6th, 13th and 22nd teeth (same scale as fig. 12).

Fig. 16. *Lamprocystis* (*Lamprocystis*) *denticulata* Quadras und Möllendorff, BBM. 82576: Penis (sheath omitted) and ends of female organs.

Figs. 17-18. *Lamprocystis* (*Lamprocystis*) *ensifera* (Mousson), BBM. 87852: 17. Dissected genitalia (penial sheath shown). 18. Radula; 14th tooth.

Figs. 19-20. *Lamprocystis* (*Lamprocystis*) *nodulata* (Mousson)?, BBM. 79096: 19. Penis (sheath omitted) and ends of female genitalia (same scale as fig. 17). 20. Radula; 14th and 15th teeth (same scale as fig. 21).

Fig. 21. *Lamprocystis* (*Lamprocystis*) *excrescens* (Mousson), BBM. 115334: Radula; central with first lateral, 6th and 7th, 11th, 26th and 31st teeth (scale above); also (T) outline of half row with widths of central and blocks of 6 teeth indicated.

Figs. 22-23. *Lamprocystis* (*Lamprocystis*) *oneataensis* (Mousson), BBM. 132860: 22. Radula; central with first lateral and 11th teeth (same scale as fig. 12). 23. Dissected genitalia (ovotestis and penial sheath omitted; same scale as fig. 2).

Plate 7. Lamprocystis and Microcystis

Figs. 1-2. *Lamprocystis* (*Tongacystis*) *solida* (Mousson), BBM. 54346: 1. Penis (sheath omitted) to prostrate and ends of female organs. 2. Radula; central and first lateral, 9th to 11th, 19th, 29th, and 30th teeth; also (T) outline of half row with widths of central and blocks of 10 teeth indicated.

Figs. 3-5. *Lamprocystis* (*Moala*) *moalana* new species, BBM. 77108; 3. Penis, etc., as in fig. 1 (same scale). 4. Internal view of pallial complex with posterior end of

posterior mantle-lobe reflected outwards. 5. Radula; central and first lateral, 11th and 31st teeth (same scale as fig. 2).

Fig. 6. *Lamprocystis* (*Guamia*) *fastigata* (Gude), BBM. 75290: Penis (sheath omitted) and ends of female organs (same scale as fig. 10).

Figs. 7-8. *Lamprocystis* (*Guamia*) *hornbosteli* new species, BBM. 77005; 7. Radula; 11th tooth (same scale as fig. 9). 8. Penis, etc., as in fig. 6 (same scale as fig. 1).

Figs. 9-11. *Lamprocystis* (*Guamia*) *misella* (Férussac): 9. Radula, BBM. 75149; central and first lateral, 11th, 43rd and 87th teeth (same scale as fig. 2); also (T) outline of half row with widths of central and blocks of 7 teeth indicated (same scale as fig. 2 T). 10. Dissected genitalia, BBM. 75149, with ovotestis and penial sheath omitted; also (dissected and drawn by Dr. Cooke from another specimen of same lot under double magnification) transverse sections (1) near middle of upper half of epiphallus, (2) near middle of lower half of same, (3) through apex of penis at entrance of epiphallus (upper arm of T-shaped lumen), (4) near base of penis (with tip of spermatophore) and (5) through penial prepuce (containing spermatophore). 11. Spermatophore, BBM. 75380, viewed by transmitted light.

Figs. 12-13. *Microcystis* (*Facorhina*) *andersoni* new species, BBM. 141821: 12. Radula; central and first lateral, 14th and 44th teeth [fig. 14T represents quite accurately outline of half row with widths of central and blocks of 7 teeth indicated]. 13. Dissected genitalia (ovotestis, its duct and principal penial sheath omitted but with intimate sheath and attachments shown).

Figs. 14-15. *Microcystis* (*Facorhina*) *lenticula* new species, BBM. 142274: 14, Radula; central and first lateral (same scale as fig. 2); also (T) outline of half row with widths of central and blocks of 6 teeth indicated. 15. Penis (sheath omitted) and ends of female organs (half post-uterine oviduct omitted; same scale as fig. 10).

Figs. 16-17. *Microcystis* (*Cnesticystis*) *kondoi* new species, BBM. 136011: 16, Radula; central and first lateral and 14th teeth. 17. Penis (sheath omitted) to prostrate and ends of female genitalia.

Figs. 18-19. *Microcystis* (*Cnesticystis*) *aspera* new species, BBM. 135918: 18. Penis (sheath omitted) and ends of female organs (same scale as fig. 17). 19. Radula; central and first lateral, 12th to 14th, 25th and 53rd teeth; also (T) line of half row with widths of central and blocks of 12 teeth indicated (scale 0.1 or fig. 19).

Plate 8. Liardetia

Fig. 1. *Liardetia* (*Dasyconus*) *normalis* (Pease), BBM. 142334: Apical outline.

Fig. 2. *Liardetia* (*Dasyconus*) *normalis aequior* new subspecies, BBM. 11484: Basal outline of type (same scale as fig. 8).

Fig. 3. *Liardetia* (*Dasyconus*) *tahitensis* (Garrett), ANSP. 49303: Frontal outline of type.

Fig. 4. *Liardetia* (*Dasyconus*) *subrugosa* (Garrett), ANSP. 49302: Frontal view of type (same scale as fig. 3).

Figs. 5-6. *Liardetia* (*Belonesia*) *undulata* new species, BBM. 151750: Basal and apical outlines of type (same scale as fig. 8).

Figs. 7-8. *Liardetia* (*Dasyconus*) *perplexa* new species, BBM. 11485: Basal and apical outlines of type.

Figs. 9-10. *Liardetia* (*Oceanesia*) *intermedia* new species, BBM. 11297: Apical and basal outlines of type.

Figs. 11-12. *Liardetia* (*Oceanesia*) *discordiae* (Garrett), BBM. 97539: Basal and frontal outlines of shell from Cook Islands: Mangaia.

Figs. 13-15. *Liardetia* (*Oceanesia*) *mooreana* (Garrett), ANSP. 49159: Frontal, basal and apical outlines of type.

Plate 9. Mendaña, Liardetia, Pukaloa and Kusaiea

Fig. 1. *Mendaña* (*Uanuka*) *intermedia* new species, BBM. 11310: Apical outline of type.

Fig. 2. *Mendaña* (*Fatuoa*) *subvenosa hivaoae* new subspecies, BBM. 11314: Apical outline of type.

Fig. 3. *Mendaña* (*Fatuoa*) *subpatula* new species, BBM. 11315: Apical outline of type.

Fig. 4. *Mendaña* (*Fatuoa*) *subvenosa* (Garrett), BBM. 99673: Frontal outline (same scale as fig. 10).

Figs. 5-6. *Liardetia* (*Liardetia*) *striolata* (Pease), BBM. 84412: Apical and basal (rotated through 180°) outlines of large shell from Samoa: Tutuila.

Fig. 7. *Liardetia* (*Liardetia*) *tenuisculpta* (Möllendorff), variety (?), BBM. 82180: Frontal outline of shell from Marianas Islands: Rota.

Fig. 8. *Liardetia* (*Liardetia*) *sculpta* (Möllendorff), BBM. 153921: Apical outline of large shell from Caroline Islands: Ponape; same scale as fig. 13.

Fig. 9. *Liardetia* (*Belopygmeus*) *doliolum* (Pfeiffer), BBM. 82705: Basal outline of shell from Marianas Islands: Guam.

Figs. 10-12. *Pukaloa obconica* (Pease), BBM. 3187: Frontal, apical and basal outlines of shell (Garrett!).

Figs. 13-15. *Kusaiea frivola* (Pease), BBM. 155100: Frontal, apical and basal outlines of shell from Caroline Islands: Kusaie.

Plate 10. Mendaña and Diastole

Fig. 1. *Mendaña* (*Mendaña*) *rectangula* (Pfeiffer), ANSP. 49016: Frontal outline of *Helix alta* Pease (probably the type).

Figs. 2-3. *Mendaña* (*Uanuka*) *marquesana* (Pease), BBM. 104969: Frontal and apical outlines of shell with color-band stippled.

Figs. 4-5. *Mendaña* (*Macrorbis?*) *tais* (Pfeiffer), ANSP. 49299: Apical and frontal (same scale as fig. 1) outlines.

Fig. 6. *Diastole* (*Diastole*) *necrodes* new species, BBM. 11399: Apical outline of type.

Figs. 7-8. *Mendaña* (*Uanuka?*) *gummea* (Garrett), BBM. 3770: Apical and frontal outlines of type shell.

Fig. 9. *Diastole* (*Diastole*) *glaucina* new species, BBM. 11400: Apical outline of type (same scale as fig. 6).

Figs. 10-11. *Diastole* (*Trochonanita*) *schmeltziana* (Mousson), BBM. 94295: Apical and frontal outlines of shell from Samoa: Upolu.

Fig. 12. *Diastole* (*Diastole*) *futunae* new species, BBM. 11403: Apical outline of type.

Figs. 13-14. *Diastole* (*Trochonanita*) *schmeltziana usurpata* (Mousson), BBM. 94305: Apical and frontal (same scale as fig. 11) outlines of shell from Samoa: Upolu.

Fig. 15. *Diastole* (*Diastole*) *tongana* (Quoy et Gaimard), BBM. 88252: Frontal outline of shell; same scale as fig. 12.

Plate 11. Diastole and Lamprocystis

Figs. 1-2. *Lamprocystis* (*Avarua*) *venosa* (Pease), BBM. 95578: Apical and frontal (same scale as fig. 8) outlines of shell.

Figs. 3-4. *Lamprocystis* (*Avarua*) *venosa subcicercula* (Garrett), BBM. 3190: Apical and frontal (same scale as fig. 8) outlines of shell from type lot.

Figs. 5-6. *Lamprocystis* (*Raiatea*) *simillima* (Pease), BBM. 87212: Apical and frontal outlines of shell.

Fig. 7. *Lamprocystis* (*Manureva*) *rurutuana* new species, BBM. 11420: Apical outline of type shell (rotated through 180°).

Fig. 8. *Lamprocystis* (*Avarua*) *globosa* new species, BBM. 95581: Frontal outline of large shell.

Fig. 9. *Lamprocystis* (*Guamia*) *misella* (Férussac), BBM. 75380: Frontal outline of embryonic shell of 2⅛ whorls.

Figs. 10-11. *Lamprocystis* (*Guamia*) *fastigata* (Gude), BBM. 75290: Apical and frontal outlines of shell.

Figs. 12-13. *Lamprocystis* (*Guamia*) *hornbosteli* new species, BBM. 11423: Apical and frontal (same scale as fig. 11) outlines of type shell.

Figs. 14-15. *Diastole* (*Euanana*) *fornicata* (Ancey), BBM. 87721: Frontal and apical outlines of shell.

Plate 12. Lamprocystis and Microcystis

Figs. 1-2. *Lamprocystis* (*Kerakystis*) *perpolita* (Mousson), BBM. 75826: Apical and frontal outlines of shell from Samoa: Savaii.

Fig. 3. *Lamprocystis* (*Kerakystis*) *vitrinella rapana* new subspecies, BBM. 11421: Apical outline of type shell; same scale as fig. 4.

Figs. 4-5. *Lamprocystis* (*Kerakystis*) *punctifera* (Garrett), BBM. 1093: Frontal and apical outlines of shell from type lot.

Figs. 6-7. *Lamprocystis* (*Lamprocystis*) *upolensis* (Mousson), BBM. 54370: Apical and frontal (same scale as fig. 14) outlines of shell from Samoa: Upolu.

Figs. 8-9. *Lamprocystis* (*Tongacystis*) *vavauensis* (Baird), BBM. 87844: Frontal (same scale as fig. 2) and apical outlines of shell.

Figs. 10-11. *Lamprocystis* (*Lamprocystis*) *oneataensis* (Mousson), BBM. 132860: Frontal (same scale as fig. 14) and apical outlines of shell from Fiji (Lau): Namuka-i-Lau.

Fig. 12. *Lamprocystis* (*Tongacystis*) *solida* (Mousson), BBM. 54346: Frontal outline of embryonic shell of 1.8 whorls.

Figs. 13-14. *Lamprocystis* (*Lamprocystis*) *unisulcata* (Mousson), BBM. 78803: Apical and frontal outlines of shell from Fiji (Lau): Tavunasithi.

Fig. 15. *Microcystis* (*Microcystis*) *ornatella* (Beck), BBM. 135220: Frontal outline of large shell.

Plate 13. Microcystis and Lamprocystis

Fig. 1. *Microcystis* (*Facorhina*) *adusta* new species, BBM. 11414: Apical outline of type shell.

Fig. 2. *Microcystis* (*Cnesticystis*) *buckorum* new species, BBM. 97624: Apical outline of type shell.

Figs. 3-4. *Lamprocystis* (*Lamprocystis*) *nodulata* (Mousson)?, BBM. 79096: Apical and frontal outlines of shell from Fiji (Lau): Kimbombo.

Figs. 5-6. *Lamprocystis* (*Lamprocystis*) *excrescens* (Mousson), BBM. 87921: Frontal and apical outlines of shell from Fiji (west): Viti Levu.

Figs. 7-8. *Lamprocystis* (*Lamprocystis*) *kioaensis* (Garrett), ANSP. 49170: Apical and frontal outlines of shell from type lot.

Figs. 9-10. *Lamprocystis* (*Lamprocystis*) *denticulata* (Möllendorff), BBM. 75296: Frontal and apical outlines of shell from Marianas Islands: Guam.

Figs. 11-15. *Lamprocystis* (*Lamprocystis*) *ensifera* (Mousson), BBM. 87852-5: 11. Frontal outline of embryonic whorl of 1⅝ whorls. 12. Ditto of 1¾ whorls. 13. Frontal outline of young shell of 2.6 whorls. 14-15. Frontal and basal outlines of shell of 4⅛ whorls.

Plate 14. Liardetia and Kusaiea

Scales represent 2 millimeters

Fig. 1. *Liardetia* (*Dasyconus*) *decussata asperior* new subspecies, BBM. 11294: Frontal view of type shell.

Figs. 2, 3a. *Liardetia* (*Dasyconus*) *decussata* new species, BBM. 11293: 2. Frontal view of type shell. 3a. Sculpture on apical surface of later whorls.

Figs. 3b, 4. *Liardetia* (*Dasyconus*) *normalis aequior* new subspecies, BBM. 11484: 3b. Sculpture on apical surface of later whorls. 4. Frontal view of type shell.

Figs. 3c, 5. *Liardetia* (*Dasyconus*) *perplexa* new species, BBM. 11485: 3c. Sculpture on apical surface of later whorls. 5. Frontal view of type shell.

Fig. 6. *Liardetia* (*Liardetia*) *sculpta* (Möllendorff), BBM. 153921: Frontal view of large shell from Caroline Islands: Ponape.

Fig. 7. *Liardetia* (*Dasyconus*) *normalis* (Pease), BBM. 142334: Frontal view of shell.

Fig. 8. *Liardetia* (*Belonesia*) *undulata* new species, BBM. 151750: Frontal view of type shell.

Fig. 9. *Liardetia* (*Belopygmeus*) *doliolum* (Pfeiffer), BBM. 82705: Frontal view of shell from Marianas Islands: Guam.

Fig. 10. *Liardetia* (*Oceanesia*) *intermedia* new species, BBM. 11297: Frontal view of type shell.

Fig. 11. *Kusaiea frivola* (Pease), BBM. 153758: Frontal view of shell from Caroline Islands: Truk.

Fig. 12. *Liardetia* (*Liardetia*) *striolata* (Pease), BBM, 84412: Frontal view of large shell from Samoa: Tutuila.

Figs. 13-15. *Liardetia* (*Nesoreus*) *grandis* new species, BBM. 11298: Basal, frontal and apical view of type shell.

Plate 15. Mendaña and Diastole

Scales represent 2 millimeters

Figs. 1-2. *Mendaña* (*Tahuatoa*) *angulifera* (Garrett), BBM. 94815: Frontal and apical views of shell.

Figs. 3-4. *Mendaña* (*Tahuatoa*) *garrettiana* (Garrett), BBM. 3845: Frontal and apical views of shell from type lot.

Figs. 5-6. *Mendaña* (*Tahuatoa* ?) *subconula* (Garrett), BBM. 3435: Frontal and apical views of shell from type lot.

Figs. 7-8. *Mendaña* (*Mendaña*) *rectangula altior* new subspecies, BBM. 11303: Frontal and apical views of type shell.

Figs. 9-10. *Mendaña* (*Macrorbis*) *mumfordi* new species, BBM. 11308: Frontal and apical views of type shell.

Figs. 11-12. *Diastole* (*Trochonanita*) *lamellaxis* new species, BBM. 75769: Frontal and apical views of type shell.

Figs. 13-15. *Mendaña* (*Mendaña*) *dentaxis* new species, BBM. 11304: Apical, frontal and basal views of type shell.

Plate 16. Mendaña and Cookeana

Scales represent 2 millimeters

Figs. 1-2. *Mendaña* (*Uanuka*) *adamsoni* new species, BBM. 11309: Frontal and apical views of type shell.

Fig. 3. *Mendaña* (*Uanuka*) *intermedia* new species, BBM. 11310: Frontal view of type shell.

Figs. 4-5. *Mendaña* (*Uanuka*) *pisum* new species, BBM. 11311: Frontal and apical views of type shell.

Fig. 6. *Mendaña* (*Fatuoa*) *subvenosa hivaoae* new subspecies, BBM. 11314: Frontal view of type shell.

Figs. 7-9. *Mendaña* (*Fatuoa*) *longicaulis* new species, BBM. 11316: Apical, frontal and basal views of type shell.

Fig. 10. *Mendaña* (*Fatuoa*) *subpatula* new species, BBM. 11315: Frontal view of type shell.

Figs. 11-12. *Cookeana anathesis* new species, BBM. 11302: Apical and frontal views of type shell.

Figs. 13-15. *Cookeana vindex* new species, BBM. 11301: Apical, frontal and basal views of type shell.

Plate 17. Diastole

Scales represent 2 millimeters

Figs. 1-2. *Diastole* (*Diastole*) *rurutui* new species, BBM. 11401: Frontal and apical views of type shell.

Fig. 3. *Diastole* (*Diastole*) *conula* (Pease), BBM. 86975: Frontal view of shell.

Figs. 4-5. *Diastole* (*Diastole*) *matafaoi* new species, BBM. 11402: Frontal and apical views of type shell.

Fig. 6. *Diastole* (*Diastole*) *necrodes* new species, BBM. 11399: Frontal view of type shell.

Fig. 7. *Diastole* (*Diastole*) *glaucina* new species, BBM. 11400: Frontal view of type shell.

Fig. 8. *Diastole* (*Diastole*) *futunae* new species, BBM. 11403: Frontal view of type shell.

Figs. 9-10. *Diastole* (*Trochonanita*) *savaii* new species, BBM. 75807: Apical and frontal views of type shell.

Figs. 11-12. *Diastole* (*Laua*) *lauae* new species, BBM. 11407: Frontal and apical views of type shell.

Figs. 13-15. *Diastole* (*Laua*) *bryani* new species, BBM. 11406: Apical, frontal and basal views of type shell.

Plate 18. Microcystis and Philonesia

Scales represent 2 millimeters

Figs. 1-2. *Microcystis* (*Microcystis*) *benesculpta* new species, BBM. 11405: Frontal and apical views of type shell.

Figs. 3-4. *Microcystis* (*Microcystis*) *ornatella parva* new subspecies, BBM. 11408: Apical and frontal views of type shell.

Figs. 5-6. *Microcystis* (*Microcystis*) *perahui* new species, BBM. 11409: Frontal and apical views of type shell.

Figs. 7-8. *Microcystis* (*Microcystis*) *fosbergi* new species, BBM. 11410: Frontal and apical views of type shell.

Fig. 9. *Microcystis* (*Microcystis*) *fosbergi taraiae* new subspecies, BBM. 11411: Frontal view of type shell.

Figs. 10-11. *Philonesia pitcairnensis* new species, BBM. 11322: Frontal and apical views of type shell from Tuamotu: Pitcairn.

Fig. 12. *Philonesia filiceti* (Beck), BBM. 135102: Frontal view of shell.

Figs. 13-15. *Philonesia mangarevae* new species, BBM, 11324: Apical, frontal and basal views of type shell from Mangareva.

Plate 19. Microcystis

Scales represent 2 millimeters

Figs. 1-3. *Microcystis* (*Leurocystis*) *saintjohni* new species, BBM. 11412: Apical, frontal and basal views of type shell.

Figs. 4-5. *Microcystis* (*Facorhina*) *lenticula* new species, BBM. 11413: Frontal and apical views of type shell.

Fig. 6. *Microcystis* (*Facorhina*) *adusta* new species, BBM. 11414: Frontal view of type shell.

Figs. 7-9. *Microcystis* (*Facorhina*) *andersoni* new species, BBM. 11415: Apical, frontal and basal views of type shell.

Figs. 10-11. *Microcystis* (*Cnesticystis*) *aspera* new species, BBM. 11416: Frontal and apical views of type shell.

Fig. 12. *Microcystis* (*Cnesticystis*) *buckorum* new species, BBM. 97624: Frontal view of type shell.

Figs. 13-15. *Microcystis* (*Cnesticystis*) *kondoi* new species, BBM. 11417: Apical, frontal and basal views of type shell.

Plate 20. Lamprocystis

Scales represent 2 millimeters

Figs. 1-2. *Lamprocystis* (*Tongacystis*) *solida* (Mousson), BBM. 54346: Apical and frontal views of shell.

Fig. 3. *Lamprocystis* (*Kerakystis*) *vitrinella rapana* new subspecies, BBM. 11421: Frontal view of type shell.

Figs. 4-5. *Lamprocystis* (*Avarua*) *globosa* new species, BBM. 11418: Apical and frontal views of type shell.

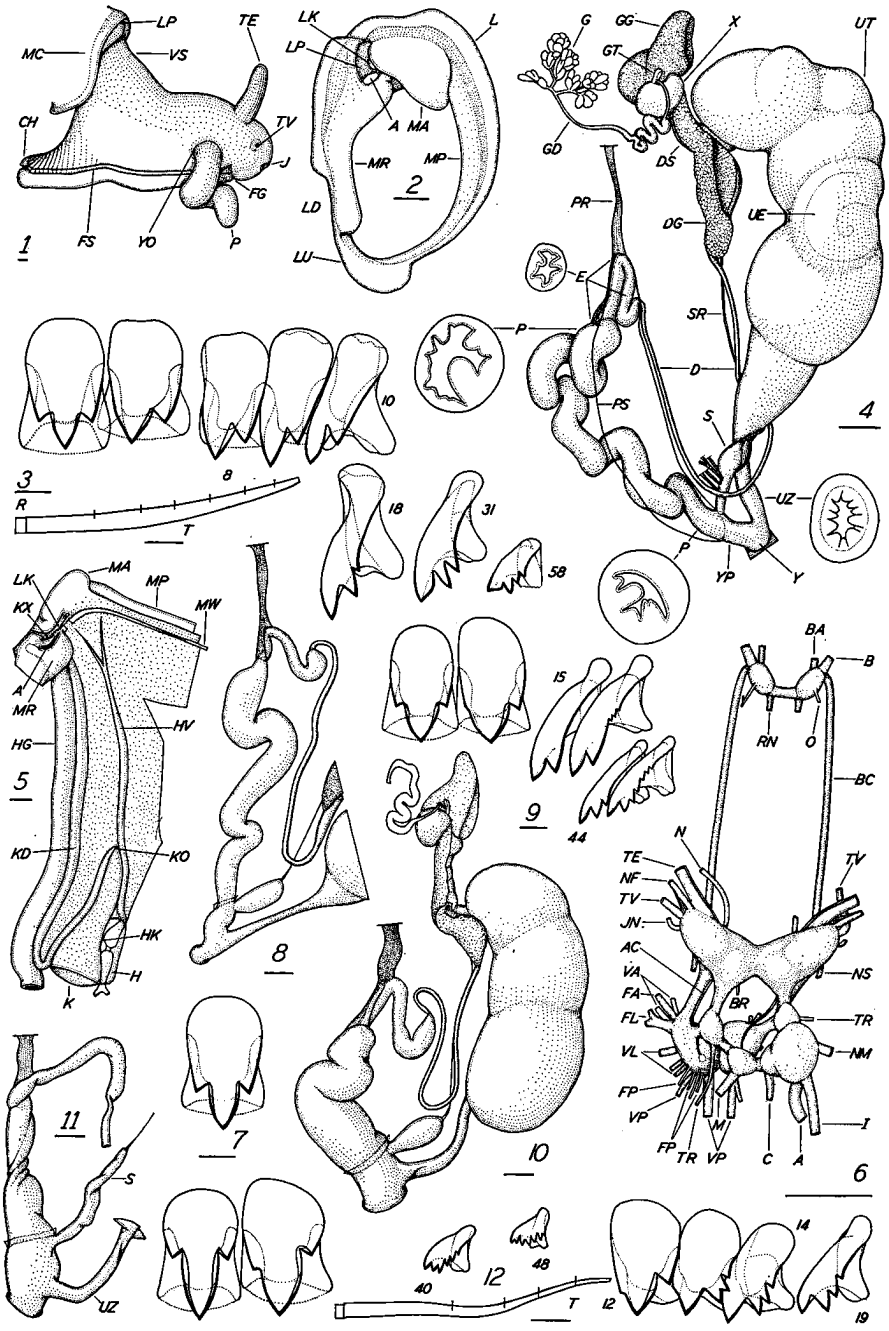
Fig. 6. *Lamprocystis* (*Manureva*) *rurutuana* new species, BBM. 11420: Frontal view of type shell.

Figs. 7-8. *Lamprocystis* (*Naiaua*) *laddi* new species, BBM. 11419: Apical and frontal views of type shell.

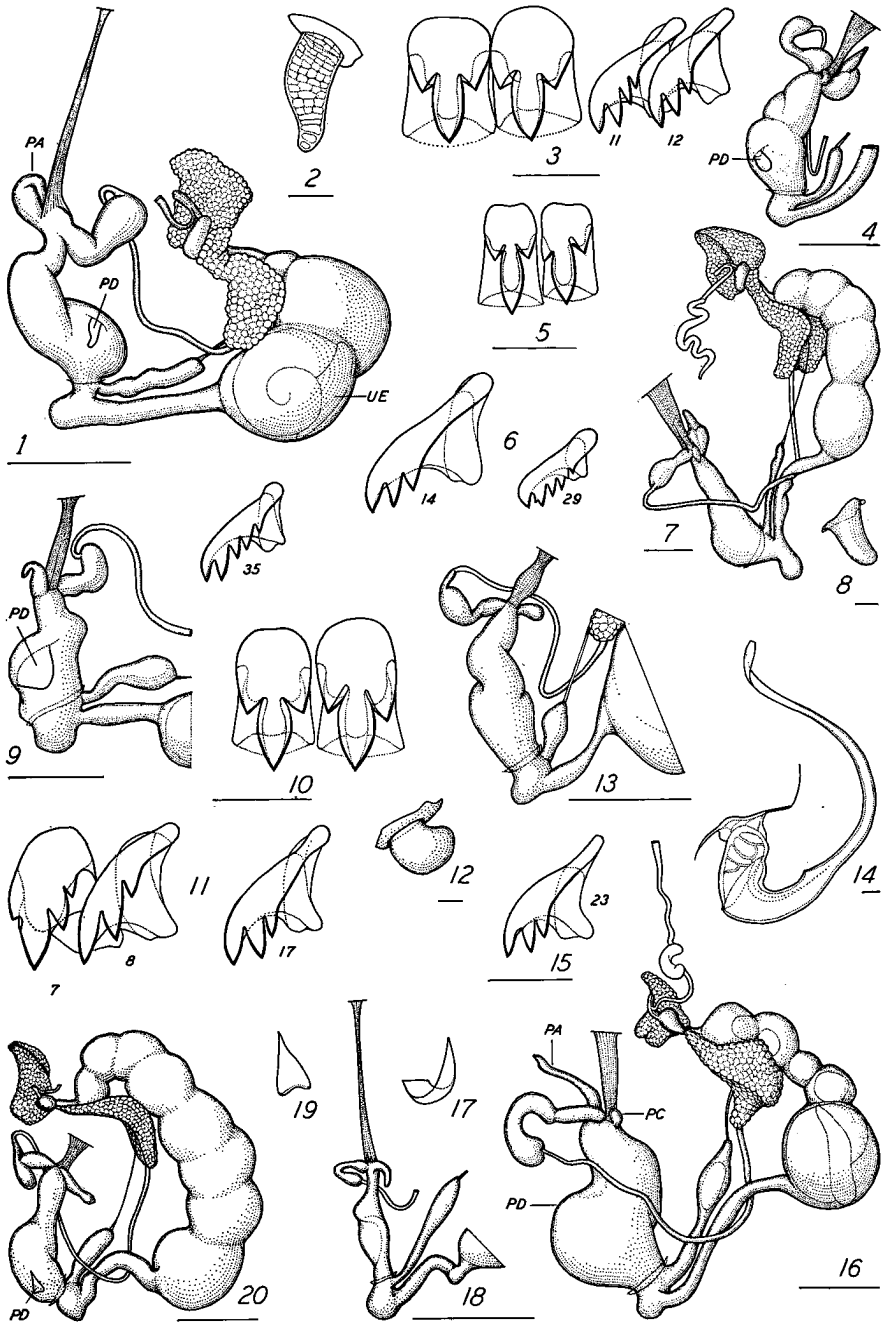
Figs. 9-10. *Lamprocystis* (*Moala*) *moalana* new species, BBM. 77095: Apical and frontal views of type shell.

Figs. 11-12. *Lamprocystis* (*Lamprocystis*) *ongeae* new species, BBM. 78332: Frontal and apical views of type shell.

Figs. 13-15. *Lamprocystis* (*Lamprocystis*) *ensifera* (Mousson), BBM. 87852: Apical, frontal and basal views of large shell from Tonga: Vavau.



MICROCYSTIS AND LAMPROCYSTIS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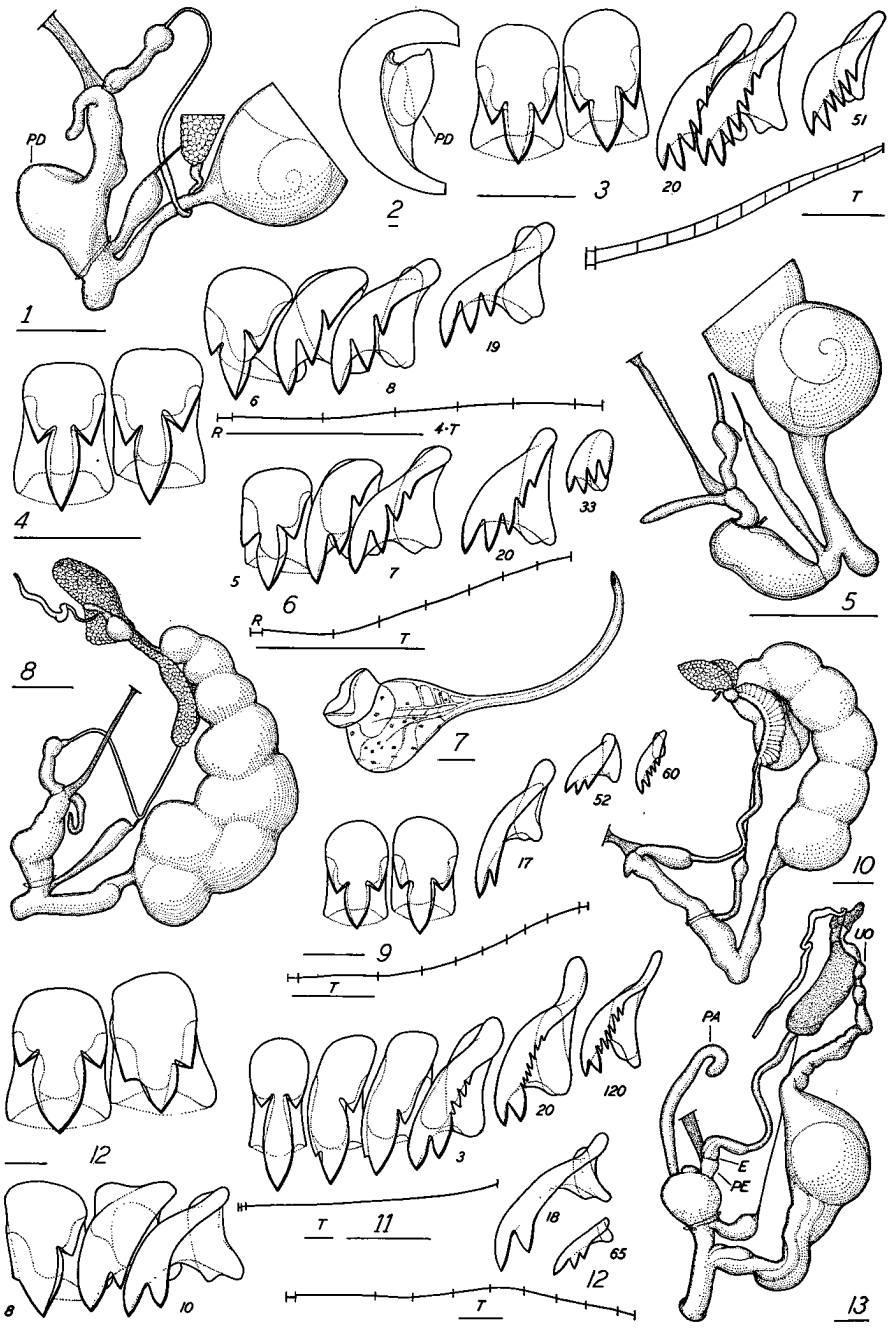
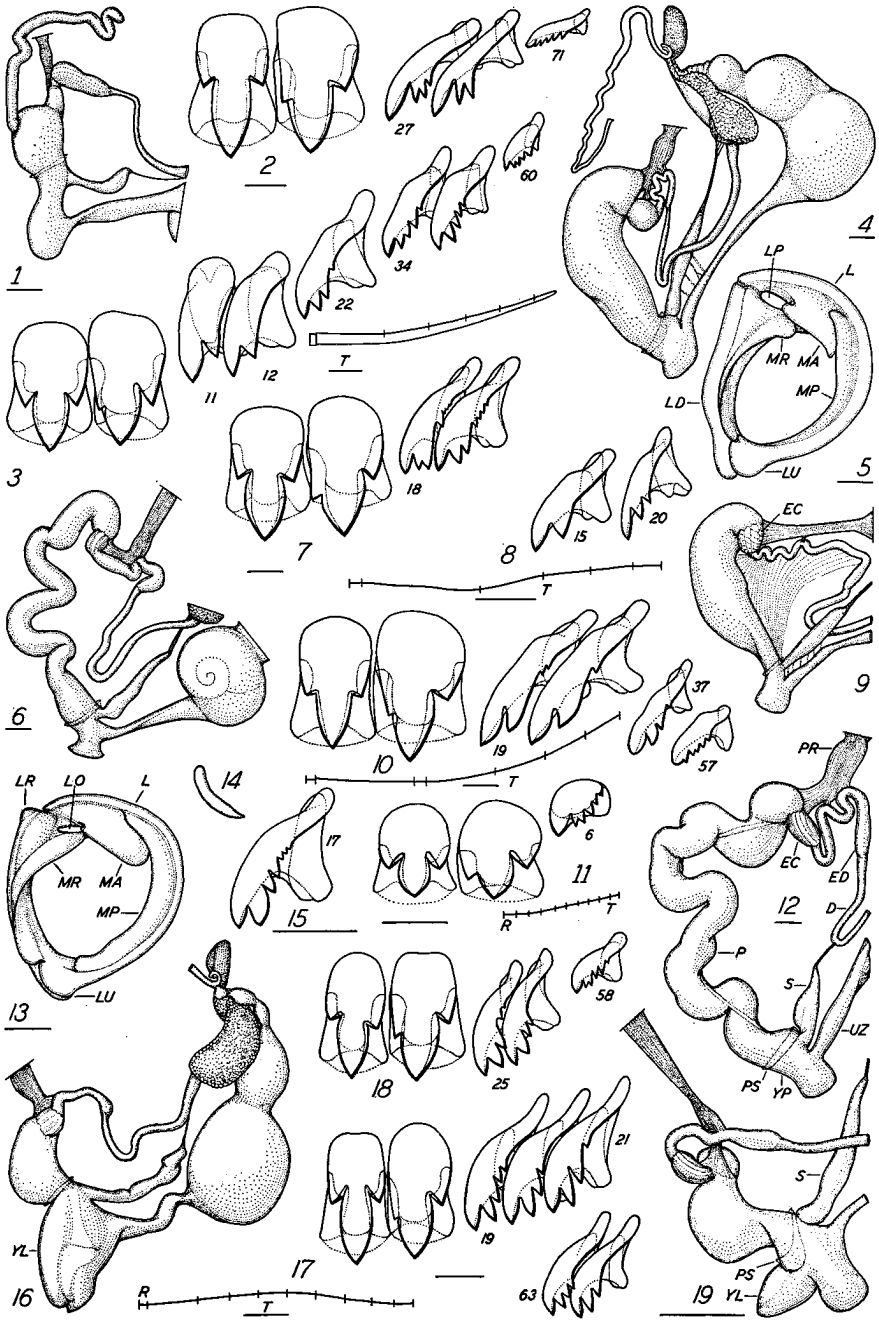
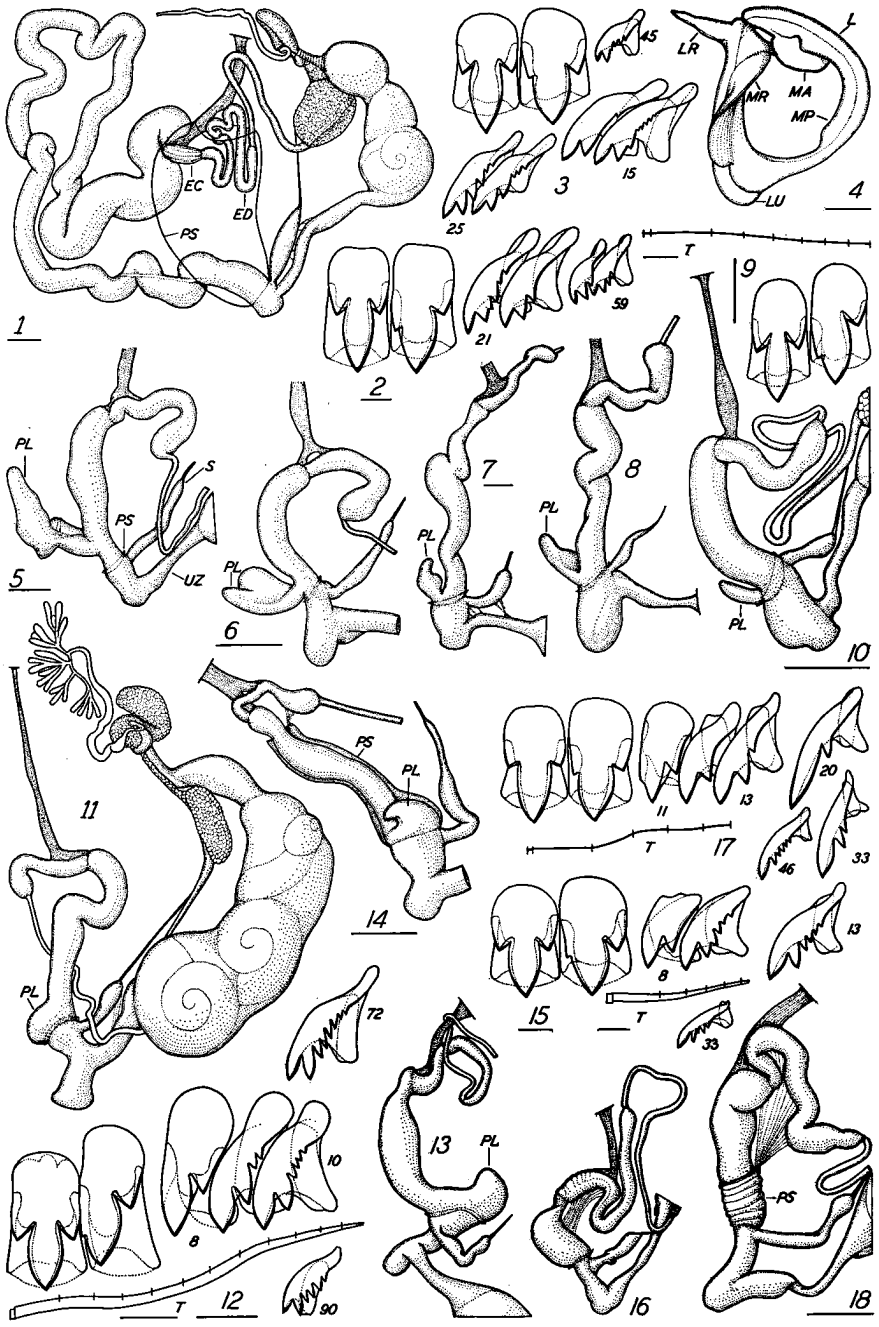
LIARDETIA



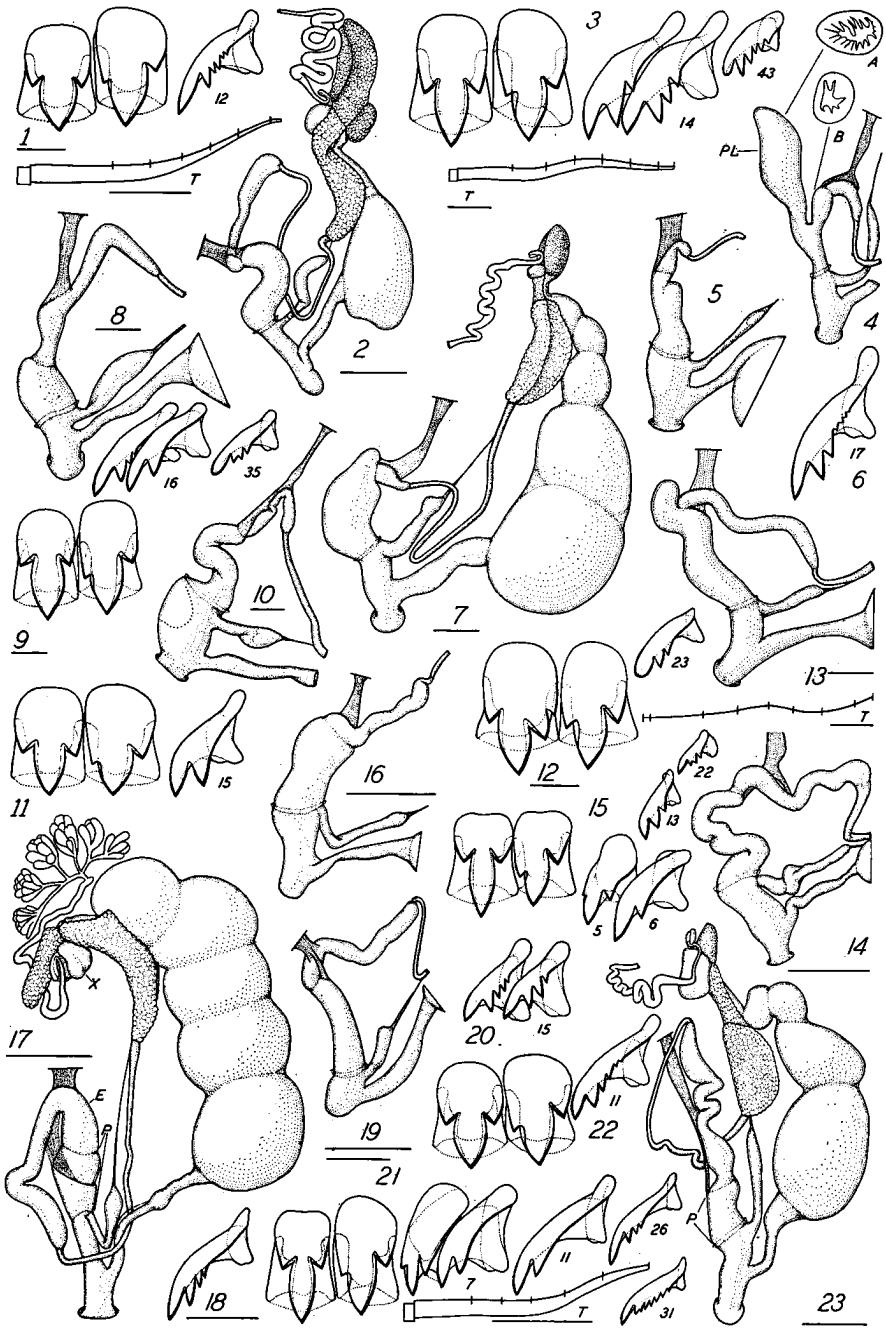
LIARDETIA, PUKALOA, COOKEANA, AND KUSAIEA



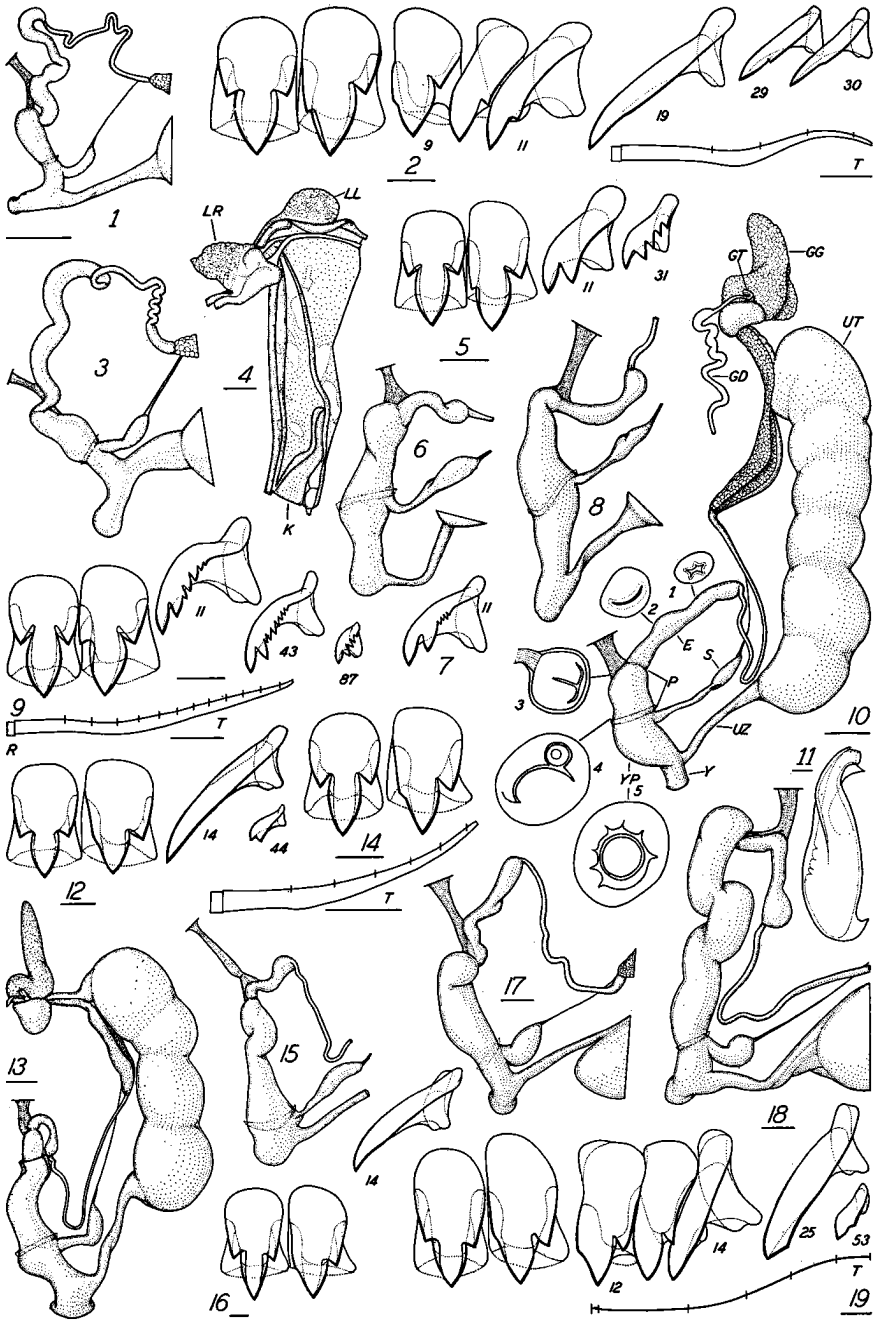
COOKEANA AND MENDAÑA



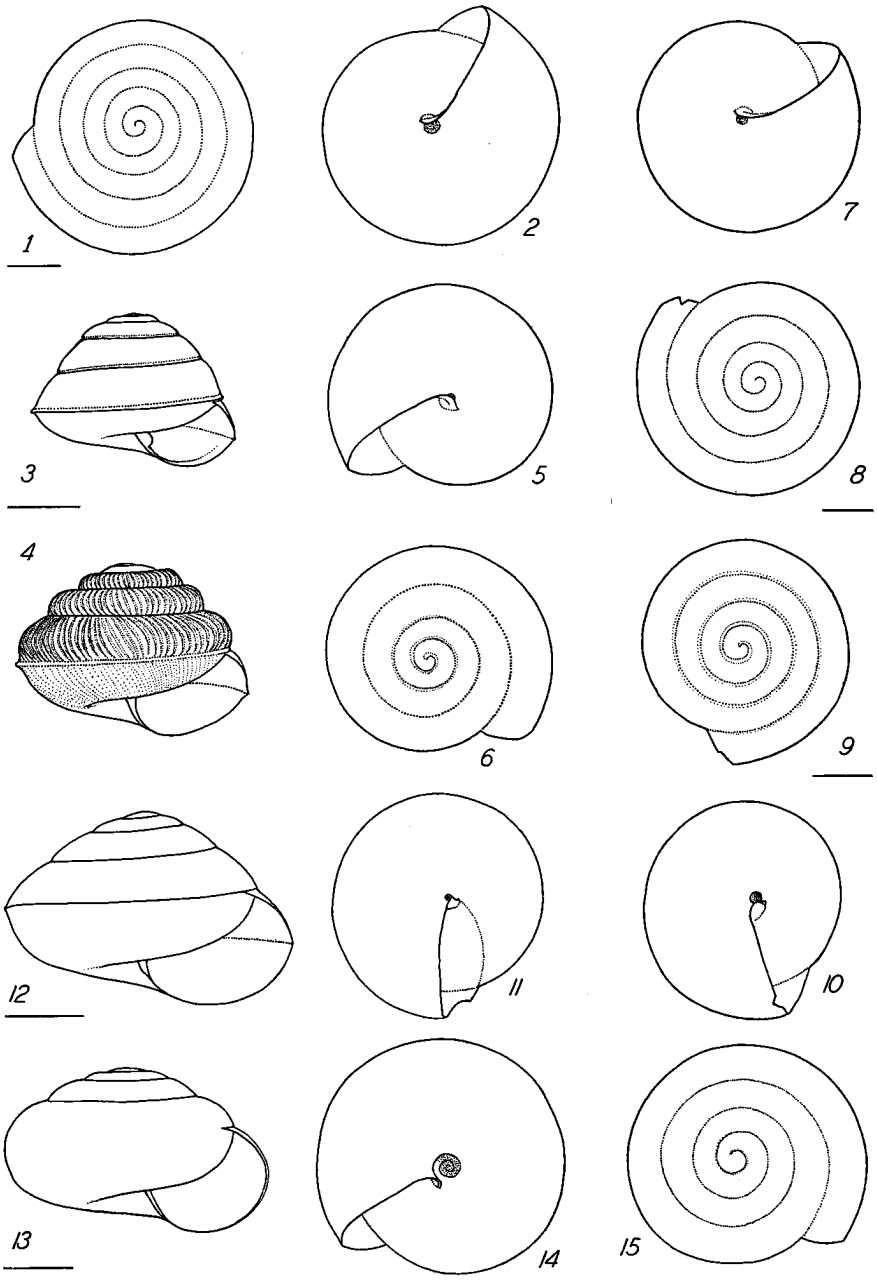
MENDAÑA AND DIASTOLE



DIASTOLE AND LAMPROCYSTIS



LAMPROCYSTIS AND MICROCYSTIS



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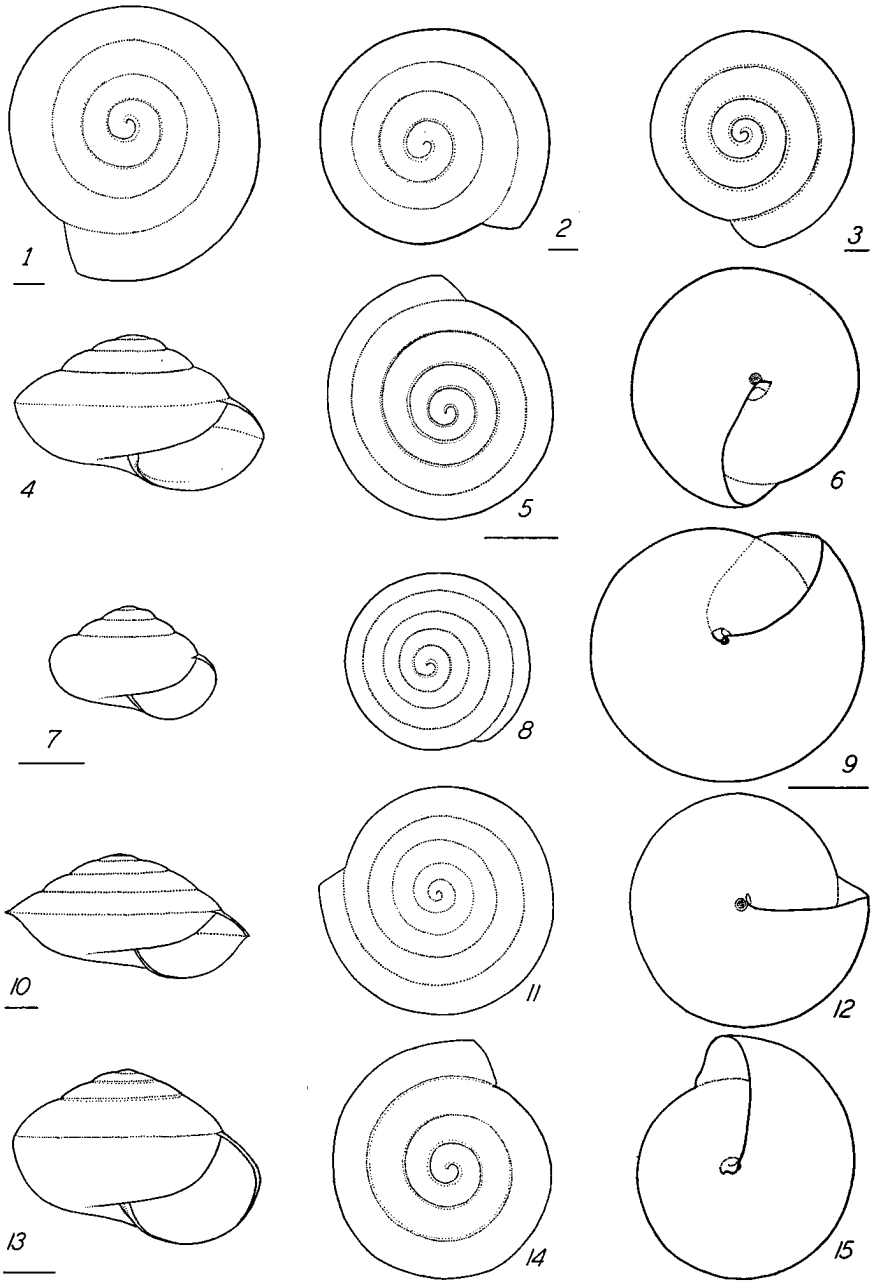
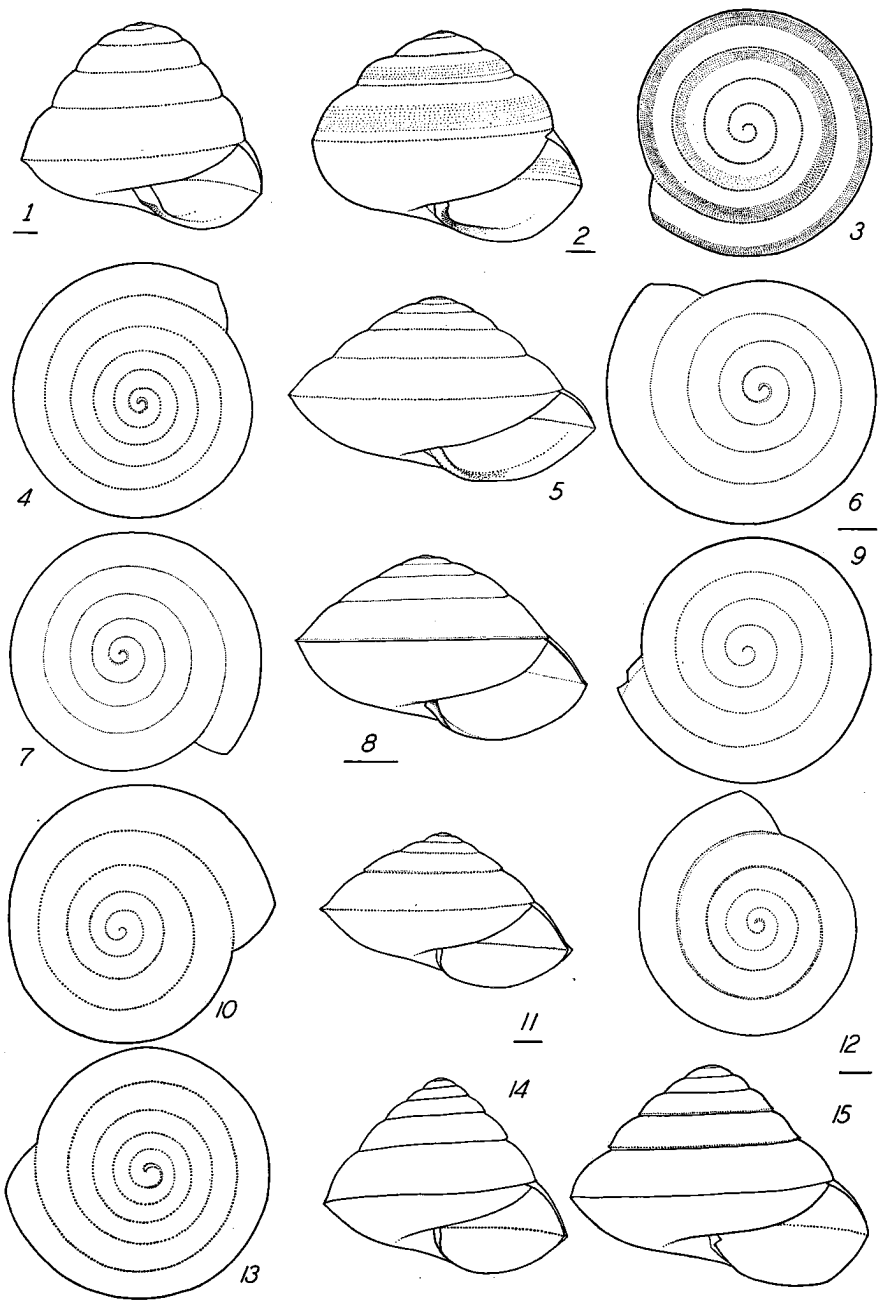
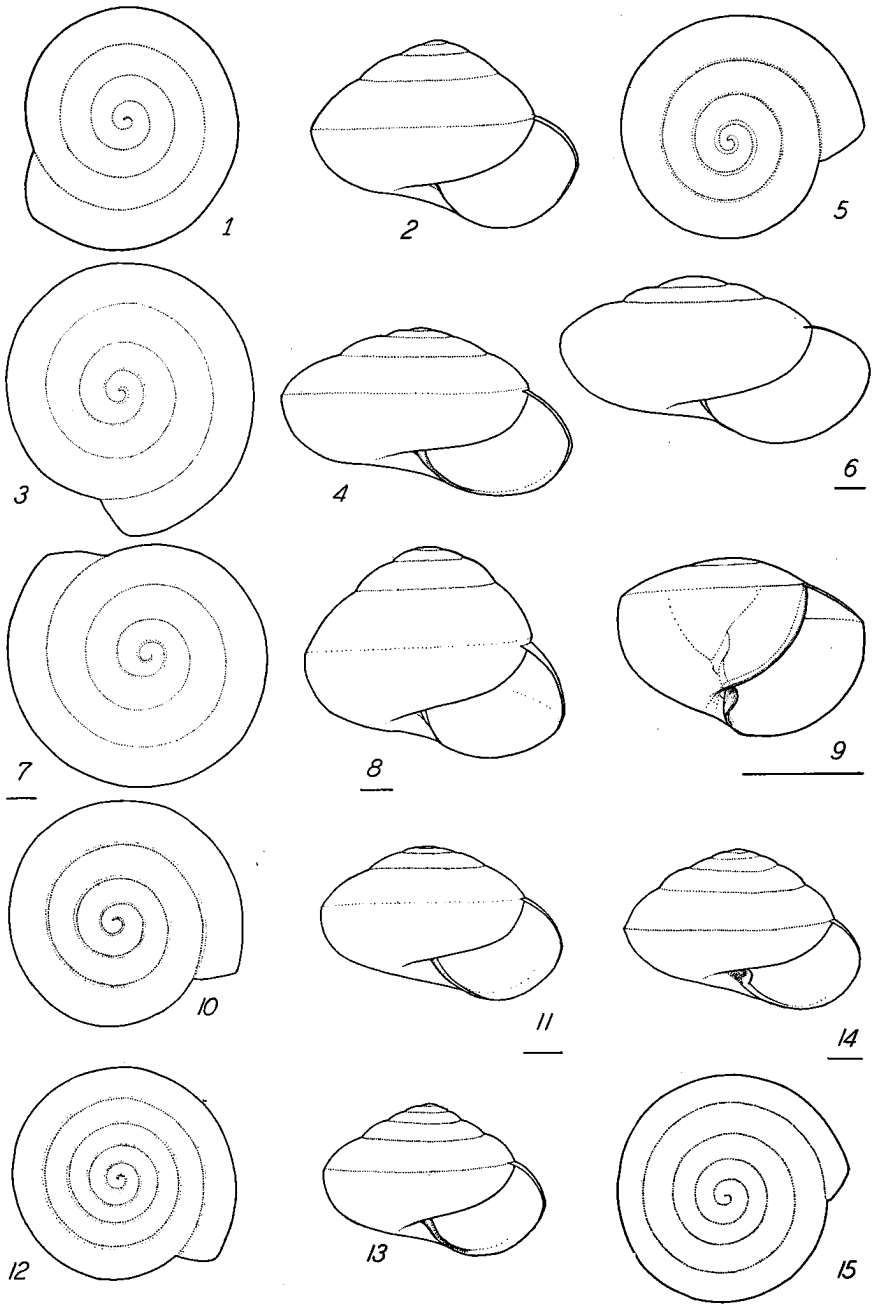


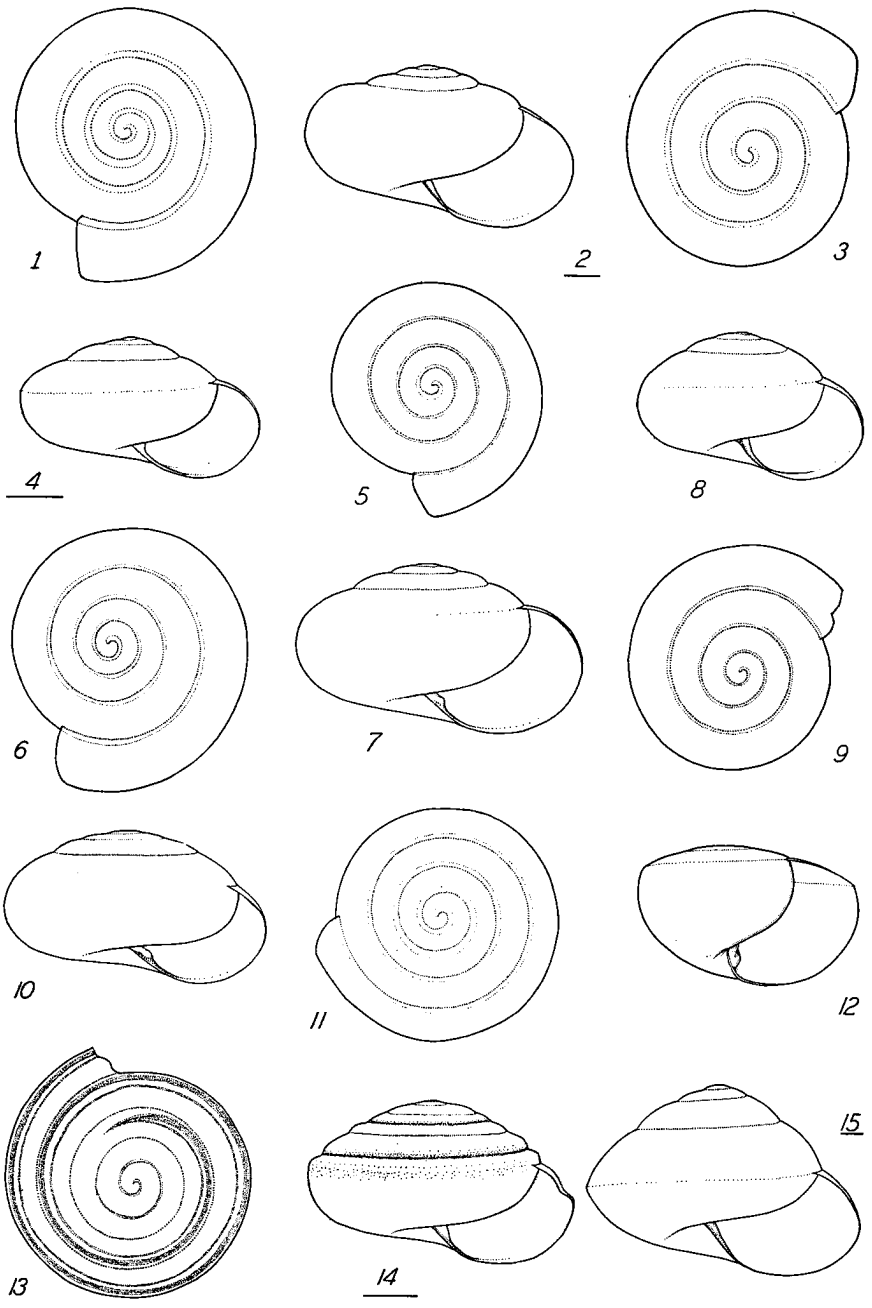
MENDAÑA, LIARDETIA, PUKALOA, AND KUSAIEA



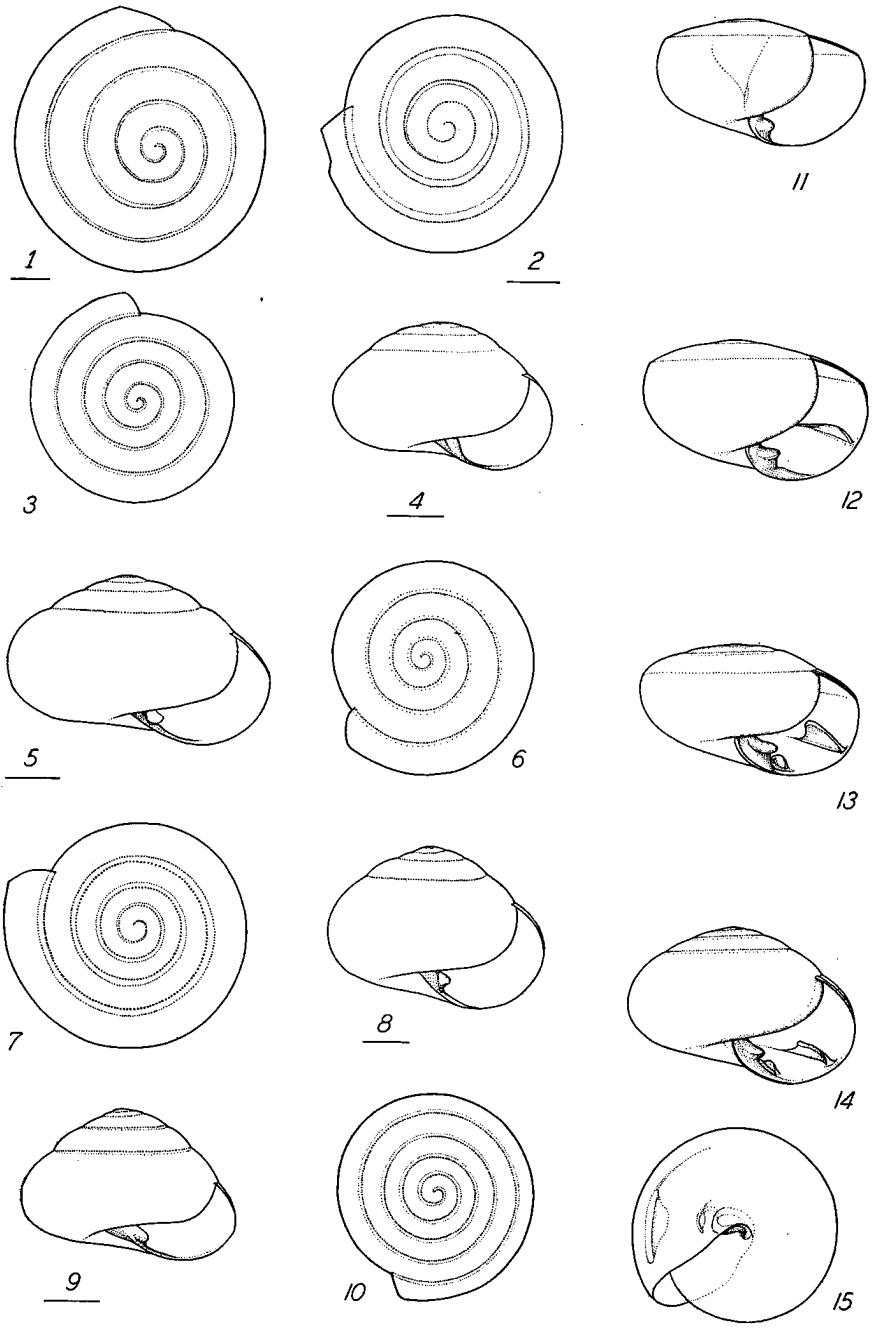
MENDAÑA AND DIASTOLE



DIASTOLE AND LAMPROCYSTIS



LAMPROCYSTIS AND MICROCYSTIS



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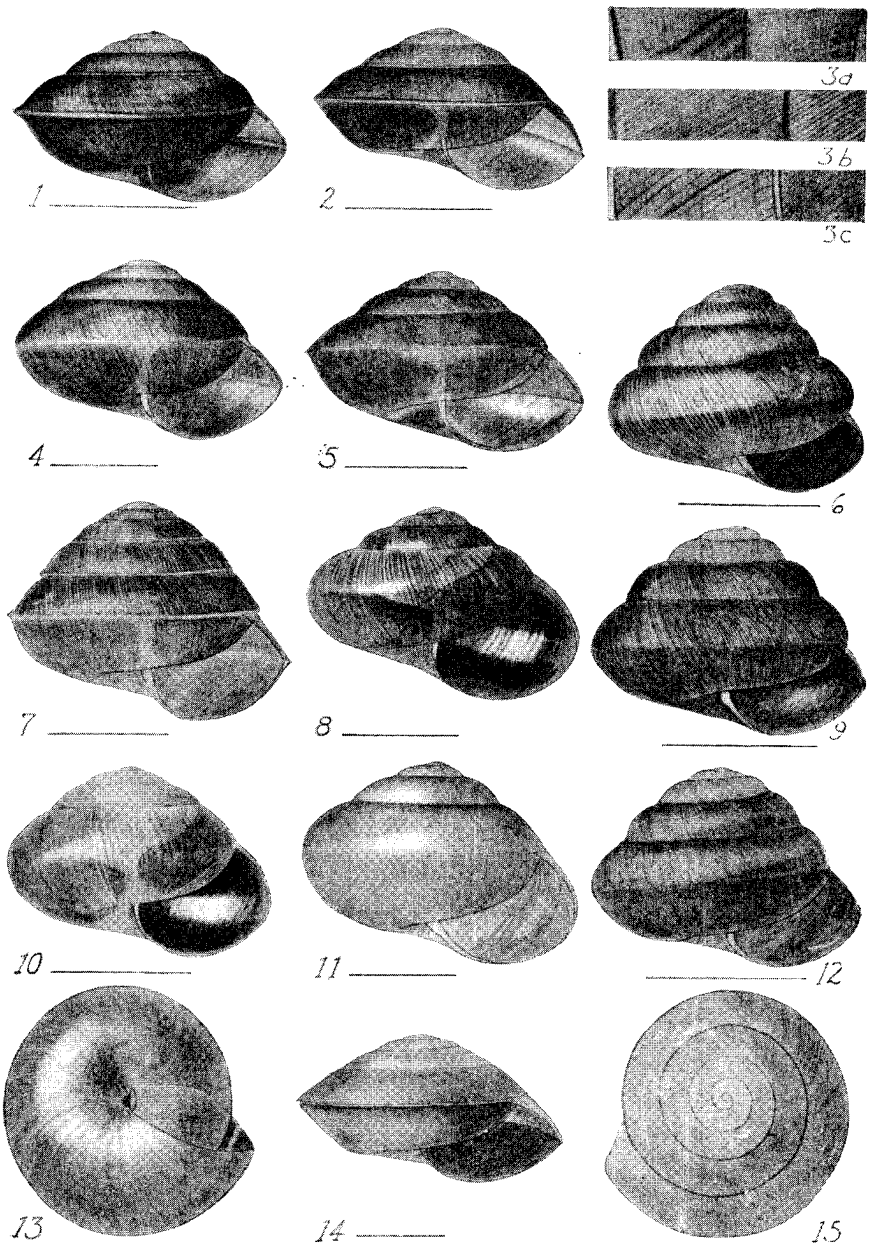
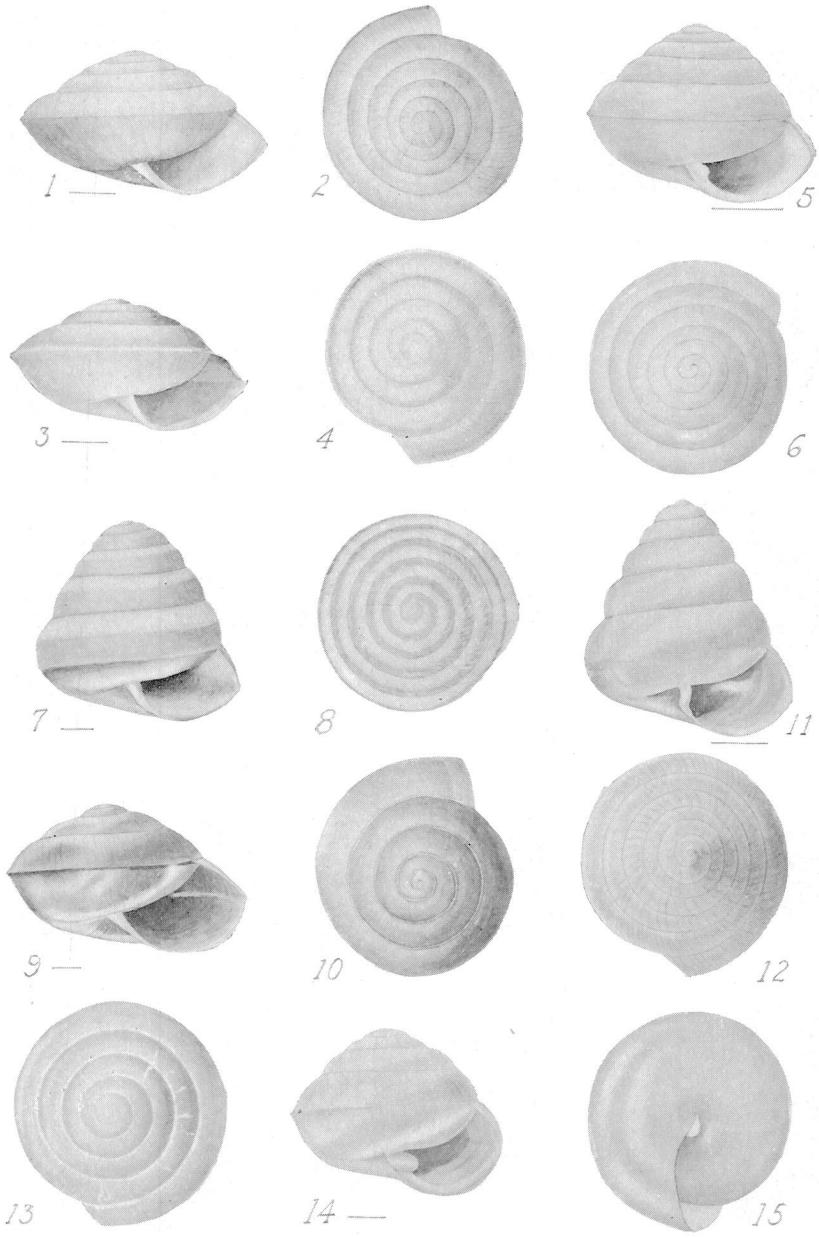
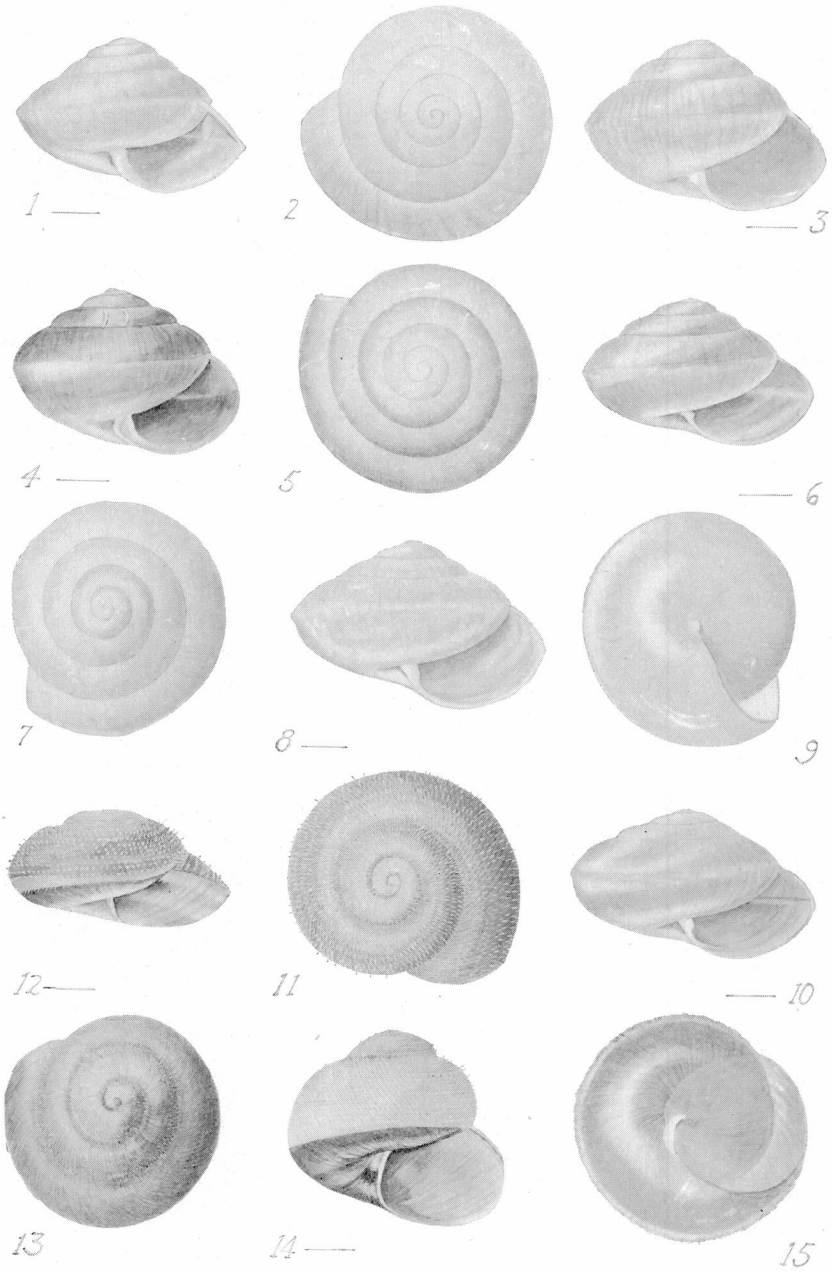


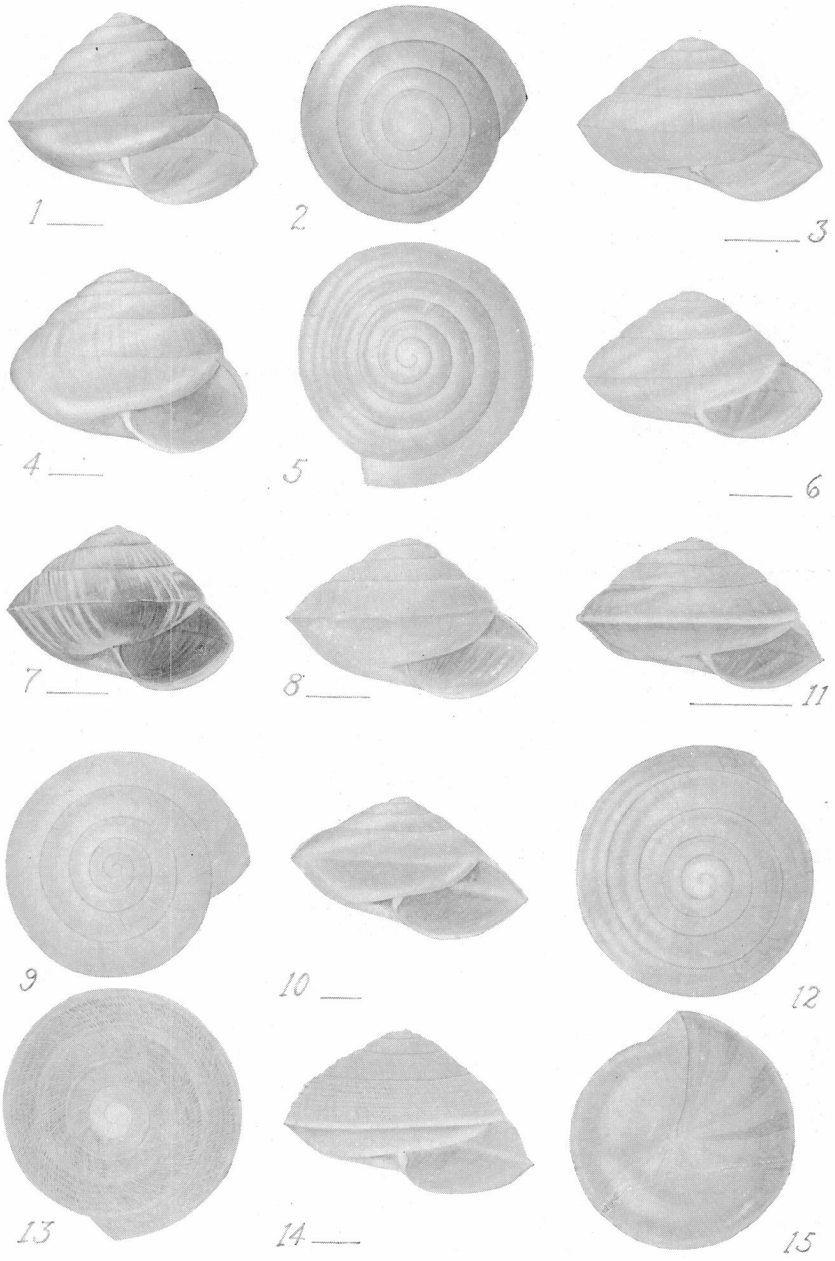
LIARDETIA AND KUSAIEA



MENDAÑA AND DIASTOLE



MENDAÑA AND COOKEANA



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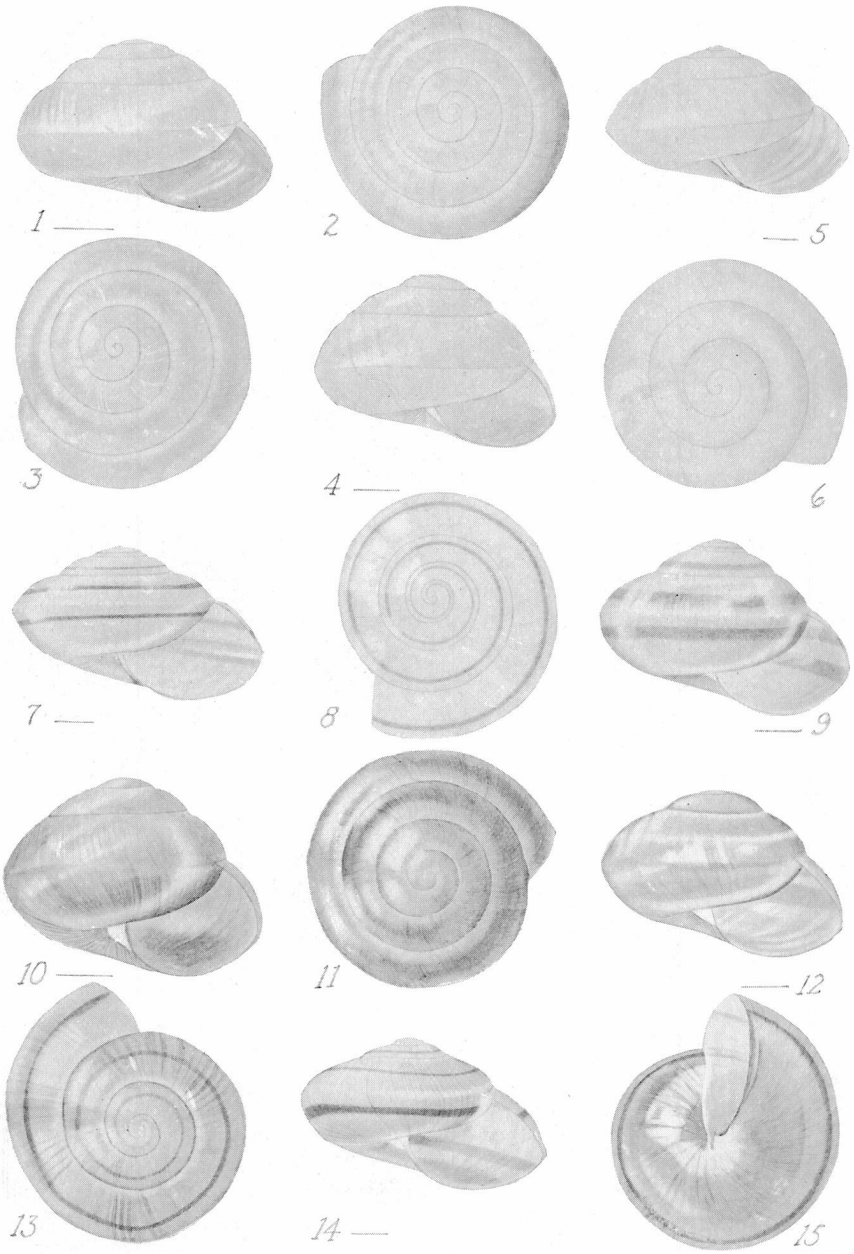
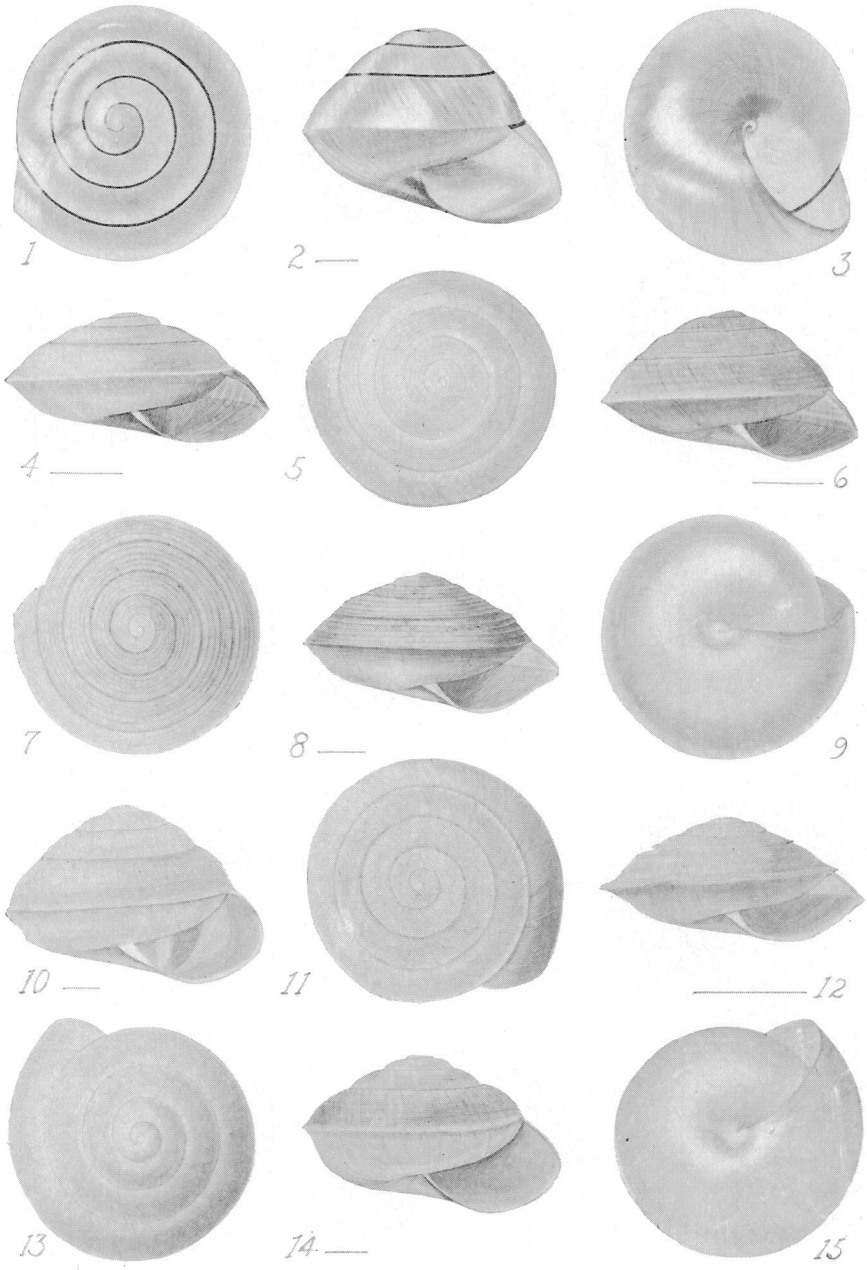
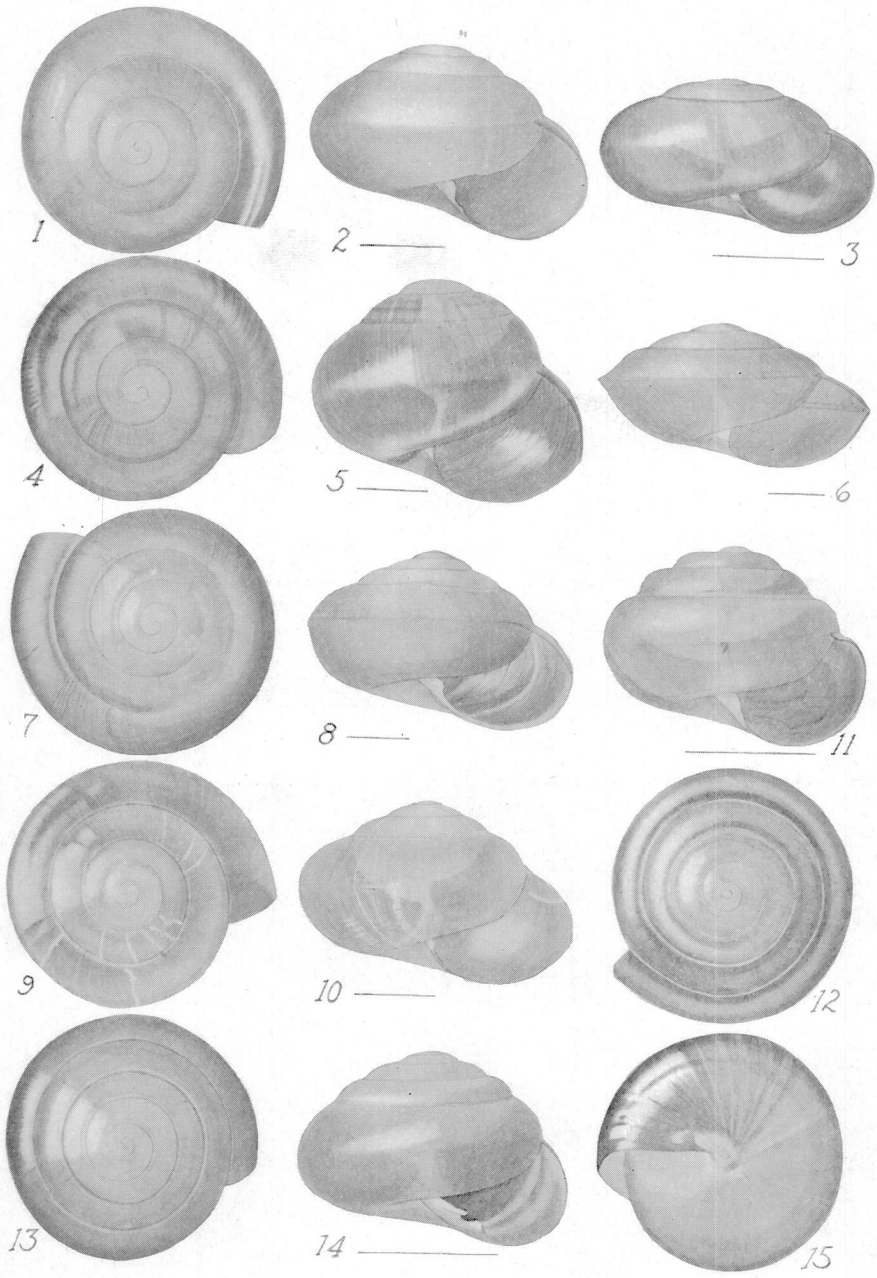


MICROCYSTIS AND PHILONESIA



MICROCYSTIS



LAMPROCYSTIS